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Event-level associations among minority stress, coping motives, and substance use among sexual minority women and gender diverse individuals

Christina Dyar¹, Debra Kaysen², Michael E. Newcomb^{3,4}, Brian Mustanski^{3,4}

¹College of Nursing, The Ohio State University

²Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine

³Institute for Sexual and Gender Minority Health and Wellbeing, Northwestern University

⁴Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University

Abstract

Background: Sexual minority women and gender diverse individuals (SMWGD) are at heightened risk for alcohol and cannabis use disorders compared to heterosexual and cisgender individuals, and their heightened risk has been attributed to minority stress. However, few longitudinal studies have examined mechanisms through which minority stress may impact substance use, and none have done so at the event-level.

Methods: We utilized data from a 30-day ecological momentary assessment study of 429 SMWGD who used alcohol or cannabis regularly to test a mechanistic process in which minority stress predicts alcohol and cannabis use via coping motives for use at the event-level.

Results: When individuals experienced more enacted stigma (e.g., microaggressions) than usual during one assessment, they were more likely to use cannabis to cope during the next. In turn, occasions when cannabis was used to cope were marked by more sessions of cannabis use, longer intoxication, higher subjective intoxication, and more cannabis consequences. Indirect effects of enacted stigma on cannabis use via coping motives were significant. However, only one of internalized stigma's indirect effects was significant, with internalized stigma predicting cannabis consequences via daily coping motives. No indirect effects predicting alcohol use were significant.

Conclusions: Findings provide robust evidence that using to cope is a mechanism through which enacted stigma predicts cannabis use and internalized stigma predicts cannabis consequences. Results did not provide evidence for similar associations for alcohol. Our findings suggest that interventions designed to reduce cannabis use among SMWGD should attend to their minority stress experiences and cannabis use motives and teach alternative coping strategies.

Keywords

sexual and gender minorities; cannabis use; minority stress; substance use motives

1. Introduction

Sexual minority populations (i.e., lesbian, gay, bisexual, and other non-heterosexual individuals) are at elevated risk for alcohol and cannabis use disorders relative to heterosexual populations (Kerridge et al., 2017; Krueger et al., 2020). This disparity is more pronounced for sexual minority women compared to sexual minority men (Kerridge et al., 2017; Krueger et al., 2020). Further, gender diverse sexual minority individuals assigned female at birth (i.e., sexual minorities who identify outside the gender binary [e.g., non-binary]) are at higher risk than their cisgender sexual minority counterparts (Watson et al., 2020). Numerous studies have linked sexual minorities' elevated rates of substance use to the stress experienced by sexual minorities as a result of the stigmatization of non-heterosexuality, referred to as minority stress (Goldbach et al., 2014; Kidd et al., 2018). However, existing research on the link between minority stress and substance use had been limited by its reliance on cross-sectional and semi-annual longitudinal methods and its limited examination of mechanisms of this association. The current study aims to address these limitations by using ecological momentary assessment (EMA) to examine a proposed mechanistic process in which minority stress predicts alcohol and cannabis use via coping motives for substance use at the event-level among a sample of sexual minority women and gender diverse individuals assigned female at birth (SMWGD).¹

1.1. Minority Stress and Substance Use

The majority of existing research on minority stress and substance use has been cross-sectional (Goldbach et al., 2014; Kidd et al., 2018). However, a small number of semi-annual longitudinal studies have found that enacted stigma (i.e., biased treatment by others; e.g., discrimination, microaggressions) predicted higher concurrent alcohol consumption (i.e., quantity by frequency; Newcomb et al., 2012) and alcohol and cannabis consequences (Dyar et al., 2020), as well as subsequent increases in binge drinking (Dermody et al., 2016). Another study linked minority stress to subsequent increases in alcohol consequences, but not in the quantity consumed (Wilson et al., 2016). While under-researched in comparison to enacted stigma, internalized stigma has also been linked to concurrent alcohol and cannabis consequences (Dyar et al., 2019). These findings provide evidence of a link between minority stress and alcohol use, but suggest that the specific outcome (e.g., consumption, consequences) linked to minority stress may vary across studies.

Semi-annual longitudinal studies, like those discussed above, provide critical information about the link between minority stress and substance use over longer periods of time (e.g., minority stress predicting substance use months later). However, they fail to capture more fine grained relationships such as how minority stress may influence substance use on a day to day basis (Bolger & Laurenceau, 2013). EMA studies (i.e., one or more assessment per day for several consecutive days) provide higher temporal precision and a detailed understanding of how minority stress events may contribute to substance use in

¹Given the growing proportion of sexual minority individuals (especially those assigned female at birth) who identify as non-binary and genderqueer (Newcomb et al., 2019; Richards et al., 2016), it is critical that research focused on sexual minorities be inclusive of gender diverse sexual minority individuals in order to increase the generalizability and inclusivity of this research.

near-real time, making them ideal for identifying mechanisms of this association (Bolger & Laurenceau, 2013; Shiffman, 2009).

