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ORIGINAL PAPER

Individual and Partner-Level Factors Associated with Condom Non-Use Among African American STI Clinic Attendees in the Deep South: An Event-Level Analysis

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Abstract The US HIV/AIDS epidemic is concentrated in the Deep South, yet factors contributing to HIV transmission are not fully understood. We examined relationships between substance use, sexual partnership characteristics, and condom non-use in an African American sample of STI clinic attendees in Jackson, Mississippi. We assessed condom non-use at last intercourse with up to three recent sexual partners reported by participants between January and June 2011. Participant- and partner-level correlates of condom non-use were examined using generalized estimating equations. The 1295 participants reported 2880 intercourse events, of which 1490 (51.7 %) involved condom non-use. Older age, lower educational attainment, reporting financial or material dependence on a sex partner, sex with a primary partner, and higher frequency of sex were associated with increased odds of condomless sex. HIV prevention efforts in the South should address underlying socioeconomic disparities and structural determinants that result in partner dependency and sexual risk behavior.

Resumen La epidemia de VIH/SIDA en los Estados Unidos se concentra en el sur del país, pero los factores que contribuyen a la transmisión del VIH no se entienden completamente. Examinamos las relaciones entre el consume de drogas y alcohol, las características sexuales entre parejas, y el uso de condón en una muestra de personas afroamericano reclutado de una clínica de ITS en Jackson, Mississippi. Entre enero y junio del 2011, con hasta tres parejas sexuales recientes reportados por los participantes evaluamos el uso de condón durante el último acto sexual. Correlatos del uso de condón, al nivel del participante y de la pareja, fueron examinados usando ecuaciones de estimación generalizadas. Los 1.295 participantes informaron

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de 2.880 eventos coito, de los cuales 1.490 (51,7 %) reportaron no usar un condón. La mayor edad, menor nivel educativo, informando dependencia financiera o material con una pareja sexual, relaciones sexuales con una pareja principal, y una mayor frecuencia de relaciones sexuales fueron asociados con mayores probabilidades de sexo sin condón. Los esfuerzos de prevención del VIH en el sur de los Estados Unidos deberían abordar las disparidades socioeconómicas subyacentes y determinantes estructurales que resultan de la dependencia de pareja y comportamiento sexual de riesgo.

Keywords HIV · Concurrency · Substance use · Contraceptive use · African Americans

Introduction

In the United States (US), the HIV/AIDS epidemic disproportionately impacts racial and ethnic minorities [1]. African Americans accounted for an estimated 44 % of all new HIV infections in 2010 [2, 3]. In addition to racial disparities, geographic differences are highly prevalent: the largest burden of HIV and AIDS is clustered in the American South [4, 5]. Eight of the ten states with the highest rate of new HIV diagnoses are in the South [2, 6]. Notably, Mississippi ranks among the top 10 states in the US with the highest rate of HIV (25.3 new HIV diagnoses per 100,000) [2]. Over 70 % of those living with HIV in Mississippi are African American and 78 % of new infections are among African Americans [7].

Previously published analyses of nationally representative datasets highlight the role of sexual network characteristics and partnership dynamics as key factors that perpetuate HIV disease transmission among African Americans in the South [8, 9]. A review of studies found high rates of partner concurrency (defined as multiple sexual partnerships that overlap in time) among African Americans residing in the South [10]. By reducing the time between secondary infections, concurrency increases the efficiency of HIV transmission through sexual networks, compared to populations in which sequential partnerships are acquired at the same rate [11]. In Mississippi, a global association study reported that over 50 % of African American males attending a sexually transmitted infection (STI) clinic reported concurrent sexual relationships with more than one partner in the past year; both drug and alcohol use, as well as structural factors (e.g., incarceration) were important predictors of concurrency [12].

Studies examining the relationship between substance use and sexual risk behavior among African Americans vary in their conclusions, particularly among heterosexual populations. For example, a global association study of serodiscordant African American couples found that alcohol use during sex was not associated with condomless intercourse [13]. Use of other illicit substances by the male partner also had no effect on sexual risk behavior, while illicit substance use by the female partner *reduced* the odds of condom non-use [13]. Another situational association study of predominately African American heterosexual homeless men found that neither one's own alcohol or drug use, nor the partner's, increased the risk of condom non-use at last intercourse [14]. In contrast, a global association study observed that recent binge alcohol use increased the odds of condom non-use among heterosexual African American men; however, this association was only significant for non-main female partners [15]. A recently published review found that multiple measures of alcohol misuse (including binge alcohol use and higher AUDIT scores) were consistently associated with condom non-use in studies involving adult African American women [16].

