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Original article

Substance Use Behaviors Among LGBTQ+ Youth of Color: Identification of the Populations Bearing the Greatest Burden in Three Large Samples

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A B S T R A C T

Purpose: Research has identified persistent disparities in alcohol, e-cigarette, and marijuana use, by sexual orientation, gender identity, and race/ethnicity. Using an intersectionality framework, the present study analyzes three large datasets to identify intersecting social positions bearing the highest burden of substance use.
Methods: Data from adolescents in grades 9–12 in three samples (2019 Minnesota Student Survey, 2017–2019 California Healthy Kids Survey, and 2017 National Teen Survey) were harmonized for an analysis (N = 602,470). A Chi-squared Automatic Interaction Detection analysis compared the prevalence of four types of substance use across all combinations of four social positions (six racial/ethnic identities, five sexual orientations, three gender identities, and two sexes assigned at birth). For each substance, 10 intersectional groups with the highest prevalence of use were examined.
Results: In the full sample, 12%–14% of participants reported past 30-day alcohol, e-cigarette, or marijuana use and 7% reported past 30-day binge drinking. Several intersecting marginalized social positions were consistently found to bear a high burden of substance use. For example, transgender and gender diverse (TGD) Latina/x/o young people, particularly those assigned male at birth, were in the high prevalence groups for alcohol use, binge drinking, and marijuana use. Black TGD or gender-questioning youth were commonly in the high prevalence groups.
Discussion: Findings suggest that support, resources, and structural changes specifically tailored to youth with multiple marginalized identities (especially TGD) may be needed. The results argue for intersectional efforts that explicitly address racial/ethnic and cultural differences, while also integrating awareness and understanding of sexual and gender diversity.

IMPLICATIONS AND CONTRIBUTION

Using data from three large samples, this study identified intersecting social positions (race/ethnicity, sexual orientation, gender identity, and assigned sex) bearing the highest burden of substance use. A higher prevalence was detected for Latina/x/o and Black TGD youth. Supports and structural changes tailored to youth with multiple marginalized identities are needed.

Substance use disparities

Existing research has identified persistent disparities in substance use, including alcohol, e-cigarettes, and marijuana use, across different populations of youth. Importantly, disparities are

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driven by social and structural factors at the personal, family, community, and national levels [1,2]. Adverse experiences of stigma may be exacerbated by the broader sociopolitical climate in different locales [3,4].

Sexually diverse and gender diverse adolescents (i.e., those who identify with labels such as gay, lesbian, bisexual, queer and/or transgender, genderqueer, nonbinary, referred to here as LGBTQ+) have been shown to have higher rates of substance use than heterosexual and/or cisgender peers [5–9]. For example, findings from the Youth Risk Behavior Surveillance System (YRBS) indicate that approximately 31% of LGB students reported recent marijuana use, compared to 21% of heterosexual students [5]. Likewise, population-based data have shown binge drinking to be significantly more prevalent among transgender (27%) than among cisgender youth (9%) [9]. Substance use disparities facing youth of color are also well documented in the research literature [5,8,10]. As per the most recent YRBS, Hispanic and White students have substantially higher rates of alcohol and e-cigarette use than Black students [5,8].

Theoretical framework

Two related theoretical frameworks guide this study. Minority Stress Theory [11,12] posits that individuals in marginalized groups are subjected to chronic social stressors. As a result, they may experience proximal stress by internalizing negative messages about their identities, having a heightened awareness of stigma, or concealing their identity, which in turn negatively impact their health. Unhealthy behaviors such as substance use or misuse may be symptoms of, or may exacerbate the adverse effects of, minority stress.

An intersectionality framework expands on minority stress by explicitly considering intersections of multiple marginalized social positions and the experience of living within overlapping systems of privilege and oppression (e.g., living with and experiencing racism and heterosexism) [13–16]. Multiplicative experiences of discrimination from dominant social groups and intragroup discrimination (e.g., racism within the LGBTQ+ community) contribute to health disparities [17], and the resources and supports youth might draw on from within their racial/ethnic community, for example, may not be available due to their sexual or gender identities.