A few recent EMA studies have examined associations between minority stress and substance use. These studies have consistently linked enacted stigma with concurrent alcohol use outcomes (Dyar, Dworkin, et al., 2021; Ehlke et al., 2021; Lewis et al., 2021; Livingston et al., 2017), but as in semi-annual longitudinal studies, the specific outcomes linked with minority stress varied from study to study and not all studies found evidence of prospective associations. For example, while Ehlke et al. (2021) linked enacted stigma with concurrent likelihood of drinking, quantity consumed, and consequences, Lewis et al. (2021) only found evidence for a link between enacted stigma and same-day likelihood of drinking, not concurrent drinking quantity or consequences. Similarly, Dyar, Dworkin, et al. (2021) linked minority stress with same-day drinking consequences, but not consumption. Kiekens and Mereish (2022) demonstrated concurrent associations between enacted stigma (but not internalized stigma) and likelihood of alcohol use. Only two studies found evidence of prospective associations, with enacted stigma predicting higher likelihood of subsequent substance use (Livingston et al., 2017) and subsequent drinking quantity, but not subsequent likelihood of drinking or consequences (Lewis et al., 2021). Together, these findings provide evidence of a link between minority stress and aspects of alcohol use, despite some variation in findings across studies. Notably, these EMA studies have almost exclusively focused on alcohol use and enacted stigma, with little examination of other substances or internalized stigma. Given recent increases in cannabis use and cannabis use disorder attributed to the legalization of medical and recreational cannabis use in many states (Hasin & Walsh, 2021; Hasin et al., 2019) and high rates of cannabis use disorder among SMWGD (Kerridge et al., 2017), additional research is needed to understand risk factors for cannabis use at the event-level in this population. Such research can inform the development of interventions for cannabis use disorder for SMWGD.

1.2. Coping Motives

Hatzenbuehler (2009) proposed a process through which minority stress may contribute to substance use among sexual minorities. Hatzenbuehler theorized that minority stress depletes sexual minorities' coping resources, leading to an increased reliance on using substances to cope with stress and negative emotions. Using to cope, in turn, has been linked to higher risk for developing disordered use via a cycle of negative reinforcement (Bresin & Mekawi, 2019; Kuntsche et al., 2016). However, few studies have tested this mechanistic process. In two cross-sectional studies, Feinstein and Newcomb (2016) and Kalb et al. (2018) demonstrated that using to cope mediated associations between enacted stigma and cannabis and alcohol use consequences, respectively. Among a sample of bi+ individuals from a semi-annual longitudinal study, Dyar, Feinstein, Newcomb, et al. (2021) demonstrated that minority stressors unique to bi+ individuals prospectively predicted increases in cannabis use consequences via increases in using cannabis to cope. However, EMA studies have found that motives for substance use vary from day to day (Dworkin et al., 2018; Dworkin et al., 2021). This suggests that coping motives may operate as mechanisms at the event-level, with minority stressors predicting using substances to cope

on the same-/next-day. Therefore, examining how the proposed mechanistic process unfolds on a day-to-day basis is an important direction for future EMA research.

1.3. Current Study

The current study aims to address gaps in the existing literature by utilizing EMA to examine a proposed process in which minority stressors (enacted and internalized stigma) predict alcohol use (quantity, consequences) and cannabis use (frequency of use, duration of intoxication, subjective intoxication, consequences) via coping motives for alcohol/cannabis use. We used a sample of sexual minority women and gender diverse individuals (SMWGD), a group that experiences pronounced disparities in alcohol and cannabis use (Krueger et al., 2020; Schuler & Collins, 2020; Watson et al., 2020). At the within-person level, we hypothesized that experiencing more enacted or internalized stigma than usual during a given assessment (time $t-1$) would prospectively predict increases in using alcohol/cannabis to cope (time t). In turn, when substance use was motivated by a desire to cope, participants would report higher alcohol consumption, more frequent cannabis use, longer duration and higher cannabis intoxication, and more alcohol and cannabis use consequences during the same assessment (time t). We did not include a lag between coping motives and substance use outcomes, because motives for use should co-occur with actual use rather than predict use many hours later.

