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Risk of heavy drinking among sexual minority adolescents: Indirect pathways through sexual orientation-related victimization and affiliation with substance-using peers

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Abstract

Aims—To test two indirect pathways through which sexual minority adolescents (SMAs) may be at risk for heavy episodic drinking (HED) including a socialization pathway via substance-using peer affiliations and social marginalization pathway via sexual minority-specific victimization and subsequent substance-using peer affiliations.

Design—Analysis of the first three waves (six-months apart) of a longitudinal adolescent health risk study (2011–2014). Participants were referred by medical providers or a screening system in providers' waiting rooms.

Setting—Two large urban adolescent health clinics in Pennsylvania and Ohio, USA.

Participants—290 adolescents (ages 14–19, mean: 17) who were 71% female, 33% non-Hispanic White, and 34% SMAs.

Measurements—Self-reported sexual minority status (wave 1) and affiliation with substance-using peers (waves 1 and 2), and latent sexual-minority specific victimization (waves 1 and 2) and HED (waves 1 and 3) variables.

Findings—Using mediation analyses in a structural equation modeling framework, there was a significant indirect effect of sexual minority status (wave 1) on HED (wave 3) via affiliation with substance-using peers (wave 2; indirect effect=0.03, 95% CI: 0.01, 0.07), after accounting for the indirect effect of sexual-orientation related victimization (wave 2; indirect effect=.10, 95% CI: 0.02–0.19). The social marginalization pathway was not supported as victimization (wave 1) was not associated with affiliation with substance-using peers (wave 2; $\beta=-.04$, $p=.66$). Sex differences in the indirect effects were not detected ($ps>.10$).

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Declaration of interest

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Conclusions—Sexual minority adolescents in the US appear to exhibit increased heavy episodic drinking via an indirect socialization pathway including affiliations with substance-using peers and a concurrent indirect pathway involving sexual minority-related victimization. The pathways appear to operate similarly for boys and girls.

Keywords

adolescence; heavy episodic drinking; longitudinal; sexual minority; sexual orientation; peer substance use

Introduction

Heavy episodic drinking (HED) has widespread effects on adolescent health and well-being (1, 2). A research priority is identifying adolescents at risk for substance use, including sexual minorities, to inform targeted prevention and intervention efforts (3). The heightened risk for alcohol use and HED among sexual minority adolescents (SMAs), a group including individuals who have a sexual orientation that is non-heterosexual based on self-identification (such as lesbian, gay, bisexual), sexual behavior, and/or sexual attraction, has been established by a number of seminal studies focusing on alcohol outcomes (4–7), and confirmed in a meta-analysis of cross-sectional research (HED; 4). Subsequent research suggest that SMA disparities in HED persist into late adolescence and young adulthood (9–12). In order to address such disparities through empirically-based interventions, it is imperative to understand factors contributing to HED risk among SMAs.

A prominent explanation for substance use among sexual minorities is the minority stress hypothesis, which posits that victimization, discrimination, and perceived and internalized stigma related to one's minority status puts them at risk for negative outcomes (13, 14), including HED. Preliminary evidence suggests that minority stress predicts HED among SMAs, including a recent meta-analysis supporting associations between victimization, including sexual minority-related victimization (15–17), and substance use including alcohol (15–18). Subsequent studies that focused on alcohol outcomes, using cross-sectional (19–21) and longitudinal (22) mediation analyses, support negative affect or victimization as indirect pathways for these disparities. Notably, few longitudinal investigations of the role of victimization have been conducted, and existing longitudinal research has detected residual associations between sexual orientation and alcohol outcomes after accounting for contributors to minority stress (22). This suggests that further longitudinal investigations are needed, including those examining additional explanatory processes of HED among SMAs.

