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Addressing gaps on risk and resilience factors for alcohol use outcomes in sexual and gender minority populations

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Abstract

Issues—In 2011, the Institute of Medicine (IOM) released a report that constituted the first comprehensive effort by a federal body to understand the current state of science pertinent to the health needs of sexual and gender minority populations. This mini-review summarises recent empirical, methodological and theoretical advances in alcohol-related research among to lesbian, gay, bisexual and transgender populations and highlights progress toward addressing gaps, with a particular interest in those identified by the IOM report.

Approach—Articles published since 2011 were identified from PsycINFO and PubMed database searches, using various combinations of keyword identifiers (*alcohol, alcohol abuse, substance abuse, LGBT, lesbian, gay, bisexual, transgender*). Reference sections of included articles were also examined for additional citations.

Key Findings—Recent empirical work has contributed to a greater understanding of sub-group differences within this diverse population. Evidence has supported theorised influences that can account for alcohol-related disparities, yet important gaps remain. Studies that examine the role of gender identity and its intersection with sexual identity within transgender and gender non-conforming sub-populations are lacking. Methodological advances in this literature have begun to allow for examinations of how minority-specific and general risk factors of alcohol misuse may contribute to patterns of alcohol involvement over time and within social-relational contexts.

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Conclusions—The recommendations made in the current mini-review are meant to facilitate future collaborative efforts, scale development, thoughtful methodological design and analysis, and theoretically-driven nuanced hypotheses to better understand, and ultimately address, alcohol-related disparities among sexual and gender minority populations.

Keywords

alcohol; LGBT; gay; lesbian; bisexual; substance abuse; transgender

Issues

Gay men and lesbian women have long been assumed to drink more heavily and be at greater risk of alcohol use disorder (AUD) than their heterosexual peers [1]. Presumptions of inherently risky drinking behaviour among non-heterosexual individuals have declined over time with the recognition that early research suffered from methodological limitations, including non-probability sampling, poor measures and lack of appropriate comparison groups [2, 3]. Further, bisexual and transgender persons were largely unrepresented in early studies. With increasing visibility and changing social attitudes, greater scientific attention has been afforded to lesbian, gay, bisexual and transgender (LGBT) health topics, including substance use [e.g. 4]. As evidence, in 2010, the Institute of Medicine (IOM) convened a committee to summarise current knowledge on LGBT health, identify existing gaps and propose future directions for research. The IOM committee drew upon several conceptual perspectives (e.g. minority stress, intersectionality and social ecology) and organised its inquiry by stage-of-life (e.g. childhood and adolescence; early and middle adulthood). The committee's report [5] constituted the first effort by a federal body to assess the state of science regarding sexual and gender minority health.

Based on their review, the IOM committee noted that alcohol research had been uneven. For example, transgender individuals have received less attention than lesbian, gay and bisexual (LGB) persons. The committee concluded that alcohol misuse remains a priority research topic, particularly among sexual and gender minority adolescents and young adults. Given established public health interest and the acceleration of relevant publications in recent years, we sought to assess the state of alcohol-related research among LGBT populations since the release of the IOM report. This mini-review, in accordance with published recommendations [6], summarises recent empirical developments and highlights progress toward addressing gaps in knowledge emphasised in the IOM report. Rather than conducting a systematic review to test a particular hypothesis, however, the overarching goal of this descriptive mini-review is to highlight remaining empirical gaps in the extant literature.

Approach

Articles published between January 2011 and May 2015 were identified from PsycINFO and PubMed database searches using various combinations of keywords (e.g. *alcohol*, *alcohol abuse*, *substance abuse*, *LGBT*, *lesbian*, *gay*, *bisexual*, *transgender*); reference sections of articles were also examined for additional citations. Studies that examined alcohol consumption or consequences (including AUD diagnosis) as primary outcomes in samples

of LGBT-identified participants were eligible for inclusion, whereas those focused on auxiliary alcohol-related constructs (e.g. expectancies, motives) as outcomes were excluded. Acknowledging that studies vary in terms of quality and rigor, empirical findings from the most authoritative peer-reviewed outlets, as deemed by the study authors, are highlighted in-text whenever possible. Greater weighting for inclusion was afforded to studies that addressed gaps specified in the IOM report, employed rigorous methods (e.g. national datasets; probability sampling), or were authored by eminent researchers in the area. Consistent with the IOM report, we organised this review by life course stages (childhood and adolescence; emerging adulthood; middle and older adulthood). Study samples comprised of participants whose ages spanned life stages were reviewed in sub-sections based on the reported average age of participants. Because men and women are considered to have distinct alcohol outcomes and risk factors [7], we distinguished findings on the basis of biological sex, when possible. Finally, we sought to update readers on recent methodological and theoretical advances that may be relevant for future efforts to address alcohol-related disparities among sexual and gender minority populations.