2. Method

2.1. Participants and Procedures

The current analyses used data from a longitudinal study of substance use among SMWGD. Participants were recruited via online advertisements on social media (e.g., Facebook) between August 2020 and May 2021. The study included a baseline assessment (day 0), a 30-day EMA study (days 1–30), and a follow-up assessment (completed within two weeks of day 30). This study uses data from the 30-day EMA study. During the EMA period, participants completed one survey in the morning (8:00am-1:00pm in their time zone) and one in the evening (6:00pm-12:00am in their time zone). The study received IRB approval at Northwestern University.

Eligible participants were U.S. residents, 18–25 years old; identified as lesbian, bisexual, pansexual, or queer; were assigned female at birth; identified as women or outside the gender binary (e.g., non-binary, genderqueer); and met alcohol or cannabis use criteria (i.e., four or more drinks at least twice and/or cannabis use on at least three days in the past month).² Transgender men and women were excluded from the current study due to differences in social norms for substance use for men and in sex-based alcohol consumption criteria (e.g., heavy episodic drinking) for individuals assigned male compared to female at birth. Participants were paid up to \$150 based on completion rates: \$20 for baseline, \$20 for follow-up, \$1 for each EMA survey, and \$5 bonus for each 6 surveys completed in a row.

²Alcohol and cannabis use criteria were selected to have adequate power (which increases as the expected number of alcohol and cannabis use days reported increases) while maintaining broader generalizability (by keeping the criteria for the minimum number of substance use days reported at baseline low) and to be broadly consistent with inclusion criteria of other EMA studies of substance use.

There were 429 participants. See Table 1 for demographics. The sample was comprised predominately of people of color, with 33.6% of the sample identifying exclusively as non-Latinx White. There were a sizeable number of gender minority participants (26.8%).

2.2. Measures

2.2.1. Enacted Stigma—Enacted Stigma was assessed by asking participants two questions. First, participants were asked an item adapted from Mohr and Sarno (2016): “Did you experience anything stressful or negative related to your sexual orientation since the last survey? This could be something that was relatively minor (e.g., feeling that your sexual identity was not respected) or major (e.g., being physically attacked because of your sexual orientation).” Participants were asked to indicate yes or no. Regardless of their response, participants were asked to “indicate which of the following events you have experienced since the last survey because of your sexual orientation” and provided with a list of 10 experiences of enacted stigma that have been utilized in previous EMA studies (e.g., “someone acted uncomfortable around me”; Dyar & London, 2018; Flanders, 2015). Utilizing both measures allowed us to capture a wider range of experiences of enacted stigma than either measure alone. Given that few participants endorsed multiple types of enacted stigma on the same day, we created a binary variable from these measures. See Supplementary Materials for all items and psychometric information.

2.2.2. Internalized Stigma—Internalized Stigma was assessed by asking participants to indicate “since the last survey, how did you feel about being (lesbian/bisexual/pansexual/queer)³?” on a sliding scale ranging from 0 (very negative) to 100 (very positive). Scores were reversed and divided by 20 to obtain final scores ranging from 0 (low internalized stigma) to 5 (high internalized stigma). This measure was selected to reduce participant burden (as other measures of internalized stigma include multiple items) and using a wider scale (0–100) was expected to provide more variability than scales with fewer options (e.g., 0–5).

2.2.3. Coping Motives for Alcohol/Cannabis Use.—During surveys when participants indicated using alcohol and/or cannabis, they were asked to indicate whether they drank or used cannabis for coping motives via three items (e.g., “to cheer me up or forget my worries or problems”; response options: (0) no, 1 (yes)). These items were adapted from Patrick et al. (2019). Using to cope was scored as a binary variable (0 = no coping motives; 1 = at least one coping motive).

2.2.4. Cannabis Use Outcomes.—The following items were assessed when participants indicated having used cannabis. Frequency, duration of intoxication, and subjective intoxication items were adapted from the Cannabis Use Inventory and participants were asked to answer them thinking about their use since the last survey (Cuttler & Spradlin, 2017).

³A participant’s sexual identity was piped into this space.

2.2.4.1. Frequency of Cannabis Use: Frequency of Cannabis Use was assessed by the item “How many separate occasions/sessions of marijuana use did you have?” Response options ranged from 0 to 50+.

2.2.4.2. Duration of Intoxication: Duration of Intoxication was measured by asking “How many hours were you high?” Responses were provided in increments of one hour from 0 to 11 hours and participants could also indicate being high for 12 or more hours.

2.2.4.3. Subjective Intoxication: Subjective Intoxication was assessed by asking “How high did you get when you used marijuana?” on a scale of 0 (not at all high) to 4 (extremely high).

