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Author Contributions

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Abstract

Purpose

Minority stress is related to short-term increases in substance use. This study identified patterns of cannabis use over four years among sexual and gender minority (SGM) people. We examined if cannabis use trajectories related to baseline minority stressors, and if differences by gender persisted after accounting for minority stress.

Procedures

Participants were 11,813 SGM people within The PRIDE Study who provided information about risk for cannabis use disorder via the National Institute on Drug Abuse Modified Alcohol, Smoking, and Substance Involvement Screening Test annually for up to four years. Latent class growth curve mixture models identified five cannabis use trajectories: 'low or no risk', 'low moderate risk', 'high moderate risk', 'steep risk increase', and 'highest risk'.

Results

Participants (n = 5,673) who reported past-year discrimination and/or victimization at baseline had greater odds of membership in any cannabis risk category compared to the 'low risk' category (odds ratios [OR] 1.17-1.33). Internalized stigma was related to 'high moderate' and 'highest risk' cannabis use over time (ORs 1.27-1.38). After accounting for minority stress, gender expansive people and transgender men had higher odds than cisgender men to have 'low moderate risk' (ORs 1.61, 1.67) or 'high moderate risk' (ORs 2.09, 1.99). Transgender men had higher odds of having 'highest risk' (OR 2.36) cannabis use compared to the 'low or no risk' category.

Conclusions

Minority stress at baseline is related to prospective cannabis use risk trajectories, and gender expansive people and transgender men have greater cannabis use risk even after accounting for minority stress.

Keywords: cannabis use, sexual minority, gender minority, minority stress

1. Introduction

Studies have indicated that sexual and gender minority (SGM) people (non-heterosexual and/or non-cisgender) may have higher rates of cannabis use, though problematic cannabis use (*e.g.,* cannabis use disorders) among SGM people and studies among specific subgroups of SGM people such as gender minority (GM) people are understudied (Dyar, 2022). Further, minority stress processes, such as mistreatment experiences related to being SGM, are related to short-term (*i.e.,* within the same day or the subsequent 30 days) increases in substance use, including cannabis use, among SGM people (Lewis et al., 2021; Livingston et al., 2017; Wolford-Clevenger et al., 2021).

Longitudinal studies (following participants for up to three years) have begun to identify long-term associations between minority stressors and cannabis use. These studies have identified that elements of minority stress, including microaggressions and victimization, are associated with current cannabis use and problems, but these studies found no relationship between minority stressors and prospective cannabis use and problems among SGM people aged 16-30 (Dyar et al., 2020, 2019). However, the representation of GM participants was relatively small (215 people across the 1579 people within the two studies), reducing the ability to look at differences by gender among SGM people.

Despite the limitations in investigating minority stress and cannabis use by gender, there appear to be differences in cannabis use by gender among SGM people. For example, transgender men have higher cannabis use than cisgender sexual minority women (Barger et al., 2020) and gender expansive (*e.g.,* non-binary or beyond binary genders) individuals and transgender men show greater odds of cannabis use over time (Flentje et al., In press). Whether

the observed differences in cannabis use translates into differences in clinically significant distress and/or impairment in day-to-day functioning (*e.g.,* cannabis use disorder) remains unknown. Whether these differences in substance use patterns are reflective of more frequent cannabis use and severity of related problems in response to greater minority stress also remains unknown. There may be additional contributors to cannabis use (*e.g.,* social or biological factors such as hormone exposures) which shape cannabis use among certain groups of SGM people. More research is needed to understand how minority stress predicts longitudinal trajectories of substance use over many years, particularly among GM individuals.

The purpose of this study was to advance our understanding of prospective cannabis use risk, defined as more frequent use and severity of use-related problems, in relation to minority stress among SGM people. We did this by examining cannabis use risk over four years and identifying patterns of cannabis use risk over time. We then identified if these cannabis use risk patterns were related to minority stressors measured at baseline, including past-year discrimination and victimization experiences, internalized stigma, disclosure and concealment of SGM identities, safety of one's community for SGM people, and acceptance of SGM people within one's community. Finally, we aimed to examine if there were differences in cannabis use risk trajectories among SGM people by gender subgroup (*i.e.* cisgender sexual minority men, cisgender sexual minority women, gender expansive people of any sexual orientation, transgender men of any sexual orientation, and transgender women of any sexual orientation), after accounting for minority stress.

2. Methods

Data are from The Population Research in Identity and Disparities for Equality (PRIDE) Study and were collected between May 2017-June 2021. The PRIDE Study is a national, online,

longitudinal cohort study of SGM adults within the United States, described in detail elsewhere (Lunn et al., 2019). To conduct this study, we used data from four Annual Questionnaires, each administered starting in approximately June of each calendar year (referred to here by year in which the Annual Questionnaire administration began). To be in The PRIDE Study, participants: 1) identify as lesbian, gay, bisexual, transgender, queer, or another sexual and/or gender minority, 2) are age 18 or older, 3) reside in the United States or its territories, and 4) are comfortable reading and writing in English as all study activities are conducted in English. Participants complete a consent process and once enrolled, participants are eligible to complete health surveys for which they receive notification *via* preferred contact methods (*e.g.,* text messages, emails). These surveys include the Annual Questionnaires, which query mental, physical, and social health and contain the measures used in this study. For this study, we included participants who provided substance use data on any Annual Questionnaire between 2017-2021. The PRIDE Study recruits participants through multiple methods including through partnerships with health, community, and other LGBTQIA+ organizations throughout the United States, social media and online advertising, and in person at LGBTQIA+ events. The human subjects procedures for The PRIDE Study were approved by the institutional review boards of the University of California, San Francisco, Stanford University, and the WIRB-Copernicus Group (WCG).

