

# Considering Sex, Gender, and Equity Factors in Methamphetamine Interventions: Findings From a Scoping Review

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## ABSTRACT

**Objectives:** Methamphetamine use is associated with numerous negative health and social concerns in Canada. Sex and gender-related factors play a crucial role in the uptake, patterns of use, responses, and treatment outcomes. This scoping review examines academic evidence on methamphetamine interventions that incorporate sex, gender, trauma, and/or equity elements.

**Materials and Methods:** Research question #1 reviewed the existing evidence on methamphetamine interventions with a specific focus on factors related to sex, gender, trauma, and equity. Research question #2 delved into the relationships between sex, gender, trauma, and equity factors, and their impact on outcomes. After analyzing the literature, we applied a sex and gender-based analysis plus.

**Results:** The search process yielded 2736 unique returns, of which 24 articles were included. The findings reveal limited evidence about effective methamphetamine interventions, an overall lack of consideration for sex, gender, and equity-related factors, and in particular, a

dearth of research specifically conducted with women within the existing literature.

**Conclusions:** The scoping review and sex and gender-based analysis plus underscore the urgent need for research that progresses sex and gender science in substance use to better understand and address the sex, gender, trauma, and equity-related factors that affect methamphetamine interventions. This would inform the development of needed tailored interventions to fill the gap in responses for women, in particular, and ensure that all future interventions incorporate sex, gender, and equity-related factors to enhance their efficacy and relevance to all.

**Keywords:** methamphetamine, sex, gender, equity, sex and gender-based analysis plus

**Objectifs:** La consommation de méthamphétamine est associée à de nombreux problèmes sociaux et de santé au Canada. Les facteurs liés au sexe et au genre jouent un rôle crucial dans la consommation de la méthamphétamine, les habitudes de consommation, les réactions et les résultats du traitement. Cette revue de la littérature examine les données universitaires sur les interventions relatives à la méthamphétamine qui intègrent des éléments liés au sexe, au genre, aux traumatismes et/ou à l'équité.

**Méthodes:** La première question de recherche (QR#1) a passé en revue les données existantes sur les interventions liées à la méthamphétamine, en mettant l'accent sur les facteurs liés au sexe, au genre, aux traumatismes et à l'équité. QR#2 portait sur les relations entre les facteurs liés au sexe, au genre, aux traumatismes et à l'équité, ainsi que sur leur impact sur les résultats. Après avoir analysé la littérature, nous avons appliqué une analyse basée sur le sexe et le genre plus (ACSG+).

**Résultats:** Le processus de recherche a permis d'obtenir 2 736 résultats uniques, dont 24 articles ont été inclus. Les résultats révèlent des preuves limitées sur les interventions efficaces contre la méthamphétamine, un manque général de prise en compte des facteurs liés

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au sexe, au genre et à l'équité et, en particulier, une pénurie de recherches spécifiquement menées auprès des femmes dans la littérature existante.

**Conclusions:** L'examen de la portée et l'analyse fondée sur le sexe et le genre + soulignent le besoin urgent de recherches qui font progresser la science lié au sexe et au genre dans le domaine de la consommation de substances afin de mieux comprendre et traiter les facteurs liés au sexe, au genre, aux traumatismes et à l'équité qui influent sur les interventions relatives à la méthamphétamine. Cela permettrait de développer des interventions sur mesure pour combler les lacunes dans les réponses apportées aux femmes, en particulier, et de s'assurer que toutes les interventions futures intègrent les facteurs liés au sexe, au genre et à l'équité afin d'améliorer leur efficacité et leur pertinence pour tous.

