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A scoping review of alcohol, tobacco, and other drug use treatment interventions for sexual and gender minority populations

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ABSTRACT

Background: Alcohol, tobacco, and other drug use are among the most prevalent and important health disparities affecting sexual and gender minority (SGM; e.g., lesbian, gay, bisexual, transgender) populations. Although numerous government agencies and health experts have called for substance use intervention studies to address these disparities, such studies continue to be relatively rare.

Method: We conducted a scoping review of prevention and drug treatment intervention studies for alcohol, tobacco, and other drug use that were conducted with SGM adults. We searched three databases to identify pertinent English-language, peer-reviewed articles published between 1985 and 2019.

Results: Our search yielded 71 articles. The majority focused on sexual minority men and studied individual or group psychotherapies for alcohol, tobacco, or methamphetamine use.

Conclusion: Our findings highlight the need for intervention research focused on sexual minority women and gender minority individuals and on cannabis and opioid use. There is also a need for more research that evaluates dyadic, population-level, and medication interventions.

1. Introduction

Over the past 20 years, an increasing number of studies have reported sexual orientation- and gender identity-related disparities in mental and physical health—with sexual and gender minority (SGM; lesbian, gay, bisexual and transgender) individuals being at substantially greater risk than heterosexual people (American Academy of Nursing, 2016; Caceres et al., 2019; Muller & Hughes, 2016; National Academies of Sciences, 2020). These studies have resulted in greater understanding of the health care needs of SGM populations and the challenges they face in accessing care and attaining/maintaining good health.

Disparities associated with alcohol, tobacco, and other drug use are

among the most prevalent sexual orientation- and gender identity-related health disparities. For example, in a U.S. population-based study, the National Survey on Drug Use and Health, sexual minority (SM; e.g., lesbian, gay, bisexual) respondents reported higher rates of past-year use of cannabis, cocaine, methamphetamine, sedatives/hypnotics, hallucinogens, inhalants, and opioids than heterosexual respondents (Medley et al., 2016). SM respondents also reported higher rates of substance use disorders (SUDs) involving alcohol, cannabis, or pain medications than their heterosexual counterparts (Medley et al., 2016). A number of other studies have found that sexual minority women (SMW), particularly bisexual women, are more likely than heterosexual women to drink, drink heavily, and experience alcohol-related problems and alcohol use disorder (Hughes et al., 2020; Hughes, McCabe, et al., 2010; McCabe

Abbreviations: BAC, blood alcohol concentration; CBT, cognitive behavioral therapy; CM, contingency management; GM, gender minority; MBSCT, modified behavioral self-control therapy; MET, motivational enhancement therapy; MI, motivational interviewing; RCT, randomized-controlled trial; SGM, sexual and gender minority; SM, sexual minority; SMM, sexual minority men; SMW, sexual minority women; SUD, substance use disorder.

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et al., 2019; Paschen-Wolff et al., 2019; Roxburgh et al., 2016). While little research has focused on gender minority (GM; e.g., transgender, nonbinary) populations, evidence exists of higher rates of tobacco (Buchting et al., 2017; Kidd, Dolezal, & Bockting, 2018), alcohol (Coulter et al., 2015; Gilbert et al., 2018), and cannabis (Gonzalez et al., 2017) use among GMs than among cisgender adults (i.e., individuals for whom their gender identity aligns with sex assigned at birth).

In addition to greater risk of substance use problems, research has identified that SGM individuals face several challenges in accessing substance use treatment (Hunt et al., 2017; Muller & Hughes, 2016). These challenges include the lack of SGM-specific treatment approaches (Hughes, 2011; Lyons et al., 2015; Talley, 2013) and providers' negative or ambivalent views about SGM patients (Eliason & Hughes, 2004; Lombardi, 2007; Lyons et al., 2015; Mullens et al., 2017). SGM individuals are also often concerned about potential negative experiences in treatment, such as providers' bias and the safety of identity disclosure (Benz et al., 2019; Dearing & Hequembourg, 2014; Eliason & Hughes, 2004; Lombardi & van Servellen, 2000; McCabe et al., 2010). Moreover, there is evidence of lower satisfaction with standard treatment among SGM individuals than among heterosexual individuals (Senreich, 2009). While SGM people may benefit from tailored treatments that address these barriers, 71% of treatment programs that advertise SGM-specific services do not actually offer them (Cochran et al., 2007; Mericle et al., 2018).

Given high rates of substance use among SGM people and treatment access barriers, a growing number of government agencies and health experts have called attention to the need for SGM intervention research (American Academy of Nursing, 2016; National Academies of Sciences, 2020; Pan American Health Organization, 2013; Stonewall International, 2016; Substance Abuse and Mental Health Services Administration, 2020). However, sexual orientation and gender identity are rarely reported in the substance use literature (Flentje et al., 2015) and relatively little research has addressed interventions aimed at preventing or reducing substance use within this population. Understanding the current "state of the science" on substance use interventions for SGM people is an important step in advancing research and practice related to SGM health.

We conducted a comprehensive scoping review of the literature on alcohol, tobacco, and other drug use interventions for SGM adults. Unlike previous reviews that were restricted to a particular substance or subset of the SGM population (Baskerville et al., 2017; Berger & Mooney-Somers, 2017; Doolan & Froelicher, 2006; Drabble & Eliason, 2012; Knight et al., 2019; Lee et al., 2014; Rajasingham et al., 2012; Wray et al., 2016), we included studies of all substances and with multiple SGM population groups.

2. Materials and methods

We utilized a scoping review methodology (Arksey & O'Malley, 2005) to examine the research question, "What types of interventions have been studied for alcohol, tobacco, and other drug use prevention and treatment among SGM individuals?" Scoping reviews, unlike systematic reviews, are designed with the goal of describing trends and identifying gaps in an emerging and broad area of research (Armstrong et al., 2011), such as substance interventions for SGM populations.

We searched for articles using three databases: PubMed, Embase, and CINAHL. We restricted the search to articles published between January 1985 and August 2019. We chose 1985 as the earliest date included because that was when the U.S. Food and Drug Administration (FDA) approved the first commercial HIV test (Roberts, 1994). Historically, the majority of SGM health research has focused on the prevention and treatment of HIV/AIDS, often with substance use as a secondary outcome (Coulter, Kenst, Bowen, and Scout, 2014). Although we discussed omitting studies in which the primary outcome was HIV/AIDS, we ultimately decided to include such articles, given that they potentially have broader utility. We first compiled a list of search terms and

keywords for each database through review of published SGM health review articles and consultation with a health science librarian. This resulted in three groups of search terms/keywords: (1) SGM related, (2) substance related, and (3) intervention related. We combined the groups using the Boolean operator "And" to identify articles with at least one search term/keyword in each group (i.e., SGM related AND Substance Related AND Intervention Related) (see the Appendix A for the search syntax for each database).