2.1 Gender

Gender was recorded every year and was assessed with the item: “What is your current gender identity? (Check all that apply.)” In 2017 and 2018 this item had the answer choices: genderqueer, man, transgender man, transgender woman, woman, and another gender identity (which prompted a write-in text response). Responses to this question were expanded starting in

the 2019 Annual Questionnaire to also include: agender, cisgender man, cisgender woman, non-binary, questioning, and Two-spirit. Sex assigned at birth was assessed with the item: “What was your sex assigned at birth, for example on your original birth certificate?”, with response options male and female. Gender and sex assigned at birth were combined using an algorithm that classified participants into the following gender groups (described in Flentje et al., 2020): cisgender sexual minority men (reporting man, cisgender man, or masculine gender write-in responses with male sex assigned at birth), cisgender sexual minority women (reporting woman, cisgender woman, or feminine write-in gender responses with female sex assigned at birth), gender expansive people of any sexual orientation (reporting through selection or write-in responses genders that are non-binary or are both masculine and feminine), transgender women of any sexual orientation (reporting woman, transgender woman, or feminine write-in gender responses with male sex assigned at birth), and transgender men of any sexual orientation (reporting man, transgender man, or masculine write-in gender responses with female sex assigned at birth). These gender groups are referred to by their gender irrespective of sexual orientation hereafter.

2.2 Demographics

Participant age was generated by subtracting each participant’s birth date from the survey initiation date. Sexual orientation was assessed with the question “What is your current sexual orientation? (Check all that apply.)” Race and ethnicity were assessed with the question, “Which categories describe you? (Check all that apply.)”, answer choices are in Table 1. Both gender and demographic variables were taken from the first available time point.

2.3 Cannabis Use Risk

Cannabis use risk, defined as the frequency of use and severity of problems related to use, was measured by calculating the cannabis use involvement score of the National Institute on Drug Abuse Modified Alcohol, Smoking, and Substance Involvement Screening Test (NIDA Modified ASSIST) using the weighted scoring recommended by NIDA-Modified ASSIST documentation (*NIDA-Modified Assist*, n.d.). Cannabis use involvement scores range from 0-39 and were entered for each year for each participant (as available). These scores are typically used to derive the following categories according to the NIDA-Modified ASSIST documentation: low risk (0-3), moderate risk (4-26), and high risk (27+) substance use for a specific substance (in this case, cannabis use, *NIDA-Modified ASSIST*, n.d.). These scores reflect frequency of use and correlates of clinically significant impairment and problems related to cannabis use thereby corresponding to the risk of a cannabis use disorder; these scores are hereafter referred to as 'risk' scores to be consistent with NIDA-Modified ASSIST documentation. Participants were also asked how many days in the prior 30 days they had used cannabis.

2.4 Minority Stress

Eleven items adapted from the Centers for Disease Control and Prevention (2019) were used to measure past-year discrimination and victimization experiences (as in Flentje et al., 2021). Participants were considered to have experienced a minority stressor if they endorsed experiencing a discrimination or victimization event within the prior year. The number of experiences of each type of stressor were summed to create an index of discrimination and victimization (as in McGeough et al., 2021).

The revised Internalized Homophobia Scale (IHP-R) was adapted to assess internalized stigma among SGM people. The original measure used the terms gay, lesbian, and bisexual (Herek et al., 1998), but the adapted version expanded both sexual orientation options and gender

options (as in Flentje et al., 2021). Higher scores represented greater internalized stigma. The adapted IHP-R has demonstrated average to good internal consistency (Cronbach's $\alpha = .68$ in SM sample and .76 in GM sample, Flentje et al., 2021).

The two subscales of the Nebraska Outness Scale (Meidlinger and Hope, 2014): Disclosure and Concealment, were adapted to be inclusive of both SM and GM experience (*e.g.,* adding text relevant to GM experience such as "How often do you avoid talking about topics related to or otherwise indicating your gender or gender identity (e.g., not correcting people when they use a name or pronoun that is not accurate for you) when interacting with members of this group?". The adapted Nebraska Outness Scale has demonstrated good internal consistency (Cronbach's $\alpha = .84$ for SM people and .88 for GM people, Flentje et al., 2021).

Participants were asked about the safety and acceptance of SGM people in their current communities. These questions were adapted from Heck et al. (2014). There were two parallel items for SM participants and GM participants, querying safety or acceptance for SM and GM people, respectively. Items were rated on a 5-point Likert scale ranging from "extremely safe [accepting]" to "extremely unsafe [unaccepting]."