**Mots-clés:** méthamphétamine, sexe, genre, équité, analyse fondée sur le sexe et le genre plus

## INTRODUCTION

Sex and gender affect methamphetamine uptake and ongoing patterns of use, access to care, and treatment outcomes. Gender also affects the reasons for using methamphetamine. Both men and women report they use methamphetamine for sexual enhancement,<sup>1</sup> but more women than men use methamphetamine pills to lose weight.<sup>2</sup> A 2008 review found that women begin methamphetamine use at an earlier age and are more dependent, but demonstrate a decreased level of toxicity and ultimately, report better treatment outcomes compared with men.<sup>3</sup> Also, more women tend to ask for treatment, compared with men.<sup>4</sup> In a 2022 review of sex-related factors, Daiwile et al (2022)<sup>5</sup> illustrated the impact of sex on methamphetamine pharmacokinetics, methamphetamine-induced alterations in behaviors and cognitive functions, structural modifications in the brain, as well as the drug's effects on neurotransmitter systems and molecular mechanisms that might have clinical implications for methamphetamine interventions.

In Canada, 0.5% of Canadians reported past year use of methamphetamine, with higher prevalence among males than females.<sup>6</sup> Lifetime use was 3.2% among all respondents. However, the accuracy of these rates was questioned in a 2019 report from the Canadian House of Commons Standing Committee on Health, suggesting that national survey data might not capture the true extent of methamphetamine use due to its concentration within specific, underrepresented population subgroups.<sup>7</sup> In addition, acknowledging the intersectionality of equity-related factors and processes is vital as certain population groups may experience a

disproportionately adverse impact from methamphetamine use and treatments. Notably, problematic use of methamphetamine among Indigenous peoples in Canada is a public health concern. According to the National Report of the First Nations Regional Health Survey,<sup>8</sup> 1.2% of the adult respondents and 0.6% of the young people reported having used methamphetamine in the past 12 months. Homosexual and bisexual men are more likely to use methamphetamine compared with heterosexual men.<sup>9</sup> Among this population, use is particularly related to sexual and injection practices, increasing the risk of human immunodeficiency virus (HIV) transmission within sexual contexts.<sup>10</sup>

While increased uptake of sex and gender science will ultimately improve the evidence base, sex and gender-based analysis plus (SGBA+) of existing materials can help to extract relevant information and point to gaps.<sup>11</sup> SGBA+ is an analytic process that promotes critical thinking on research, programs, and policies as they are being developed, to generate interventions that foster greater equity and fairness.<sup>12</sup> It is important to apply SGBA+ to substance use in general,<sup>13</sup> to assessing research,<sup>14</sup> and to programs and policies.<sup>15</sup>

Creating gender transformative approaches that promote gender equity along with better health<sup>16</sup> is the ultimate goal. Gender-transformative approaches prioritize the dual objectives of improving health, and transforming existing gender norms, stereotypes, and power dynamics to achieve broader gender equity.<sup>16</sup> However, some research, programs, or policies still ignore gender norms, roles, and relationships, thereby unintentionally perpetuating gender-based discrimination, biases, and stereotypes. Other gender-specific programs recognize gender norms and take into account the specific needs of both women and men and other gender groups, and make some efforts to accommodate their needs.<sup>17</sup>

There is ample indication that both sex and gender issues matter, especially when responding to women who use substances. Integrating sex and gender informed responses have been found to improve access to services, help-seeking, readiness for change, treatment completion and increased engagement in preventative services.<sup>18,19</sup> There are benefits to programs and services that take into account sex-specific variations, including biological differences in substance use initiation, addiction patterns, and treatment results.<sup>20,21</sup>

Despite this, and the extant evidence on the effects of and interactions between sex and gender-related factors on methamphetamine use, little has been reported about their impact on intervention options for those who use methamphetamine or develop a disorder. Intervention options for methamphetamine dependence have been recently reviewed,<sup>22-24</sup> but sex and gender-related factors

were not closely examined. Hence, we applied an SGBA+ to the extant literature unearthed in a scoping review to determine gaps and opportunities for improving interventions and responses to methamphetamine use.

## MATERIALS AND METHODS

The purpose of this scoping review was to synthesize evidence on methamphetamine interventions and harm reduction approaches with a particular interest in sex and gender-related factors. In this scoping review, we addressed the following research questions (RQs):

- RQ #1. What evidence on methamphetamine interventions that include sex, gender, trauma, and equity-related factors have been published, and how effective are they?
- RQ#2. How do sex, gender, trauma, and equity affect intervention/treatment/harm reduction outcomes for methamphetamine dependence, use disorder, or problematic use?