The present study

Beyond surveillance studies of LGBTQ+ youth and youth of color described previously, a relatively small body of research explicitly addresses substance use behaviors among LGBTQ+ youth of color [18–22]. Although this existing work begins to highlight disparities facing youth growing up with intersecting forms of oppression, it is also subject to several limitations. First, in most existing quantitative research, LGBQ youth are grouped together for analysis. Related, identities such as pansexual and queer, which are increasingly used among young people [23], have rarely been considered in their intersections with different racial and ethnic identities. Second, due to small numbers when crossed with LGBQ students, most studies are limited in the number of racial and ethnic groups they can include and therefore either focus only on Black and Hispanic students or combine all youth of color for an analysis. Third, survey research regarding transgender/gender diverse (TGD) youth of color is particularly lacking. Understanding the unique needs of this population—distinct from LGBQ youth—may identify germane interpersonal, organizational, and structural characteristics that can be targeted to reduce substance use disparities.

The aim of the present study, therefore, is to expand on existing literature by harmonizing three very large samples to identify intersecting social positions bearing the highest burden of substance use. This work will permit a more nuanced understanding of distinct identities with regards to combinations of sexual orientation, gender identity, and race/ethnicity than that has been available previously. Findings are expected to be instructive for identifying groups of youth who may experience inequities in support.

Methods

Data sources and sample

Three separate samples were combined for this analysis: the 2019 Minnesota Student Survey (MSS), the 2017–2019 California Healthy Kids Survey (CHKS), and the 2017 LGBTQ+ National Teen Survey (NTS). Although younger adolescents also participated in these surveys, the present analysis was restricted to those in grades 9–12 (i.e., traditional high school years) due to the availability of data on sexual orientation and gender identity and the increase in substance use rates in this developmental period.

The MSS is conducted by the Minnesota Departments of Health, Education, Public Safety, and Human Services every 3 years in fifth, eighth, ninth, and 11th grades. All school districts in the state are invited to participate in each cycle; in 2019, 81% of districts had at least one school that provides data. Anonymous data collection took place in schools using online surveys. The MSS sample included in the present analysis consisted of 80,456 students in grades 9 and 11 (including 13.9% who were LGBTQ+, as defined below). Additional details about the MSS are available elsewhere [24].

The CHKS is conducted in English and Spanish with seventh–12th grade public school students every other year (thus, one dataset includes two school years; for a small number of schools that participated annually, we included only the 2018–2019 school year); participation rates ranged from 56%–77% by grade. Anonymous data collection took place in schools using online surveys; data were cleaned and <2% of surveys were removed due to a pattern of impossible or highly improbable responses (i.e., mischievous responders); 512,067 participating CHKS students were included in this analysis (including 15.2% LGBTQ+). Additional details about the CHKS are available elsewhere [25].

The NTS data were collected in partnership with the Human Rights Campaign (HRC). Participants were recruited through a comprehensive social media initiative, including collaboration with HRC's multiple community partners. Adolescents aged 13–17 years who identified as LGBTQ+, were English-speaking, and lived in the United States were invited to complete the online survey. Data from 9,947 LGBTQ+ -identified youth were included. Additional details about the NTS are available elsewhere [26,27].

The University of Minnesota's Institutional Review Board determined that the present analysis was not human subjects research and therefore was exempt from review, due to the use of existing anonymous data.

Survey measures and harmonization process

All three surveys included measures of race, ethnicity, sexual orientation, gender identity, sex assigned at birth, and past 30-day alcohol use, binge drinking, and marijuana use; the MSS and CHKS additionally included a measure of past 30-day e-cigarette use.

Data were harmonized using a multistep process that included identifying similar variables across datasets, creating uniform variables, and pooling them into a cohesive analytic dataset [28,29]. Where wording and response options were very similar, variables were combined with only minor modification. Substance use items were very similar, for example, "During the last 30 days, on how many days did you… drink one or more drinks of an alcoholic beverage (MSS)/use one or more drinks of alcohol (CHKS)/have at least one drink of alcohol (NTS)?" All three offered multiple responses, including an option of 0 days, and responses for each substance use behavior were dichotomized at any versus no days of use in the past month.