We exported citations to the citation manager, Endnote (Clarivate Analytics, 2018). We first removed duplicate citations and then sequentially reviewed article titles and abstracts to determine which articles met criteria for full-text review. Table 1 summarizes the exclusion categories used in selecting articles for the review. Next, we reviewed full-text versions of the remaining articles using the same exclusion categories as in the title/abstract review, with two additions: we excluded (a) substance use interventions that included SGM people but did not present SGM-specific data and (b) SGM-focused substance use interventions that did not present outcome data (e.g., process papers, protocol summaries, feasibility and acceptability studies). The team sorted articles into five groups based on primary substance (alcohol, tobacco, methamphetamine, other drugs/general substance) or whether the intervention focused on sexual risk reduction as the primary outcome. For each of the five groups of articles, a single researcher reviewed all articles within that group. An additional researcher reviewed all five groups of articles to ensure consistency in the review process. For each article, we abstracted information about level of intervention (e.g., individual, group, population), study location (e.g., U.S. versus non-U.S.), study design (e.g., single-arm versus randomized-controlled trial), target population (e.g., SM men, SM women, GM individuals), and key findings. Finally, to reduce potential bias in our search strategy, we revisited articles that we had excluded as "review articles" (e.g., systematic reviews, meta-analyses) to identify additional studies cited within those articles that met our inclusion criteria.

3. Results

Our selection process (see Fig. 1) yielded 71 articles that met inclusion criteria (see Appendix B for individual article summaries). Table 2

Table 1
Exclusion categories used for title and abstract review.

Exclusion category	Description (if applicable)
Not written in English	–
Not peer-reviewed	Conference proceedings, dissertations, magazine articles, news alerts, opinion pieces
Not human	Research with non-human animals
HIV/AIDS, sexually transmitted infections (STIs), or viral hepatitis	(a) Articles focused solely on HIV prevalence, treatment (e.g., antiretroviral medication), or prevention (e.g., pre-exposure prophylaxis); (b) articles focused on the management of opportunistic infections in people living with HIV; (c) articles focused solely on prevalence, treatment, or prevention of STIs and/or viral hepatitis. We did not exclude articles focused on intravenous drug use or risk factors for HIV, STIs, or viral hepatitis.
Not adults	Studies with samples composed exclusively of individuals under age 18.
Not relevant	Articles that did not focus on alcohol, tobacco, or other drug use (e.g., chemotherapy trials).
No SGM individuals	Articles that specifically excluded SGM individuals or did not state whether the study population included SGM individuals.
Review articles	Articles that did not present original research (e.g., systematic reviews, meta-analyses).
Not an intervention	Articles that did not describe intervention studies (e.g., cross-sectional studies, observational studies, case reports).

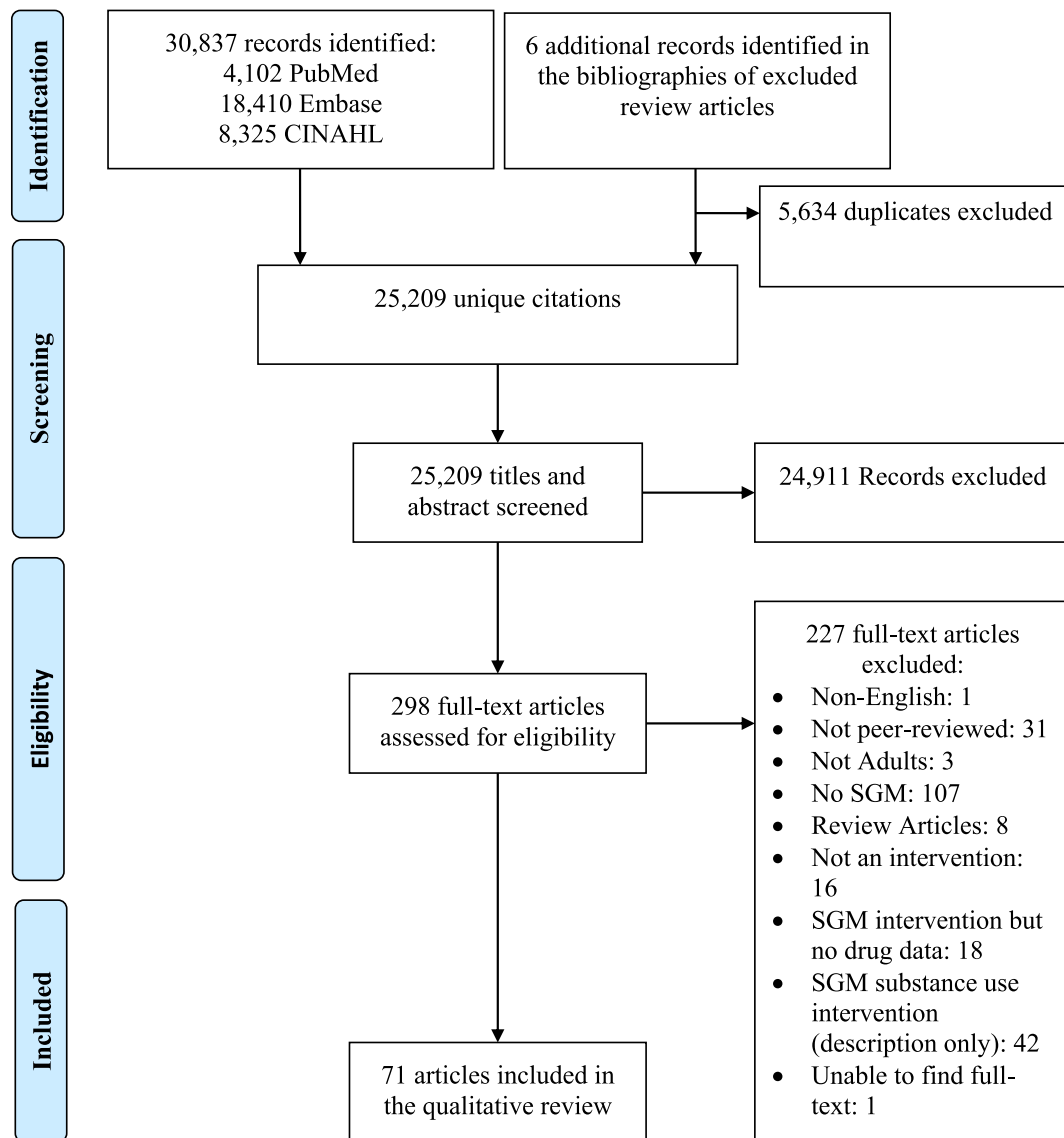


Fig. 1. The PRISMA flow diagram for the scoping review that details database searches, title and abstract screening, and the number of full-text articles included in the review.

summarizes study characteristics for each group of articles. Table 3 summarizes the outcome measures used in intervention trials for alcohol, tobacco, and methamphetamine use. Fig. 2 summarizes the cumulative number of included articles over the 35-year review time-period, overall, and by population subgroup.

3.1. Alcohol

Fifteen studies evaluated the impact of interventions on alcohol outcomes (Charlebois et al., 2017; Chavez & Palfai, 2019; Chen et al., 2014; Croff et al., 2012; Fals-Stewart et al., 2009; Kahler et al., 2018; Kuerbis et al., 2014; Millar et al., 2016; Morgenstern et al., 2007; Morgenstern et al., 2012; Santos et al., 2014; Santos et al., 2016; Smith et al., 2017; Velasquez et al., 2009; Wray et al., 2019). Nearly all of these studies ($n = 14$) were conducted in the United States. The only non-U.S. study was conducted in Canada (Smith et al., 2017).