2.2.4.4. Cannabis Consequences: Cannabis Consequences were measured only during morning assessments by using six selected items from two existing measures of marijuana consequences (Lee et al., 2021; Simons et al., 2012). Participants were asked which “of the following things happened to you as a result of your marijuana use yesterday?” (e.g., “I felt dizzy or sick”). Participants could select multiple items. A count of consequences endorsed (ranging from 0 to 6) was calculated.

2.2.5. Alcohol Use Outcomes.—The following items were assessed when participants indicated drinking.

2.2.5.1. Number of Drinks: Number of Drinks consumed was assessed by asking participants “How many drinks did you have since the last survey?” Participants could indicate the specific number of drinks they consumed from 0 to 24 or indicate that they consumed 25 or more drinks.

2.2.5.2. Alcohol Consequences: Alcohol Consequences were measured only during morning assessments using a five item adapted version of a measure of consequences used in a previous EMA study of alcohol use among sexual minority women (Dyar, Dworkin, et al., 2021). One item from the original six item measure (“I hurt or injured myself by accident”) was dropped due to low endorsement in the prior study (Dyar, Dworkin, et al., 2021). Participants were asked “Did any of the following things happen to you yesterday as a result of drinking?” and could indicate 1 (yes) or 0 (no) to five negative consequences (e.g., “I did something that embarrassed me”; “I had a hangover”). A count of the consequences endorsed was calculated.

2.3. Analytic Plan

Analyses were conducted in Mplus version 8.6. There were a total of 19,186 completed surveys from 429 participants. The median completion rate was 88.3% ($M = 74\%$, $SD = 28\%$). Within completed surveys, less than 1% of data were missing. Missing data were handled using Bayesian methods (Asparouhov & Muthén, 2010). Multilevel structural equation modeling (MSEM) with a Bayesian estimator and diffuse (non-informative) priors was used.^{4,5} A probit link was used for binary outcomes (e.g., using to cope).⁶ The confidence/credible interval for the indirect effect was calculated within the context of

the model using Bayesian estimation, as bootstrapping is not necessary with Bayesian estimation (Yuan & MacKinnon, 2009).

We examined prospective indirect effects models. In each model, within- and between-person components of a minority stress variable (i.e., enacted or internalized stigma) predicted within- and between-person components of using to cope and a substance use outcome. Additionally, within- and between-person components of using to cope predicted within and between-person components of a substance use outcome. At the within-person level, minority stress was assessed at time $t-1$ (e.g., at one assessment), while coping motives and substance use were assessed at t (e.g., at the next assessment). We did not include a lag between coping motives and substance use as coping motives for use would no longer align with characteristics of the use occasion motivated by coping (e.g., number of use sessions, subjective high).

As coping motives were only assessed during observations when a substance was used, only observations during which participants reported drinking or using cannabis were included in analyses. Further, only participants who met inclusion criteria for a substance were included in analyses of that substance. This resulted in a total of 3,383 observations from 322 participants for alcohol use analyses and 5,267 observations from 319 participants for cannabis use analyses. As consequences were only assessed once per day, analyses that involved this variable used day-level composites of other variables. In all models, we controlled for day of assessment and assessment type (weekend/weekday; morning/evening) at the within-person level. Further, we included first-order autocorrelations for the mediator and outcome in each model (i.e., correlation between variable at $t-1$ with variable at t), which effectively controls for the prior timepoint of the mediator and the outcome. Within-person associations among minority stress, using to cope, and substance use variables and autocorrelations were allowed to vary across individuals. Age, sexual identity, gender identity, and race/ethnicity were included as covariates at the between-person level. See Figure 1 for a visual depiction of the prospective indirect effects model.

3. Results

Participants reported experiencing enacted stigma on 8% of days, drinking on 20% of days, and cannabis use on 28% of days (Table 2). On drinking days, participants consumed an average of 2.51 drinks and experienced less than one consequence. On cannabis use days, participants reported using cannabis 1.91 times, were intoxicated for 3.31 hours, reported being moderately intoxicated, and experienced less than one consequence on average. Using to cope was common, with participants indicating drinking to cope on 56% of drinking days and using cannabis to cope on 80% of cannabis use days.

⁴MSEM utilizes latent variables, rather than group- and grand-mean centering, to separate within- from between-person variance (Ludtke et al., 2008). By removing the between-person variance from the within-person variance, the within-person variables indicate the extent to which an individual was experiencing more/less of a construct than usual (above/below their person mean) on a particular day (e.g., experiencing more/less minority stress than usual).