One such additional explanatory process is based on Socialization Theory, which posits that individuals may be at risk for using substances because the social networks or communities they affiliate with tend to be more tolerant of drug use (23, 24). In fact, associating with substance-using peer groups is a primary risk factor in most adolescent substance use theories (24, 25) and one of the strongest risk factors in adolescent substance use (26). Social learning theories posit that adolescents are strongly influenced by the behaviors of their peers (27); therefore, an adolescent who has peers who experiment with substance use is also more likely to use substances. The role of substance-using networks has been

identified as a risk factor for drug use among gay men (28); its contributing role in HED risk among SMAs needs to be determined.

Furthermore, Social Marginalization Theory suggests that marginalized groups are at risk of affiliating with deviant peer groups who engage in antisocial behaviors in an effort to fit in. In general, adolescents who are rejected by their mainstream peers are at risk for forming relationships with deviant peers (29) and, in turn, using substances (24, 25). Similarly, SMAs who are victimized or rejected by their peers may be at risk for substance use through their associations with specific peer groups. To our knowledge, only one study has investigated this pathway among SMAs (19). Consistent with Social Marginalization Theory, using cross-sectional analysis, anti-LGBT victimization was associated with substance abuse, and this association was statistically mediated by affiliation with deviant peers (19). To build on this study, the present study aims to examine this social marginalization pathway longitudinally for the first time among SMAs.

Overview and Hypotheses

The primary goal of this paper was to test the indirect socialization and social marginalization pathways to HED among SMAs. For the socialization pathway, it was hypothesized that SMAs would report higher levels of affiliation with substance-using peers, and that these affiliations would be associated with increased HED. The role of this pathway was examined over and above the role of one contributor to minority stress: sexual minority-related victimization. For the social marginalization pathway, it was hypothesized that affiliating with substance-using peers would be preceded by sexual minority-specific victimization, which would place SMAs at risk for HED. Furthermore, as prior research has supported larger disparities for sexual minority girls than boys in substance use (8) and HED (9, 11), sex differences were explored.

Method

Participants

Adolescents between 14 and 19 years old (inclusive) were recruited for a longitudinal study of adolescent health and wellness with an open-cohort design. Participants were recruited from medical provider referrals or a screening system in providers' waiting rooms from two large, urban adolescent medicine clinics affiliated with academic medical centers in Pennsylvania and Ohio. To participate in the study, the individual needed to be able to read and understand English at a sixth grade reading level. If under the age of 18, written consent was obtained from a parent or legal guardian. Both the parent and participant were present during the informed consent process during which it was explained verbally and in writing that none of the participant's responses will be shared with the parent. Participants over 18 years old provided written consent. Recruitment occurred between 2011 and 2014, and data collection will conclude in early 2016. Based on prior research identifying medium-range effects sizes of SMA disparities in alcohol outcomes medium range (7, 8), we designed this study to recruit a minimum of 300 participants, which would provide adequate power (>0.80) to detect small-to-medium effects. The goal of our purposive sample was to recruit up to 400 adolescents matched on sexual minority status, age, gender, and race. The study

procedures were approved by the Institutional Review Boards at the University of Pittsburgh and Nationwide Children's Hospital (Columbus, OH).

The present investigation focuses on the 303 adolescents with baseline and two follow-up visits as of 2014. Thirteen participants were not included in the analyses because they were missing baseline data for constructs in the present investigation, including parent education ($n=6$), sexual orientation ($n=1$), substance use ($n=5$), race/ethnicity ($n=1$), leaving a final sample size of 290 for this analysis.

Procedures

All assessments were completed using a computer-administered battery of questionnaires. Questionnaires were repeated every six months following the baseline assessment. The present study focuses on the first year that participants were in the study, which includes 3 evenly-spaced assessments that were each 6 months apart.