We followed the methodological framework for scoping studies developed by Arksey and O'Malley<sup>25</sup> and Preferred reporting items for systematic reviews and meta-analyses-ScR.<sup>26</sup> Systematic searches were conducted on June 10, 2021, in the following databases: Medline, CINAHL, Embase and PsycInfo. A search strategy using a combination of subject terms and keywords was used, focusing on the concepts of methamphetamine interventions, treatment, prevention, and harm reduction approaches. The full Ovid MEDLINE is available in Supplemental Table S1 (Supplemental Digital Content 1, <http://links.lww.com/CJA/A36>), and all searches are available upon request.

For RQ#1, we included studies testing psychosocial, pharmacological, and other types of methamphetamine interventions involving women, girls, pregnant girls and women, boys, men, trans people/gender diverse people with methamphetamine dependence, use disorder, problematic use, or recreational or infrequent use; interventions included sex, gender, trauma and/or equity considerations.

Sex-specific considerations include biological factors in substance use and dependence, such as responses to use, treatments, pharmacotherapies, or interventions, including metabolism, hormones, genetics, or anatomic or physiological processes. Gender considerations include: (1) gender-based violence and negative gender stereotypes, (2) gender roles or norms, or (3) gender identity. We also included studies on trauma, violence

awareness, and equity [eg, tailored to lesbian, gay, bisexual, transgender, queer or questioning, and two-spirit plus (LGBTQ2+) people, address poverty or low social income, etc], even without comparators, as long as they were gender or trauma-informed.

Outcomes of interest for RQ#1 included changes in (1) methamphetamine (and other substance) use (eg, abstinence and reduction), (2) physical health (eg, sexually transmitted infections, risk behaviors, and hospitalization), (3) study retention/dropout/treatment completion/discontinuation, (4) services use, (5) mental health and quality of life, and (6) withdrawal symptoms (eg, cravings), etc.

For RQ#2, we focused on women, girls, pregnant girls and women, boys, men, trans people/gender diverse people with methamphetamine dependence, use disorder, problematic use, or recreational or infrequent use. We included analyzing outcomes between gender groups (eg, women vs men) or without a comparison group (eg, single gender/sex sample). Outcomes of interest were changes in (1) methamphetamine (and other substance) use, (2) physical health, (3) service provider perceptions/stigma reduction, (4) study retention/ dropout/ treatment completion/discontinuation, (5) service use, and (6) mental health and quality of life.

Both RQs covered English articles published between 2015 and 2021 with data from Austria, Australia, Belgium, Canada, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States were included. We included various study designs, including randomized controlled trials (RCTs), case-control studies, and qualitative studies.

Exclusion criteria comprised non-peer-reviewed articles, case reports, and studies without sex or gender disaggregation or interventions that were not sex and/or gender informed.

SGBA+ can be integrated into research and data analysis in various ways. In this scoping review, we included: (1) interventions tailored to specific gendered populations (eg, sexual minority men), (2) interventions with outcomes disaggregated by sex/gender, with or without significance testing, (3) studies where sex/gender was considered as a confounder and controlled for, often within regression models, and (4) studies with outcomes specific to one sex/gender group only. Taking these approaches into account, we incorporated an SGBA+ commentary throughout our synthesis and reporting.