⁵We used Markov Chain Monte Carlo (MCMC) algorithms to generate a series of 10,000 random draws from the multivariate posterior distribution of our sample for each model. Trace plots and the Gelman-Rubin potential scaling reduction (PSR) were used to determine whether convergence was achieved (Depaoli & Clifton, 2015; Muthen, 2010).

⁶Probit regression coefficients represent the variance shared by the predictor and the latent continuous response variables underlying each binary observed item (Agresti, 2003).

3.1. Cannabis Use Models.

At the within-person level, when participants experienced enacted stigma, they were more likely to use cannabis to cope during the subsequent period (e.g., during the next evening). When cannabis was used to cope, individuals tended to report more sessions of cannabis use, longer duration of intoxication, higher subjective intoxication, and more consequences of use compared to when cannabis was not used to cope (Table 3). All of these prospective indirect effects were significant (Table 4).

In models examining internalized stigma, a different pattern of within-person associations was present. Internalized stigma only prospectively predicted using to cope in the model of cannabis use consequences. Using to cope, in turn, significantly predicted all cannabis use outcomes. Only one prospective indirect effect was significant. Specifically, when participants experienced higher internalized stigma than usual (i.e., compared to their average across observations), they were more likely to use cannabis to cope in the next period, which in turn was associated with experiencing more cannabis use consequences than usual.

3.2. Alcohol Use Models.

At the within-person level, enacted stigma was not prospectively associated with drinking to cope, and drinking to cope was not associated with number of drinks or consequences. While internalized stigma was prospectively associated with drinking to cope in the alcohol consequences model, drinking to cope was not associated with drinking consequences. Therefore, none of the hypothesized indirect effects were significant.

4. Discussion

To our knowledge, this is the first EMA study to test the proposed mechanistic process in which minority stress predicts substance use via using to cope. Consistent with hypotheses, we found that enacted stigma prospectively predicted several cannabis use outcomes via using to cope and internalized stigma predicted cannabis use consequences (but not other cannabis use outcomes) via coping motives. Surprisingly, we found no evidence that using to cope mediated associations between minority stress and alcohol use. Together, these findings substantially advance our understanding of how minority stress may contribute to substance use on a day-to-day basis.

These findings provide strong support for Hatzenbuehler's (2009) psychological mediation framework with regard to cannabis use. Very few studies have previously tested the role of coping motives in associations between minority stress and substance use, and they have been cross-sectional (Feinstein & Newcomb, 2016; Kalb et al., 2018), with the exception of one semi-annual longitudinal study (Dyar, Feinstein, Newcomb, et al., 2021). By demonstrating that using to cope mediated associations between minority stress (especially enacted stigma) and cannabis use outcomes at the event-level, these findings demonstrate that this process unfolds quickly. When an individual experiences minority stress, they are more likely to use cannabis to cope during the next 12–24 hours, and when coping is the motive for use, individuals tend to use cannabis more frequently, attain higher intoxication,

stay intoxicated for longer, and experience more consequences. These findings demonstrate the robustness of this indirect effect by providing evidence that it affects four cannabis use outcomes, only one of which was examined in the recent semi-annual longitudinal study (Dyar, Feinstein, Newcomb, et al., 2021). Further, our findings indicate that this process unfolds at the event level, rather than requiring an accumulation of minority stress over a longer period. This information could be used to inform future interventions, which may teach alternative strategies for coping with minority stress.

Notably, evidence for coping motives as a mechanism of the association between internalized stigma and cannabis use was less consistent, with only one significant indirect effect. This may be due to the low percentage of day-to-day variance in internalized stigma, which may have hindered our ability to detect significant within-person effects. This may reflect the measure used or low daily variation in this construct. As prior studies utilizing other measures have also noted low variance in internalized stigma (Dyar, Feinstein, Bettin, et al., 2021; Feinstein et al., 2017), it appears that internalized stigma may not be an ideal construct for examination on a daily basis. Future research may consider examining associations between internalized stigma and substance use over longer timeframes using semi-annual longitudinal methods. Despite this limited daily variance, there was a significant effect of internalized stigma on cannabis consequences. Similar patterns (i.e., significant associations between minority stress and consequences but not quantity of substance use) have been found in other samples (Dyar, Dworkin, et al., 2021; Dyar et al., 2020; Wilson et al., 2016). This pattern may indicate that internalized stigma is associated with higher risk styles of substance use (e.g., using alone) or reduced use of protective behavioral strategies in some circumstances. Given the persistence of this pattern of findings across numerous samples, further research should examine potential factors that may explain this pattern.