To improve participant experience and measurement of constructs, participants self-selected if they wanted to complete measures designed for sexual minority people, gender minority people, or both. For participants who completed measures for both sexual *and* gender minority people, the measure with the score reflecting the greater level of minority stress was used for that individual. This decision was made because greater minority stress has been shown to be related to adverse health outcomes.

2.5 Analysis

We used a 3-step latent growth curve model class analysis (LGCM, (Asparouhov and Muthén, 2014) to identify meaningful subgroups of cannabis use trajectories. LGCM is used to identify homogenous subgroups based on participants' patterns of response to indicators. The 3-step approach has several advantages over 1-step LGCM, including not having to re-calculate estimations of LGCM when including covariates or distal outcomes while also taking into account the classification uncertainty rate. We used all available data (NIDA-modified ASSIST scores) and participants over the 4-year data collection period. The latent growth curve models included random intercepts and random slopes; random slopes were defined as linearly increasing by study year. Random intercepts and slopes were allowed to correlate. We extracted latent growth classes via mixture modeling with 2 through 13 classes studied. We chose the model with the number of classes with the smallest Bayesian information criterion (BIC) as the final model (Nylund et al., 2007). We examined demographic differences by class using ANOVA and chi-square statistics, percentages and means between categories reflecting significant differences were examined and compared. For non-mutually exclusive categories (*i.e.,* race and ethnicity and sexual orientation), we ran these chi-square statistics for each category. Minority stressors (discrimination and victimization measured through our index score, internalized stigma measured through the adapted IHP-R, the adapted concealment scale from the NOS, the adapted disclosure scale from the NOS, safety of one's current environment, and acceptance in one's current environment) measured in 2017 were entered as auxiliary variables to estimate parameters of multinomial regression in the 3-step approach (Asparouhov and Muthén, 2014). Only participants who had available 2017 minority stress scores were used in the analysis predicting cannabis use trajectories so that we could study how minority stress in 2017 was

related to prospective cannabis use. We conducted analyses using M*plus* (version 8.5, Muthén & Muthén, 2017) and SAS 9.4 (S.A.S. Institute, 2013).

3. Results

Sample Characteristics are reported in Table 1. In total there were 11,813 individuals who had cannabis use data who were included in analyses.

3.1 Cannabis Trajectory Classes

There were five identified trajectories of cannabis risk (see Figure 1) based on the lowest BIC criteria. The description of these classes and rationale for their names is in Table 2, described here from lowest to highest risk scores, and referred to hereafter by the shortened class name provided here. Most participants had 'low or no risk', in the lower risk range (Mean [M] cannabis use involvement scores from the NIDA-modified ASSIST ranges across times: 0.6-0.8, 77.7% of participants). 'Low moderate risk' was the next largest class with 12.7% of participants (M range: 6.5-7.0). The 'high moderate risk' class contained 6.0% of participants (M range 12.4-14.6) with a visually detectable, but slight decline over time. The 'steep risk increase' class contained 1.7% of participants (M at baseline: 3.0, M at year 4: 20.5). Finally, the 'highest risk' class contained 2.0% of participants (M range: 4.6-25.4). Differences in class membership by demographic characteristics are reported in Table 3.

3.2 Multinomial Logistic Regression Model Estimates with Minority Stress and Gender Group Predicting Odds of Cannabis Risk Trajectory

The 'low or no risk' class was selected as the reference class, as our interest was in how minority stress may be related to cannabis risk patterns. Results of these analyses can be found in Table 4. Given that only baseline data from 2017 were used in models examining minority stress

at baseline predicting cannabis risk class, the sample size for these analyses was reduced to 5,673.

Participants who endorsed more types of past-year discrimination and victimization (18.3% increase in odds for each type of minority stress event experienced) or a less safe environment (28% increase in odds per rating point of less safety) had greater odds of being in the 'low moderate risk' class than the 'low or no risk' class. Participants had lower odds of being in the 'low moderate risk' class if they lived in environments that they described as unaccepting of SGM people (31% decrease in odds per one unit increase in unaccepting environment). After accounting for these minority stressors, gender expansive people and transgender men had greater odds relative to cisgender men of being in the 'low moderate risk' class (61% increase in odds for gender expansive people, 67% percent increase in odds for transgender men) than the 'low or no risk' class.

Individuals who had experienced more types of past-year discrimination and victimization (17% increase in odds for each type of minority stress event experienced) or more internalized stigma (27% greater odds for each unit increase in internalized stigma) had greater odds of being in the 'high moderate risk' class compared to the 'low or no risk' class. Individuals with more identity concealment had lower odds of being in the 'high moderate risk' class (8% decrease in odds per unit increase in identity concealment). After accounting for minority stressors, both gender expansive people and transgender men had greater odds relative to cisgender men of being in the 'high moderate risk' class compared to the 'low or no risk' class (109% and 199% greater odds, respectively).

Compared to people with 'low or no risk', individuals had greater odds of being in the 'steep risk increase' class if they had experienced more types of discrimination and victimization

(23% greater odds for each type of minority stress event experienced). After accounting for minority stress, there were no differences by gender group in being in the 'steep risk increase' class.