Key Findings

Childhood and Adolescence

Background—Adolescence is a period characterised by identity exploration and integration [8], including for some the beginning of a coming-out process [9]. Nevertheless, due to the stigmatised nature of LGB identities, many youth report difficulty with the process of sexual identity development [10]. Indeed, sexual minority adolescents who initiate involvement in gay-related activities during this developmental period often report higher levels of alcohol misuse, which decreases as youth became more involved in such activities over time [11]. Reducing alcohol use among LGB and gender non-conforming youth is critical, as drinking in adolescence is associated with a host of harmful behaviours [12,13]. Additionally, heavy episodic drinking (HED), defined as the consumption of 4+/5+ standard drinks per drinking occasion (more recently — over a 2-hour period) for women and men, respectively, has been linked to poorer cognitive functioning [14] and riskier decision-making [15]. Prior studies demonstrated that sexual minority adolescents are more likely than their heterosexual peers to report current alcohol use [16,17]. Moreover, those who drink report a higher prevalence of HED than their heterosexual counterparts [18–20].

Empirical update—New research has estimated rates of alcohol use among various sexual minority adolescent sub-groups (e.g. based on race/ethnicity, sex, dimensions of sexual orientation). Findings from cross-sectional [21–23] and longitudinal studies [24–26], as well as systematic reviews and meta-analyses [27, 28], have highlighted alcohol-use disparities among LGBT sub-groups. For example, Marshal and colleagues published a series of studies examining alcohol involvement among sexual minority youth, as determined by either: (i) a single-item measure of sexual orientation [25, 29]; or (ii) combining separate items assessing sexual identity and attraction [30], and consistently found heavier rates of recent use among sexual minority girls than sexual minority boys. Similarly, an analysis of the 2005 and 2007 Youth Risk Behavior Surveys found higher rates of recent alcohol use among sexual minority girls than boys [31]. In addition, younger

sexual minority adolescents and bisexual youth reported higher rates of alcohol use, respectively, than their older and exclusively gay/lesbian counterparts, with few differences across race and ethnicity [31]. Finally, findings from a study of persons who reported bisexual attractions (i.e. “being attracted to individuals of more than one sex/gender”; [33]), supported prior work suggesting that bisexual adolescents and young adults are at increased risk of alcohol use and misuse.

Recent studies have increasingly examined the role of ethnicity/race in alcohol use disparities among sexual minority youth [31,32]. For example, among young men who have sex with men (MSM; ages 16–20; [32]), White youth were more likely than Black or Hispanic youth to report recent alcohol use and be polysubstance users. Recent work has also begun to examine alcohol-use disparities among transgender and gender non-conforming youth. Reisner and colleagues [34], for example, recently showed that transgender and gender non-conforming youth reported a greater likelihood of past-year alcohol use than cisgender youth, and this association was partially explained by gender minority social stress (i.e. bullying; cf. [35]).

Additional studies seeking to explain the mechanisms and social contexts contributing to alcohol misuse among LGBT youth remain sparse. For example, one study found that, among female but not male sexual minority youth, the presence of Gay-Straight Alliances was associated with lower odds of reporting a recent drinking episode (any use), whereas Gay-Straight Alliances and explicit anti-homophobic policies were protective against reporting a recent HED episode (5+ drinks) [36; see also [37]]. Another study found the relationship between sexual identity and Alcohol Use Disorders Identification Test scores, was explained, in part, by depressive symptoms, suggesting a potential target for interventions [38]. Finally, Bird and colleagues [39] explored, among LGBT youth and young adults, the value of having an identifiable “role model” in thwarting maladaptive health behaviours, including frequent HED.

