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The Relationship between Substance Use and Sexual Health among African American Female Adolescents with a History of Seeking Mental Health Services

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Introduction and Background

Although cultural protective factors, such as family disapproval of substance use and strong value placed on parental approval, emphasis on religion, and extended kinship networks, may protect against drug and alcohol use among African American youths (French, Finkbiner, & Duhamel, 2002), some research suggests consequences may be worse for African American girls who do use substances. For example, Guthrie and Low (2000) found that despite drinking less and starting later than their White peers, African American girls who drink experience higher rates of alcohol-related problems including illicit substance use, unprotected sex, and truancy. Further, another study indicated among youth who have used marijuana, African American girls are disproportionately likely to go on to use other illicit substances (Li, Feigelman, Stanton, Galbraith, & Huang, 1998). Substance use has also been linked to childhood adversity and a more general pattern of problems among young women, including homelessness, delinquency, school problems, and prostitution (Wilson & Widom, 2009), suggesting that substance use in girls may develop as part of a more pervasive constellation of health risks. Moreover, mental health problems are associated both with increased substance use and sexual risk in adolescents (Brown et al. 2010; Turner, Latkin, Sonenstein, & Tandon, 2011; Brown, 1997; Donenberg & Pao, 2004), including African American young women (Donenberg, Emerson, & Mackesy-Amiti, 2011; Seth, Raiji, DiClemente, Wingood, & Rose, 2009).

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Although African American girls are on the whole less likely than their peers to engage in substance use, those who do may represent a group at particular risk for co-morbid substance-related problems, psychopathology, and other health risks. This, coupled with research that indicates African American female youth are less likely to receive appropriate psychiatric services (Alegria, Vallas, & Pumariega, 2010) and African Americans with lifetime co-morbid substance use and mental health problems experience disparities in receiving appropriate services to address both mental health and substance use problems (Hatzenbuehler, Keyes, Narrow, Grant, & Hasin, 2008) supports examining co-morbid health risk behaviors (e.g., substance use and sexual risk) among African American young women in psychiatric care. Indeed, research is needed with clinical populations of African American girls in order to design effective interventions to address the complex needs of those presenting to mental health clinics.

Substance use is associated with a variety of sexual risk behaviors and sexual health outcomes among adolescents including multiple sexual partners, inconsistent condom use, and STI acquisition (Bryan, Ray, & Cooper, 2007; Rosengard et al., 2008; Guo et al., 2002; Boyer et al., 1999). Research demonstrates a positive association between severity of substance use and sexual risk among African American adolescent females, with increased frequency and quantity of alcohol use and presence of substance or alcohol use disorder associated with testing positive for STIs, inconsistent condom use, and multiple sexual partners, (Cook et al., 2006; Seth, Sales, DiClemente, Wingood, Rose, & Patel, 2011; Wingood & DiClemente, 1998). Sexual risk behavior may be a substance-related consequence that disproportionately impacts low-income African American girls, who are at heightened risk of STIs (Centers for Disease Control and Prevention, 2009; Forham et al., 2009). For example, one study with African American girls found that substance use was the strongest correlate of sexual risk behavior compared to other potential risk factors such as emotional and behavioral problems, sexual self-efficacy, social support, and peer norms (Bachanas et al., 2002). Other studies indicate that marijuana use is associated with higher STI rates and less consistent condom use among African American female adolescents (Li, Stanton, Cottrell, Burns, Pack, & Kaljee, 2000; Boyer et al., 1999). However, this relationship may not be causal. Li and colleagues (2000) noted that the order of sexual behavior and substance use initiation did not matter for African American youth who engaged in both, since youth reported a similar level of high-risk sexual behavior before and after initiation of substance use. Further, not all studies support linkages between substance use and sexual risk behavior or STIs among African American girls. One study reported that sexual activity among 11–14 year old urban African Americans was not associated with substance use and delinquency (Black, Ricardo, & Stanton, 1997). These findings suggest that research is needed to carefully examine characteristics of substance use (e.g., patterns, severity, problem use) that impact the sexual risk behavior of African American girls.