Compared to people in the 'low or no' risk class, there were greater odds of being in the 'highest risk' class when participants had more minority stress events (33% greater odds for each type of minority stress event experienced) and more internalized stigma (38% greater odds for each unit increase in internalized stigma). They had lower odds of being in the 'highest risk' class if they lived in a less accepting environment for SGM people (34% lower odds for each unit increase in less accepting environment). After accounting for minority stressors, transgender men had greater odds relative to cisgender men of being in the 'highest risk' class compared to the 'low or no risk' class (136% greater odds).

Given that gender expansive people were at greater odds for being in the 'low moderate' and 'high moderate' risk classes than cisgender men after minority stress was taken into account, we conducted a post-hoc analysis to identify if there were differences in class membership among gender expansive people by sex assigned at birth. In post hoc analyses we restricted the sample to only gender expansive people and used multinomial logistic regression predicting cannabis risk class membership. We entered minority stress variables (as in primary analyses) and compared gender expansive people assigned male at birth to gender expansive people assigned female at birth. There were no differences by sex assigned at birth in class membership ($p < .05$ for all).

4. Discussion

Consistent with prior results (Flentje et al., In press), most SGM people within our sample (around 78% of our sample) have very 'low or no' risk related to cannabis use over time,

reflecting very little use and/or very few use-related problems. In this study, cannabis use risk was measured using the NIDA-Modified ASSIST, with items that were created and validated to screen and identify individuals potentially at risk for cannabis use disorder. Among individuals in this study, we found five trajectories of cannabis use risk over time. Four of these trajectories were defined by relatively steady mean cannabis risk scores over time, reflecting 'low or no risk' related to cannabis use (around 78% of participants), 'low moderate risk' at the low end of the moderate risk range (around 13% of participants), 'high moderate risk' use in the high moderate risk range (around 6% of participants), and in the 'highest risk' range (2% of participants). Only one class reflected a 'steep risk increase' over time, with around 2% of participants in this class. Taken together, these findings suggest that risk for cannabis use disorder increases across a four-year period for only 2% of SGM people overall, and approximately 22% of SGM people have more than 'low or no risk' cannabis use. Four years is a relatively brief period of the lifespan and introduces the opportunity for regular screening in primary care (*e.g.,* in the context of annual well visits) and brief intervention. Given the relationships we observed between minority stress and cannabis risk trajectories, these brief interventions may benefit from including psychoeducation about minority stress and its impacts.

National estimates (not specific to SGM status) suggest that between 11-30% people who use cannabis regularly will develop cannabis use disorder, and between 1.5-3% of U.S. adults have current cannabis use disorder (Budney et al., 2019). Estimates of past-year cannabis use disorder among SM people range from around 3-10%, depending on the specific SM group (Dyar, 2022). ASSIST score cutoffs were derived to predict likely cannabis use disorder (Humeniuk et al., 2006). There were 22.4% of people in classes that reflected cannabis use risk, suggesting that cannabis use disorder among our SGM sample may be higher than prior

estimates of SM people in the U.S. Alternatively, these ASSIST cutoff scores may no longer be accurate in the context of cannabis legalization. The three cannabis use risk classes with the highest risk (~9.7% of our total sample) are close to the higher end of the range of national estimates for cannabis use disorder for SM people. While accurate population-based estimates of cannabis use disorder are not available for SGM people in the U.S., this study suggests the need for further research and that the rates of cannabis use disorder among SGM people may be significantly higher than among national estimates within the general population.

In this study, we found relationships between different elements of minority stress and cannabis risk trajectories. Overall, the number of different types of past-year discrimination and victimization experiences were related to greater odds of being in any of the four classes reflecting moderate risk cannabis use over time (either steady risk or increasing risk), compared to no or low use. Prior research among cisgender SM women and GM individuals assigned female at birth found that increases in enacted stigma exposures were related to cannabis use outcomes (*e.g.,* longer duration of use, consequences of use, subjective intoxication) within 24 hours when coping was a motivation for use (Dyar et al., 2022). In our study, internalized stigma was related to both 'high moderate risk' and the 'highest risk' cannabis use over time. Internalized stigma has been shown to prospectively predict coping as a motivation for cannabis use (Dyar et al., 2022). Finally, we also found that living in a community that a participant felt was less safe for SGM people was related to greater odds of low moderate cannabis use over time (compared to little or no use). These findings demonstrate the importance of accounting for internalized stigma, safety in one's community, and discrimination and victimization experiences in relation to 4-year trajectories of cannabis use risk. More research is needed to determine how all components of minority stress affect the underlying motivations of cannabis use and relate to

coping mechanisms over longer periods of time. We need to identify if and how those relationships can be mitigated to decrease minority stress experiences and cannabis use within SGM communities. Further, interventions are needed to support SGM individuals in navigating minority stress to target the disparities in cannabis use.

In this study, we found that living in a place perceived to have a lack of acceptance of SGM people at baseline was related to reduced odds of 'low moderate risk' and 'highest risk' cannabis use. This is contrary to what we would expect under the minority stress model. This should not be misconstrued to suggest that a lack of acceptance confers reduced cannabis use risk. One potential pathway to explain this relationship is that prior work has found that cannabis acceptance and legalization is related to greater rates of cannabis use (Cerdá et al., 2020). Further, prior work has shown that cannabis use is higher among SGM youth where cannabis possession for recreational use is legal (Wheldon et al., 2023). Our results may suggest that there could be overlap between community acceptance of cannabis use and acceptance of SGM people, though future research will have to test these relationships. Furthermore, acceptance of SGM people in this study was measured in 2017-18; since that time there has been a significant emergence of anti-SGM rhetoric and policies, which may alter the associations we have observed here.