Measures

Sexual minority status—Participants were classified as being a sexual minority at wave 1 if they endorsed any sexual orientation outside of 100% heterosexual (i.e., mostly heterosexual (straight), but somewhat attracted to people of your own sex; bisexual--that is, attracted to men and women equally; mostly homosexual (gay), but somewhat attracted to people of the opposite sex; and 100% homosexual (gay)), endorsed any same-sex attraction in the past six months (i.e., a little bit, somewhat, very much, or extremely sexually attracted to same sex), or endorsed having sexual intercourse with a same-sex partner. Of the 100 adolescents classified as sexual minorities, 92 endorsed any sexual orientation outside of 100% heterosexual, and an additional 8 endorsed same-sex attraction or behavior. The resulting dummy-coded variable was coded '0' for heterosexual and '1' for sexual minority.

Sexual minority-specific victimization experiences—At waves 1 and 2, four items assessed the occurrence of sexual minority-specific victimization during the previous 6 months, including being “teased or bullied”, “hit or beaten up”, “treated rudely or unfairly”, or “called bad names” because “someone thought that you were gay/lesbian.” A programming issue allowed a subset of participants ($n = 15$ at wave 1, $n = 15$ at wave 2) to advance past items without selecting the “skip” response option, thus it is not known if these items were skipped inadvertently or intentionally. This programming issue was later addressed. Missingness/skippedness was not associated with sexual minority status and was evenly distributed across the questions. We retained individuals with missing/skipped responses in the analyses and estimated a victimization latent variable at each wave, which estimates a latent score based on all provided data. Factor loadings for identical items did not differ between waves ($\chi^2 = 2.52$, $df = 3$, $p = .47$) and thus were set to be equal.

Affiliation with substance-using peers—Thirteen items were adapted from previous research (30, 31) to assess peer substance use and tolerance of use. Specifically, 6 items assessed how many of the participant's friends (0 = none to 5 = all) engaged in alcohol, marijuana, and other drug use occasionally or regularly and 7 items asked if their “close friends” would strongly disapprove (0) to strongly approve (4) of the participant using the

substances occasionally or regularly, or “binge” drink each weekend. The items demonstrated acceptable internal validity at waves 1 (.89) and 2 (.89), and thus were averaged for a composite score (possible range: 0–4.5).

HED—Two items assessed the frequency of HED during the past 6 months at waves 1 and 2. Participants reported “how often did you drink five or more drinks when you were drinking?” and “how often have you gotten drunk or ‘very, very high’ on alcohol?” Response options ranged from 0 (not at all) to 11 (several times per day). At each wave, a latent variable representing HED was created with these two items as indicators with equal factor loadings.

Analytic Approach

Models were estimated in a structural equation modeling (SEM) framework using Mplus version 7.2 (32). The robust weighted least squares estimator (WLSMV) was utilized because the model included continuous, categorical, and non-normal variables. WLSMV handles missing data similarly to maximum likelihood, using all available data for model estimates (33). Model fit was acceptable if the 90% confidence interval of RMSEA contained .05 and CFI is > .95 (34). Outside of the HED and victimization variables that were modeled as latent variables, all other variables were observed variables. The indicators for the HED and victimization variables were specified as ordinal. The analyses controlled for baseline age, race (0=non-Hispanic White; 1=other race/ethnicity), and parent educational attainment, which was defined as the highest level of education completed by the participant’s mother, father, or parental figure (0=high school diploma, GED, or less; 1=at least some college).

The present study evaluated the socialization and social marginalization pathways by testing parallel and serial indirect pathways, respectively. First, the role of affiliating with substance-using peers in explaining sexual minority disparities in HED was examined (i.e., socialization pathway). This was accomplished by testing the indirect effect of sexual minority status (wave 1) on HED (wave 3) via affiliation with substance-using peers (wave 2) (Figure 1). Joint significance testing was used to test the significance of indirect effects, which supports the pathway when the product of the path coefficients (in this case the product of the effect of sexual minority status on affiliation with substance-using peers and the association between affiliation with HED) is statistically different from 0. Mediation analyses were conducted to test these indirect pathways irrespective of the significance of the direct effect because the aim of the study is to investigate processes linking sexual minority status to HED. Furthermore, statistical tests of direct effects are susceptible to being underpowered, particularly when there are multiple pathways or individual variability (such as sex differences) in the indirect effects(35)—both of which are relevant to this investigation. A 95% confidence interval for the indirect effect was computed using the Asymmetric Confidence Interval Method (ACI), using Prodcin software, taking into account the non-normally distributed indirect effect (36).

