Off-Premise Alcohol Sales Policies, Drinking, and Sexual Risk Among People Living With HIV

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Drinking among HIV-positive individuals increases risks of disease progression and possibly sexual transmission. We examined whether state alcohol sales policies are associated with drinking and sexual risk among people living with HIV. In a multivariate analysis combining national survey and state policy data, we found that HIV-positive residents of states allowing liquor sales in drug and grocery stores had 70% to 88% greater odds of drinking, daily drinking, and binge drinking than did HIV-positive residents of other states. High-risk sexual activity was more prevalent in states permitting longer sales hours (7% greater odds for each additional hour). Restrictive alcohol sales policies may reduce drinking and transmission risk in HIV-positive individuals. (*Am J Public Health.* 2010;100:1890–1892. doi:10.2105/AJPH.2008.158543)

More than 1 million people in the United States are living with HIV,[1] and about 56 000 people are newly infected each year.[2] Approximately one half of those who have had positive test results for HIV drink alcohol; about 1 in 6 regularly binge drinks.[3] Drinking in this population is associated with poor treatment adherence,[4,5] disease progression,[6–8] and spread of the virus through risky sexual activity.[9–12]

Thus, reducing drinking and problem drinking among HIV-positive individuals is an important public health goal. Alcohol sales policies may be 1 tool for accomplishing this. Research has linked geographic variations in off-premise alcohol sales practices (e.g., regulations regarding the sale of alcohol in stores) to drinking and drinking problems in the general population.[13] Other types of alcohol regulation have been linked to sexual health.[14–16] Sales policies may influence drinking and sexual activity by making purchases inconvenient or affecting where and when people drink.[17–20] We investigated (1) whether findings linking off-premise sales policies to drinking extend to those living with HIV (who have unique demographic characteristics, drinking patterns, and life circumstances) and (2) whether off-premise sales policies predict sexual risk behavior in this group.

METHODS

We predicted drinking among participants in the second follow-up wave of the HIV Cost and Services Utilization Study (HCSUS). HCSUS surveyed a national probability sample of HIV-infected adults.[21,22] Of the 2267 persons completing the second follow-up wave (conducted August 1997 through January 1998), 4 lacked state-level identifiers, and 5 lacked drinking behavior data, resulting in an analytic sample of 2258 (Table 1). We predicted sexual risk among sexually active participants in the Risk and Prevention study, a separately funded and run study of the sexual risk and prevention behavior of HIV-positive adults.[23,24] The Risk and Prevention survey staff interviewed 1421 HCSUS second follow-up respondents (September 1998 to December 1998). Of these, 920 were sexually active. Weights corrected for sampling design, nonresponse, and attrition for reasons other than known mortality.[23,25]

Variables

We derived dichotomous (past 4 weeks) variables from HCSUS second follow-up data: any drinking, daily drinking (drank on each of the past 28 days), and binge drinking (5 or more drinks on 1 or more days). High-risk sexual activity (from the Risk and Prevention study) reflected any anal or vaginal sex without a condom and with a partner of negative or unknown serostatus.

Policy variables were based on 1998 data from the Alcohol Policy Information System[26] and the Distilled Spirits Council of the United States,[27] supplemented by a search of states' archived legal codes. "Convenience sales permitted" indicated states where sales of liquor were permitted in grocery and drug stores. "State control" indicated states where liquor was sold only in government-run outlets. "Sunday sales banned" indicated states where no alcohol of any type could be sold on Sundays. "Longer sales hours" reflected the number of hours per day that alcohol could be sold on weekdays.

Data Analysis

We used MlwiN software version 2 (Centre for Multilevel Modelling, University of Bristol, Bristol, UK) to conduct random-intercept (multilevel) logistic regression analysis, and we adjusted for use of analytic weights with linearization methods. We used stratified "hot deck" or regression imputation to fill in the fewer than 5% of missing values on some predictors.[28] Models controlled for gender, sexual orientation, race/ethnicity, education, age, and lowest ever CD4 cell count.

RESULTS

Convenience sales of liquor predicted drinking, daily drinking, and binge drinking. HIV-positive residents of states permitting sales of liquor in drug and grocery stores had from 1.70 to 1.88 times the odds of each drinking pattern examined compared with those in states without convenience sales (Table 2). State control of sales also predicted binge drinking. Longer sales hours predicted high-risk sexual activity. Each additional hour of alcohol sales multiplied the associated odds of any high-risk sexual activity by 1.07.