A number of factors may explain these inconsistent findings. First, studies focusing on substance use and sexual risk among African Americans have varied considerably in the extent to which analyses control for other sexual partnership characteristics, which may confound the relationship between substance use and condom non-use. Second, most research has focused on "global" (e.g., substance use within the past 90 days) or "situational" (e.g., substance use during sex) factors, rather than "episode-level" analyses (e.g., substance use during specific sexual events). Among men who have sex with men, episode-level analyses have demonstrated specific and strong associations between substance use prior to or during sex and condom non-use, particularly for methamphetamines and binge alcohol use [17–19]. Analyses at the event-level may therefore help to elucidate novel substance use contexts that promote HIV risk among African American populations in the Deep South.

The objective of this study was to identify individual- and partner-level factors, including substance use and other partnership characteristics, that are associated with condom non-use at most recent intercourse among an African American sample of STI clinic attendees in Jackson, Mississippi. We hypothesized that sexual partnership characteristics (partnership type, partner concurrency) and episode-level substance use would independently increase the risk of reported condom non-use among study participants.

Methods

Study Design and Sample

Data for these analyses were derived from a study of individuals who presented for care at a publicly funded STI

clinic in Jackson, Mississippi [12]. Participants were eligible to participate if they: (1) were at least 18 years of age, (2) presented for STI and HIV screening, (3) were willing to complete a 30-min computerized behavioral survey, and (4) spoke English. All clinic attendees presenting for care between January and June 2011 (the study period) were offered participation; the acceptance rate was 93 %. Before completing the self-administered computerized survey, all participants provided informed consent. The study was approved by the institutional review boards at the University of Mississippi Medical Center, the Mississippi State Department of Health, and The Miriam Hospital in Providence, Rhode Island. Participants did not receive compensation for their participation. The study design and setting have been described in detail elsewhere [12].

Of the 1485 African American participants who agreed to participate in the study, 49 (3.2 %) were missing data on condom use at last intercourse for all sex partners and 141 (9.1 %) did not provide information to determine type of sexual relationships (i.e., main vs. non-main). Therefore, the final analytic sample included 1295 participants.

Measures

The questionnaire solicited information regarding sociodemographic characteristics, substance use, sexual behavior history, access to medical care, and other structural factors. Participants were also asked specific questions about their three most recent sexual partners within the past year. For each sexual partner reported, episode-level information was ascertained, referring specifically to the last sexual encounter with this partner. To avoid confusion and to reduce measurement error, participants were asked to provide each partner's initials, which were then referred to throughout the survey.

The primary dependent variable for this analysis was condom non-use at last vaginal or anal intercourse with each reported partner (yes vs. no). In participant-level analyses (see below), the following sociodemographic characteristics were examined: gender (male, female), age (per year older), ethnicity (Hispanic/Latino, not Hispanic/Latino), sexual orientation (heterosexual vs. gay, lesbian, or bisexual), any same sex activity in the past year (yes vs. no), relationship status (currently single vs. not currently single), highest level of education obtained (high school or less, some college, college degree or higher), monthly gross income (<$500, $501–$1500, $1501–$3000, >$3000), and current homelessness (yes vs. no). The following "global" substance use behaviors were also assessed: alcohol use frequency in the past year (never, monthly, 2–4 times per month, more than once weekly); marijuana use in the past 30 days (yes vs. no); other illicit drug use in the past 30 days (both yes vs. no); and ever having sex while under the influence of the following (yes vs. no): alcohol, marijuana, cocaine or crack, or other drugs (e.g., heroin, ecstasy, crystal methamphetamine, and non-medical prescription drugs). Finally, we assessed participants' total reported number of lifetime sexual partners.

For partner-level analyses, we examined the following variables of interest: partner's gender (same sex vs. opposite sex), partner's race (African American vs. other), and partner's age (both absolute age and in relation to the participant). Participants were also asked to report whether each person was a "main" or "non-main" sexual partner. As defined previously, we considered main partners as those that the participant, "has an emotional bond with and with whom you have regular sex, such as a boyfriend or girlfriend, spouse, significant other, or life partner," and non-main partners as "people you have sex with every now and then, or one-night stands" [12, 20]. We also examined frequency of sex with the partner (once, less than monthly, less than once a week, weekly or more) and trust in the partner (responses to the statement "I trust my partner" were dichotomized into strongly agree/agree vs. neutral/disagree/strongly disagree). We also examined self-reported financial or material dependency on the partner (yes vs. no), which, as described previously [20], was defined as relying on the partner to cover bills and household expenses, housing, transportation, food, child care, etc. Participants were also asked to report whether they or their partner had used either alcohol or drugs during the most recent intercourse event. Finally, to be consistent with previously published studies of the same dataset [12, 20], we assessed concurrent sexual activity, defined as an affirmative response to the question, "During the time you were having sex with {PARTNER INITIALS}, did you also have other sexual partners?", and whether they knew if their partner had concurrent sexual activity during the same period (yes, no, don't know).