Recommendations—Despite advances in delineating sub-group differences, much work remains to better understand risk factors of alcohol misuse among LGB adolescents. First, further investigations of alcohol-related disparities, based on various patterns of sexual identity, attraction, and behaviour and related characteristics, are warranted. Second, studies of sexual identity development and corresponding associations with risk of alcohol misuse among gender non-conforming youth are important to disseminate. Third, we recommend additional research examining structural determinants of alcohol involvement among LGB youth that considers both minority-specific stressors, or sources of excessive stress resulting from disadvantaged social standing [40], as well as common intrapersonal and interpersonal stressors, which are risk factors for alcohol misuse regardless of one’s social status [41]. For example, social contexts such as the home, school, peer networks, religious institutions, racial/ethnic communities-of-origin and shifts in national policies (e.g. marriage equality) may influence the stress and alcohol relationship [42]. Finally, findings should be used to inform theoretically- and empirically-supported interventions for at-risk sexual and gender minority youth.

Emerging Adulthood

Background—Emerging adulthood, usually defined as ages 18 to 25 [43], is associated with heightened identity exploration across multiple domains, including sexual identity. Generally, emerging adulthood represents the highest risk period for both recent and lifetime diagnosis of AUD and is characterised by high rates of HED [44–46]. Patterns of use during this critical developmental period may be influenced by various facets of sexual orientation (i.e. sexual identity, attraction, behaviour), with previous work showing rapidly increasing alcohol use among LGB young adults over this stage-of-life [47–49].

Empirical update—Studies have continued to investigate how alcohol use varies by gender among sexual minority young adult populations. Several large, nationally representative surveys have corroborated findings that alcohol-related problems are common among sexual minority women. For example, data from the National Survey of Family Growth showed that, among females aged 15-to-24, non-heterosexual identity, same-sex attraction, and same-sex behaviour were associated with increased likelihood of past-year HED (i.e. 5 drinks on 1 occasion) [50]. In an analysis of the National Longitudinal Study of Adolescent Health, among women, endorsing a non-heterosexual identity or any same-sex attraction or sexual partners was strongly associated with a greater likelihood of endorsing problematic alcohol use [51]. The aforementioned associations were either weak or non-significant among men in both the samples. Similar to adolescent girls, women in emerging adulthood who identify as bisexual are more likely than their lesbian peers to report possible AUD (based on Alcohol Use Disorders Identification Test-Consumption scores [52]) and negative alcohol-related consequences [53].

Race/ethnicity is important to consider for female alcohol use in emerging adulthood. In a cross-sectional study [56], no differences emerged in drinking-related consequences or alcohol consumption between White, Black or Hispanic lesbian and bisexual women in emerging adulthood. However, there were differences in number of drinks consumed during peak drinking occasions between White and Black women [56]. Most notable were differences between White women and women of colour in exposure to life stressors that may increase risk of violence exposure and contribute to overall stressors for sexual minority women of colour. Specifically, women of colour reported more economic disadvantage, higher rates of homelessness, and less access to housing and health insurance.

Recent studies [54,55] have also investigated the prevalence of drinking among transgender and gender non-conforming young adults. In the National College Health Assessment Survey [54], non-transgender-identified females reported fewer days consuming alcohol use in the prior month and a lower frequency of recent HED (5+ drinks in one sitting) than transgender-identified peers. By contrast, non-transgender-identified males were more likely to report any HED in the past two-weeks, but they reported less frequent HED than transgender-identified persons.

Advances have been made in understanding mechanisms through which sexual minority status confers risk of alcohol misuse in emerging adulthood. One potentially important factor is perceived drinking norms. In a study of emerging adults followed over four years, lesbian and bisexual women perceived that sexual minority women drank more than their

heterosexual peers and these drinking norms influenced alcohol consumption over time in a reciprocal, feed-forward fashion where alcohol use was prospectively predictive of increased perceived norms for drinking [57]. Studies have also investigated the effects of discrimination, including victimisation and harassment, on the alcohol involvement of LGBT young adults. For example, Woodford and colleagues [58] found that higher levels of problematic drinking, as measured by the CAGE, among LGBT students were explained, in part, by witnessing acts of incivility and hostility (e.g. physical or verbal threats, bullying, assault). In a longitudinal study of LGBT young adults in Chicago, women who reported sexual orientation-based victimisation and elevated levels of psychological distress increased alcohol use more quickly over time than those who did not [59]. A separate cross-sectional study showed that sexual minority women in emerging adulthood who indicated a history of childhood or adult sexual assault reported higher alcohol consumption and perceived drinking norms [60]. Finally, a prospective study involving 230 transgender women in New York found that a history of gender abuse predicted increased alcohol use during follow-up, an association that was primarily mediated through depressive symptoms [55]. Thus, consistent with minority stress theory [40], sexual and gender minority young adults' ongoing exposure to victimisation, prejudice, and discrimination appears to increase risk of alcohol misuse.