DISCUSSION

Convenience sales results suggested that the ability to purchase alcohol along with other supplies (i.e., avoiding a special trip) or simply having more outlets from which to purchase alcohol may influence drinking amounts. Models predicting high-risk sexual activity told a different story. Because sales hours were not associated with consumption, they are not related to sexual behavior through increased

TABLE 1—Characteristics of Participants (n = 2258): HIV Cost and Services Utilization Study (HCSUS) Second Follow-Up Wave, August 1997–January 1998

	No.	Weighted %
Gender or risk group		
Gay or bisexual male	1246	57
Heterosexual male	358	20
Female	654	23
Race/ethnicity		
White or other	1230	53
Black	703	32
Hispanic	325	15
Education		
< High school	544	24
High school	626	28
Some college	655	28
College graduate	433	20
Lowest CD4 cell count, mm^3		
< 200	937	43
200–499	775	34
≥ 500	546	24
Age at HCSUS baseline, y		
< 35	764	34
35–44	985	43
≥ 45	509	23
Any drinking	1177	53
Daily drinking[a]	94	4
Binge drinking[b]	346	16
High-risk sexual activity[c]	210	22

[a]Defined as drinking on each of the past 28 days.
[b]Defined as drinking 5 or more drinks on 1 or more days in the past month.
[c]Percentage shown for high-risk sexual activity (any anal or vaginal sex without a condom and with a partner of negative or unknown serostatus) is of those who were sexually active.

TABLE 2—Multivariate Logit Models Predicting Drinking and Risky Sexual Behavior Among HIV-Positive Individuals, by Alcohol Sales Policy Variables and Individual-Level Covariates

	Any Drinking (n = 2258), OR (95% CI)	Daily Drinking[a] (n = 2258), OR (95% CI)	Binge Drinking[b] (n = 2258), OR (95% CI)	High-Risk Sexual Activity[c] (n = 920), OR (95% CI)
State and district policy variables				
Convenience sales permitted	1.70*** (1.34, 2.15)	1.88* (1.13, 3.13)	1.77* (1.13, 2.78)	1.21 (0.85, 1.72)
State control	1.42 (0.94, 2.14)	1.84 (0.65, 5.20)	1.90** (1.23, 2.92)	1.19 (0.70, 2.01)
Sunday sales banned	0.97 (0.75, 1.25)	0.78 (0.39, 1.55)	1.21 (0.77, 1.90)	0.84 (0.51, 1.36)
Longer sales hours	1.01 (0.97, 1.05)	1.01 (0.95, 1.07)	1.01 (0.95, 1.07)	1.07** (1.01, 1.14)
Individual-level covariates				
Female	0.39*** (0.31, 0.51)	0.44* (0.21, 0.95)	0.52*** (0.39, 0.68)	1.01 (0.64, 1.59)
Heterosexual male	0.60*** (0.47, 0.77)	1.09 (0.80, 1.50)	1.06 (0.73, 1.54)	0.47*** (0.30, 0.76)
Black	0.89 (0.74, 1.06)	1.73 (0.84, 3.58)	1.02 (0.69, 1.51)	1.65** (1.11, 2.44)
Hispanic	0.84 (0.71, 1.01)	0.43* (0.19, 0.98)	1.38 (0.89, 2.12)	1.45* (1.02, 2.06)
High school graduate	1.03 (0.77, 1.38)	0.71 (0.40, 1.28)	0.74 (0.41, 1.33)	1.23 (0.79, 1.94)
Some college	1.11 (0.81, 1.51)	0.80 (0.49, 1.31)	0.66* (0.45, 0.95)	1.01 (0.58, 1.75)
College graduate	1.13 (0.68, 1.88)	0.33* (0.12, 0.89)	0.53 (0.27, 1.04)	1.82* (1.01, 3.28)
CD4 cell count ≥ 500/mm^3	1.90** (1.23, 2.92)	3.19*** (1.64, 6.21)	1.90 (0.79, 4.58)	1.40 (0.64, 3.08)
CD4 cell count 200–499/mm^3	1.21 (0.96, 1.53)	1.65 (0.95, 2.85)	1.42 (1.00, 2.02)	1.19 (0.94, 1.50)
Age 35–44 y	0.94 (0.81, 1.10)	1.51 (0.72, 3.17)	0.92 (0.70, 1.21)	0.72 (0.49, 1.06)
Age ≥ 45 y	0.67** (0.51, 0.88)	2.14*** (1.34, 3.42)	0.66 (0.42, 1.03)	0.70 (0.43, 1.15)