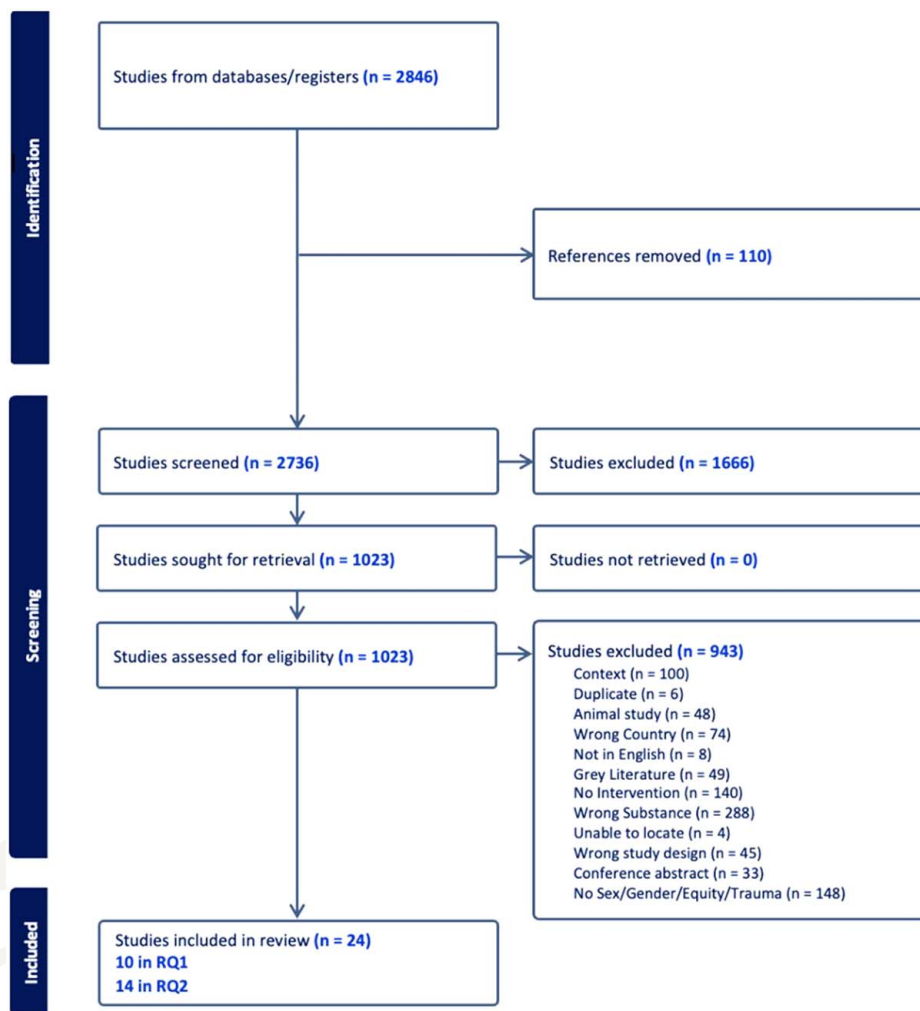
## RESULTS

Searches in 4 databases resulted in  $n = 2736$  unique returns published between 2015 and 2021 (Fig. 1). Twenty-four papers met the inclusion criteria.

### Interventions for methamphetamine use tailored to address sex, gender, or equity factors

Ten articles addressed RQ#1, and all focused on interventions or services designed specifically for sexual minority men. Although these interventions were designed to meet the unique needs and challenges faced by sexual minority men (eg, using methamphetamine for sexual pleasure), an exploration of sex and/or gender factors was notably lacking. Moreover, these studies missed the opportunity to explore the complex interplay of sex and gender-related factors, particularly within the specific context of sexual orientation and, more precisely, among sexual minority men.

Two Australian studies described interventions with harm reduction aims related to methamphetamine use.<sup>27,28</sup> An Australian study evaluated the Re-Wired Program, a 6-week group treatment by a community-based LGBT organization, targeting men who have sex with men (MSM) with methamphetamine use issues.<sup>27</sup> The program addressed health effects, relapse prevention, and holistic well-being, resulting in reduced drug use and psychological distress, and increased overall well-being. Positive outcomes included improved readiness to change, with notable shifts from initial contemplation stages to preparation and action phases.<sup>27</sup> Another study examined the treatment outcomes among gay and bisexual men receiving outpatient counseling for methamphetamine use at an lesbian, gay, bisexual, transgender and intersex-specific service in Sydney.<sup>28</sup> Treatment encompassed structured interviews, clinical assessment, and a psychosocial intervention using different therapeutic modalities such as acceptance and commitment therapy, cognitive-behavioral therapy (CBT), and motivational interviewing. The study reported a reduction in methamphetamine use,



**Figure 1.**

PRISMA flow diagram of a search strategy. RQ indicates research question; PRISMA, preferred reporting Items for systematic reviews and meta-analyses.



dependence, days of methamphetamine use, and sharing ancillary injecting equipment. The authors noted that reaching and engaging other sexual minority groups, such as lesbian, bisexual women, and transgender people, may require different strategies.