Second, two models were tested to see if the socialization pathway operates independently from or in sequence with a victimization pathway. To examine if this pathway occurs

parallel to (or independent from) a victimization pathway, the model depicted in Figure 2 was tested. That is, the indirect effects of affiliation with substance-using peers and sexual minority-specific victimization were tested simultaneously. To test if affiliation with substance-using peers may follow victimization (i.e., social marginalization pathway), the serial indirect pathway model depicted in Figure 3 was tested. This involved testing the relation between sexual minority status (wave 1) with sexual minority-related victimization (wave 1), which was, in turn, associated with affiliation with substance-using peers (wave 2), and, in turn, related to HED (wave 3). In addition to controlling for the aforementioned demographic covariates, all analyses controlled for baseline (wave 1) levels of the intervening variable(s) and dependent variable. For all models, sex was explored as a moderator of the indirect pathways using product terms.

Results

At wave 1, of the participants (mean age = 17.08) in this analysis, 92.4% were non-Hispanic, and 38.3% were White, 49.7 % Black, and 12.0% multi-racial/other race. 34.5% of the sample were SMAs. SMAs and heterosexual adolescents did not differ with regards to age, race, or parent education (Table 1). Females were more highly represented among SMAs ($\chi^2=10.62$, $df=1$, $p=.001$). SMAs reported significantly greater sexual minority-specific victimization experiences than heterosexual individuals ($b=1.19$, $p<.001$), which was not moderated by sex ($p=.64$). SMAs exhibited greater HED at wave 1 than heterosexual adolescents, but the difference was not statistically significant ($b=.14$, $p=.09$) nor was sex a significant moderator ($p=.06$). At wave 3, SMAs exhibited greater HED than heterosexual adolescents that was not statistically significant ($b=.09$, $p=.28$); however, sex was a significant moderator ($b=.41$, $p=.03$) such that SMAs exhibited significantly higher HED than heterosexual adolescents but only for females ($p=.05$).

The model testing the indirect effect of affiliation with substance-using peers between sexual minority status and HED exhibited acceptable model fit (reported in Figure 1). Relative to heterosexual adolescents, SMAs (wave 1) exhibited increased affiliation with substance-using peers (wave 2), controlling for previous affiliation with substance-using peers (wave 1; α). In turn, controlling for initial HED (wave 1), affiliation with substance-using peers (wave 2) was associated with increased HED (wave 3; β). These significant pathways corresponded with a significant indirect effect such that, relative to heterosexual adolescents, SMAs were more likely to affiliate with substance-using peers, which in turn, was associated with increased HED (indirect effect = 0.03, 95% CI: 0.01–0.07). Sex was not a moderator of the α or β pathways ($ps = .64$ and $.64$, respectively).

The parallel indirect effect model depicted in Figure 2 also demonstrated acceptable fit (reported in figure). Again, SMAs (wave 1) exhibited increased affiliation with substance-using peers (wave 2; α_1), which, in turn, was associated with increased HED (β_1), controlling for baseline HED and concurrent sexual minority-specific victimization. The pathways corresponded with a significant indirect effect (indirect effect=0.03, 95% CI: 0.01, 0.07). Similarly, SMAs reported more sexual minority-specific victimization than heterosexual adolescents (wave 2; β_2), controlling for such victimization at baseline. In turn, sexual minority-specific victimization was associated with increased HED (β_2), controlling

for concurrent affiliation with substance-using peers and baseline HED. The corresponding indirect pathway was supported, in which SMAs were at risk of victimization, which in turn, covaried with increased HED (indirect effect=.10, 95% CI: 0.02–0.19). Sex was not a significant moderator for the α or β paths comprising the indirect effects of affiliation ($ps = .30$ and $.93$, respectively) and victimization ($ps = .19$ and $.73$).