In contrast, some measures differed more substantially across the three instruments and response options were combined to create compatible variables, in consultation with scholars and community members. For example, the MSS item asked "How do you describe yourself?" with response options of heterosexual (straight), bisexual, gay or lesbian, questioning/not sure, pansexual, queer, I do not describe myself in any of these ways, and I am not sure what this question means. The CHKS item asked "Which of the following best describes you?" with responses of straight (not gay), gay or lesbian, bisexual, I am not sure yet, something else, and decline to respond. The NTS item asked "How do you describe your sexual identity?" with response options of gay or lesbian; bisexual; straight, that is, not gay; or something else. For NTS participants choosing something else, a follow-up question provided additional options including questioning and an open-response option. For harmonization, MSS sexual orientation options of pansexual and queer were combined with "something else" from the other two surveys to create a combined category. Similarly, open-ended sexual orientation responses were reviewed and reassigned as appropriate (e.g., a write-in of bisexual was assigned to that group as opposed to remaining in the "something else" group). Responses of "I am not sure what this question means," and "decline to respond" were set to missing. In addition, approximately 8% of MSS participants responded "I do not describe myself in any of these ways"—the largest group after heterosexual. Because this group was more similar to heterosexual youth than any LGBQ group and likely consisted of a combination of students who were straight and those who used labels not listed on the survey (e.g., demisexual, asexual) [23], they were also set to missing for this analysis. Final harmonized values for all demographic categories are shown in Table 1.

Data analysis

Descriptive analyses included calculating prevalences of each social position and substance use and comparing substance use across the three data sources using Chi-squared tests of association.

A promising new method for intersectionality research with quantitative data [30,31], an exhaustive Chi-squared Automatic Interaction Detection (CHAID) analysis, was used for the primary analysis. This data-driven, decision tree-based algorithm allows for complex testing of how youth with specific combinations of social positions vary on substance use behaviors. In contrast to regression models with numerous interaction terms, this approach is nonparametric and provides results that are readily understandable. In brief, exhaustive CHAID cycles through all categorical predictors (i.e., social positions) and creates splits between categories, beginning with smallest Bonferroni-adjusted p value for a Chi-squared test of difference in the prevalence of the dependent variable. Splitting continues where significant differences between categories are detected, ending at a "terminal node" when no further splits can be performed given the specified p value (.05) and specified minimum node size (set at 100 to avoid overfitting). Ten-fold cross-validation was conducted to ensure robust results. For the present analysis, four social positions were included (race/ethnicity, sexual orientation, gender identity, and sex assigned at birth) plus the data source, to allow for differences in the two smaller datasets (MSS and NTS) to emerge. Youth with missing data on social positions were retained in the exhaustive CHAID models as a "missing" category. For each substance, the 10 nodes with the highest prevalence of use were examined.

Results

Characteristics of the sample

As shown in Table 1, approximately half the harmonized sample were assigned male at birth, 45% identified as Latina/x/o and an additional 30% as non-Hispanic White, 7% as bisexual, and 3% as TGD or questioning their gender identity. Several differences in the demographic make-up of the three samples were apparent, consistent with differences in the sampling frames (two statewide school samples compared to national recruitment of LGBTQ+ youth and demographic differences between Minnesota and California). For example, 70% and 66% of the MSS and NTS (respectively) identified as non-Hispanic White, compared to 23% of the CHKS. The NTS had much higher prevalences of LGBQ and TGD identities than the two population-based samples.

Substance use behaviors are also shown in Table 1. Overall, approximately 12%–14% of participants reported past 30-day alcohol, e-cigarette, or marijuana use and approximately 7% reported past 30-day binge drinking. Rates differed significantly ($p < .001$) across the three data sources; most notably, almost 25% of NTS participants reported recent alcohol use, in contrast to 13% and 17% of CHKS and MSS participants, respectively. Recent e-cigarette use was almost twice as common in Minnesota (21%) than in California (11%).

Intersecting social positions bearing the greatest substance use burden

In all exhaustive CHAID models, race/ethnicity was the first branching variable, indicating that racial/ethnic identity was the characteristic that most clearly distinguished between groups with regard to substance use. Sexual orientation was most often the second branching variable but this was not consistent across substances and within racial/ethnic groups.