Surprisingly, we found no evidence of an indirect effect of minority stress on alcohol consumption or consequences via drinking to cope. In most models, minority stress did not predict drinking to cope, which in turn, did not predict alcohol use. These non-significant associations may be due to lower drinking consequences compared to cannabis use consequences in this sample. At baseline, the average AUDIT (Alcohol Use Disorder Identification Test; Saunders et al., 1993) score was 9.81 ($SD = 5.21$), while the average CUDIT score (Adamson et al., 2010) was 12.57 ($SD = 6.39$) despite the potential range for CUDIT (0–32) being lower than for AUDIT (0–40). Therefore, it is possible that minority stress may only contribute to higher rates of use via using to cope among individuals with patterns of use associated with consequences. Alternatively, using cannabis to cope may be perceived to be more socially acceptable than using alcohol to cope among SMWGD. Research indicates that the perceived riskiness of cannabis use decreases in the general population following the legalization of medical and recreational use (Carliner et al., 2017). As cannabis use was already perceived to be more acceptable among SMWGD than among heterosexual, cisgender individuals (Mereish et al., 2017), it is possible that the legalization of cannabis use and cannabis's perceived efficacy in reducing stress (Cuttler et al., 2018) may have contributed to higher social acceptability for using cannabis to cope. Further research is needed on descriptive and injunctive norms for alcohol and cannabis use among SMWGD. Given that these non-significant findings are inconsistent with theory and prior

studies, further research is needed to explore when and in what circumstances minority stress contributes to drinking.

4.1. Limitations

Study findings should be considered in light of their limitations. First, only SMWGD who lived in the United States and used alcohol or cannabis regularly were included in this sample. It unclear to what extent findings generalize to sexual minority men, sexual minorities assigned male at birth, sexual minorities who live outside the US, and those who use alcohol or cannabis less frequently. Second, data were collected during the COVID-19 pandemic, a period when substance use was elevated for some groups (Dumas et al., 2020; Fish et al., 2021), and this may have affected findings. Third, the cannabis use inclusion criteria did not take into account the amount of cannabis consumed on each occasion due to a lack of established guidelines regarding cannabis quantity that parallel those for heavy episodic drinking. Therefore, inclusion criteria for alcohol and cannabis use were not equivalent and may have contributed to differences in the effects found for these two substances. Fourth, while the current sample included cisgender women and gender diverse individuals, our analyses focused on sexual minority stress. Future research should explore the effects of gender minority stress and the intersection of sexual and gender minority stress on substance use among gender diverse samples. Fifth, this manuscript focused on coping motives. However, it has been suggested that other motives may also link minority stress with substance use (Dworkin et al., 2018). Future research should explore the roles of other substance use motives in this association.

4.2. Conclusions

The current study was the first to use EMA to test using to cope as a mechanism of the association between minority stress and substance use. Findings provide robust evidence that enacted stigma predicts various cannabis use outcomes and internalized stigma predicts cannabis use consequences via using to cope. Surprisingly, results did not provide evidence for similar associations for alcohol use. Our findings suggest that interventions designed to reduce cannabis use among SMWGD should attend to their experiences of minority stress and motives for cannabis use and teach alternative approaches to coping with minority stress.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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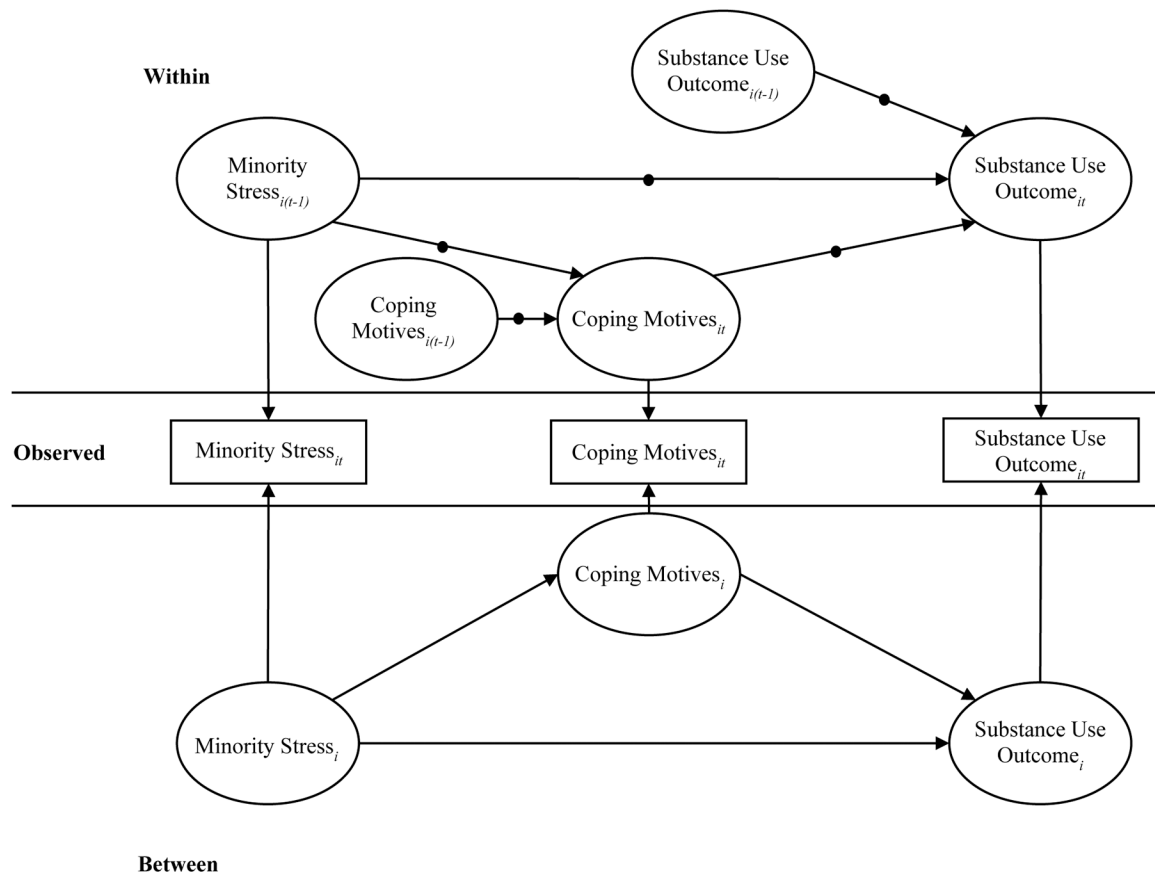