Statistical Analyses

As a first step, we examined the distributional properties of each variable of interest, including mean and medians for continuous variables and proportions for categorical variables. Next, we used generalized estimating equations (GEE) logistic regression models with an unstructured correlation matrix to determine the participant- and partner-level correlates of condom non-use at most recent intercourse. The purpose of employing GEE was to account for within-subjection correlation at the participant-level [21], given that study subjects could contribute multiple outcome responses (i.e., up to three intercourse events). Therefore, this method permitted the analysis of all episode-level data collected from eligible participants, with

correct specification of the standard errors and 95 % confidence limits [22].

As a final step, we constructed multivariable GEE models to identify the independent correlates of condom non-use at last intercourse. Two separate models were constructed. The first was a participant-level model, which considered participant sociodemographic characteristics, global substance use variables, as well as lifetime sexual partner data. The second was a partner-level model, for which partner sociodemographics, episode-specific participant and partner alcohol and drug use, and other factors (e.g., partner dependency, partner concurrency) were considered. In post hoc analyses, we tested interaction terms between gender and all variables that were included in the partner-level multivariable model. In both models, we included all variables for which at least one category was significant at $p < 0.05$ in bivariable analyses. We conducted all analyses in SAS (version 9.3). All reported p values are two-sided.

Results

The sociodemographic characteristics of the sample are reported in Table 1. The median age was 23 (interquartile range [IQR] = 7), approximately one-third (37.4 %) were male, and the majority was heterosexual (91.0 %). Approximately forty percent (41.3 %) of the sample had a high school or less education, and income was generally low (68.2 % reported less ≤$1500 in monthly gross income), but few (2.7 %) reported current homelessness. A total of 934 (72.1 %) reported alcohol use at least monthly, and 28.3 % reported marijuana use in the last 30 days. Approximately half (54.0 %) and one-third (36.2 %) of participants reported ever having sex under the influence of alcohol or marijuana, respectively. Other types of illicit drug use (in the past 30 days and ever using prior to or during sex) were reported infrequently by study participants (see Table 1).

The 1295 eligible participants reported a median of 2 (IQR = 1–3) sexual partners in the past year. Detailed episode-level data was collected on a total of 2880 intercourse events. As shown in Table 2, more than half of all encounters (51.7 %) involved no condom use. Same-sex encounters were more commonly reported by men (12.1 % vs. 2.9 % of all episodes, respectively). Participant and partner alcohol use occurred in 14.3 and 15.0 % of all reported intercourse events, respectively. The prevalence of drug use at last sex was similar, with 10.2 and 10.9 % of encounters involving participant and partner drug use, respectively. Men were more likely to report that their sexual encounters involved alcohol or drug use (see Table 2). Of all sexual episodes reported, 20.7 % occurred with partners for whom the participant financially or materially depended on, and 47.1 % occurred with partners whom the participant trusted. Over forty percent (40.1 %) of all encounters reported involved a partner with whom the participant had other concurrent relationships, and approximately one-third (38.0 %) of encounters occurred with partners who the participant perceived as having a

Table 1 Sociodemographic characteristics, substance use, and sexual behavior reported by African American participants attending an STI clinic in Jackson, Mississippi ($n = 1295$)