For each substance, the 10 intersectional groups with the highest prevalences of use are shown in Table 2. Several commonalities were observed regarding intersecting social positions with a consistently high burden of substance use. First, young

Table 1
Characteristics of the harmonized sample, N = 602,470

Characteristics	Total		CHKS (N = 512,067, 85.0%)		MSS (N = 80,456; 13.4%)		NTS (N = 9,947, 1.7%)	
	N	%	N	%	N	%	N	%
Demographic characteristics								
Grade								
9	285,592	47.4	238,565	46.6	45,232	56.2	1,795	18.1
10	35,510	5.9	33,047	6.6	0	0	2,463	24.8
11	245,460	40.7	207,338	40.6	35,224	43.8	2,898	29.1
12	35,908	6.0	33,117	6.6	0	0	2,791	28.1
Sex assigned at birth								
Male	287,545	49.9	244,825	50.4	40,121	50.0	2,599	26.1
Female	288,467	50.1	240,956	49.6	40,163	50.0	7,348	73.9
Race/ethnicity								
NH American Indian	4,797	0.8	3,812	0.8	941	1.2	44	0.5
NH Asian/Pacific Islander	69,503	11.7	63,717	12.6	5,390	6.8	396	4.0
NH Black	25,145	4.2	18,712	3.7	5,996	7.5	467	4.7
Latina/x/o	269,017	45.2	260,602	51.5	6,826	8.5	1,589	16.1
NH White	177,617	29.8	114,905	22.7	56,163	70.3	6,549	66.3
NH multiracial	49,676	8.3	44,224	8.7	4,625	5.8	827	8.4
Sexual orientation								
Straight	453,481	84.3	390,525	85.6	62,799	87.3	157	1.6
Gay or lesbian	14,136	2.6	9,119	2.0	1,253	1.7	3,764	38.6
Bisexual	38,339	7.1	30,477	6.7	4,515	6.3	3,347	34.4
Questioning	20,165	3.7	18,280	4.0	1,662	2.3	223	2.3
Something else (including pansexual, queer)	11,794	2.2	7,843	1.7	1,701	2.4	2,250	23.1
Gender identity								
Cisgender/not transgender	528,252	96.9	446,453	97.6	75,220	97.0	6,579	66.1
Trans/gender diverse	9,181	1.7	4,724	1.0	1,141	1.5	3,316	33.3
Questioning	7,600	1.4	6,369	1.4	1,179	1.5	52	0.5
Substance use, past 30 days[a]								
Any alcohol	76,067	13.8	61,855	13.1	11,772	16.6	2,440	24.6
Binge drinking	37,562	6.8	31,747	6.7	4,958	7.0	857	8.6
Any e-cigarette	68,592	12.6	53,843	11.4	14,749	20.8	-	-
Any marijuana	71,861	13.0	62,814	13.3	7,773	11.0	1,274	12.8

CHKS = California Healthy Kids Survey; MSS = Minnesota Student Survey; NH = Non-Hispanic; NTS = National Teen Survey.
[a] Prevalences of each substance use differed significantly across datasets ($p < .001$).

people who identified as Latina/x/o and TGD, particularly those assigned male at birth, were in the high prevalence groups for alcohol use, binge drinking, and marijuana use, for several different sexual orientation identities regardless of dataset. For example, 31.1% of Latina/x/o, straight, TGD, and youth who were assigned male at birth reported drinking alcohol in the past 30 days. Second, Black youth who also identified as TGD or questioning their gender were commonly in the high prevalence groups, but in most cases, this finding was specific to youth in the CHKS dataset. Third, youth who identified as TGD or as questioning their gender, in combination with many other marginalized social positions, were also common in the high prevalence groups. Fourth, Asian/Pacific Islander youth were not in the high prevalence groups for any substance examined here. Finally, for e-cigarette use, most high prevalence groups were specific to the MSS dataset only.

Discussion

Stigmatizing experiences (e.g., exclusion, harassment); interpersonal and institutionalized racism, xenophobia, homophobia, and transphobia; and a lack of access to resources and services can lead to distress and unhealthy coping behaviors, including substance use [32–36]. Using the power and diversity of three distinct large datasets and an innovative analytic technique specifically recommended for quantitative studies of intersectionality, we found significant disparities in substance use, with the burden varying by unique intersecting marginalized identities. This approach is recommended to examine disparities in groups often treated as homogeneous, as a precursor to developing relevant and appropriate responses, including prevention strategies and organizational and policy support for groups that bear the greatest substance use burden. Findings of high prevalence in certain intersecting groups suggest that support, resources, and structural changes specifically tailored to TGD Latina/x/o youth or other marginalized identities may be needed to support these youth in the context of their unique lived experiences. The results argue for efforts that are intersectional—that explicitly address racial/ethnic and cultural differences (including, for example, resources in Spanish and other languages), while also integrating awareness and understanding of sexual and gender diversity.