We found no relationship between SGM-identity disclosure and cannabis use risk. SGM-identity concealment, however, was related to reduced odds of 'high moderate risk' cannabis use. Given the consistent relationships demonstrated between past-year discrimination and victimization experiences and cannabis use in this study, it is possible that for some SGM people, greater concealment of one's identity reduces exposure to these discrimination and victimization experiences that are associated with cannabis use, though future research is needed

to investigate the interrelationships between these constructs. Concealment was not related to other cannabis use risk trajectories in this study. Prior systematic review has shown that greater concealment is related to less substance use among sexual minority people, but also found that concealment is associated with greater internalized mental health problems such as anxiety and depression (Pachankis et al., 2020), thus it cannot be conceptualized as protective.

We found that gender expansive people and transgender men were at greater risk for 'low moderate risk' and 'high moderate risk' related to cannabis use than cisgender men, even after minority stress had been taken into account. There were no differences in cannabis risk by sex assigned at birth among gender expansive people, suggesting that gender and not sex assigned at birth, was the more important predictor of cannabis use risk. Transgender men were also at greater risk of being in the 'highest risk' cannabis use class. This study contributes to the limited existing work in this area that has suggested gender differences in cannabis use among SGM groups (Dyar, 2022). Our work suggests that even when minority stress has been taken into account, there may be different use patterns among gender expansive people and transgender men that warrant further exploration. In addition to minority stress exposures, there may be social (*e.g.,* gender socialization or patterns of use within specific communities) and biological (*e.g.,* hormonal influences that encourage use) contributors to cannabis use (Flentje et al., In press). Transgender men and gender expansive people were not more likely than cisgender men to have use patterns reflective of a 'steep risk increase' over time. This suggests that rapidly increasing risk related to cannabis use (*i.e.,* over a period of 4 years) may not be influenced by gender or related to gender-specific social or biological influences. The effect sizes observed for past-year discrimination and victimization types in relation to being in the 'steep risk increase' class were similar to those observed for other cannabis use risk classes, suggesting that risk

related to this type of minority stress may be relatively similar across the cannabis risk classes. Future work is needed to understand what underlies the highest risk of increase in cannabis use (*e.g.,* genetic predisposition), and how high-risk cannabis use can best be prevented.

4.1 Limitations

In this study we used self-report measures of substance use. Given the national focus of our study that is the most practical design, but it does suggest the potential for underreporting of substance use. Our sample was self-selected; thus, they may not be representative of all SGM people within the U.S. In addition, we considered minority stress related to SM status or GM status together by taking the score reflective of the greatest minority stress exposure. We did this because methods have not yet been developed to account for intersecting minority stress exposures that consider multiple intersecting identities contemporaneously, or methods that account for a lack of an exposure due to a non-shared identity characteristic. The scope of this study was to look at minority stress and gender specifically in relation to cannabis use. Given differences in cannabis use trajectories across other demographic characteristics (*e.g.*, income, education, sexual orientation), future studies should examine whether some of these factors may contribute to differences observed here by gender.

5. Conclusions

In this study, we found five trajectories of cannabis use among SGM people over a 4-year period. Nearly 4 in 5 participants had little to no cannabis use and/or associated risk. Prospective moderate cannabis use risk (versus 'low or no risk') was related to past-year discrimination and victimization, internalized stigma, and perceived safety of one's community. Further, transgender men and gender expansive people had greater odds of 'low moderate risk' and 'high moderate risk' related to cannabis use compared to cisgender men, even when minority stress

was taken into account. Future research can begin to investigate additional contributors to cannabis use among these populations to empower people to engage or not engage with cannabis in a way that promotes their health.

Table 1. Sample characteristics (*N* = 11,813) among SGM people who reported on cannabis use in one or more years between 2017-2021 within The PRIDE Study.

Gender (*n*, *%*)[a]	
Cisgender man	2,941 (25.4)
Cisgender woman	4,091 (35.3)
Gender expansive individuals	3,039 (26.3)
Transgender man	982 (8.5)
Transgender woman	523 (4.5)
Sex assigned at birth (*n*, *%*))[a]	
Female	7,,464 (66.2)
Male	3813 (33.8)
Age, in years (Mean, Median, SD)	33.55, 29.00, 13.41
Race and ethnicity (*n, %*)[a,b]	
American Indian or Alaska Native	390 (3.3)
Asian	538 (4.6)
Black, African American, or African	433 (3.7)
Hispanic, Latino, or Spanish	871 (7.5)
Middle Eastern or North African[c]	76 (0.7)
Native Hawaiian or other Pacific Islander	52 (0.5)
White	10,251 (87.8)
None of these fully describe me	303 (2.6)
Reported more than one race/ethnicity	1,446 (12.5)
Sexual orientation[a, b]	
Asexual	1,193 (10.2)
Bisexual	3,419 (29.3)
Gay	3,850 (32.9)