Variable	*n* (%)
Socio-demographic characteristics	
Male	484 (37.4)
Hispanic	7 (0.5)
Median age (IQR)	23 (7)
Sexual orientation	
Heterosexual	1178 (91.0)
Gay or lesbian	44 (3.4)
Bisexual	73 (5.6)
Any same-sex activity (past year)	104 (8.0)
Currently single	1133 (87.5)
Education	
High school or less	534 (41.3)
Some college	580 (44.8)
College degree or higher	180 (13.9)
Monthly income	
<$500	397 (30.9)
$501–$1500	479 (37.3)
$1501–$3000	252 (19.6)
>$3000	156 (12.2)
Currently homeless	35 (2.7)
Substance use and sexual behavior	
Alcohol use frequency	
Never	361 (27.9)
Monthly	384 (29.6)
2–4 times a month	360 (27.8)
More than once a week	190 (14.7)
Use in the past 30 days:	
Marijuana	365 (28.3)
Cocaine or crack	13 (1.0)
Other drugs	39 (3.0)
Ever had sex while under influence of	
Alcohol	699 (54.0)
Marijuana	469 (36.2)
Cocaine or crack	33 (2.6)
Other drugs	117 (9.0)
Lifetime number of sexual partners	
1–5	430 (33.3)
6–10	348 (27.0)
>10	512 (39.7)

Table 2 Characteristics of most recent intercourse episodes ($n = 2880$) with up to three recent sexual partners reported by African American participants attending an urban STI clinic in Jackson, Mississippi

Variable	*N* (%)	Female respondents	Male respondents
Condom non-use at last sex	1490 (51.7)	922 (53.4)	568 (48.9)
Partner socio-demographic characteristics			
Same sex partner	191 (6.6)	50 (2.9)	141 (12.1)
African American partner	2745 (96.1)	1675 (98.1)	1070 (93.0)
Hispanic partner	45 (1.6)	22 (1.3)	23 (2.0)
Median age of partner (IQR)	24 (8)	25 (8)	23 (8)
Substance use			
Alcohol use at last sex	406 (14.3)	185 (10.9)	221 (19.5)
Partner alcohol use at last sex	424 (15.0)	260 (15.3)	164 (14.5)
Drug use at last sex	286 (10.2)	137 (8.1)	149 (13.2)
Partner drug use at last sex	309 (10.9)	204 (12.0)	105 (9.3)
Partnership characteristics			
Partner is a main partner	1503 (53.4)	1004 (59.7)	499 (44.1)
Financial or material dependence on partner	590 (20.7)	391 (23.0)	199 (17.3)
Trust in partner	1331 (47.1)	805 (47.6)	526 (46.4)
Frequency of sex with partner			
One time	589 (20.9)	310 (18.4)	279 (24.5)
Less than once a month	747 (26.4)	433 (25.7)	314 (27.6)
Less than once a week	644 (22.8)	407 (24.1)	237 (20.8)
Once a week or more	845 (29.9)	537 (31.8)	308 (27.1)
Participant has a concurrent sexual relationship	1135 (40.1)	590 (34.7)	545 (48.0)
Perceived partner concurrency[a]			
No	764 (27.0)	398 (23.4)	366 (32.3)
Yes	1076 (38.0)	733 (43.1)	343 (30.3)
Don't know	993 (35.0)	568 (33.4)	425 (37.5)

[a] Participant believes partner has concurrent sexual relationship

concurrent sexual relationship. Men were more likely to report that their sexual episodes occurred during periods of partner concurrency, and women were more likely to perceive that their sex partners were concurrent.

Factors associated with condom non-use at last intercourse in participant-level analyses are shown in Table 3. Factors that increased the odds of condom non-use included: older age, high school or lower education, current homelessness, and ever having sex under the influence of marijuana. Male participants, and those who reported being single (compared to those who reported being in a relationship) were less likely to report condomless intercourse at last sex. The effect estimates from the final participant-level multivariable model are shown in Table 3. All factors except for current homelessness remained statistically significant.

Partner-level correlates of condom non-use at last intercourse are shown in Table 4. Condom non-use was significantly *more* likely with older partners, main partners, partners for whom the participant financially or materially depended on, and those for whom the participant trusted. More frequent sex with the partner increased the odds of condom non-use in a dose-dependent fashion. We did not observe a statistically significant relationship between participant or partner alcohol or drug use at last sex and condom non-use.

In the final partner-level multivariable model, factors that independently increased the odds of condomless intercourse included: sex with a main partner, financial or material dependency on the partner, and frequency of sex with the partner. In post hoc analyses that included an interaction term between gender and partner dependency, the relationship between financial or material dependence on a partner and condom non-use was stronger for women (adjusted odds ratio [AOR] = 1.83, 95 % CI 1.35–2.48) than for men (AOR = 1.46, 95 % CI 1.01–2.12). However, this difference was not statistically significant (p value for interaction = 0.564). Similarly, the relationship between the partner being a primary partner and condom non-use was stronger for women (AOR = 1.75, 95 % CI 1.35–2.28) than men (AOR = 1.40, 95 % CI 1.09–1.80), but the interaction term was not significant (p value for interaction = 0.181). The interaction term for gender and frequency of sex was non-significant.