The serial indirect effect model depicted in Figure 3 exhibited acceptable model fit (see figure caption). The serial indirect effect pathway was not supported because sexual minority-specific victimization was not associated with affiliation with substance-using peers (β_1).¹ Sex did not significantly moderate the pathways (ps for moderators of α : $.66$, β_1 : $.62$, β_2 : $.50$).

Discussion

Results from this study provide the first longitudinal evidence for a socialization pathway to HED among SMAs. Specifically, affiliating with substance-using peers was supported as an indirect pathway from sexual minority status to HED. SMAs reported increased affiliations with substance-using peers over time relative to heterosexual adolescents, which was associated with increased risk of HED six months later. This indirect effect was associated with HED over and above an indirect effect of sexual minority-specific victimization that has been identified in prior longitudinal investigations of minority stress processes (22). Taken together, these results support two independent indirect pathways: one through affiliation with substance-using peers and another through victimization (one contributor to minority stress) that may explain HED risk among SMAs.

The pathways via substance-using peers and victimization appeared to operate similarly for boys and girls. Specifically, the associations between sexual minority status, victimization, affiliation with substance-using peers, and HED were similar for males and females. Sex differences in these pathways warrant additional consideration in future research, however, as the lack of sex differences in these indirect pathways could be partly due to the relatively small subsample of sexual minority boys.

A prospective social marginalization pathway, however, was not supported as sexual minority-specific victimization was not associated with affiliation with substance-using peers over time. These findings are in contrast to a recent cross-sectional investigation that supported relations between anti-LGBT school victimization and affiliation with deviant peers (19). The associations seen in the cross-sectional study were successfully replicated, however, in post-hoc cross-sectional analyses using the first wave of the present data. Thus, the inconsistent findings in this investigation may be due to examining prospective associations. Alternatively, the differential findings may be due to this study focusing on affiliation with substance-using peers over time as opposed to deviant peers that engage in a variety of antisocial behaviors. The results suggest that during late adolescence, affiliating with substance-using peers may put SMAs at risk for HED, but this pathway may not

¹The pattern of findings for the parallel and serial indirect effect models were successfully replicated after 1) classifying individuals as sexual minorities only if they endorsed minority sexual orientation (not based on same-sex attraction or behavior), 2) when the indicators of the HED variables were made dichotomous (representing non versus any HED), and 3) when only examining females.

necessarily result from recent victimization experiences. Future research is warranted to replicate these longitudinal pathways over a longer time frame or among younger SMAs whose peer groups may be differentially influenced by victimization. Furthermore, additional contributors to minority stress, such as discrimination and perceived or internalized stigma, may play a role in socialization processes and thus warrant further study in this context.

The results of the present investigation should be considered in light of several strengths and limitations. First, by utilizing longitudinal models, we were able to disentangle the temporal sequencing of interrelated variables that may impact HED among SMAs. Furthermore, by examining both victimization and socialization pathways simultaneously, it was possible to provide support for each pathway in uniquely contributing to HED risk among SMAs.

With respect to limitations, causal inferences cannot be made based on the statistical mediation tests. Disparities in HED based on sexual orientation were not entirely consistent with the existing literature as significant mean differences in HED were observed at wave 3 but not wave 1. This may be due to a number of factors, including sex differences and sample size. Specifically, consistent with prior investigations (7, 9, 11), disparities in HED were larger for female SMAs than male SMAs such that disparities were statistically significant only for females at wave 3. Also disparities may have been mitigated due to sample size, which would not only reduce power but also prevented separately examining risk for HED for subgroups of sexual minority adolescents. Prior research suggests that HED risk may be greater among bisexual girls than other sexual minority groups (8, 9). Furthermore, the present sample was recruited from urban adolescent medicine clinics; future work should examine these relations in nationally representative samples. Finally, to facilitate comparisons of drinking in our sample to national epidemiological studies, binge drinking was defined as 5 drinks or more per occasion, which may have underestimated binge drinking frequency for females that is typically defined as 4 drinks or more.