Two studies focused on the treatment of DSM-IV alcohol use disorder—one with sexual minority men (SMM) only (Morgenstern et al., 2007) and one with both SMM and SMW (Fals-Stewart et al., 2009). The remaining 13 studies focused on interventions to prevent or reduce high-risk drinking among SMM. Of these, five were interventions to reduce

alcohol consumption among SMM who engaged in heavy drinking (Chavez & Palfai, 2019; Kahler et al., 2018; Santos et al., 2014; Santos et al., 2016; Wray et al., 2019); two were designed to prevent or reduce heavy drinking among young SMM (Millar et al., 2016; Smith et al., 2017); four targeted SMM who engaged in both heavy and otherwise harmful drinking (i.e., negative consequences) (Chen et al., 2014; Kuerbis et al., 2014; Morgenstern et al., 2012; Velasquez et al., 2009); and two focused on reducing alcohol consumption and preventing intoxication among bar patrons (Charlebois et al., 2017; Croff et al., 2012).

Eight interventions focused on individual psychotherapy (Chen et al., 2014; Kahler et al., 2018; Kuerbis et al., 2014; Millar et al., 2016; Morgenstern et al., 2007; Morgenstern et al., 2012; Santos et al., 2014; Santos et al., 2016) and one on couple-level psychotherapy (Fals-Stewart et al., 2009). One study (Smith et al., 2017) evaluated a group intervention for young SMM, while another study (Charlebois et al., 2017) adopted a multi-pronged approach that included structural (i.e., physical environment), environmental (e.g., in-bar media campaign), and individual elements in a venue-based (gay bar) setting. One study evaluated an online app-based intervention that incorporated motivational interviewing (MI) (Wray et al., 2019). Three other studies

Table 2

Characteristics of studies included in the scoping review of intervention research for alcohol, tobacco, and other drug among sexual and gender minority individuals (N = 71).

	Alcohol (n = 15)	Tobacco (n = 7)	Methamphetamine (n = 28)	Other, multiple, or general substance use (n = 9)	Non-substance interventions with substance-focused outcomes (n = 12)
Study location					
U.S.	14	6	26	9	9
Non-U.S.	1	1	2	0	3
Purpose of intervention					
Prevention	9	0	13	5	12
Treatment	2	7	10	4	0
Combination	4	0	5	0	0
Intervention type					
Individual, in-person psychotherapy without medication	6	0	17	2	1
Individual, in-person psychotherapy with medication	3	1	2	0	0
Medication only	0	0	1	0	0
In-person group therapy	1	4	3	1	7
Online/web-based	1	1	1	0	1
Macrosystems intervention	1	1	0	0	1
Other	3	0	4	6	2
Study design					
Single-arm (uncontrolled)	3	6	12	5	7
Controlled, non-randomized	1	0	0	0	1
Randomized controlled	11	1	16	4	4
Sample composition					
Only SM men included	12	2	26	4	11
SMW included but not analyzed	0	4	0	4	0
SMW analyzed	1	1	0	0	0
GM individuals included but not analyzed	2	5	1	0	0
GM individuals analyzed	0	0	1	1	1
Included a cisgender, heterosexual comparison group	0	4	0	0	0
Analysis of sub-group differences					
Age differences	0	1	2	2	0
Sex differences (i.e., SMM vs SMW)	1	1	0	0	0
Gender identity differences (i.e., GM vs non-GM or GM women vs GM men)	0	0	0	0	0
Sexual orientation differences (e.g., lesbian vs bisexual women)	0	0	1	2	2
Racial/ethnic differences	0	1	1	1	2
Studies with positive substance-use outcomes	14	5	19	7	6

SGM = sexual and gender minority; SM = sexual minority; GM = gender minority; SMM = sexual minority men; SMW = sexual minority women.

evaluated combinations of individual, group, and online interventions (Chavez & Palfai, 2019; Croff et al., 2012; Velasquez et al., 2009).

Eleven studies used randomized controlled trial (RCT) designs (Chen et al., 2014; Croff et al., 2012; Fals-Stewart et al., 2009; Kahler et al., 2018; Millar et al., 2016; Morgenstern et al., 2007; Morgenstern et al., 2012; Santos et al., 2014; Santos et al., 2016; Velasquez et al., 2009; Wray et al., 2019). Of the other four studies, two were pilot studies to test feasibility and efficacy (Chavez & Palfai, 2019; Smith et al., 2017), one was a bar-based intervention with control locations (Charlebois et al., 2017), and one was an exploratory study of one component (personalized normative feedback) of a larger intervention (Kuerbis et al., 2014).

Most alcohol interventions included only cisgender SMM (n = 12). In two of those studies both cisgender and GM men were eligible to participate (Smith et al., 2017; Velasquez et al., 2009), but the study did not include GM men in sufficient number to permit comparative or separate analyses. Only one study included SMW and conducted separate analyses for SMW and SMM (Fals-Stewart et al., 2009). None of the studies reported outcomes for bisexual or GM individuals or differences in outcomes by race/ethnicity.

Most studies reported significant change in alcohol-related outcomes. Seven studies that used an RCT design showed positive outcomes in reducing heavy drinking in treatment groups that received MI (Kahler et al., 2018; Morgenstern et al., 2007; Smith et al., 2017), cognitive behavioral therapy (CBT) (Chen et al., 2014; Morgenstern et al., 2007; Santos et al., 2014), combined MI and CBT (Chen et al., 2014;

Morgenstern et al., 2012), and personalized normative feedback (i.e., correcting misperceptions about the prevalence of heavy drinking in SGM populations) (Kuerbis et al., 2014). For example, a preliminary RCT of a web-based brief MI intervention for reducing alcohol use among SMM seeking rapid HIV testing found fewer drinking days, binge drinking days, and alcohol-related problems in the intervention group (Wray et al., 2019). Fals-Stewart et al. (2009) found that behavioral couples therapy for SM individuals with alcohol use disorder and their nondependent partners was more effective than individual treatment alone in reducing heavy drinking in the year after treatment.

Three smaller pilot studies showed some promise for intervention efficacy (Chavez & Palfai, 2019; Santos et al., 2016; Smith et al., 2017). One pilot feasibility study of a mobile app focused on MI found a reduction in past 30-day heavy drinking (Chavez & Palfai, 2019). A feasibility study of naltrexone as an intervention for SM men with nondependent binge drinking and methamphetamine use found reductions in both substances for some participants (Santos et al., 2016). Project PRIDE, a small-group intervention designed to reduce negative mental health outcomes associated with minority stress, found small effect sizes for reduced drinking (Smith et al., 2017).

Two efficacy studies focused on naltrexone in combination with psychotherapeutic interventions (Chen et al., 2014; Morgenstern et al., 2012). One study found that adding naltrexone to Modified Behavioral Self-Control Therapy (MBSCT, an amalgamation of CBT and MI) did not improve outcomes over MBSCT therapy alone (Morgenstern et al., 2012). A second study found that genotyping for the 5-HTTLPR

Table 3

Outcome measures used in intervention studies focused on alcohol, tobacco, and methamphetamine use among sexual and gender minority populations.