Recent studies have also investigated how social and structural support systems influenced alcohol involvement among LGBT young adults. A study of LGBT college students noted that those who attended high schools without gay-straight alliance programs reported higher levels of problematic alcohol use than LGBT students who had attended schools with these programs [61]. Another cross-sectional study found that higher levels of structural stigma, defined as a lack of state-level policies providing equal opportunities and protections for sexual minorities, interacted with gay-related rejection sensitivity (i.e. expecting rejection in society because of one's sexual identity) to increase the risk of frequent alcohol use among sexual minority college students [62]. Collectively, findings illustrate how stigma may operate at personal, organisational, and institutional levels to influence alcohol involvement of LGBT young adults.

Despite increased attention to sexual minority women's alcohol involvement, the majority of studies of emerging adults have continued to focus on MSM and alcohol's contribution to risky sexual behaviour (e.g. condomless anal sex [CAS]). Recently published work has continued to demonstrate that alcohol use during or prior to sex increases risk of CAS with HIV-discordant or unknown serostatus partners [63]. Newly identified moderators of this association include age [64], partnership type [65], sensation-seeking [66] and race/ethnicity. Two recent studies of young MSM [67, 68] showed that HED varied by race/ethnicity, with White MSM consuming significantly more alcohol than Black, Latino, or mixed-race MSM. A longitudinal study [69] involving young MSM also found that White participants reported the highest frequency of past-week alcohol use at baseline, and greater increases in past-week alcohol use over 18 months, compared to Black, Hispanic, Asian/Pacific Islander, and mixed-race MSM. Compared to ethnic/racial minority young MSM, White MSM may have differential risk of problematic drinking.

Recommendations—Several areas for future research are apparent. First, extant literature relies heavily on studies of college students. This limits the generalisability to young adults outside of college settings, especially as colleges may have groups, clubs, and support systems available for sexual minorities that are harder for non-college-attending young adults to access. Moreover, despite high rates of alcohol misuse among young women who express minority sexual orientations, there remains an under-representation of findings involving this population. Second, more research must consider the role of developing identities, navigating role transitions, and building peer relationships and how these processes may, in turn, influence drinking behaviours among sexual and gender minorities. Finally, alcohol research has yet to fully articulate subgroup differences or factors that may make some sub-populations more resilient or vulnerable to minority stress. In particular, studies are needed to determine how persons' racial/ethnic identity interacts with gender and sexual identities to impact alcohol use in emerging adulthood [e.g. 31,56].

Middle and Older Adulthood

Background—Middle and older adulthood, beginning in the mid- to late-20s, is a period in which alcohol consumption and risk of alcohol problems and AUD typically decline with age [70] (see [71] for cohort and period effects). However, individuals who consume alcohol as they age may face age-specific complications, such as enhanced susceptibility to genetic liabilities for AUD [72] and negative health effects of long-term heavy drinking [73], as well as comorbid conditions worsened by alcohol misuse [74], potential prescription drug interactions [71,74,75], and greater difficulty identifying problematic drinking [76]. Research among sexual minority persons in middle and older adulthood has only recently begun to investigate alcohol-related disparities based on various dimensions of sexual orientation.

Empirical update—Green and Feinstein [3] reviewed evidence to suggest that adult women who identify as lesbian or bisexual are more likely to report alcohol misuse and related consequences than heterosexual women. Using data from Australian women (ages 25–30), Hughes and colleagues [4] showed that, compared to heterosexual-identified women, those who identified as mostly heterosexual or bisexual, but not lesbian, were more likely to report alcohol consumption, including HED. McCabe and colleagues examined rates of AUD in a national sample based on three dimensions of sexual orientation. Women who identified as lesbian, bisexual, or who indicated that they were unsure of their sexual identity, were at elevated risk for a lifetime AUD, compared to heterosexual-identified women [77,78]. McCabe and colleagues [77] also found that, compared to women who were attracted to or engaged in sexual behaviours with only persons of the opposite-sex, those who were attracted to or engaged in behaviours with only persons of the same-sex or both sexes had greater risk for a lifetime AUD. Drabble and colleagues [79] showed that, compared to their exclusively heterosexual counterparts, HED levels were consistently elevated among adult lesbian and bisexual women and women who identified as heterosexual yet reported a history of same-sex partners. Thus, emerging evidence, although equivocal, suggests that, among women in middle adulthood, those with lesbian or bisexual identities or behaviours may be at elevated risk for HED [79] (cf. [4]) relative to those espousing exclusively heterosexual identities and behaviours. Notably, epidemiological