Given the dearth of longitudinal studies examining mediators of SMA disparities in substance use, the present study extends the current literature by providing longitudinal evidence of the role of sexual minority-related victimization in HED as well as demonstrating a parallel socialization pathway of risk via affiliation with substance-using peers. The present study provides a one-year snapshot of these processes in later adolescence; however, future research is warranted to investigate the processes connecting victimization, development of peer relations, and HED over longer time frames and during different developmental stages. Thus, the present study provides a preliminary rationale for developing interventions that target peer-related pathways to HED among SMAs. For example, previous studies suggest that adolescents would benefit from discussions with their healthcare providers about sexual orientation as one means to intervene with associated victimization and health risk behaviors like substance abuse (37, 38). As our sample was recruited from adolescent medicine clinics, it further suggests that these issues are salient to many SMAs presenting to these clinics. Furthermore, as associations between sexual minority-related victimization and substance use have also been identified in school settings, and positive school environment and adult or parental support appear to be protective factors (17, 39), an area of future research is determining if these risk processes can be intervened

with via school and parental interventions. Taken together, identifying multiple risk pathways for HED among SMAs opens the door for additional approaches to prevent heavy and problematic drinking.

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Figure 1.

The indirect effect of sexual minority status on HED via affiliations with substance-using peers.

Note. Standardized path coefficients are reported in the figure. Analyses controlled for wave 1 levels of the intervening and dependent variables, age, minority race or ethnicity, and parent educational attainment. Observed variables are represented by boxes and latent variables by circles. Model fit was acceptable, $\chi^2 = 49.26$, $df = 31$, $p = .02$; RMSEA = .045, 90% CI: .02–.07; CFI = 0.99.

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Figure 2.

A parallel indirect effects model testing the role of affiliations with substance-using peers on HED over and above the effect of victimization.

Note. Standardized path coefficients are reported in the figure. Analyses controlled for wave 1 levels of the intervening and dependent variables, age, minority race or ethnicity, and parent educational attainment. Observed variables are represented by boxes and latent variables by circles. Model fit was acceptable, $\chi^2 = 283.10$, $p < .001$; RMSEA = .063, 90% CI: .05–.07; CFI = .97.

*** $p < .001$, ** $p < .01$, * $p < .05$, $^{\dagger}p < .10$

Figure 3.

A serial indirect effect pathway testing the role of social marginalization in risk of HED.

Note. Standardized path coefficients are reported in the figure. Analyses controlled for wave 1 levels of the intervening and dependent variables, age, minority race or ethnicity, and parent educational attainment. Observed variables are represented by boxes and latent variables by circles. Model fit was acceptable, $\chi^2 = 128.69$, $p < .001$; RMSEA = .05, 90% CI: .04–.07; CFI = .98).

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Table 1

Baseline characteristics by sexual minority status.

	Sexual minority (n = 100)	Heterosexual (n = 190)	Total (N = 290)
Age	17.17 (1.50)	17.03 (1.33)	17.08 (1.39)
Female (%)	83.0	64.7	71.0
Non-Hispanic White (%)	29.0	35.8	33.4
High parent education (%)	63.0	66.8	65.5
Heavy episodic drinking *	0.87 (1.79)	0.49 (1.59)	0.62 (1.67)
Sexual minority-related victimization *	1.99 (2.19)	0.44 (1.26)	0.98 (1.79)

* Latent variable scores are reported.