Alcohol
<ul style="list-style-type: none"> • 30-day Timeline Follow back: binge drinking frequency • 90-day Timeline Follow back: average daily or weekly consumption, drinks per day, heavy drinking days • Alcohol Use Disorders Identification Test (AUDIT or AUDIT-C): Hazardous drinking • Short Inventory of Problems (SIP): drinking-related consequences • Blood alcohol concentration • Readiness to Change Questionnaire • Goal Systems Assessment Battery: self-regulation for limiting alcohol use • Composite International Diagnostic Interview (CID): DSM-IV-TR alcohol dependence • Alcohol Dependence Scale: DSM-IV alcohol dependence severity • Miscellaneous: Heavy drinking (yes/no; 6+ drinks), sex under the influence of alcohol
Tobacco
<ul style="list-style-type: none"> • Cigarettes per day (typically used to assess whether participants achieved abstinence) • Fagerstrom Test for Nicotine Dependence • Intention to quit smoking • Attitudes about smoking cessation programs
Methamphetamine
<ul style="list-style-type: none"> • Timeline Follow back: frequency of use (past 2-week, 30-day, 2-month, or 3-month) • Any injection of methamphetamine during the study period • Amount of money spent on methamphetamine in the past 30 days • University of Minnesota Cocaine Craving Scale and Obsessive-Compulsive Drinking Scale adapted for methamphetamine use • Behavioral Questionnaire - Amphetamine (BQA): sex under the influence • Drug Use Disorders Identification Test (DUDIT): drug-related problems • Addiction Severity Index: drug-related problems • Urine drug screen for methamphetamine metabolites • Mini-International Neuropsychiatric Interview (MINI) or Structured Clinical Interview for DSM Disorders (SCID-IV): stimulant use disorder • Methamphetamine craving

polymorphism in the serotonin transporter gene, which has been shown to moderate alcohol dependence risk and treatment response, might be helpful in identifying which SGM adults with drinking problems may benefit more from naltrexone and CBT, as opposed to less intensive treatment (Chen et al., 2014).

One multi-level intervention in gay bars was effective in reducing exit blood alcohol concentration (BAC; measured by breathalyzer) and increasing intentions to reduce alcohol consumption (Charlebois et al., 2017). The intervention had three components: freely available water, an in-bar media campaign on drinking water to pace alcohol intake, and normative feedback about BAC. BAC was lower among patrons exiting the intervention sites than those at comparison sites. A second venue-based intervention appeared to be less effective. Croff et al. (2012) found that BAC did not differ between gay bar patrons who received a brief intervention (feedback on potential drinking risks tailored to level of intended alcohol use) and the attention control group. However, the authors pointed out that patrons in the intervention group who were classified as high-risk for alcohol-related problems (i.e., based on an estimated BAC $\geq 0.08\%$; calculated based on length of drinking occasion, planned alcohol consumption, and weight) drank significantly less than they planned (based on actual exit BAC).

3.2. Tobacco

Seven studies described tobacco use interventions and outcomes (Covey et al., 2009; Dickson-Spillmann et al., 2014; Eliason et al., 2012; Matthews et al., 2013; Vogel et al., 2019; Walls & Wisnecki, 2011; Wintenberg et al., 2017). All studies were conducted in the United States, except one study conducted in Switzerland (Dickson-Spillmann et al., 2014). All focused on treatment (as opposed to prevention), with six studies using smoking cessation as the primary outcome and one

study focusing on intent to quit (Wintenberg et al., 2017).

One study evaluated an in-person individual intervention (Covey et al., 2009) and four evaluated group interventions (Dickson-Spillmann et al., 2014; Eliason et al., 2012; Matthews et al., 2013; Walls & Wisnecki, 2011). Each of these articles discussed pharmacotherapy, but only two used pharmacotherapy (nicotine-replacement alone or with bupropion) in their interventions (Covey et al., 2009; Walls & Wisnecki, 2011). One study used an RCT design to deliver an online intervention to SGM young adults via Facebook (Vogel et al., 2019). Wintenberg et al. (2017) evaluated the impact of a state-wide smoke-free policy intervention on SGM smoking.

Two studies described interventions focused exclusively on SMM (Covey et al., 2009; Dickson-Spillmann et al., 2014); four interventions combined all SGM individuals (Matthews et al., 2013; Vogel et al., 2019; Walls & Wisnecki, 2011; Wintenberg et al., 2017). Only Eliason et al. (2012) reported outcomes separately for SMW. It is notable that five studies included GM individuals (Eliason et al., 2012; Matthews et al., 2013; Vogel et al., 2019; Walls & Wisnecki, 2011; Wintenberg et al., 2017); however, none reported GM-specific outcomes. Eliason et al.' (2012) study was the only one to examine racial/ethnic and age differences in the intervention outcomes.

Five studies showed promising results for tobacco use outcomes (Dickson-Spillmann et al., 2014; Eliason et al., 2012; Matthews et al., 2013; Walls & Wisnecki, 2011; Wintenberg et al., 2017); four of these used adaptations of the American Lung Association's Freedom From Smoking program. Freedom From Smoking combines online, phone, and in-person group support with information about evidence-based pharmacotherapy for tobacco use disorder (American Lung Association, 2020). Dickson-Spillmann et al. (2014) conducted a pilot study in Zurich, Switzerland, using a 7-week group intervention based on Freedom From Smoking, delivered in an SGM health center. Eliason et al. (2012) and Walls and Wisnecki (2011) used The Last Drag Intervention, also based on Freedom From Smoking, with additional content about tobacco use in the SGM community. Matthews et al. (2013) expanded on The Last Drag by adding SGM-inclusive language (e.g., partner instead of husband/wife); SGM-identified facilitators (SGM-identity salience); panel discussions with SGM health experts; and information about the history of targeted tobacco marketing to SGM communities. Of the four interventions based on Freedom From Smoking, all reported statistically significant tobacco abstinence rates postintervention. Three had outcomes comparable to general population smoking cessation intervention trials (Dickson-Spillmann et al., 2014; Eliason et al., 2012; Matthews et al., 2013). Only Walls and Wisnecki (2011) showed a quit rate (88.9%) that exceeded what would be expected in a general population trial.

Wintenberg et al. (2017) examined the association of local smoke-free ordinances on smoking status among SGM people recruited at SGM-oriented events in Missouri. SGM current smokers (25%) were significantly more likely than SGM former smokers (19%) to live in a community without a smoke-free ordinance. SGM current smokers who lived in communities that had instituted smoke-free policies for two or more years reported significantly greater intention to quit (94%) than those living in communities without a smoke-free policy (76%).