Two studies incorporated technology to deliver tailored interventions to sexual and gender minority groups.<sup>29,30</sup> For example, a pilot study by Reback et al (2018)<sup>30</sup> explored smartphone ecological momentary assessments for self-monitoring among gay and bisexual men, focusing on reducing methamphetamine use and associated risky behaviors. In one arm, participants had weekly meetings with a substance use counselor. The counselor-assisted condition showed decreased episodes of condomless anal intercourse.<sup>30</sup> Another RCT by Reback et al (2019)<sup>29</sup> studied 3 conditions of Project Tech Support2 over 8 weeks. All conditions involving text messages led to immediate reductions in self-reported episodes of sex while under the influence of methamphetamine, and episodes of condomless anal intercourse with casual male sexual partners. Other outcomes included reductions in days of methamphetamine use for all three conditions at 9 months. Approximately 67% of participants identified as gay. Despite this, all interventions used gay-specific messages without a detailed exploration of the language implications of using gay-specific messages versus MSM-specific messages.

Several studies examined interventions for sexual minority men with components that target methamphetamine use and reducing HIV viral load and transmission, combining both contingency management interventions and positive affect interventions. These interventions aimed to enhance stress management, positive affect, and overall psychological adjustment, rather than focusing more directly on changing motivation for substance use.<sup>31-33</sup> One study sought to explore the potential advantages of employing an expressive writing intervention as a trauma-informed approach for HIV-positive men who used methamphetamine.<sup>34</sup>

An example is the ARTEMIS intervention,<sup>31-33</sup> a multi-component including five 1-hour sessions delivered over a 3-month period, a workbook, and an iPod device loaded with mindfulness exercises. This intervention aimed to improve positive affect skills such as noticing positive events, gratitude, informal and formal mindfulness and breath work, positive reappraisal, personal strengths, attainable goals, and acts of kindness. The studies using this approach found participants had significantly lower viral load, increased positive affect and decreased methamphetamine use at 3, 6, and 12 months,<sup>32</sup> and reductions in self-reported meth use and meth cravings at 3 months.<sup>33</sup>

One RCT pilot study aimed to investigate an expressive writing intervention with HIV-positive men using

methamphetamine as a trauma-informed intervention.<sup>34</sup> The intervention proved feasible and acceptable, uncovering themes of stigma, discrimination, and interpersonal rejection related to HIV and sexual minority status. The MSM in the intervention reported reductions in methamphetamine use at 1 month but not at the 3-month follow-up. The authors note that more intensive intervention approaches that simultaneously target trauma and stimulant use may optimize HIV/acquired immunodeficiency syndrome prevention efforts and methamphetamine reduction/cessation in this population.<sup>34</sup>

In a U.S. study, researchers addressed the limited success of existing methamphetamine treatments by focusing on replacement activities or the role of depressed mood.<sup>35</sup> They tested a 13-session intervention for MSM using crystal methamphetamine that involved relearning how to engage in non-drug-using aspects of life, paired with cognitive behavioral therapy for decreasing depression, as well as sexual risk reduction counseling.<sup>35</sup> The results showed good intervention outcomes, including a reduction of sexual risk for HIV, methamphetamine use, and high retention at 6 months.<sup>35</sup>