Table 3 Participant-level correlates of condom non-use at most recent intercourse among African American STI clinic attendees in Jackson, Mississippi: $n = 2880$ sexual episodes reported by $N = 1295$ participants

Variable	Odds ratio (95 % CI)	*p* value	Adjusted odds ratio (95 % CI)	*p* value
Socio-demographic characteristics				
Male	0.79 (0.66–0.94)	0.008	0.69 (0.57–0.84)	<0.001
Age (per year older)	1.03 (1.01–1.05)	<0.001	1.03 (1.01–1.04)	0.004
Currently single	0.58 (0.44–0.76)	<0.001	0.69 (0.51–0.94)	0.017
Self-reported sexual orientation				
Heterosexual	REF			
Homosexual	0.74 (0.44–1.26)	0.273		
Bisexual	1.03 (0.72–1.46)	0.873		
Any same sex activity (past year)	0.98 (0.70–1.37)	0.898		
Education				
College degree or higher	REF		REF	
Some college	1.08 (0.83–1.40)	0.561	1.22 (0.93–1.60)	0.151
High school or less	1.49 (1.14–1.95)	0.003	1.70 (1.27–2.27)	<0.001
Monthly income				
< $500	REF		REF	
$501–$1500	1.10 (0.89–1.36)	0.379	1.07 (0.86–1.33)	0.534
$1501–$3000	1.31 (1.02–1.70)	0.038	1.38 (1.06–1.80)	0.018
>$3000	0.91 (0.68–1.21)	0.500	0.96 (0.71–1.29)	0.769
Currently homeless	2.03 (1.19–3.45)	0.009	1.67 (0.92–3.02)	0.090
Substance use and sexual behavior				
Marijuana use in the past 30 days:	1.15 (0.96–1.39)	0.139		
Alcohol use frequency				
Never	REF			
Monthly	0.86 (0.68–1.08)	0.203		
2–4 times a month	0.97 (0.77–1.23)	0.808		
More than once a week	0.95 (0.71–1.27)	0.743		
Ever had sex while under influence of				
Alcohol	1.11 (0.93–1.32)	0.239		
Marijuana	1.24 (1.04–1.48)	0.015	1.28 (1.07–1.54)	0.008
Cocaine or crack	1.53 (0.92–2.56)	0.103		
Other drugs	1.06 (0.81–1.40)	0.661		
Lifetime number of sexual partners				
1–5	REF			
6–10	0.99 (0.79–1.25)	0.963		
>10	1.03 (0.84–1.27)	0.786		

Note generalized estimating equations (GEE) were used to account for within-subject correlation among participants reporting >1 partner

Discussion

In this sample of African Americans attending an urban STI clinic in Mississippi, a number of individual- and partner-level factors were associated with condom non-use at most recent intercourse. Partnership-level factors, including type of relationship and reporting financial or material dependency on a sexual partner, were associated with condom non-use at most recent intercourse. Neither participant nor partner alcohol or drug use independently increased the risk of condom non-use in this sample. Collectively, these findings suggest that HIV and STI prevention interventions should address underlying structural determinants (such as poverty, limited educational opportunities, and incarceration) that produce conditions in which economic dependence on sexual partners (that in turn are associated with HIV risk behavior) are common [23–26].

Table 4 Partner-level correlates of condom non-use at most recent intercourse among African American STI clinic attendees in Jackson, Mississippi: $n = 2880$ sexual episodes reported by $N = 1295$ participants

Variable	Odds ratio (95 % CI)	p value	Adjusted odds ratio (95 % CI)	p value
Partner socio-demographic characteristics				
Same sex partner	0.66 (0.43–1.02)	0.062		
Partner is African American	1.11 (0.72–1.71)	0.632		
Partner is older by at least 5 years	0.90 (0.74–1.10)	0.320		
Partner age (per year older)	1.01 (1.00–1.03)	0.032	0.93 (0.75–1.15)	0.513
Substance use				
Alcohol use at last sex	1.01 (0.80–1.27)	0.943		
Partner alcohol use at last sex	1.14 (0.92–1.42)	0.229		
Drug use at last sex	1.20 (0.91–1.57)	0.194		
Partner drug use at last sex	1.28 (0.99–1.65)	0.060		
Partnership characteristics				
Partner is a main partner	2.73 (2.32–3.21)	<0.001	1.62 (1.32–1.98)	<0.001
Financial or material dependence on partner	2.55 (2.08–3.13)	<0.001	1.61 (1.28–2.02)	<0.001
Trust in partner	1.38 (1.18–1.62)	<0.001	0.93 (0.78–1.10)	0.390
Frequency of sex with partner				
One time	REF		REF	
Less than once a month	1.53 (1.21–1.92)	<0.001	1.36 (1.07–1.72)	0.011
Less than once a week	2.43 (1.92–3.07)	<0.001	1.85 (1.44–2.38)	<0.001
Once a week or more	5.28 (4.17–6.70)	<0.001	3.39 (2.60–4.41)	<0.001
Participant has a concurrent sexual relationship	1.06 (0.90–1.25)	0.490		
Perceived partner concurrency[a]				
No	REF			
Yes	1.15 (0.94–1.40)	0.180		
Don't know	0.91 (0.74–1.11)	0.338		