3.3. Methamphetamine

Out of 28 methamphetamine use interventions, 13 focused on reducing use among current users or among those at risk for use (Carrico et al., 2018; Carrico, Gómez, et al., 2015; Landovitz et al., 2015; Mimiaga et al., 2012; Reback et al., 2012; Reback et al., 2015; Reback et al., 2019; Reback & Shoptaw, 2014; Shoptaw et al., 2008; Shoptaw et al., 2017; Wu et al., 2011; Zhang et al., 2018; Zule et al., 2012); 10 interventions focused on individuals who met criteria for methamphetamine use disorder (Coffin et al., 2018; Colfax et al., 2011; Das et al., 2010; Landovitz et al., 2012; Lea et al., 2017; McElhiney et al., 2009; Mimiaga, Pantalone, et al., 2019; Reback et al., 2010; Reback et al.,

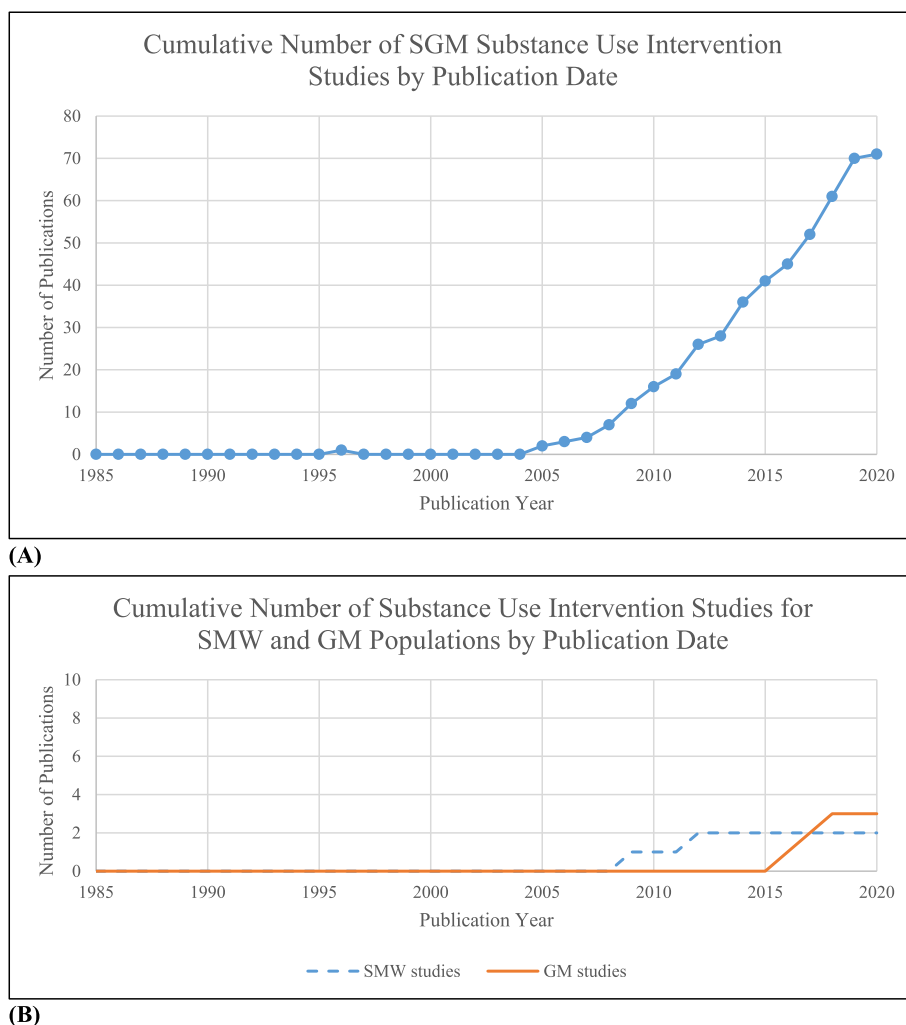


Fig. 2. Cumulative number of substance use intervention studies by publication date for sexual and gender minority (SGM) populations overall (A) and for sexual minority women (SMW) (B, dashed line) and gender minority (GM) individuals (B, solid line).

2018; Shoptaw et al., 2005). The other five studies evaluated interventions for individuals who used methamphetamine, regardless of whether they met criteria for methamphetamine use disorder (Burgess et al., 2018; Carrico et al., 2014; Carrico, Nation, et al., 2015; Lyons et al., 2014; Menza et al., 2010). More than one-half of the studies ($n = 16$) were RCTs. All but two studies (Burgess et al., 2018; Lea et al., 2017) were conducted in the United States. The two non-U.S. studies were both conducted in Australia.

Nearly all the methamphetamine intervention studies focused on SMM ($n = 26$), and most samples were made up largely of non-Hispanic white cisgender SMM. Two studies included GM participants (Carrico et al., 2014; Zhang et al., 2018); however, only one reported findings for this group (Zhang et al., 2018). No studies included SMW. Only two studies examined subgroup differences in samples of SMM. Shoptaw et al. (2017) found no sexual identity, age, or racial/ethnic differences in intervention outcomes among 119 HIV negative SMM. Among Black SM male couples, Wu et al. (2011) found that older age was associated with greater postintervention methamphetamine use.

Most studies ($n = 17$) evaluated individual, in-person psychotherapeutic interventions. Contingency management (CM), alone or in combination with other modalities, was most common (Carrico et al., 2018; Carrico, Gómez, et al., 2015; Landovitz et al., 2012; Landovitz et al., 2015; Menza et al., 2010; Reback et al., 2010; Shoptaw et al., 2017; Zhang et al., 2018). Overall, CM interventions were effective at reducing methamphetamine use among SMM and transgender women. For

example, Landovitz et al. (2012) conducted a single-group pilot study that led to significant reductions in frequency and quantity of methamphetamine use based on self-report and urine drug screen. A follow-up RCT found the CM group had more stimulant metabolite-free urine samples than the yoked control condition group (8.9 vs. 6.1, $p = 0.04$) (Landovitz et al., 2015). Similarly, Reback et al. (2010) found that, among 131 homeless SMM, those who participated in a 24-week CM program had greater reductions in methamphetamine use than SMM in the control condition. Reductions were sustained at 9- and 12-month follow-up.

Across a series of RCTs with SMM, Reback and Shoptaw (2014) found CM in combination with SM-specific CBT led to greater reductions in past 30-day methamphetamine use than CM alone. In another RCT, SMM who received CM or CM + CBT had longer periods of methamphetamine-negative urine samples than those who received CBT alone (Shoptaw et al., 2005). Those who received culturally tailored CBT showed no difference in methamphetamine use, compared to those who received standard CBT. In a subsequent study, Shoptaw et al. (2017) found stimulant-using SMM randomized to CM versus non-contingent yoked control had greater treatment response. Last, Zhang et al. (2018) found no significant between-group differences in stimulant-using homeless cisgender SMM or transgender women randomized to either a nurse case-managed program combined with CM or a CM program combined with viral hepatitis education.