results show that bisexual and lesbian identities, attractions, and behaviours confer greater risk of lifetime AUD [77].

By contrast, adult men who identify as gay or bisexual report levels of alcohol involvement similar to their heterosexual male [77] and lesbian female counterparts [80]. For example, when McCabe and colleagues [77] examined data on associations among various facets of sexual orientation and men's alcohol involvement, no differences in likelihood of lifetime AUD, based on identity or attraction, were shown. Instead, men who had only engaged in sexual behaviour with same-sex partners in their lifetime were shown to be at *lower* risk of lifetime AUD. Among HIV-infected men, HED is of particular concern due to adverse HIV-related health complications, yet over 10% of HIV-infected MSM receiving care in a veteran's hospital reported long-term, consistent HED [81]. In another study, only about half who identified as gay or bisexual and self-reported symptoms of alcohol abuse (20% of the sample) had received a formal AUD diagnosis within a primary medical setting [82]. Considering that treatment for alcohol use is much less likely for HIV-infected adults who identify as non-heterosexual [83] and a higher prevalence of treatment seeking for alcohol misuse among sexual minority persons, particularly women [77, 84], interest in culturally tailored interventions among specialised sexual and gender minority sub-populations is increasing [85].

Past epidemiologic studies [e.g. 86] found that male-to-female transgender adults reported higher rates of substance abuse than the general population but were similar to other sexual and gender minorities with regard to prevalence of disordered use. Recent work has examined, more fully, alcohol use disparities among transgender adults. A state-based probability sampling of adults (ages 18–64; [87]) found that transgender and cisgender individuals reported equivalent rates of past-month HED. Another study reported that 58% of a convenience sample of adult transgender women [88] reported drinking and 30% engaged in HED in the past 6 months. By contrast, approximately 49% of a convenience sample of adult female-to-male transmasculine individuals [89] reported recent alcohol use. Although alcohol consumption is relatively common among transgender adults, prevalence and incidence AUDs and patterns of alcohol-related consequences are still being investigated.

Alcohol misuse and addiction have significant impacts on stress responses, co-morbid mental disorders, and biopsychosocial functioning [90]. Nevertheless, emerging evidence continues to support that both general (e.g. [4]) and minority-specific stressors (e.g. [91]) contribute to alcohol-use disparities among LGB persons. For example, Hughes and colleagues [4] found that *mainly heterosexual, bisexual, or lesbian* women reported higher levels of general perceived stress, which was shown to relate to HED and negative alcohol-related consequences, than *exclusively heterosexual* women [4]. In a sample of Black MSM [92], depressive symptoms were elevated among the approximately one-third who reported problematic alcohol use (i.e. CAGE score of 3 or 4). Other recent work [78,79] demonstrated that, compared to exclusively heterosexual women who reported no same-sex partners, a history of child or adult victimisation partially accounted for alcohol-related disparities among adults who identified as lesbian or bisexual, or who identified as heterosexual yet reported a history of same-sex partners. Among MSM, in addition to a

history of victimisation, other behavioural correlates have been related to alcohol misuse. For example, Jones-Webb and colleagues [94] identified a sub-group of MSM, a large majority of whom drank across social (e.g. social parties/gatherings) and bar (e.g. bars/clubs, restaurants) settings, as opposed to primarily in social settings, and found that the former were at heightened risk of reporting frequent heavy drinking and CAS while intoxicated. Among older MSM, risky sexual activity was also associated with higher levels of alcohol involvement [95] (see also [96] for similar findings). Consistent with prior work, Flood and colleagues [97] also showed that, among gay men, perceived discrimination and level of “outness” were positively related to HED.