Parsons et al (2018)<sup>36</sup> conducted an 8-session motivational interview with CBT (MI+CBT) study for HIV-positive gay and bisexual men not seeking treatment. Participants fell into 3 groups: (1) change-ready for both outcomes, (2) ready for medication adherence change but ambivalent about methamphetamine use, and (3) those with global barriers. The MI+CBT intervention focused on information, motivation, self-efficacy, and behavioral skills. Results showed both interventions reduced methamphetamine use, improved medication adherence, and decreased condomless anal sex at 3, 6, 9, and 12 months. MI+CBT had greater medication adherence improvements for those with global barriers compared with education sessions.<sup>36</sup>

### **Sex and/or gender differences in outcomes for several types of methamphetamine interventions**

The studies addressing RQ#2 included other gender groups and sex-disaggregated data. Even so, the majority of studies included in the RQ#2 lacked comprehensive SGBA+. Any sex-disaggregated outcome differences were briefly acknowledged in some of the studies. A detailed examination of sex and/or gender differences was largely absent. Furthermore, these studies did not explore sex and/or gender-related factors in connection with mechanisms and dynamics, nor did they address the interactions between sex and gender.

In a U.S. RCT targeting high-risk HIV women and men, researchers designed an intervention for methamphetamine use, depressive symptoms, and condomless sex.<sup>37</sup>

Males reported a greater decline in methamphetamine use compared with females, even after adjusting for various factors.<sup>37</sup> Males who received the intervention reported significantly greater decreases in methamphetamine use than males in the control group. Among males, decreases in methamphetamine use were associated with decreases in condomless sex, but not with decreases in depressive symptoms.<sup>37</sup> Females were more likely than males to be unhoused, have children, have a lower income, and have moderate and severe depression.<sup>37</sup>

A German-language group psychotherapy manual was examined as a methamphetamine-specific relapse prevention approach for individuals with methamphetamine dependence. Conducted alongside standard psychiatric care, the intervention comprised 15 psychologist-led small group sessions covering various topics. A successful outcome, defined as no more than one methamphetamine relapse and attendance at 8 out of 15 sessions, was achieved by 48% of participants. Females were significantly more likely than males to have a successful treatment outcome. The intervention was not described as having any gender, trauma or equity-related components and the authors did not offer any reasons for these sex differences in outcomes.<sup>38</sup>

An Australian study investigated abstinence outcomes 1 year after entry into live-in rehabilitation.<sup>39</sup> The sample was primarily male (74%), and most participants injected methamphetamine (84%). The study found that individual counseling, good rapport between the client and the treatment provider, and longer stays in live-in rehabilitation were associated with continuous abstinence. Sex was not associated with continuous abstinence 1 year after entry into live-in rehabilitation.<sup>39</sup> Within the scope of this study, sex was treated as a demographic factor. Specifically, the term “male” was referenced three times, whereas “female” did not appear in the article.

A U.S. study investigated whether an 8-week exercise intervention would influence depression outcomes among males and females who were methamphetamine-dependent and enrolled in a live-in substance use treatment program.<sup>40</sup> Participants were randomly assigned to either the exercise intervention or a health education control group. The study found a significant improvement in depression symptoms, irrespective of sex, age, education level attained, and employment status.<sup>40</sup> The authors did not explore sex or gender-related factors associated with exercise or depression, which may highlight areas for tailoring exercise interventions to males and females.

Four studies focused on pharmacotherapeutic approaches, such as bupropion,<sup>41</sup> ibudilast,<sup>42</sup> methylphenidate (MPH),<sup>43</sup> and creatine monohydrate.<sup>44</sup> They did not describe any

tailoring for either sex or gender-related factors. Six studies examined the advantages of combining both pharmacotherapeutic approaches with other interventions and provided some sex and/or gender disaggregated results noting whether the intervention was beneficial for the specific sex and/or gender group. Nevertheless, some of the studies integrated pharmacotherapy with motivational interviewing, a practice that would probably have encouraged discussions related to sex, gender, trauma, or equity-related ideas during conversations about change.