The finding of disparate rates of substance use across different intersecting identities is consistent with previous studies [19–22]. In the present study, certain intersections of LGBQ youth of color were among the high prevalence groups for some substances in ways that have been identified before (e.g., marijuana use among Black bisexual youth in the CHKS dataset, as seen in a recent article by Feinstein et al. [19]). However, with the present study's measure of TGD and gender questioning youth, key findings emphasize the importance of understanding experiences related to gender and race/ethnicity for substance use among adolescents—in many cases beyond the role of sexual orientation. The stressful experience of stigma stemming from

Table 2
10 Intersecting identities with highest prevalence of each substance (past 30 days)

Alcohol use (overall 13.8%)					
Prev, %	Race/ethnicity	Sexual orientation	Gender identity	Assigned gender	Dataset
33.6	Latina/x/o	Missing	TGD	–	–
31.3	Black	LG/B/Something else	TGD	–	–
31.1	Latina/x/o	Straight	TGD	Male	–
29.7	White	B	–	Male/missing	NTS
28.7	White	LG	–	Male	NTS
28.7	Multiracial	LG/B	–	–	MSS
27.7	White	Something else	–	Male	MSS/NTS
27.4	White	B	–	Female	MSS/NTS
26.1	Latina/x/o	B	TGD/quest/missing	Male/missing	–
25.5	White	Straight/quest	–	Female/missing	NTS
Binge drinking (overall 6.8%)					
Prev, %	Race/ethnicity	Sexual orientation	Gender identity	Assigned gender	Dataset
27.4	Black	–	TGD	–	CHKS
21.5	White	Straight	TGD	–	CHKS/NTS
20.5	Latina/x/o	Straight	TGD	–	–
19.6	Latina/x/o	Quest/missing	TGD	–	–
18.7	Latina/x/o	Something else	TGD/quest/missing	Male/missing	–
18.3	Latina/x/o	LG/B	TGD/quest/missing	Male/missing	–
17.2	Missing	–	TGD/quest	–	–
16.5	Black	–	Quest	–	CHKS
16.4	Latina/x/o	Quest/missing	Quest	Male/missing	–
15.9	Multiracial	Straight	TGD/quest	–	–
E-cigarette use (overall 12.6%)					
Prev, %	Race/ethnicity	Sexual orientation	Gender identity	Assigned gender	Dataset
36.2	Multiracial	B/something else	–	–	MSS
33.4	Latina/x/o	B	–	–	MSS
32.0	NA	–	–	Female	MSS
31.3	Black	–	TGD	–	CHKS
24.9	White	B	–	Female/missing	MSS
27.9	Latina/x/o	Straight/missing	TGD	–	CHKS
25.8	Multiracial	LG/straight/quest/missing	–	–	MSS
25.6	Latina/x/o	LG	TGD	–	–
25.1	White	B	–	Male	MSS
24.5	Latina/x/o	Something else/quest	Cis	–	MSS
Marijuana use (overall 13.0%)					
Prev, %	Race/ethnicity	Sexual orientation	Gender identity	Assigned gender	Dataset
35.3	White	Straight	TGD	–	CHKS
33.2	Multiracial	B	–	–	MSS
32.0	Latina/x/o	Missing	TGD	–	–
31.5	Latina/x/o	Straight	TGD	–	–
31.1	Latina/x/o	B	TGD	Male/missing	–
30.1	Black	B	–	–	CHKS
28.1	Black	LG/Q/Something else	TGD/quest/missing	–	MSS/CHKS
27.8	Black	Straight/missing	TGD/quest	–	–
27.5	NA	LG/B/Something else	–	–	–
27.5	NA	Straight/missing	–	Female	MSS/NTS

– Within this intersection of identities, there were no significant differences by the column variable.
LGBQ = lesbian, gay, bisexual, questioning; NA = Native American; TGD = transgender/gender diverse; Quest = questioning.

transphobic interpersonal interactions, organizational characteristics (e.g., gendered bathrooms at school), and discriminatory legislation [37] likely contributes to the disparities particularly affecting TGD youth.