Santos and colleagues [88] highlighted risk factors, such as transphobia and additional medical stressors, which may uniquely contribute to alcohol-related disparities among transgender individuals. Among transgender individuals [99], those who reported discrimination related to their transgender status were more likely to report a past or current drinking problem. Among transwomen specifically, Hotton and colleagues [100] showed that those who used alcohol were marginally more likely to report avoidant coping strategies. For transwomen who indicated elevated levels of perceived stigma or depressive affect, Operario and colleagues [101] found a greater likelihood of past-month alcohol intoxication, which was highly associated with CAS and other drug use. General life stressors reported by transwomen (e.g., homelessness, financial difficulties) have also been implicated in their alcohol misuse [100]. Similar to sexual minority-identified women, transwomen with a history of sexual victimisation were at-risk for alcohol misuse [102].

As others have concluded [3], recent work suggests that identifying as female [103] and older [104], typically protective for heterosexual individuals, failed to buffer against alcohol misuse among LGBT adults. Similarly, sexual minority individuals of colour appear at greater risk of alcohol misuse compared to their heterosexual counterparts [96]. Recent work continues to examine psychosocial factors that moderate levels of alcohol involvement among sexual minority sub-groups. For example, Flynn [105] showed that levels of perceived lack of control, which increased across heterosexual, gay, and bisexual sub-groups, respectively, interacted with sexual identity status to influence their likelihood of past-year AUD.

Recommendations—Emergent findings in this area have attempted more nuanced investigations of sub-group differences, which may support future attempts to tailor alcohol use interventions. Relatedly, explanatory mechanisms for alcohol use disparities among various sexual and gender minority groups are important to investigate. Recent publications continue to examine generalised stressors that operate as risk factors for alcohol misuse, yet are often found to unduly burden sexual minority persons (e.g. depressive symptomology, victimisation). Nevertheless, additional work is needed to understand both general (e.g. financial stress) and minority-specific stressors (e.g. sexual identity-related characteristics) that contribute to alcohol misuse and pathology. We specifically recommend research with transgender and gender non-conforming populations whose representation in the empirical literature is largely invisible relative to others. Finally, additional work is warranted to identify protective demographic and psychosocial characteristics that may inform efforts to reduce risk of problematic alcohol use among LGBT adults.

Need for Innovation in Methods and Measurement

A key component to better understanding alcohol use among LGBT persons is the inclusion of well-validated psychometric measures in population studies. We advocate for the standardisation of assessments of alcohol-related outcomes and gender and sexual identity. Assessments catalogued in the PhenX Toolkit are recommended, designated measures of phenotypes (e.g. alcohol use; [102]) endorsed by the National Institutes of Health, which facilitate cross-study comparisons. Standardised assessments of gender and sexual identity can be obtained by selecting best-practice, recommended measures [103]. Although no comprehensive measure of minority stress currently exists, some advances have been made. Both Woodford and colleagues [104] and Balsam and colleagues [105] have published brief scales to explore micro-aggressions on college campuses and among racial/ethnic minority LGB individuals. In addition, Lin and Israel [106] published a scale to explore connectedness to the LGB community, which may relate to alcohol involvement. Finally, a measure assessing positive identity among transgender individuals was recently published [107], yet future work is required to determine whether scores will relate to alcohol misuse. Clearly, more comprehensive measures of gender and sexual minority stress and related constructs are needed to elucidate how individual difference factors increase or attenuate risk of alcohol misuse.

Our understanding of the relational context of drinking is critical and currently lacking. This includes research on how sexual and relationship partners affect one's patterns of alcohol use, how alcohol use affects the dynamics of sexual minority relationships, and the impact of perceived social norms on drinking. Studying alcohol use in dyads is necessary to understand how relationship partners affect each other's alcohol involvement. Other fields, such as HIV prevention, have recognised this gap in knowledge and have begun to apply theories and methods that focus on dyads and the interaction between dyadic pairs [108,109]. Researchers can and should collect data from same-sex couples about their use of alcohol and relationship dynamics, then apply findings to develop tailored-intervention strategies.