Two studies that explored pharmacotherapeutic approaches which included both females and males found that the sex of the individual was not associated with treatment outcomes.<sup>41,42</sup>

In a U.S. study,<sup>44</sup> 21 females using methamphetamine received an 8-week creatine monohydrate treatment for depression. Results showed improved depressive and anxiety symptoms, methamphetamine use decreased from 50% to 21.4% by the sixth week with a 78.6% completion rate.

Cook et al (2017)<sup>45</sup> investigated whether abstinence for methamphetamine dependence in the first weeks of 4 pharmacological treatments (sertraline, modafinil, and 2 of bupropion) was associated with later study retention. Sex was not a significant predictor of dropout, but female sex was associated with fewer negative urine screens.

Evidence from a U.S. study showed that mirtazapine (an antidepressant) combined with counseling sessions using CBT and MI reduced methamphetamine use and HIV risk behaviors among cisgender men and transgender women.<sup>46</sup> Although transgender men were eligible, none chose to enroll in the study.

In a study on extended-release naltrexone along with CBT and MI,<sup>47</sup> there was no decrease in methamphetamine use or risky behaviors among methamphetamine-dependent MSM. Although transgender males and females were included, 98% of participants were assigned male at birth. Although gender identity was included in baseline characteristics, the results were not discussed by gender identity. Santos et al (2016)<sup>48</sup> found that targeted naltrexone combined with substance use and HIV-risk reduction counseling (CBT+ MI) reduced methamphetamine use in high-risk MSM. Stauffer et al (2020)<sup>49</sup> investigated the effects of oxytocin administered before each of the six sessions of motivational interviewing group therapy on methamphetamine use in MSM, observing improved session attendance but negligible effects on craving. This study included male-identified (or genderqueer and assigned male at birth) and transgender male participants, with results presented by these categories but not discussed by the authors.

## DISCUSSION

The objective of this scoping review was to describe and synthesize existing evidence on sex, gender, and equity-related factors and methamphetamine interventions and harm reduction approaches. We sought to investigate the impact of sex and gender-related factors by applying an SGBA+ to these studies, with the goal of identifying gaps and opportunities for future interventions responding to methamphetamine use. This scoping review identified and included studies that were tailored to specific populations and studies that included sex or gender-disaggregated outcomes for females, males, or transgender people.

In RQ#1, all studies were tailored to sexual minority men and focused primarily on sexual orientation-related factors. Even though these studies did not incorporate a gender-informed approach, we can delve into these missed opportunities and apply SGBA+ to their results. The interventions described were designed to address the unique needs, concerns, and risks faced by these sexual minority groups by considering that they may have distinct health-related issues and behavioral patterns that require tailored approaches for effective interventions. For instance, one focus was on challenges associated with experiencing pleasure from activities unrelated to drugs while encouraging engagement with diverse facets of life that extended beyond drug utilization.<sup>35</sup> Although there was not an explicit focus on gender-informed approaches, certain elements within the intervention could have adopted a gender-informed perspective.

One of the studies focused on gay and bisexual men seeking treatment for methamphetamine use, given the limited number of clients presenting who identified as lesbian, bisexual women, transgender, or intersex individuals.<sup>28</sup> This underscores the importance of recognizing the diversity within sexual minority populations. To ensure inclusivity, reaching and engaging other sexual minority groups, such as lesbian, bisexual women, and transgender individuals (men and women), may require the implementation of different strategies.

One study explored the feasibility and acceptability of an expressive writing intervention introducing a trauma-informed strategy for HIV-positive MSM who use methamphetamine.<sup>34</sup> Unlike prior studies on expressive writing, where only women reported notable decreases in posttraumatic stress symptoms, depression, and HIV-related symptoms,<sup>50</sup> this study promoted emotional expression among men and emphasized the innovative lens of such a gender transformative approach.