Asian American/Pacific Islander youth were not among the highest prevalence categories for the substance use behaviors examined here. Several considerations might account for this finding. Prior research has identified disparities across ethnic identities within Asian American/Pacific Islander youth [38]. The present study did not account for this identity characteristic, which may have masked differences in substance use burden and would be important to investigate further in future studies. In addition, evidence suggests that Asian American/Pacific Islander youth may initiate substance use in late adolescence or early adulthood [38,39], leaving them with relatively low prevalences in the high school years, which were the focus of the present study.

One pattern within the present findings—that e-cigarette use was more common in most MSS groups than in CHKS groups—clearly suggests the importance of considering features of the social environment in examining adolescent behaviors. Survey data were collected after California had raised the minimum purchase age for tobacco products, including e-cigarettes, to 21 years (2016), but before Minnesota had done so in most

communities (and before this policy went into effect nationally at the end of 2019) [40]. This difference in the policy landscape may drive the disparities by location noted here. Importantly, a patchwork of different social policies relating to substances or directly affecting LGBTQ+ populations (e.g., criminalization of healthcare for transgender youth, barring access to gender-specific resources like restrooms or sports teams) may further affect substance use behaviors, particularly among marginalized youth. An assessment and analysis of such policies is beyond the scope of the present work but is a rich area for further research.

Item-specific missingness may have affected this analysis. Although there was little missing data on two of our key identity items (1.1% for race/ethnicity and 4.4% for sex assigned at birth), missingness was slightly higher for gender identity (9.5%) and sexual orientation (10.7%), particularly in the MSS dataset. The main source of missing data on this variable was approximately 8% of the sample who indicated that they "do not describe myself in any of these ways" with regard to sexual orientation and is likely to be a mix of heterosexual students and those who use identity labels that were not assessed separately. Participants' missing data on sexual orientation and/or gender identity were intentionally retained in this exploratory analysis as a first step toward learning about this understudied group that may include emerging identities.

Limitations and strengths

Several limitations deserve attention when considering this study's findings. First, the process of harmonizing datasets requires identifying commonalities across datasets, which takes precedence over nuance that may be available in any single dataset. For example, a nonbinary gender identity category was not available in all three datasets, and the harmonized version therefore does not include this indicator. There may therefore be further distinctions within the category of TGD that were not apparent from this analysis. Second, the two school-based samples systematically excluded youth who were out of school on the days of data collection. Both LGBTQ+ youth and those involved in substance use are more likely than their peers to stay home due to personal safety concerns or have left or been pushed out of school; findings may therefore underestimate use or disparities. Likewise, the NTS sample was recruited through partnering organizations serving LGBTQ+ youth. Participants who received the survey information are more likely to be out and connected to organizations than those who did not receive the survey information, and findings may therefore not be the representative of all LGBTQ+ youth. Third, as with all survey data, responses were self-reported and may be subject to bias. For example, social desirability and community values may play a stronger role for youth with certain racial/ethnic identities compared to others, which could influence findings regarding the prevalence of substance use behaviors. Finally, as noted above, data on structural and policy factors of relevance to LGBTQ+ youth of color and substance use (e.g., legalization of marijuana, Tobacco 21 laws) were not available for this study.

However, this study also benefits from several strengths. First, the inclusion of three distinct, large datasets and a direct analysis of differences across data sources provide robust findings that are expected to be widely generalizable beyond the three studies independently. With the inclusion of gender identity and numerous separate sexual orientation identities and separate racial/ethnic identities, key findings from the present study extend our understanding of the substance use experiences of youth with multiple marginalized identities. Finally, the strategic harmonization of three samples and application of an innovative new method for quantitative analyses for intersectionality provide unprecedented possibility to study groups of youth with intersecting social identities that have been so small as to be invisible in prior research (e.g., Black transgender or gender-diverse youth or multiracial bisexual youth).