The relationship between substance use and sexual risk is particularly important to examine among African American girls with a history of seeking mental health care. Longitudinal research has demonstrated a strong co-occurrence between substance use and mental health problems among African American females that persists from childhood through adulthood (Green, Zebrak, Robertson, Fothergill, & Ensminger, 2012). Further, as noted above, mental health is linked to sexual risk among African American female adolescents (Donenberg et al., 2011; Seth et al., 2009). Despite the interrelationships between substance use, sexual risk behavior, and mental health among African American girls, most service systems target these problems separately and do not adequately meet the needs of adolescents with multi-problem presentations (Hawkins, 2009). This problem is compounded among African American youth who experience disparities in mental health care, including higher rates of unmet mental health need and lower quality of mental health services (Lindsey, Chambers, Pohle, Beall, & Lucksted, 2013; Alegria, Carson, Goncalves, & Keefe, 2011; Alegria et al.,

2010). In order to reduce these disparities and improve the quality of services African American girls who seek services receive it is important to ensure treatments match their specific needs (Alegria et al., 2011). Understanding the relationships between substance use patterns and problems and sexual risk experienced by African American girls with a history of seeking mental health care is a critical step in this process.

Taken together, existing literature suggests that the relationship between substance use and sexual risk behavior among African American girls may be age dependent. Further, researchers argue that there may be unique relationships between different substance use patterns and sexual risk behavior (Guo et al., 2002). In addition, it is important to examine these relationships in African American girls who are at increased risk, such as those impacted by mental health problems. Substance use in African American girls may be associated with numerous comorbid problems, and thus research is needed to explicate links between substance use and sexual risk in youth with a history of seeking mental health care. These girls may be particularly vulnerable to health consequences associated with substance use and are therefore in need of effective interventions. The current study examined the combined and relative contribution of age, substance use patterns, and substance use problems to sexual risk behavior and self-reported STIs among low-income, urban African American female adolescents with histories of seeking mental health services. We hypothesized that age, patterns of repeated single substance use and repeated poly-substance use, and substance use problems would each be positively associated with increased sexual risk behavior and increased STI risk, with poly-substance use and substance use problems associated with greatest risk. Findings can guide clinical interventions with African American girls from low-income, urban communities presenting for mental health services.

Methods

Study Design and Sample

Data were collected as part of a larger longitudinal study examining mother-daughter relationships and development of HIV-risk behavior (i.e., risky sexual behavior and substance use) from ages 12–16 to ages 14–18. Participants for the current study (N=177) were drawn from an original sample of African American females ages 12–16 years old and their primary female caretakers who were recruited from eight outpatient mental health clinics, serving urban, mostly low-SES communities in Chicago. Eligible families were invited to participate in the longitudinal study by clinic staff. They were assessed every six months for two years and completed five waves of data collection. Girls and mothers were compensated \$45 each at Wave 1, \$50 each at Wave 2, \$55 each at Wave 3, \$60 each at Wave 4, and \$65 each at Wave 5, plus \$15 for travel and parking at each wave. A total of 266 mother-daughter dyads completed the baseline interview, and between 75% and 82% of the baseline sample was retained at each follow-up.

Enrollment in the study began in 2002, and wave 5 data collection was completed in 2010. There was substantial variability in the severity and type of mental health problems at baseline. Based on self reports on the Computerized NIMH Diagnostic Interview Schedule for children (CDISC 4.0) (Shaffer, Fisher, Lucas, Dulcan, & Schwabstone, 2000), 4% of the girls met DSM-IV criteria for major depressive disorder (MDD), 5% for PTSD in the past year, and 11% for conduct disorder (CD). Caregiver reports of girls' mental health symptoms indicated 8% met criteria for MDD, 3% for PTSD, 13% for CD, and 10% ADHD at baseline. These discrepancies between self-report and caregiver reports are consistent with research that indicates correlations between parent and child reports of mental health problems average <.30 (Achenbach, 2006). Consistent with methods used by Brown et al. (2010) of combining caregiver and adolescent report and collapsing clinical and borderline

clinical categories, 66% of the girls met criteria for at least one psychiatric diagnosis (Donenberg et al., 2011).