Figure 1. Visual depiction of prospective multilevel indirect effect model. Lines with dots at the within-person level indicate random slopes. Covariates and residual variances are not presented for simplicity. At the within-person level, fixed effects of day of assessment, morning/evening assessment, and weekend/weekday assessment predicted coping motives_{it} and substance use outcome_{it}. At the between-person level, age, sexual identity, race/ethnicity, and gender identity predicted coping motives_i and substance use outcomes_i. All random slopes were allowed to correlate at the between-person level, but this is not presented for figure clarity.

Table 1

Demographics of Analytic Sample at Baseline (N = 429)

Demographic Variable	<i>n</i>	%
Sexual Identity		
Lesbian	112	26.1%
Bisexual	111	25.9%
Pansexual	112	26.1%
Queer	94	21.9%
Race/Ethnicity ^a		
White	235	54.8%
Black	102	23.8%
Latinx	129	30.1%
Asian	53	12.4%
Other Race/Ethnicity	34	7.9%
Gender Identity		
Cisgender Women	314	73.2%
Gender Minority	115	26.8%
Substance Use Criteria Met		
Alcohol Only	110	25.6%
Cannabis Only	107	24.9%
Alcohol and Cannabis	212	49.4%
Age (<i>M, SD</i>)	22.27 (2.01)	

^aPercentages add up to more than 100% because participants could select multiple racial/ethnic identities.

Table 2

Means, Variances, and Intraclass Correlations

	Mean	Standard Deviation	Range	Intraclass Correlation
Enacted Stigma	.08	.27	0–1	.14
Internalized Stigma	1.30	1.06	0–5	.81
Likelihood of Alcohol Use	.20	.40	0–1	.13
Number Drinks	2.51	1.84	1–34	.35
Drinking Consequences	.31	.70	0–5	.30
Drinking to Cope	.56	.50	0–1	.20
Likelihood of Cannabis Use	.28	.45	0–1	.38
Cannabis Frequency	1.91	1.41	1–25	.51
Duration High	3.31	2.06	0–12	.45
Subjective High	1.80	.81	0–4	.32
Cannabis Consequences	.42	.76	0–6	.38
Using Cannabis to Cope	.80	.40	0–1	.20