Conclusion

This study represents an early step in applying an intersectionality framework to questions of disparities in the face of multiple types of structural oppression. Three avenues are recommended for further research in this area. First, future studies exploring disparities in other health behaviors (e.g., high-risk sexual behaviors) and conditions (e.g., emotional distress) are needed; similar patterns across a range of domains will strengthen the present study's findings. Second, analyses that explicitly consider exposure to bullying, discrimination, stigma, and other experiences of adversity at multiple ecological levels—and tests the mediating role of such adversity—can highlight opportunities for prevention within systems. Third, studies are needed to expand upon the methods used here, including additional geographic regions, survey measures with identical language across sources, and qualitative approaches. This emerging body of work will continue to provide critical evidence regarding the complex considerations of identity, risk behaviors, and structural oppression.

Youth with multiple marginalized identities bear a greater burden of substance use than other adolescents. Targeted prevention and intervention activities may be beneficial for intersecting identity groups with the highest prevalence of use, and further research is warranted to identify and address structural factors contributing to these disparities (e.g., stigmatizing organizational characteristics and social policy). Clinicians, educators, and others working with and on behalf of youth should address intersecting types of stigma and oppression that may contribute to substance use.

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References

[1] Viner RM, Ozer EM, Denny S, et al. Adolescence and the social determinants of health. Lancet 2012;379:1641–52.
[2] Braveman P, Gottlieb L. The social determinants of health: It's time to consider the causes of the causes. Public Health Rep 2014;129:19–31.
[3] Eisenberg ME, Gower AL, McMorris BJ, et al. Emotional distress, bullying experiences, and protective factors among transgender and gender non-conforming youth in urban, suburban, town and rural locations. J Rural Health 2019;35:270–81.
[4] Kosciw JG, Greytak EA, Diaz EM. Who, what, where, when, and why: Demographic and ecological factors contributing to hostile school climate for lesbian, gay, bisexual, and transgender youth. J Youth Adolesc 2009;38:976–88.
[5] Jones CM, Clayton HB, Deputy NP, et al. Prescription opioid misuse and use of alcohol and other substances among high school students — youth risk behavior survey, United States, 2019. MMWR Suppl 2020;69:38–46.
[6] Eisenberg ME, Gower AL, McMorris BJ, et al. Risk and protective factors in the lives of transgender/gender non-conforming adolescents. J Adolesc Health 2017;61:521–6.
[7] Marshal MP, Friedman MS, Stall R, et al. Sexual orientation and adolescent substance use: A meta-analysis and methodological review. Addiction 2008;103:546–56.
[8] Creamer MR, Jones SE, Gentzke AS, et al. Tobacco product use among high school students — youth risk data source. MMWR Suppl 2020;69:56–63.
[9] Day JK, Fish JN, Perez-Brumer A, et al. Transgender youth substance use disparities: Results from a population-based sample. J Adolesc Health 2018;61:729–35.
[10] Johnson RM, Fleming CB, Cambron C, et al. Race/ethnicity differences in trends of marijuana, cigarette, and alcohol use among 8th, 10th, and 12th graders in Washington state, 2004 – 2016. Prev Sci 2019;20:194–204.
[11] Hendricks ML, Testa RJ. A conceptual framework for clinical work with transgender and gender nonconforming clients: An adaptation of the minority stress model. Prof Psychol Res Pr 2012;43:460–7.
[12] Meyer I. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. Psychol Bull 2003;129:674–97.
[13] Bowleg L. The problem with the phrase women and minorities: Intersectionality — an important theoretical framework for public health. Am J Public Health 2012;102:1267–73.
[14] Parent MC, DeBlaere C, Moradi B. Approaches to research on intersectionality: Perspectives on gender, LGBT, and racial/ethnic identities. Sex Roles 2013;68:639–45.
[15] López N, Gadsden VL. Health inequities, social determinants, and intersectionality [Internet]. 2016. Available at: https://nam.edu/wp-content/uploads/2016/12/Health-Inequities-Social-Determinants-and-Intersectionality.pdf. Accessed May 23, 2022.