During 2009–2010, participants who completed the baseline interview and at least one follow-up assessment from the original study were asked to participate in a 6th wave of data collection focused on exposure to trauma and other stressors. Problems associated with drug and alcohol use were also assessed for the first time at this interview, and sexual behavior and substance use over the past 6 months were assessed. Among eligible girls, 178 (74%) were enrolled, but one case was dropped due to lack of comprehension and inconsistent responding. Eligible girls who did not participate either could not be reached, could not be located, moved out of state (23%) or refused (3%). On average, the 6th wave of interviews occurred 3.27 years after baseline and 1.14 years after Wave 5 of the initial study. Girls' mean age was 17.28 years (SD = 1.64; range = 14 – 22), and all but one participated with a female caretaker. Girls completed a comprehensive assessment of lifetime trauma and victimization history as well as substance use and sexual risk behavior over the past 6 months. The current paper focuses on participant-reported substance use (i.e., alcohol and other drug use) and STIs collected at each of the six waves and reports of substance-related problems and sexual risk behaviors at wave 6 only. This design allowed for determination of substance use patterns onset, desistence, and variation over a developmental time period reflecting early to late adolescence.

Participants (N=177) did not differ from girls lost to attrition on any baseline variable, including mean age (14.43 vs 14.52; $t = -.59$, $p = .55$) or SES rating on the Hollingshead (1975) index (2.38 vs 2.22; $t = 1.05$, $p = .30$); use of alcohol (31.6% vs 34.8%; $\chi^2 = .27$, $p = .60$), marijuana (23.2% vs 28.1%; $\chi^2 = .77$, $p = .38$), tobacco (20.3% vs 25.8%; $\chi^2 = 1.04$, $p = .31$), or other drugs (5.6% vs 2.2%; $\chi^2 = 1.59$, $p = .21$); sexual experience (31.6% vs 37.1%; $\chi^2 = .79$, $p = .38$), average number of sexual partners ($t = -.89$; $p = .38$), or condom use inconsistency ($t = -.97$, $p = .33$). All procedures were approved by the Institutional Review Boards at the University of Illinois at Chicago and Rosalind Franklin University of Medicine and Science. All measures were reviewed by an advisory board of experts on HIV prevention research with African American female adolescents and baseline measures were piloted with adolescents that matched the study population. Written, informed parental consent and adolescent assent or consent (for those age 18 or over) were obtained for each participant.

Measures

Sexual risk and STIs—The AIDS-Risk Behavior Assessment (ARBA) is a computer-assisted structured interview designed specifically for use with teens to assess sexual behavior, drug use, and needle use (Donenberg, Emerson, Bryant, Wilson, & Weber-Shifrin, 2001). The ARBA assesses type, frequency, and method of substance use and sexual behavior directly related to HIV transmission (e.g., condom use, sex with high-risk partners, sex while using drugs or alcohol, number of partners, frequency of sex, and age of sexual debut). ARBA completion lasts 10 to 20 minutes and focuses on behavior in the past 6 months. A sexual risk behavior score was calculated for each participant as follows: no sexual activity (0); sex with one partner and always used condoms (1); sex with multiple partners and always used condoms (2); sex with one partner and inconsistent condom use (3); and sex with multiple partners and inconsistent condom use (4). This scale was adapted from an index created by CDC researchers from rankings of sexual practices by experts in sexual behavior and has been used in previous research (Wilson, Woods, Emerson, & Donenberg, 2012). At baseline, participants reported whether they were ever told by a doctor or nurse that they had hepatitis, TB, mononucleosis, gonorrhea, syphilis, chlamydia, yeast infections, genital herpes, genital warts, trichomoniasis, or abscesses. At each follow-