Note generalized estimating equations (GEE) were used to account for within-subject correlation among participants reporting >1 partner

[a] Participant believes partner has concurrent sexual relationship

Our results further demonstrate that educational and economic inequalities (particularly those that result in dependence on sexual partners for material resources) are associated with an increased risk of HIV transmission in African American communities [27, 28]. Previous studies have demonstrated that, in the context of financial or material dependence, women may acquiesce to their partner's requests for condomless sex for fear of losing income, food, housing, and child support [29, 30]. A meta-analysis of HIV and STI behavioral interventions for African American women found that programs were most efficacious when intervention components focused on empowerment, assertiveness, and other skills to improve gender equality in sexual relationships [31]. Our results support this approach to intervention development, as dependence on one or more sexual partners was reported by over 20 % of the sample, and was one of the strongest correlates of condomless intercourse, independent of other measured relationship characteristics. Our finding that men who reported financial or material dependence on a partner were also more likely to report condom non-use requires further investigation.

In our study, although global and episode-level substance use variables were associated with condomless intercourse in bivariable analyses, only ever having sex under the influence of marijuana remained significant in multivariable analyses. These results suggest that the relationships between substance use and sexual risk behavior may be accounted for by partner-level factors, such as partnership type, trust, and dependency. In our recently published study of the same sample, event-level alcohol and drug use were strongly associated with partner concurrency [12]. Although additional longitudinal research is needed, these findings indicate that partner concurrency (and other partnership characteristics) may mediate or moderate alcohol/substance use and sexual risk relationships that were observed in bivariable analyses.

An alternative explanation is that the types of substances used most frequently by heterosexual African Americans (i.e., alcohol and marijuana) do not enhance libido,

heighten sexual sensation seeking, and increase sexual adventurism to the same degree as drugs used more commonly by MSM [32]. One qualitative study of African American MSM found that drug use played a central role in same-sex sexuality and the rationalization of condomless sexual activity, with participants noting that crack cocaine and crystal methamphetamine were used most frequently reported during these events [33]. Although additional research is warranted, our results indicate that HIV and STI prevention programs which address the shared contextual drivers of substance use and sexual risk may be more effective than interventions that seek only to reduce drug use and alcohol consumption among individuals at highest risk for contracting HIV in the Deep South.

This study has a number of important limitations that should be noted. First, participants were selected from a population of STI clinic attendees, and therefore our findings should not be generalized to the larger African American population in Mississippi or elsewhere. Second, sexual and drug use behaviors were self-reported, which may have resulted in under-reporting, socially desirable reporting, or recall bias (particularly those referring to lifetime recall periods). We attempted to mitigate these potential biases by using computerized self-interviewing techniques, and by reassuring confidentiality throughout all interactions with participants. Third, we assessed condom use at last intercourse for up to three recent sexual partners only; therefore, the complete condom use patterns of persons with a higher number of partners are not reflected in this analysis. Fourth, as the study was cross-sectional, causation cannot necessarily be inferred from observed associations. Longitudinal studies are needed to determine whether evolving relationship dynamics (including for example improved trust or decreased financial and material dependency in a partnership), may subsequently result in changes in the pattern and frequency of sexual risk activities. Finally, we were unable to measure associations between independent variables of interest and biological outcomes, including prevalent or incident HIV or other STIs.

In summary, this study found that low educational attainment and a number of sexual partnership characteristics, including partner dependency, were strong and independent risk factors for condomless sex among STI clinic attendees at high risk for contracting HIV in Mississippi. Programs and policies that address the underlying structural determinants that produce these relationships contexts are urgently needed.

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