Overall, the integration of an SGBA+ approach in interventions for methamphetamine use among MSM would improve the understanding of how substance use and

health implications could be addressed for this group of men. A more nuanced examination of how sex, and gender-related factors, sexual orientation, gender identity, and diverse experiences of trauma intersect with substance use behaviors, sexual practices, and associated health outcomes among MSM is needed. Such an approach would allow for a more comprehensive understanding of the unique challenges faced by those MSM engaging in chemsex, and the intersections with other issues such as stigma, discrimination, sexual risk-taking, mental health, and barriers to accessing health care services.<sup>51</sup> Moreover, integrating SGBA+ perspectives fosters greater inclusivity and responsiveness to the diverse realities of MSM, ultimately contributing to more effective and equitable public health initiatives not only for this group but all other groups.<sup>12</sup>

Across various studies included in RQ#2, a consistent trend emerged in the way sex and gender were utilized, often revealing a tendency to interchange these terms.<sup>45,52</sup> Despite a distinct focus on examining sex as a sociodemographic variable, some studies employed “sex” and “gender” interchangeably in their narratives.<sup>37,41,42</sup> Within the scope of RQ#2 analyzing methamphetamine interventions, a few studies showcased distinct outcomes based on sex, illustrated by sex-disaggregated analyses.<sup>37,38</sup> However, these studies missed an opportunity to pay closer attention to the potential sex/gender interactions and sex- and gender-related factors that may affect various outcomes related to methamphetamine use, mental health and wellness, and physical health, related to various therapeutic activities available in treatment. Although the general findings suggest efficacy in some methamphetamine treatment interventions, evidence remains very limited, particularly regarding interventions for women, and those encompassing trauma and equity considerations. The only sex-informed information that was included in 2 studies that examined pharmacotherapies was related to the inclusion of female participants. These studies required female participants to not be pregnant or lactating and to commit to using reliable contraception during trials.<sup>37,42</sup>

A few studies acknowledged the inclusion of transgender individuals.<sup>46,47,49</sup> However, transgender individuals were a minority and even though authors disaggregated data by gender identity, the results were not discussed in terms of gender identity most likely due to a lack of sufficient sample size.<sup>46,47,49</sup> This situation underscores the importance of more inclusive recruitment in future studies involving transgender populations. With a larger and more representative sample, researchers would be better positioned to provide nuanced analyses and discussions in terms of gender identity and methamphetamine use.



## Limitations

This scoping review has certain limitations. Although our scope aimed to incorporate a comprehensive SGBA of methamphetamine interventions, we observed a conflation between sex and gender in the language used across the included papers. This highlights a notable imprecision and/or lack of awareness regarding the distinct roles that sex and gender-related factors play in methamphetamine interventions. Furthermore, the studies synthesized in this review predominantly originated from high-income countries such as the United States, Australia, and the Czech Republic, potentially limiting the generalizability of the findings to other geographical contexts and diverse populations. Finally, we restricted the inclusion of studies to those published between 2015 and 2021.

## CONCLUSIONS

While existing research has explored some of the influences of sex and gender-related factors on methamphetamine use, this scoping review reveals notable gaps in integrating these findings into the development and testing of methamphetamine interventions. The scarcity of studies conducted with females and women is a key gap that needs urgent attention. This review highlights the need for interventions that not only include women but also consider the intricate interplay of sex and gender-related factors and interactions in women's lives that influence methamphetamine use and

affect responses to interventions.<sup>53</sup> This would also recognize the importance of addressing gender inequities and promoting empowerment among women, while also addressing factors such as trauma, family responsibilities, and social support systems.

In addition, more attention needs to be paid to addressing the interplay of sex, gender and trauma in developing effective interventions that more comprehensively address needs and experiences of trauma across diverse populations.<sup>54</sup> It is imperative to recognize the intersections of sex and gender-related factors with structural processes and dynamics, and social determinants of health, including gender, class, race, ability, and ethnicity. Further research in this area is essential to gain a comprehensive understanding of how these intersecting factors shape methamphetamine use and inform the possible development of transformative interventions that promote gender-equitable health outcomes for all individuals affected by methamphetamine use. Indeed, all gender groups of methamphetamine users could benefit from integrating evidence on gender, social norms, and power dynamics as they affect the unique challenges and systemic factors that contribute to their substance use.

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