up, participants reported about the same diseases in the past six months. Girls were asked separately about each STI, and report of any of these at any time point indicated history of an STI. Girls were also asked if they had been tested for HIV and if they ever tested positive. Positive HIV tests were also included in the STI history variable. Given the relative infrequency of STIs reported by this sample, a dichotomous score indicated the presence (1) or absence (0) of STI history. As a result of wave 6 ARBA data for six participants being inadvertently deleted in the process of data transfer and missing data on the substance use patterns and problems variables, out of the entire sample of 177 participants, 175 were included in analyses for history of STI and 169 in analyses for unsafe sexual behavior.

Substance use patterns—Drug, alcohol, and tobacco use was also assessed on the ARBA. Consistent with previous research we focused on patterns and intensities of substance use (Stockwell et al., 2004), and classified each participant according to their pattern of substance use across five categories. We classified each individual's substance use according to the frequency (i.e., number of time points at which substance use was endorsed) and type of substances used. Participants who did not use any substances at any time point were classified as “no substance use.” Girls who reported a single substance use at only one time point were classified as “experimental single substance use.” Girls who reported only one substance but use at two or more time periods were classified as “repeated single substance use.” Girls who endorsed two or more substances at only one time point were classified as “experimental polysubstance use.” Lastly, participants who reported using multiple substances at two or more time points were classified as “repeated poly-substance use.” For substance use patterns, we created a series of dummy coded categories, one each for no substance use, experimental single substance use, repeated single substance use, experimental poly-substance use and repeated poly-substance use.

Substance use problems—Part B of the Adolescent Alcohol and Drug Involvement Scale (AADIS) was used to measure problems related to substance use (Moberg & Hahn, 1991). Part B includes 14 items assessing problems related to alcohol and drug use (e.g., “What time of day do you use alcohol or drugs?”; “What effects have you had from drinking or drugs?”) and yields a score ranging from 0–79, with higher scores representing greater severity and a score of 37 or above indicating significant problems. This scale has strong internal consistency (.94), and good predictive validity for substance use disorder diagnoses among juvenile detainees (Winters, Botzet, Anderson, Bellehumeur, & Egan, 2001).

Data Analysis

Descriptive and distributional characteristics of the variables were evaluated, and bivariate correlations between the independent variables and sexual risk behavior and STIs were examined prior to multivariate analyses. A combination of hierarchical regressions examined the relationship between the independent variables and sexual risk behavior (linear) and STIs (logistic). Age at time 6 was entered in the first step of the analyses to control for the relationship between age and the outcome variables. The second step included the substance use patterns (no substance use, experimental single substance use, repeated single substance use, experimental poly-substance use, and repeated poly-substance use) and substance use problems, a continuous variable.

Results

Descriptive and Bivariate Analyses

Means and standard deviations for demographic, substance use and sexual risk behavior variables are shown in Table 1. On average, girls reported low to medium sexual risk,

roughly sex with one partner always using condoms, though there was significant variability, and 31.6% girls reported STI history. Although substance related problems were low in the sample on average (mean = 18.22, SD = 19.41), 22.7%, scored at or above the clinically significant score of 37 on the AADIS (Moberg & Hahn, 1991), indicating serious problems related to drug or alcohol use.

Bivariate correlations between independent and dependent variables are presented in Table 2. Sexual risk behavior and STI history were strongly related to the covariates and independent variables. Older girls were more likely to report STI history ($r = .21, p < .01$) and reported riskier sexual behavior ($r = .18, p < .05$). STI history showed a particularly strong positive relationship with repeated poly-substance use ($r = .26, p < .001$) and substance use problems ($r = .34, p < .001$). Similarly, sexual risk behavior was strongly related to repeated poly-substance use ($r = .46, p < .001$) and substance use problems ($r = .52, p < .001$). Girls in the no substance use group were less likely to report STI history and sexual risk behavior ($r = -.22, p < .001$ and $r = -.45, p < .001$, respectively).