[16] Bauer GR. Incorporating intersectionality theory into population health research methodology: Challenges and the potential to advance health equity. Soc Sci Med 2014;110:10–7.
[17] Balsam K, Molina Y, Beadnell B, et al. Measuring multiple minority stress: The LGBT people of color microagressions scale. Cultur Divers Ethnic Minor Psychol 2011;17:163–74.
[18] Talley AE, Hughes TL, Aranda F, et al. Exploring alcohol-use behaviors among heterosexual and sexual minority adolescents: Intersections with sex, age, and race/ethnicity. Am J Public Health 2014;104:295–303.
[19] Feinstein BA, Turner BC, Beach LB, et al. Racial/ethnic differences in mental health, substance use, and bullying victimization among self-identified bisexual high school-aged youth. LGBT Health 2019;6:174–83.
[20] Thoma BC, Huebner DM. Health consequences of racist and antigay discrimination for multiple minority adolescents. Cultur Divers Ethnic Minor Psychol 2013;19:404–13.
[21] Corliss HL, Rosario M, Birkett MA, et al. Sexual orientation disparities in adolescent cigarette smoking: Intersections with race/ethnicity, gender, and age. Am J Public Health 2014;104:1137–47.
[22] Newcomb ME, Birkett MA, Corliss HL, Mustanski B. Sexual orientation, gender, and racial differences in illicit drug use in a sample of US high school students. Am J Public Health 2014;104:304–10.
[23] Gower A, Rider GN, Brown C, Eisenberg ME. Diverse sexual and gender identity, bullying, and depression among adolescents. Pediatrics 2022;149.e2021053000.
[24] Minnesota Center for Health Statistics. Minnesota student survey [Internet]. 2016. Available at: https://www.health.state.mn.us/data/mchs/surveys/mss/index.html. Accessed May 23, 2022.
[25] WestEd for the California Department of Education. California school climate, health, and learning surveys. Available at: https://calschls.org/. Accessed May 23, 2022.
[26] Watson RJ, Wheldon C, Puhl RM. Evidence of diverse identities in a large national sample of sexual and gender minority youth. J Res Adolesc 2020;30 Suppl 2. 431–442.
[27] Human Rights Campaign. Growing up LGBT in America: HRC youth survey report [Internet]. Available at: https://www.hrc.org/resources/youth-report. Accessed May 23, 2022.
[28] Ruggles S. Big microdata for population research. Demography 2014;51:287–97.
[29] Fortier I, Doiron D, Little J, et al. Is rigorous retrospective harmonization possible ? Application of the DataSHaPER approach across 53 large studies. Int J Epidemiol 2011;40:1314–28.
[30] Bauer G, Churchill S, Mahendran M, et al. Intersectionality in quantitative research: A systematic review of its emergence and applications of theory and methods. SSM Popul Health 2021;14:100798.
[31] Kass G. An exploratory technique for investigating large quantities of categorical data. J R Stat Soc Ser C Appl Stat 1980;29:119–27.
[32] Rinehart S, Espelage D. A multilevel analysis of school climate, homophobic name-calling, and sexual harassment victimization/perpetration among middle school youth. Psychol Violence 2016;6:213–22.
[33] Tebbe EN, Moradi B. Anti-transgender prejudice: A structural equation model of associated constructs. J Couns Psychol 2012;59:251–61.
[34] Poon C, Saewyc EM, Chen W. Enacted stigma, problem substance use, and protective factors among Asian sexual minority youth in British Columbia. Can J Commun Ment Health 2011;30:47–64.
[35] Saewyc EM. Research on adolescent sexual orientation: Development, health disparities, stigma and resilience. J Res Adolesc 2011;21:256–72.
[36] Mays VM, Cochran SD, Barnes NW. Race, race-based discrimination, and health outcomes among African Americans. Annu Rev Psychol 2007;58:201–25.
[37] Krishnakumar P. This record-breaking year for anti-transgender legislation would affect minors the most. CNN.com; 2021. Available at: https://www.cnn.com/2021/04/15/politics/anti-transgender-legislation-2021/index.html. Accessed May 23, 2022.
[38] Ahmmad Z, Atklins D. Ethnicity and acculturation: Asian American substance use from early adolescence to mature adulthood. J Ethn Migr Stud 2021;47:4570–96.
[39] Hahm HC, Wong FY, Huang ZJ, et al. Substance use among Asian Americans and Pacific Islanders sexual minority adolescents: Findings from the national longitudinal study of adolescent health. J Adolesc Health 2008;42:275–83.
[40] Campaign for Tobacco Free Kids. states and localities that have raised the minimum legal sale age for tobacco products to 21. 2019. Available at: https://www.lung.org/our-initiatives/tobacco/cessation-and-prevention/tobacco-21-laws.html. Accessed May 23, 2022.