Lesbian	2,685 (23.0)
Pansexual	1,965 (16.8)
Queer	4,322(37.0)
Questioning	425 (3.6)
Same-gender loving	643 (5.5)
Straight	249 (2.1)
Two-spirit	17 (0.6)
Another sexual orientation	418 (3.6)
Reported more than one sexual orientation	4,894 (41.9)
Annual individual income (*n, %*)[a]	
≤ $20K	4,541 (41.8)
$20K to $40K	2,318 (21.3)
$40K to $60K	1,517 (14.0)
≥$60K	2,492(22.9)
Educational level (*n, %*)[a]	
No high school diploma	65 (0.7)
High school/GED graduate or some college[d]	2,441 (26.5)
College degree (2-year)	421 (4.6)
College degree (4-year)	3,154 (34.3)
Graduate degree[e]	3,122 (33.9)

[a] Percentages are calculated on the number of participants answering a given question.

[b]These categories are not mutually exclusive as participants could have selected more than one option,

[c]Middle Eastern or North African was added as a response option in 2018, so may not have been an available choice for participants prior to that date.

[d]Also includes participants with trade, technical, or vocational training.

[e]Graduate degree = Master's, doctoral, or professional (*e.g.,* MD, JD, MBA) degrees

Table 2. Definitions of cannabis use risk classes, from lowest to highest risk

Name of class	Percentage of sample within class	Range of mean cannabis ASSIST scores across years	Percentages within each class in ASSIST defined risk categories across years[a]	Mean number of days of cannabis use in the prior 30 days at their first time point	Rationale for class name
'Low or no risk'	77.7%	0.6-0.8	Low: 89.6-92.6% Moderate: 7.4-10.4% High: 0%	0.4	Scores in this range are consistent with no or low use and no or low risk
'Low moderate risk'	12.7%	6.5-7.0	Low: 3.0-7.2% Moderate: 96.1-97.0% High: 0%	9.3	Scores in this range are consistent with moderate risk at the lower end of the moderate range
'High moderate risk'	6.0%	12.4-14.6	Low: 0-1.6% Moderate: 98.1-98.8% High: 0-1.2%	20.2	Scores in this range are consistent with moderate risk on the high end of the moderate risk range
'Steep risk increase'	1.7%	3.0-20.5	Low: 51.9% at baseline to 0% in year 4[b] Moderate: 48.1% at baseline to 90.0% in year 4[b] High: 0% at baseline to 10.0% in year 4[b]	11.6	Scores for this class begin consistent with the low end of the moderate risk range and increase over time the high end of the moderate risk range
'Highest risk'	2.0%	24.6-25.4	Low: 0% Moderate: 61.0-65.4% High: 34.6-39.0%	22.8	Scores in this range are at the high end of the moderate risk range

[a]NIDA Modified ASSIST risk categories are defined as 0-3: low risk, 4-26: moderate risk, and ≥ 27: high risk consistent with NIDA Modified ASSIST documentation ("NIDA-Modified ASSIST," n.d.); ranges are provided irrespective of chronological order except where specified

[b]Greater specificity at baseline and year 4 is provided for this class due to changes seen in this class over time.

Table 3. Demographic characteristics and comparisons among SGM people (N = 11,813) by cannabis use risk class

	Low or no risk (77.7%)	Low moderate risk (12.7%)	High moderate risk (6.0%)	Steep risk increase (1.7%	Highest risk (2.0%)	χ^2(df) or F (df)	p value
Gender (n, %)[a]						123.76 (20)	<.001
Cisgender man	2408 (81.9)	318 (10.8)	148 (5.0)	36 (1.2)	31 (1.1)		
Cisgender woman	3261 (79.7)	496 (12.1)	205 (5.0)	59 (1.4)	70 (1.7)		
Gender expansive individuals	2221 (73.1)	436 (14.4)	224 (7.4)	69 (2.3)	89 (2.9)		
Transgender man	709 (72.2)	140 (14.3)	80 (8.2)	26 (2.7)	27 (2.8)		
Transgender woman	415 (79.4)	59 (11.3)	29 (5.5)	9 (1.7)	11 (2.1)		
Sex assigned at birth (n, %)[a]						22.02 (4)	<.001
Female	5734 (76.8)	980 (13.1)	447 (6.0)	144 (1.9)	159 (2.1)		
Male	3065 (80.4)	428 (11.2)	210 (5.5)	54 (1.4)	56 (1.5)		
Age, in years (Mean, Median, SD)	34.1, 30.0, 13.6	32.4, 28.0, 12.8	31.9, 28.0, 12.4	29.0, 26.0, 10.7	29.2, 26.0, 10.3	20.38 (4, 11,675)	<.001
Race and ethnicity (n, %)[a,b]							
American Indian or Alaska Native	303 (77.7)	52 (13.3)	22 (5.6)	4 (1.0)	9 (2.3)	1.61 (4)	.807
Asian	452 (84.0)	52 (9.7)	17 (3.2)	9 (1.7)	8 (1.5)	14.50 (4)	.006
Black, African American, or African	324 (74.8)	52 (12.0)	36 (8.3)	7 (1.6)	14 (3.2)	9.03 (4)	.060
Hispanic, Latino, or Spanish	664 (76.2)	113 (13.0)	59 (6.8)	15 (1.7)	20 (2.3)	2.24 (4)	.692
Middle Eastern or North African[c]	57 (75.0)	7 (9.2)	7 (9.2)	2 (2.6)	3 (4.0)	4.20 (4)	.379