Multivariate Analyses

The primary aim of the study was to examine whether substance use patterns and problems were related to (1) an STI reported during at least one of the six time points, and (2) sexual risk behavior at wave 6. In the hierarchical logistic regression model (see Table 3), age at time 6 was associated with STI history (OR = 1.36, 95% CI = 1.10–1.68), but the model including only age had a relatively poor association with STI history (Nagelkerke $R^2 = .07$). The addition of substance use patterns and problems significantly improved the model (Nagelkerke $R^2 = .24$). Although no patterns of substance use were significantly associated with STI history, substance use problems were significantly related to STI history (OR=1.03, $p < .05$, CI_{or} = 1.01–1.05). As indicated in Table 3, the odds of having an STI at any time point were increased by 1.03 for each unit increase in AADIS scores.

In the linear regression model with sexual risk behavior as the outcome (see Table 4), inclusion of substance use patterns and problems again significantly improved the model over the age-only model (R^2 change = .31, F change = 15.36, $p < .001$). Further, each of the substance use variables was positively associated with sexual risk behavior (See Table 4): experimental single substance use ($\beta = .15, p < .05$), repeated single substance use ($\beta = .14, p < .05$), experimental poly-substance use ($\beta = .21, p < .01$), repeated poly-substance use ($\beta = .40, p < .001$) and substance use problems ($\beta = .27, p < .01$). Notably, the strongest association was between sexual risk behavior and repeated poly-substance use.

Conclusions and Discussion

This study found strong associations between negative sexual health outcomes and patterns of substance use and severity of substance use problems among African American female adolescents with a history of seeking mental health services. In particular, greater severity of substance use (i.e., repeated poly-substance use) and greater substance use problems were associated with more sexual risk. This study extends literature linking substance use and sexual risk among African American adolescents (Mandara, Murray, & Bangi, 2003; Bachanas et al., 2002) by specifying particular characteristics of substance use (i.e., patterns and problems) that are related to increased sexual risk among African American girls with a history of seeking mental health care. Better understanding of these particular characteristics and relationships between risk factors is important to inform optimal care for this highly vulnerable group that experiences substantial sexual risk and mental health care disparities.

While previous studies with African American males and females have found linkages between substance use and sexual risk behavior despite level of use (i.e., among both light

and heavy substance users; Turner et al., 2011) our study focused specifically on African American *girls* demonstrated some support for this pattern in relation to sexual risk behavior but not self-reported STI diagnoses. Indeed, only severity of substance use problems was associated with STIs when accounting for substance use patterns and age. Further, although all substance use patterns and substance use problems were associated with sexual risk behavior, the relationship was strongest for the greatest severity of use (i.e., using multiple substances over multiple time points).

These unique findings for a sample of African American girls with a history of seeking mental health services suggests several possibilities for future research. These findings may relate to gender norms associated with substance use and sexual behavior. A “gender paradox” has been described whereby women are in general less likely to use substances than men, but risk factors are stronger for women (Wilson & Widom, 2009). A similar paradox may exist for health consequences of drug and alcohol use in African American young women. Social sanctions against substance use for women (Wilson & Widom, 2009) coupled with cultural protective factors reducing substance use in African American youth (French, Finkbiner, & Duhamel, 2002) may serve protective functions for African American girls in general, but may make the consequences worse for those who do use drugs or alcohol. Future studies that explore the possibility of this phenomenon by exploring the relationships between social and cultural norms and substance use consequences is warranted.