Researchers have just begun to examine the role of perceived social norms in understanding LGBT drinking behaviours [47,57,110]. Recent findings suggest social/peer influences and perceptions may be an additional risk factor to explore in understanding alcohol misuse among sexual minorities [111,112]. Studies have just begun to examine sexual minority-specific normative misperceptions (e.g., "how much does the typical lesbian or bisexual woman drink?") as opposed to the applicability of general norms (e.g. "how much do your close friends drink?"). In light of recent evidence suggesting bidirectional influence between sexual minority-specific descriptive drinking norms and sexual minority women's alcohol consumption [57], additional work on perceived peer drinking behaviour among LGBT subgroups is warranted.

Theoretical Advances

As recent empirical work has increased, so too have efforts to develop new or refine existing theories. Originating in efforts to explain racial/ethnic minority health disparities, the minority stress model posits that members of a disadvantaged social group will experience

excess stress (i.e. above-and-beyond expected levels) due to their minority status [113–115]. Such excess stress may in turn be associated with maladaptive coping behaviors, including substance use. An adaptation of the minority stress model for lesbian, gay, and bisexual populations was proposed in the 1990s, becoming a widely used framework for studying sexual minority health [116]. Hendricks and Testa [117] have extended it further, describing how parallel processes of stigma, discrimination, and internalised negative attitudes based on gender identity and presentation, rather than sexual orientation, may operate for transgender or gender-variant persons. Additionally, Lick, Durso, and Johnson [118] developed a conceptual model that elaborates additional psychological and physiological pathways from minority stressors to physical health disparities. Although not an adaptation per se, it is highly congruent with previously developed minority stress models and may serve as a useful extension by identifying additional mediators (e.g. psychological distress, immune system dysregulation, allostatic load). We note, however, that the various minority stress models have focused on a single identity category. To date, none have considered the combined effects of minority race/ethnicity and minority sexual orientation or gender identity.

Among other salient factors, stigma has received ongoing attention. Denton, Rostosky, and Danner [119] extended Hatzenbuehler's [120] conceptual framework, which focuses on stigma-related stressors to include additional mediators, such as coping self-efficacy, that may help explain LGBT health disparities. Hatzenbuehler and colleagues [121] continued their own conceptual work, positing that stigma functions at multiple ecological levels as a "fundamental cause of health inequalities" (p. 819). They elaborated several mediators, in addition to stress, through which stigma may influence health outcomes. Similarly, Talley and Littlefield [122] synthesised the evidence about relationship of stigma to substance use and proposed a conceptual model for individuals with a concealable identity (e.g., minority sexual orientation). Their work included situational factors and intra-individual cognitive and affective sequelae of stigma that may increase risk of alcohol and other drug use.

Finally, citation reports show that Syndemic Theory [123,124] has grown in prominence as a conceptual framework. Originally developed to explain the disproportionately high HIV burden among MSM through concurrent epidemics of substance use, violence, and victimisation, its application to other populations has been limited. Among recent notable work, Brennan and colleagues [125] used it as the organising framework for their analysis of HIV-risk among transgender women, and Coulter et al. [126] found evidence to support a Syndemic Theory model of substance use and risky sexual behaviour among sexual minority women. Attending to sexual minority women, Johnson and Nemeth [112] used grounded theory methods to produce a conceptual model of health service utilisation among lesbian and bisexual women that may be relevant for substance abuse treatment. Although not exhaustive, the aforementioned work represents recent theoretical advances for LGBT populations. Future studies are needed to lend empirical support and further refine theoretical models.

Concluding Remarks

Since publication of the IOM report on sexual and gender minority health disparities, additional work has contributed to a greater understanding of biopsychosocial correlates of alcohol involvement within this diverse population. Nevertheless, important gaps remain and more work is needed. In particular, studies that examine the role of gender identity and its intersection with sexual identity within transgender and gender non-conforming sub-populations are still largely missing. Recent developments in theory that are germane to LGBT individuals have given researchers direction for future work addressing potential mechanisms that account for, and conditions that strengthen or attenuate, alcohol-related disparities among sexual and gender minorities. Methodological advances in this literature have begun to allow for examinations of how minority-specific and general risk factors of alcohol misuse may contribute to patterns of alcohol involvement over time and within social-relational contexts. Together, the recommendations of the IOM report, as well as those mentioned herein, will necessitate subsequent collaborative efforts, scale development, thoughtful methodological design and analysis, and theoretically-driven, nuanced hypotheses to better understand and, ultimately, ameliorate alcohol-related disparities among sexual and gender minority individuals.

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