Native Hawaiian or other Pacific Islander	36 (69.2)	6 (11.5)	6 (11.5)	1 (1.9)	3 (5.8)	7.37 (4)	.118
White	7979 (77.8)	1297 (12.7)	595 (5.8)	182 (1.8)	198 (1.9)	5.49 (4)	.241
None of these fully describe me	215 (71.0)	52 (17.2)	27 (8.9)	4 (1.3)	5 (1.7)	12.03 (4)	.017
Reported more than one race or ethnicity	1094 (75.7)	191 (13.2)	95 (6.6)	28 (1.9)	38 (2.6)	7.69 (4)	.104
Sexual orientation[a, b]							
Asexual	1045 (87.6)	77 (6.5)	41 (3.4)	17 (1.4)	13 (1.1)	76.26 (4)	<.001
Bisexual	2563 (75.0)	471 (13.8)	228 (6.7)	71 (2.1)	86 (2.5)	25.71 (4)	<.001
Gay	3066 (79.6)	459 (11.9)	206 (5.4)	65 (1.7)	54 (1.4)	17.99 (4)	.001
Lesbian	2132 (79.4)	327 (12.2)	130 (4.8)	43 (1.6)	53 (2.0)	9.51 (4)	.050*
Pansexual	1381 (70.3)	306 (15.6)	177 (9.0)	41 (2.1)	60 (3.1)	85.91 (4)	<.001
Queer	3131 (72.4)	679 (15.7)	299 (6.9)	94 (2.2)	119 (2.8)	119.61 (4)	<.001
Questioning	322 (75.8)	55 (12.9)	28 (6.6)	10 (2.4)	10 (2.4)	2.02 (4)	.732
Same-gender loving	468 (72.8)	86 (13.4)	55 (8.6)	13 (2.0)	21 (3.3)	16.13 (4)	.003
Straight	201 (80.7)	20 (8.0)	17 (6.8)	2 (0.8)	9 (3.6)	9.36 (4)	.053
Two-spirit	13 (76.5)	2 (11.8)	2 (11.8)	0 (0)	0 (0)	1.58 (4)	.812
Another sexual orientation	324 (77.5)	47 (11.2)	23 (5.5)	10 (2.4)	14 (3.4)	6.20 (4)	.185
Reported more than one sexual orientation	3691 (75.4)	667 (13.6)	311 (6.4)	108 (2.2)	117 (2.4)	36.38 (4)	<.001
Annual individual income (*n, %*)[a]						115.35 (12)	<.001
≤ $20K	3413 (75.2)	595 (13.1)	313 (6.9)	108 (2.4)	112 (2.5)		

$20K to $40K	1729 (74.6)	337 (14.5)	154 (6.6)	42 (1.8)	56 (2.4)		
$40K to $60K	1221 (80.5)	189 (12.5)	70 (4.6)	17 (1.1)	20 (1.3)		
≥$60K	2083 (83.6)	262 (10.5)	102 (4.1)	28 (1.1)	17 (0.7)		
Educational level (*n, %*)[a]						114.89 (16)	<.001
No high school diploma	50 (76.9)	6 (9.2)	3 (4.6)	6 (9.2)	0 (0.0)		
High school/GED graduate or some college[d]	1823 (74.7)	315 (12.9)	177 (7.3)	68 (2.8)	58 (2.4)		
College degree (2-year)	301 (71.5)	54 (12.8)	45 (10.7)	12 (2.9)	9 (2.1)		
College degree (4-year)	2430 (77.1)	410 (13.0)	187 (5.9)	63 (2.0)	64 (2.0)		
Graduate degree[e]	2576 (82.5)	351 (11.2)	121 (3.9)	42 (1.4)	32 (1.0)		

[a] Percentages are calculated on the number of participants answering a given question.

[b]These categories are not mutually exclusive as participants could have selected more than one option,

[c]Middle Eastern or North African was added as a response option in 2018, so may not have been an available choice for participants prior to that date.

[d]Also includes participants with trade, technical, or vocational training.