Note. CI = confidence interval; OR = odds ratio. Reference categories for the individual-level dummy variables are gay or bisexual male, non-Hispanic White, no high-school diploma, CD4 cell count less than 200/mm^3, and aged less than 35 years. Longer sales hours reflect number of hours per day alcohol is sold on weekdays. Drinking analyses use data drawn from participants in the HIV Cost and Services Utilization Study, August 1997–January 1998. Sexual behavior analyses use data drawn from the Risk and Prevention Study, September 1998–December 1998.
[a]Defined as drinking on each of the past 28 days.
[b]Defined as drinking 5 or more drinks on 1 or more days in the past month.
[c]Defined as any anal or vaginal sex without a condom and with a partner of negative or unknown serostatus.
*P < .05; **P < .01; ***P < .001.

drinking. In practice, fewer sales hours are equivalent to limited late-night sales. Perhaps late-night sales are linked to drinking contexts that affect sexual behavior (e.g., where one drinks and with whom).

These documented associations between alcohol policy, sexual activity, and drinking may not be causal. State policies may have arisen in response to drinking patterns, and factors may covary with state policy that we did not account for. Ours is the only national probability sample of people with HIV but includes only persons receiving care and may not represent the 2009 HIV-positive population.

Strengths of this study included examination of drinking and sexual activity in the same study and tests for independent correlates of related policies. Our study was also the first study of alcohol policy to examine sexual behavior. These characteristics shed light on the potential mechanisms whereby policy may affect alcohol-related behavior. Results suggested that certain off-premise alcohol sales policies might provide levers to reduce transmission of HIV and improve the health of those living with the virus. ■

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This brief was accepted July 7, 2009.

Contributors

R.L. Collins obtained funding, contributed to study design, oversaw data analysis, and led the writing of results. S.L. Taylor and J.S. Ringel contributed to study design and data analysis, collected public use data, and contributed to writing of results. M.N. Elliott and D.E. Kanouse contributed to study design, data analysis, and writing of results. R. Beckman collected public use data, prepared data files, conducted all analyses, and contributed to writing of results.

Acknowledgments

This study was funded by the National Institute on Alcohol Abuse and Alcoholism (R01AA015838). The original Risk and Prevention study data collection was

funded by the National Institute of Child Health and Human Development (R01HD35040).

The authors thank Kristin Lang at RAND for library assistance in obtaining state policy data.

Human Participant Protection

RAND's institutional review board approved all procedures; informed consent was obtained from participants as part of the Risk and Prevention study.

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Consistency and Change in Club Drug Use by Sexual Minority Men in New York City, 2002 to 2007

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We used repeated cross-sectional data from intercept surveys conducted annually at lesbian, gay, and bisexual community events to investigate trends in club drug use in sexual minority men (N = 6489) in New York City from 2002 to 2007. Recent use of ecstasy, ketamine, and γ-hydroxybutyrate decreased significantly. Crystal methamphetamine use initially increased but then decreased. Use of cocaine and amyl nitrates remained consistent. A greater number of HIV-positive (vs HIV-negative) men reported recent drug use across years. Downward trends in drug use in this population mirror trends in other groups. (*Am J Public Health.* 2010;100:1892–1895. doi: 10.2105/AJPH.2009.175232)

"Club drugs" are illicit substances consumed in social or party situations[1] to increase social disinhibition and heighten sensual and sexual experiences.[2,3] This category typically includes ecstasy (3,4 methylenedioxymethamphetamine), γ-hydroxybutyrate (GHB), and ketamine,[4] although recent reports also have included cocaine[5] and crystal methamphetamine.[6]

Concern about club drug use has increased because of consistent associations with unprotected sexual intercourse.[7–9] Given the high rates of use[4] among men who have sex with men, most club drug research has focused on this population—and on identified gay and bisexual men specifically.[10,11] Published prevalence estimates are quite variable, ranging, for example, from 6% to 65% for crystal