Further, African American girls who engage in these behaviors may be isolated from peers, placing them on a trajectory of increasingly greater risk due to social isolation and stigma. This situation may be exacerbated for girls with mental health problems, who are already at risk for low self-worth, hopelessness, feelings of isolation and shame, and strained relationships with peers and partners (Brown et al. 2010; Turner et al., 2011; Brown, 1997; Donenberg & Pao, 2004). It is also possible that substance use in African American girls, particularly when it is heavy and associated with significant problems, is a sign of more significant risk and fewer protective factors more generally. These possibilities should be examined in future research designed to explicate the links between specific mental health variables (e.g., low self-worth, hopelessness, etc.) and substance use and sexual risk and studies that identify the relative contribution of risk and protective factors to substance use among African American girls. Nonetheless, it is clear that for African American girls who engage in substance use, with a history of seeking mental health services, culturally appropriate interventions that simultaneously address the complex context of substance use, sexual risk, and mental health problems are needed.

The bimodal distribution of substance use patterns in the current sample with the highest number of African American girls reporting either no substance use or repeated poly-substance use is particularly notable. The findings are consistent with the hypothesis of a “two worlds” phenomenon of African American alcohol use based upon epidemiological research indicating high levels of abstinence and high levels of heavy, chronic drinking among African Americans (Wallace, 1999). Results from the current study suggest that this “two worlds” phenomenon may also apply to other substances and again suggests that girls who engage in substance use may be on a particularly risky trajectory. This supports the importance of comprehensive substance use screening in mental health clinics serving low-income African American girls.

Implications for Practice and/or Policy

This study found that use of multiple substances on a repeated basis over time and experience of substance use problems are highly associated with sexual risk, offering support for comprehensive intervention efforts that take a harm reduction approach and

target negative consequences and risky patterns of substance use. Adolescent substance use interventions that incorporate a harm reduction approach have been successful in reducing problematic patterns of use (Toumbourou et al., 2007; McBride, Farrington, Midford, Meulenens, & Phillips, 2003). Findings from the current study support implementing this approach with African American female adolescents seeking mental health treatment as a way to reduce problematic substance use and sexual risk. Similarly, findings provide some evidence that targeting problems associated with substance use, or girls who have developed such problems, may be most effective in preventing negative sexual health outcomes related to substance use. Further, incorporating cultural and contextual considerations in this harm reduction approach is warranted (Andrasik, Woods, & George, 2012). For example, interventions might specifically address gender and cultural norms impacting African American female adolescents that may increase risk for those who engage in substance use (e.g., social sanctions against substance use that increase stigma and social isolation; lack of moderate drinking in community that places those who engage in substance use on particularly risky trajectory). Future studies that better explicate the relationship between gender and cultural norms and substance use consequences for African American girls is needed to inform these interventions.

Limitations and Future Studies

Limitations of the current study include generalizability concerns, the self-report nature of the data, issues of defining the substance use patterns, and the limited use of the substance use problems measure in previous studies. First, this study focused on low-income African American female adolescents who were originally recruited from mental health services, limiting the generalizability to other populations of adolescents. However, due to the disproportionate impact of substance use and sexual risk behavior on African American girls in general and the increased vulnerability among those with mental health problems, research with this population is needed to understand these health risks and the relationships between them. Second, it is possible that adolescents under-reported their level of substance use and risk behavior. However, use of self-administered ACASI interviews and guarantee of confidentiality in this study likely decreased the likelihood of underreporting. Third, assessment of STIs is limited by adolescent self-reports, which may not be accurate if teens are not aware of the STI or have not been diagnosed by a doctor. Therefore, the reports in the current study may be an underestimate. Fourth, the definition of repeated substance use as use at two or more time periods may represent a narrow definition of repeated use. However, this definition allowed for distinctions between different patterns of substance use reported over time by girls in this sample. Fifth, the substance use problems measure (AADIS) was developed and tested with juvenile detainees which may not be a good analog for the current sample. However, measures used in the current study were reviewed and approved by an advisory board of experts in HIV prevention research with African American female adolescents prior to inclusion. Finally, the direction of effects from this study cannot be determined. It is possible that sexual risk precipitated substance use problems, or that both concerns developed as part of a broader risk-taking pattern.