The remaining individual psychotherapy interventions tested a

variety of modalities (i.e., SM-specific CBT, MI, resilient affective processing, behavioral activation, or a combination of these modalities) (Carrico et al., 2014; Zule et al., 2012). In a sample of 128 SMM, participants randomized to SM-specific CBT had a higher percentage of methamphetamine-negative urine samples, compared to those in the SM-specific social support condition (Shoptaw et al., 2008). In addition, Carrico et al. (2015) found that SMM randomized to a 4-week multi-component resilient affective processing group reported greater reductions in frequency of methamphetamine use postintervention than control participants. The two studies that used behavioral activation showed reductions in methamphetamine use among SMM. Mimiaga et al. (2012) found that 10-session behavioral activation and HIV-risk reduction counseling led to significant reductions in past 30-day and 3-month methamphetamine use. In a subsequent study, Mimiaga et al. (2019) found that SMM randomized to behavioral activation plus sexual risk reduction reported more continuous days abstinent from methamphetamine at 6-month follow-up, compared to control participants. Carrico and colleagues conducted two RCTs of SMM with HIV, randomized to either CM plus a positive affect intervention or CM alone. They found that SMM randomized to the enhanced CM condition had fewer methamphetamine-positive urine samples (Carrico, Gómez, et al., 2015), and less self-reported stimulant use (Carrico et al., 2018) and less methamphetamine craving (Carrico et al., 2018).

Three pilot studies combined individual psychotherapy/counseling with medication. While Das et al. (2010) found reductions in methamphetamine-positive urine with bupropion and McElhiney et al. (2009) found reductions in self-reported methamphetamine use and craving with modafinil, no statistically significant differences occurred between treatment arms in these studies. Colfax et al. (2011) found that SMM who received mirtazapine had a larger reduction in methamphetamine-positive urine samples (29%) than the placebo group (4%).

Three studies evaluated in-person, group, or dyadic interventions. Lyons et al. (2014) found that a 10-week group intervention was associated with reductions in stimulant use among SMM. In contrast, Burgess et al. (2018) found that a six-week culturally tailored group intervention followed by peer support was associated with only modest declines in use among SMM who used methamphetamine. In a 7-week dyadic intervention with Black SM male couples, Wu et al. (2011) found significant reductions in methamphetamine use.

The remaining studies employed several intervention modalities, including technology-assisted therapies, with mixed results. Reback et al. (2018) conducted a pilot study of 34 SMM enrolled in an outpatient methamphetamine treatment program. The study randomized participants into either a self-directed condition that included access to a web-based ecological momentary assessment response dashboard, or a counselor-supported condition that included weekly one-on-one review of the self-monitoring data. The investigators found no differences in methamphetamine use between treatment conditions. Reback et al. (2015) also conducted a pilot study to test the efficacy of theory-based text messages in reducing methamphetamine use among SMM (n = 52). They found lower frequency of methamphetamine use two months postintervention. A subsequent study randomized 286 SMM who used methamphetamine to one of three conditions: 1) interactive text messages with peer support plus five-times-a-day automated theory-based messages and a weekly self-monitoring text-message assessments, 2) daily automated messages and weekly self-monitoring assessments, or 3) weekly self-monitoring assessments only (Reback et al., 2019). No differences occurred across groups in methamphetamine use.

3.4. Other, multiple, or general substance use

Nine studies, all conducted in the United States, examined interventions targeting use of substances other than those previously described—or interventions targeting use of multiple substances (Ashford et al., 2018; Empson et al., 2017; Mericle et al., 2019; Morgenstern

et al., 2009; Paul et al., 1996; Proeschold-Bell et al., 2016; Starks et al., 2019; Wong et al., 2008; Zajac et al., 2020).¹ Five studies focused on preventing SUDs or substance use-related problems (Empson et al., 2017; Morgenstern et al., 2009; Proeschold-Bell et al., 2016; Starks et al., 2019; Wong et al., 2008); the remaining studies focused on treating individuals with SUDs or supporting individuals in recovery from SUDs (Ashford et al., 2018; Mericle et al., 2019; Paul et al., 1996; Zajac et al., 2020).

Two studies involved interventions consisting of individual in-person sessions: Wong et al. (2008) tested a 15-session case management intervention, and Zajac et al. (2020) tested a CM-based intervention. Another study evaluated an in-person group intervention (Empson et al., 2017). Most studies evaluated multi-modality interventions such as combined individual and group sessions (Paul et al., 1996; Proeschold-Bell et al., 2016), or other components and services (e.g., HIV-risk reduction strategies, case management, recovery support services) (Ashford et al., 2018; Mericle et al., 2019; Starks et al., 2019). Five studies used single-arm study designs (Ashford et al., 2018; Empson et al., 2017; Mericle et al., 2019; Paul et al., 1996; Proeschold-Bell et al., 2016) and four were RCTs (Morgenstern et al., 2009; Starks et al., 2019; Wong et al., 2008; Zajac et al., 2020).

Four studies recruited participants irrespective of SM status (Ashford et al., 2018; Proeschold-Bell et al., 2016; Wong et al., 2008; Zajac et al., 2020). However, only one study (Ashford et al., 2018) examined differences among SGM-subgroups and in comparison to heterosexual individuals. In this evaluation of a peer specialist opioid harm-reduction program, gay/lesbian participants had the lowest odds of being administered naloxone for an opioid overdose during study participation, compared to heterosexual clients. Bisexual participants had the highest odds of receiving naloxone for an opioid overdose. Four studies focused exclusively on SMM (Mericle et al., 2019; Morgenstern et al., 2009; Paul et al., 1996; Starks et al., 2019) and four studies included SMW (Ashford et al., 2018; Proeschold-Bell et al., 2016; Wong et al., 2008; Zajac et al., 2020), but none reported outcomes separately for SMW. One study focused on HIV-positive transgender women (Empson et al., 2017).

Seven studies found improvements in substance use outcomes for SGM adults (Empson et al., 2017; Morgenstern et al., 2009; Paul et al., 1996; Proeschold-Bell et al., 2016; Starks et al., 2019; Wong et al., 2008; Zajac et al., 2020). Among the uncontrolled studies, Empson et al. (2017) found reductions in alcohol and drug problems among seven transgender women living with HIV after a 12-session PTSD Seeking Safety intervention. Paul et al. (1996) found that alcohol and drug use reduced over a 12-month period among 455 SMM attending an SM-specific substance use treatment program. Proeschold-Bell et al. (2016) found reductions in alcohol and drug use severity over 12 months using an integrated health and substance use treatment intervention, irrespective of SM status. Using more rigorous RCT designs, researchers found evidence for effectiveness of interventions involving MI (Morgenstern et al., 2009), substance use assessment and reflection (Starks et al., 2019), and counseling/case management (Wong et al., 2008), and CM (Zajac et al., 2020).

3.5. Non-substance interventions with substance-focused outcomes

Twelve studies evaluated interventions that were primarily or dually aimed at reducing risk for HIV/STI infection/transmission but also assessed substance-related outcomes (Buttram & Kurtz, 2017; Darrow & Biersteker, 2008; Feinstein et al., 2018; Kurtz et al., 2013; Lelutiu-Weinberger et al., 2015; Liu et al., 2018; Mansergh et al., 2010; Mimiaga, Hughto, & Reisner, 2019; Reisner et al., 2016; Sabin et al., 2019; Williams et al., 2006; Williams et al., 2014). Consistent with the sexual

¹ Zajac et al. (2020) was included in this scoping review because it was e-published online in 2019.

risk reduction aim of the interventions, all of these studies reported intervention efficacy for preventing, rather than treating, substance use problems. Additionally, the studies focused exclusively on cisgender SMM except for [Reisner et al. \(2016\)](#), who evaluated an intervention for transgender men who have sex with men (MSM). Only three studies were conducted outside of the United States (in China, Vietnam, and South Africa) ([Liu et al., 2018](#); [Sabin et al., 2019](#); [Williams et al., 2014](#)).