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Table 3

Prospective Within-Person Effects

Predictor	Mediator	Outcome	Pathway	Prospective			
				b	95% CI p		
Enacted Stigma	Coping Motives for Cannabis Use	Frequency Cannabis Use	Enacted Stigma → Coping Motives	.25	.08, .43	.004	
			Coping Motives → Freq. Cannabis Use	.13	.09, .19	<.001	
	Duration of High	Duration of High	Enacted Stigma → Freq. Cannabis Use	-.08	-.20, .03	.16	
			Enacted Stigma → Coping Motives	.27	.10, .45	.002	
			Coping Motives → Duration High	.05	.03, .10	<.001	
	Subjective High	Subjective High	Enacted Stigma → Duration High	-.15	-.32, .02	.08	
			Enacted Stigma → Coping Motives	.24	.05, .46	.01	
	Cannabis Consequences	Coping Motives → Subjective High	Subjective High	Coping Motives → Subjective High	.04	.001, .07	.04
				Enacted Stigma → Subjective High	-.10	-.20, .001	.06
		Cannabis Consequences	Cannabis Consequences	Enacted Stigma → Coping Motives	.35	.05, .62	.02
Coping Motives → Consequences				.12	.04, .20	.002	
Enacted Stigma → Consequences				-.09	-.25, .05	.23	
Coping Motives for Drinking	Coping Motives for Drinking	Number of Drinks	Enacted Stigma → Coping Motives	.08	-.14, .26	.49	
			Coping Motives → Drinks	.01	-.05, .07	.72	
	Alcohol Consequences	Alcohol Consequences	Enacted Stigma → Drinks	.05	-.22, .30	.73	
			Enacted Stigma → Coping Motives	.24	-.09, .66	.16	
			Coping Motives → Consequences	.02	-.07, .10	.69	
	Internalized Stigma	Coping Motives for Cannabis Use	Frequency Cannabis Use	Enacted Stigma → Consequences	-.05	-.23, .13	.57
				Internalized Stigma → Coping Motives	.10	-.02, .22	.10
		Duration of High	Duration of High	Coping Motives → Freq. Cannabis Use	.16	.11, .19	<.001
				Internalized Stigma → Freq. Cannabis Use	-.07	-.14, .001	.05
				Internalized Stigma → Coping Motives	.08	-.04, .20	.21
Subjective High	Subjective High	Coping Motives → Duration High	.10	.05, .15	<.001		
		Internalized Stigma → Duration High	-.19	-.30, -.08	<.001		
Coping Motives → Subjective High	Coping Motives → Subjective High	Internalized Stigma → Coping Motives	.07	-.08, .21	.34		
		Internalized Stigma → Subjective High	.04	.01, .07	.01		
Internalized Stigma → Subjective High	Internalized Stigma → Subjective High	Internalized Stigma → Subjective High	-.02	-.08, .06	.62		

Predictor	Mediator	Outcome	Pathway	b	Prospective	
					95% CI	p
		Cannabis Consequences	Internalized Stigma → Coping Motives	.75	.21, 1.16	.01
			Coping Motives → Consequences	.12	.06, .19	< .001
			Internalized Stigma → Consequences	.002	-.14, .15	.99
		Number of Drinks	Internalized Stigma → Coping Motives	-.07	-.21, .07	.34
			Coping Motives → Drinks	.001	-.07, .07	.99
			Internalized Stigma → Drinks	-.15	-.29, -.02	.02
		Alcohol Consequences	Internalized Stigma → Coping Motives	.59	.28, .96	< .001
			Coping Motives → Consequences	.04	-.04, .11	.31
			Internalized Stigma → Consequences	-.03	-.15, .09	.59

Associations presented are within-person prospective effects (predictor at *t*, mediator and outcome at *t+1*). Within-person covariates included in all models: day of assessment; assessment type (weekend/weekday; morning/evening). First-order autocorrelations for the mediator and outcome were included in all models. Between-person covariates included: age, sexual identity, gender identity, and race/ethnicity.

Table 4

Prospective Within-Person Indirect Effect Estimates

Predictor	Mediator	Outcome	Indirect Effect				
			<i>b</i>	95% <i>CI</i>	<i>p</i>		
Enacted Stigma	Using Cannabis to Cope	Frequency Cannabis Use	.03	.01, .06	.004		
		Duration of High	.01	.004, .03	.002		
		Subjective High	.01	.0001, .02	.05		
		Cannabis Consequences	.04	.004, .10	.02		
	Drinking to Cope	Number of Drinks	.001	-.01, .01	.87		
		Alcohol Consequences	.002	-.02, .04	.71		
		Internalized Stigma	Using Cannabis to Cope	Frequency Cannabis Use	-.001	-.002, <.001	.10
				Duration of High	.0100	-.004, .02	.21
Subjective High	.002			-.003, .01	.36		
Cannabis Consequences	.09			.02, .18	.01		
Drinking to Cope	Number of Drinks		<.001	-.01, .01	.96		
	Alcohol Consequences	.02	-.02, .08	.31			