Future studies should examine underlying factors that relate to both substance use patterns and problems as well as sexual risk among low-income African American female adolescents. Theories have suggested the co-occurrence of sexual risk behavior and substance use may be due to personality traits such as impulsivity and sensation seeking (Cooper, Wood, Orcutt, & Albino, 2003) or other shared risk factors such as low school and family connectedness, risky peer norms, and peer and parental modeling (Beyers, Toumbourou, Catalano, Arthur, & Hawkins, 2004). Studies of these potential explanatory mechanisms among African American female adolescents would help to uncover the most beneficial targets for interventions to reduce comorbid substance use and sexual risk in this

population. Nonetheless, findings from the current study support implementing harm-reduction approaches that attempt to reduce problematic substance use patterns and problems and negative sexual health consequences of substance use among African American female adolescents with a history of seeking mental health services.

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Table 1

Demographics, sexual risk behaviors and substance use characteristics.

	<i>M</i>	<i>SD</i>	Range
Age	17.28	1.64	14 – 22
Sexual Risk Behavior	1.37	1.53	0 – 4
STI (Number of time points reported)	.63	1.17	0 – 6
Substance Use Problems (AADIS)	18.22	19.41	0 – 59
Substance Use Patterns	N (%)		
No Substance Use	N (31.6)		
Experimental Single Substance Use	N (19.5)		
Repeated Single Substance Use	N (3.0)		
Experimental Poly-Substance Use	N (19.9)		
Repeated Poly-Substance Use	N (25.9)		

Note. *N* = 177.

Table 2

Bivariate correlations with sexual risk and substance use patterns and problems.

	1	2	3	4	5	6	7	8	9
1. STI	--	.33***	.21**	-.22***	-.07	-.07	.07	.26***	.34***
2. Sexual Risk Behavior		--	.18*	-.45***	-.07	.05	.04	.46***	.52***
3. Age at Time 6			--	-.13	.02	.06	-.05	.13	.12
4. No Substance Use				--	-.34***	-.12	-.34	-.40***	-.51***
5. Experimental Single Substance Use					--	-.09	-.25***	-.29***	-.14
6. Repeated Single Substance use						--	-.09	-.10	-.02
7. Experimental Poly-Substance Use							--	-.30***	.02
8. Repeated Poly-Substance Use								--	.60***
9. Substance Use Problems (AADIS)									--

Note. STI = Sexually Transmitted Illnesses.*
 $p < .05$,**
 $p < .01$,***
 $p < .001$.

Table 3
Hierarchical logistic regression with substance use patterns and problems predicting self-reported STIs.

	β	S.E.	Wald	<i>p</i>	OR (CIs)	Nagelkerke R^2
Step 1						.07
Age at Time Point 6	.31	.11	8.13	<.01	1.36 (1.10–1.68)	
Step 2						.24
Experimental Single Substance Use	-.75	.63	1.40	.24	.47 (.14–1.64)	
Repeated Single Substance Use	-1.13	1.17	.91	.34	.33 (.03–3.24)	
Experimental Poly-Substance Use	-.17	.65	.07	.79	.84 (.24–2.98)	
Repeated Poly-Substance Use	.26	.62	.18	.68	1.30 (.34–4.37)	
Substance Use Problems (AADIS)	.03	.01	6.46	<.05	1.03 (1.01–1.06)	

Note. *N* = 175.

* *p* < .05,

** *p* < .01,

*** *p* < .001.

Regular Poly-Substance Use did not meet the criteria for inclusion in the analysis.

Hierarchical linear regression with substance use patterns and problems predicting sexual risk behavior.

Table 4

	β	p	R^2	R^2 Change	F/F Change
Step 1			.03	.03	5.29*
Age at Time Point 6	.18	<.05			
Step 2			.34	.31	15.36***
Experimental Single Substance Use	.15	<.05			
Repeated Single Substance Use	.14	<.05			
Experimental Poly-Substance Use	.21	<.01			
Repeated Poly-Substance Use	.40	<.001			
Substance Use Problems (AADIS)	.27	<.01			

Note. $N = 169$.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

No Substance Use did not meet the criteria for inclusion in the analysis.