Most of these studies ($n = 7$) evaluated in-person, group-based interventions ([Buttram & Kurtz, 2017](#); [Feinstein et al., 2018](#); [Kurtz et al., 2013](#); [Mansergh et al., 2010](#); [Mimiaga, Hughto, & Reisner, 2019](#); [Reisner et al., 2016](#); [Williams et al., 2006](#)). These interventions consisted of 4–6 small groups. Session content primarily focused on safe-sex education, negotiation skills, the relationship between alcohol/other drug use and sexual risk, and developing ways of socializing outside the context of sex and drugs. [Reisner et al. \(2016\)](#), however, evaluated the LifeSkills intervention for young transgender MSM and incorporated identity-affirmation topics with particular relevance for this population. Most studies focused on sexual encounters broadly, while [Mimiaga et al. \(2019\)](#) focused on reducing sexual risk-taking in the context of private sex parties. Unlike the other group-based interventions that focused on individuals at-risk for HIV/STI infection, [Feinstein et al. \(2018\)](#) evaluated a couples-based intervention, in which male couples attended weekly sessions. In these sessions, couples developed shared definitions of healthy and unhealthy relationship characteristics, practiced effective communication, and engaged in an approach based on CBT and acceptance and commitment therapy to cope with relationship stressors.

One study evaluated an online intervention ([Lelutiu-Weinberger et al., 2015](#)). This 8-session intervention drew on MI and CBT principles. The study conducted sessions in a live-chat format, and the study assigned participants homework to help them practice skills outside the sessions. Three studies evaluated national prevention outreach ([Sabin et al., 2019](#)) or social marketing campaigns ([Darrow & Biersteker, 2008](#); [Williams et al., 2014](#)).

Seven studies used a single-arm design ([Buttram & Kurtz, 2017](#); [Darrow & Biersteker, 2008](#); [Feinstein et al., 2018](#); [Lelutiu-Weinberger et al., 2015](#); [Reisner et al., 2016](#); [Sabin et al., 2019](#); [Williams et al., 2014](#)). Two of these reported improved substance use outcomes. [Williams et al. \(2014\)](#) evaluated a peer-counseling HIV prevention intervention for SMM engaged in sex work in South Africa. Participants reported greater willingness to reduce drug use, and 29% accepted referral to drug treatment. The majority of SMM who injected drugs agreed to adopt noninjection methods of drug use. [Feinstein et al. \(2018\)](#) evaluated a HIV prevention intervention for same-sex male couples that consisted of four weekly group sessions, led by an openly SGM facilitator, that focused on improving communication and connectedness between partners. Participants reported pre-post intervention reductions in alcohol consumption; however, this finding was significant only for participants with high baseline internalized stigma.

Four studies were RCTs, focusing exclusively on SMM and combined all drug use into single outcome measures (e.g., past 3-month drug use, drug dependence symptoms) ([Kurtz et al., 2013](#); [Liu et al., 2018](#); [Mimiaga, Hughto, & Reisner, 2019](#); [Williams et al., 2006](#)). Of these, two interventions demonstrated efficacy for improving substance use outcomes. [Williams et al. \(2006\)](#) found significantly greater reductions in past 3-month drug use and injection drug use among intervention participants than control participants. [Liu et al. \(2018\)](#) compared outcomes among Chinese SMM assigned to either CBT-based peer counseling (intervention) or standard physician-delivered safer-sex counseling (control). The intervention consisted of group and individual sessions focused on HIV risk-factor modification, including reducing alcohol and drug use before and during sex. Those engaged in peer counseling were more likely to reduce drug use.

4. Discussion

This review demonstrates that substance use intervention research

among SGM people is in its infancy. Compared to substance use intervention research with individuals in the general population, relatively little literature exists about interventions to address SGM health disparities, and limitations of extant research prevent conclusions about the relative impact of SGM-specific interventions. Few studies included SMW or GM individuals. Most were U.S.-based studies and few examined SGM subgroup differences. Most studies focused on individual-level psychotherapies for alcohol, tobacco, and methamphetamine use in uncontrolled trials without comparing culturally tailored, SGM-specific treatments to nontailored interventions. Interventions based on CM, CBT, and MI showed promise.

4.1. Gaps in SGM intervention research

There remains a paucity of rigorous studies on interventions that are designed for SMW or that include adequate samples of SMW to permit stratified analyses or comparisons with heterosexual women or SMM. Of the studies reviewed, only two ([Eliason et al., 2012](#); [Fals-Stewart et al., 2009](#)) analyzed outcomes among SMW. Research on interventions for SMW are needed, particularly those that address concurrent risk factors. For example, among SMW, hazardous drinking often occurs in the context of depression and anxiety ([Drabble et al., 2018](#); [Mereish et al., 2015](#)). Further, hazardous drinking, depression, and anxiety are strongly associated with trauma exposure among SMW ([Hughes et al., 2014](#); [Hughes, McCabe, et al., 2010](#); [Hughes, Szalacha, et al., 2010](#); [Szalacha et al., 2017](#)).

Only three studies had sample sizes of GM individuals that were large enough to support separate analyses ([Empson et al., 2017](#); [Reisner et al., 2016](#); [Zhang et al., 2018](#)), with one study focused on transgender MSM ([Reisner et al., 2016](#)) and another on transgender women living with HIV ([Empson et al., 2017](#)). Five of seven tobacco intervention studies included GM adults, but none reported outcomes by gender identity. At minimum, intervention studies designed to assess effectiveness of interventions for SGM adults should endeavor to include large enough samples of GM individuals to assess potential differences in effectiveness by gender identity.

Studies that examined racial/ethnic differences in outcomes were also lacking. Only one tobacco study examined racial/ethnic differences in outcomes ([Eliason et al., 2012](#)), no alcohol interventions examined differences by race/ethnicity, and interventions for methamphetamine use included samples that were predominately non-Hispanic white, cisgender, gay or bisexual men, or MSM. The lack of attention to racial/ethnic differences is important given that SGM people of color are subject to stigma, prejudice, and discrimination across intersecting minority identities that can increase risk for substance use ([Schuler et al., 2020](#)). Although debate exists in the field as to whether the effects of multiple forms of discrimination are additive, multiplicative, or even offset one another ([Velez et al., 2019](#)), individuals with multiple marginalized identities have unique experiences that may influence their substance use risk and response to interventions.