[e]Graduate degree = Master's, doctoral, or professional (*e.g.,* MD, JD, MBA) degrees

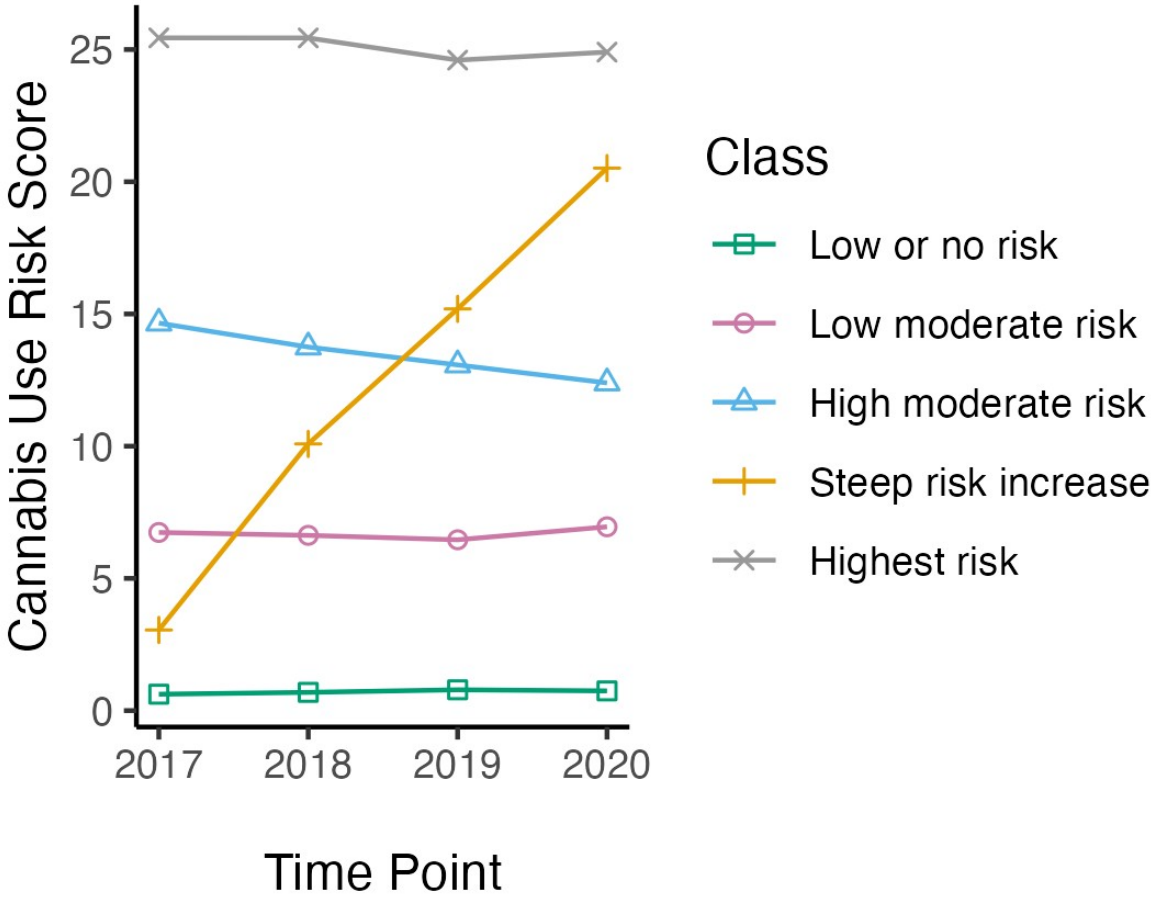
*This *p* value was <.05 prior to rounding

Table 4. Minority stress and gender group predicting cannabis risk trajectories among *n* = 5,673 with baseline data from 2017

	Odds Ratio (95% CI) for Cannabis Risk Trajectory Class Relative to the Reference Class of 'Low or No Risk'			
	Low moderate risk	High moderate risk	Steep risk increase	Highest risk
Past-year discrimination and victimization	**1.18 (1.10, 1.28)*** **	**1.17 (1.05, 1.31)** **	**1.23 (1.05, 1.44)***	**1.33 (1.15, 1.54)*** **
Internalized stigma	.98 (.84, 1.14)	**1.27 (1.06, 1.53)** **	1.34 (.96, 1.85)	**1.38 (1.07, 1.78)***
Disclosure of identity	1.03 (.98, 1.09)	.98 (.92, 1.04)	1.04 (.93, 1.16)	1.02 (.90, 1.14)
Concealment of identity	.97 (.92, 1.02)	**.92 (.86, .98)** **	**.**89 (.80, 1.00)	1.06 (.94, 1.20)
Safety of community	**1.28 (1.07, 1.53)** **	.94 (.74, 1.19)	1.01 (.68, 1.50)	1.23 (.84, 1.82)
Acceptance of community	**.69 (.59, .82)*** **	.90 (.72, 1.12)	1.11 (.75, 1.63)	**.66 (.46, .94)***
Cisgender men	Ref	Ref	Ref	Ref
Cisgender women	1.13 (.86, 1.47)	.96 (.67, 1.38)	1.11 (.62, 1.98)	1.25 (.65, 2.39)
Gender expansive people	**1.61 (1.16, 2.23)** **	**2.09 (1.39, 3.14)*** **	1.20 (.58, 2.49)	1.88 (.91, 3.86)
Transgender women	.95 (.52, 1.76)	1.18 (.57, 2.43)	1.19 (.42, 3.41)	1.27 (.40, 4.09)
Transgender men	**1.67 (1.09, 2.55)***	**1.99 (1.20, 3.28)** **	1.04 (.41, 2.63)	**2.36 (1.01, 5.54)***

* p <.05 ** p<.01 ***p<.001, models were run with *n*= 5,928

Figure 1: Cannabis use trajectories across four years (2017-2020) among sexual and gender minority people in The PRIDE Study



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