4.2. Gaps in research beyond alcohol, tobacco, and methamphetamine use

The literature on substance use interventions for SGM populations focuses primarily on alcohol, tobacco, and methamphetamine use with less attention to other drugs. Previous analyses of population-based data indicate a higher prevalence of cannabis use and cannabis use disorder among SGM adults than their non-SGM peers ([Gonzalez et al., 2017](#); [Medley et al., 2016](#); [Philbin et al., 2019](#); [Trocki et al., 2009](#)). Despite this, we found no reports of interventions focused on reducing cannabis use. We also found no interventions focused on cocaine, benzodiazepines, prescription stimulants, inhalants, or non-prescription opioid use. The absence of interventions focused on preventing and treating opioid misuse is particularly concerning given the major toll of the opioid epidemic and growing evidence that SM adults have a higher prevalence

of prescription and non-prescription opioid use and use disorders than their heterosexual peers (Medley et al., 2016). Several analyses of population-based data indicate that opioid use and misuse may be especially high among bisexual adults relative to heterosexual and gay/lesbian adults in the United States (Schuler et al., 2019; Schuler & Collins, 2020). Fewer studies have assessed opioid use among GM individuals (Nuttbrock et al., 2014; Restar et al., 2020). Our findings highlight the need for formative research to develop and test culturally tailored interventions for cannabis, opioid, and other nonmethamphetamine drugs among SGM adults.

4.3. Promising interventions and gaps in research beyond individual psychotherapies

A number of studies showed positive results for reducing alcohol, tobacco, and methamphetamine use among SGM individuals. In most cases, these were individual psychotherapies—CBT and CM were the most common efficacious modalities. Interventions that used MI (e.g., motivational interviewing, motivational enhancement therapy [MET]) were the next most common. This is consistent with research supporting CBT, CM, and MI/MET as evidence-based treatments for a variety of SUDs (Carroll & Onken, 2005; Miller et al., 2003; Prendergast et al., 2006). For alcohol, personalized normative feedback also demonstrated efficacy. Each of the efficacious alcohol interventions utilized the evidence-based platforms of standard CBT, CM, or MI/MET in combination with adaptations for specific groups of SM individuals.

Most of the studies reviewed focused exclusively on individual-level interventions. Venue-based and macro-level interventions were under-represented but showed promise in improving substance use outcomes. These included bar-level interventions to promote lower alcohol consumption among patrons at SGM-oriented bars, and local smoke-free ordinances targeting the population at large. Although conducting an RCT with individuals is arguably easier than conducting it with multiple people, a need exists for RCTs with couples and groups. Given a robust body of literature documenting the importance of using an ecological framework in addressing individual, interpersonal, and environmental factors impacting substance use (DeJong & Langford, 2002; Jalali et al., 2020), a need also exists for additional research that examines interpersonal and environmental strategies for prevention and early intervention to reduce substance-related problems among SGM individuals.

A gap in the literature exists regarding the benefits of culturally adapted substance-use interventions for SGM populations. While many of the studies included in this review focused on interventions that incorporated elements intended to be responsive to the needs and perspectives of SGM individuals, only nine studies directly compared tailored and nontailored versions of an intervention (Carrico et al., 2018; Carrico, Gómez, et al., 2015; Morgenstern et al., 2007; Reback et al., 2018; Reback et al., 2019; Reback & Shoptaw, 2014; Shoptaw et al., 2005; Shoptaw et al., 2008; Starks et al., 2019); all but two (Morgenstern et al., 2007; Starks et al., 2019) focused on methamphetamine use. This limits our ability to draw conclusions about the relative effectiveness of cultural adaptation for SGM populations. The adaptations that showed promise focused on unique aspects of substance use among SGM individuals (e.g., the connection between methamphetamine use and unprotected sex) and/or unique substance use-related risk factors among SGM, including minority stress. Minority stress is an additive stress experienced by marginalized populations as a result of discrimination, internalized stigma, and societal prejudice (Hendricks & Testa, 2012; Meyer, 2003). Minority stress is associated with elevated rates of substance use among SGM individuals (Gilbert et al., 2018; Hughes et al., 2020; Kidd, Jackman, et al., 2018), who often cite coping with minority stress as a motivation for substance use (Staples et al., 2018). Research is needed to develop and evaluate the relative effectiveness of interventions that integrate minority stress or other relevant adaptations for SGM populations.

Even though FDA-approved medications are available to treat

alcohol, tobacco, and opioid use disorders, the reviewed studies rarely incorporated pharmacotherapy. Those that did were predominantly small pilot trials that were underpowered to assess efficacy. Underutilization of pharmacotherapy in tobacco intervention studies is concerning because clear evidence exists that medications significantly increase quit rates compared to behavioral treatments alone (Agency for Healthcare Research and Quality, 2008). Similarly, evidence supports the use of medications as first-line treatment of opioid use disorder to reduce relapse and opioid overdose risk (Sofuoglu et al., 2019).

4.4. Limitations

This review provides a comprehensive summary of intervention research for alcohol, tobacco, and other drug use among SGM people. However, our review is limited to peer-reviewed articles indexed in three databases (PubMed, Embase, and CINAHL) and is subject to publication bias. Inclusion of additional databases (e.g., PsychInfo) could have altered these findings. Our findings are also restricted to SGM adults. However, Coulter et al. (2019) found only two substance use intervention studies in their systematic review of mental health, drug, and violence interventions among SGM youth (<18 years). Finally, we restricted our analysis to interventions that reported effectiveness or efficacy outcomes. Therefore, we did not include feasibility or acceptability trials. Outcomes such as treatment engagement and retention are relevant because of the health care access barriers that many SGM individuals experience (Kenagy, 2005; Lombardi & van Servellen, 2000; Lyons et al., 2015). These access barriers may also impact recruitment for treatment studies of SGM individuals and the generalizability of findings. For this reason, special attention is needed to recruit subpopulations of SGM individuals who might have difficulty accessing treatment and treatment-focused research (e.g., GM individuals, SGM people of color, SGM older adults).

5. Conclusion

Overall, substance use prevention and treatment are understudied areas of SGM health research. This scoping review highlights several areas for future study. First, a need exists for greater focus on interventions for SMW, GM individuals, SGM people of color, and SGM populations outside of the United States. Next, research needs to expand beyond interventions targeting alcohol, tobacco, and methamphetamine use, particularly given emerging evidence of elevated rates of opioid use among SM populations. Third, a need exists for studies of dyadic, structural, and medication interventions for SGM substance use as well as research that compares SGM-specific treatments to standard interventions. Finally, in addition to SGM-specific studies, all substance use clinical trials should include sexual orientation and gender identity measures (Sexual Minority Assessment Research Team, 2009; The GenIUSS Group, 2014) to understand how candidate interventions impact substance use among SGM individuals.

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CRedit authorship contribution statement

All authors worked collaboratively to develop the aim and design for this scoping review. Jeremy Kidd led the scoping review. This included

coordinating the initial article search, title/abstract/full-text review, abstraction, and manuscript writing. Margaret Paschen-Wolff, Amy Mericle, Billy Caceres, Laurie Drabble, and Tonda Hughes all participated in article review, abstraction, and manuscript writing. All of the authors have revised and approved the final manuscript.

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Appendix A. Search syntax by database

Appendix B: Individual summarizes for all articles included in this scoping review. Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jsat.2021.108539>.

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