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Sexualized drug use and chemsex: A bibliometric and content analysis of published literature

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ABSTRACT

Sexualized drug use (SDU) describes drug-facilitated sexual enhancement, and chemsex is an SDU subculture involving the use of specific drugs by men who have sex with men (MSM). This study aimed to identify research trends, foci, and themes within the SDU and chemsex-specific literature. The Web of Science Core Collection was searched with a list of SDU synonyms. All SDU-related articles were analyzed using the R package, bibliometrix. Full text review identified chemsex-specific records, and text was extracted verbatim for content analysis in Leximancer. The search returned 1,866 unique records. A total of 521 addressed SDU, and 301 papers specifically addressed chemsex. The small but growing SDU literature primarily addressed consensual encounters between MSM, and drug-facilitated assault experienced by women, in Western settings. Little attention was given to transgender communities or consensual SDU in cisgender heterosexual individuals. The literature primarily viewed SDU through a public health lens, specifically focusing on the risk conferred to sexual health.The SDU and chemsex-specific literature are potentially limited in scope and may inadequately capture the geographical, demographic, and cultural diversity of these phenomena. Future research should address the myriad social and health implications of SDU and chemsex participation across all relevant communities and settings.

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Introduction

Sexualized drug use (SDU) is an umbrella term referring to the use of drugs in a manner to enhance or facilitate sex (Edmundson et al. 2018). Individuals of any gender identity or sexual orientation can participate in SDU (Demant et al. 2017; Moyle et al. 2020), but it is disproportionately practiced among sexual and gender minorities (Daly et al. 2023; Hibbert et al. 2019). One sub-culture within the SDU space of increasing public health importance is chemsex. Despite heterogeneity in its definition (Amundsen et al. 2023; Santoro et al. 2020), chemsex typically refers to the intentional use of specific drugs ("*chems,*" usually some combination of methamphetamine, γ-hydroxybutyrate/γ-butyrolactone [GHB/GBL], and mephedrone) by men who have sex with men (MSM), which can take place in private residences (often facilitated by geosocial networking apps) or sex-on premise venues (Bourne et al. 2015; Maxwell, Shahmanesh, and Gafos 2019). Despite notable heterogeneity and a lack of representativeness biasing estimates on chemsex participation, sexual health and HIV service surveys suggest that 20–40% of MSM participate in chemsex (Blomquist et al. 2020; Edmundson et al. 2018; Whitlock et al. 2021). The term chemsex is primarily used in western/central European settings (Amundsen et al. 2023); however, the use of methamphetamine (Guadamuz and Boonmongkon 2018), synthetic cathinones (Skryabin, Bryun, and Maier 2020) and GHB/GBL (Amundsen et al. 2022) by MSM to enhance sex appears to be a global phenomenon (Chan and Tang 2021; Juyal et al. 2021; Lasco and Yu 2023; Lopes de Sousa et al. 2020; Sousa et al. 2020; Wang, Jonas, and Guadamuz 2023).

SDU is practiced for a variety of reasons, including enhancing sexual pleasure (Hurley and Prestage 2009;

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Kurtz 2005), reducing sexual anxiety (Weatherburn et al. 2017) and for sexual coercion (Beynon et al. 2008). Although some individuals are able to manage the risks and harms of SDU (i.e., tolerable low mood or physical health impacts because of the pleasures associated with engaging), there are a range of adverse long-term health outcomes associated with SDU participation such as increased risk of depression (Brogan et al. 2019), substance dependence (Íncera-Fernández, Gámez-Guadix, and Moreno-Guillén 2021), sexually transmitted infections (Achterbergh et al. 2020), cardiovascular disease (Kevil et al. 2019) and suicidality (Strasser et al. 2023). In addition, participation in SDU is associated with behaviors that have further implications for health, including an increased likelihood of condomless sex (Hibbert et al. 2021). Chemsex presents particular public health challenges, and the unique cultural, political, and social drivers of participation in chemsex necessitate distinct approaches to prevention, policy, and practice (Stevens and Forrest 2018).

With the rise of chemsex as a public health crisis (McCall et al. 2015), it is important to understand the current focus and direction of both SDU and chemsex literature to ensure it accurately represents the phenomena and can inform efficacious policy and practice. Bibliometric and content analyses have previously been used in multiple areas of life and social sciences to analyze large volumes of bibliometric data, identifying key evolutionary trends and gaps in literature and proposing important future research directions (Raji and Demehin 2023; Tabak et al. 2023; Wasti et al. 2023)

While a number of systematic reviews in SDU and chemsex have been conducted (Amundsen et al. 2023; Hibbert et al. 2021; Maxwell, Shahmanesh, and Gafos 2019; Moreno-Gámez, Hernández-Huerta, and Lahera 2022), to our knowledge, neither a bibliometric nor content analysis has been conducted in either field. Although systematic reviews are of value in understanding and contextualizing study findings, bibliometric and content analyses can elucidate larger volumes of bibliographic data and understand disciplinary, demographic and geographic trends in extant literature. Our study aims to identify research trends and foci within the SDU and chemsex literature, specifically:

(1) Determining the current geographical spread, demographic coverage, and disciplinary focus of the SDU literature;
(2) Identifying the potential differences in research trends and themes within the chemsex literature, as well as identifying the extent of change in the drugs associated with chemsex;
(3) Placing the bibliometric and content findings within the context of the current public health needs of both SDU and chemsex to make recommendations for the future direction of research.

Materials and methods

Search and screening

The protocol for this study is published in the Open Science Framework (https://osf.io/fjbrd/). The Web of Science Core Collection (1900-present day) was searched without restrictions on July 11, 2023 using an exhaustive set of SDU synonyms (Suplementary Table S1) informed by previous systematic reviews on SDU and chemsex (Connolly et al. 2023) and discussion between the authorship team and field experts. Following automated de-duplication in bibliometrix (Aria and Cuccurullo 2017), bibliographic data were uploaded to Rayyan (Mourad Ouzzani et al. 2016) for title-abstract screening by one author (LM). A single review identified records that addressed SDU. Papers focusing on the pharmacology or toxicology of drugs SDU-related drugs were excluded. A second title-abstract review was performed by LM for content analysis using Leximancer that addressed chemsex, specifically.

Bibliometric analysis

Bibliometric analysis is a method for exploring, analyzing, and visualizing large volumes of bibliographic data (Donthu et al. 2021). Key bibliometric data such as keywords, authorship, collaboration, and journal information can be used to derive information on the geographic, demographic, and disciplinary foci of a field, as well as identify important gaps within a body of research. The bibliometric analysis was conducted on all entries that passed title and abstract screening, using bibliometrix. Bibliometrix is an open-source R package that enables quantitative bibliometric research using high-quality numerical routines and integrated data visualization tools (Aria and Cuccurullo 2017). Bibliometrix was used to perform descriptive bibliometric analyses (e.g., identifying most cited references and authors, calculating authors' dominance ratings), create network matrices such as bibliographic coupling and co-word analyses and perform bibliometric mapping (i.e., forming conceptual structure maps (Aria and Cuccurullo 2017)). Co-word analyses use word co-occurrences to map the conceptual structure of a bibliometric framework, and will be performed by multiple correspondence analysis (MCA

(Ejaz et al. 2022)). MCA is a multivariate exploratory, dimensionality reduction technique that graphically and numerically analyzes multivariate categorical data, investigating the interdependence of categorical variables and deriving overarching, latent classes (Ejaz et al. 2022; Matute and Linsen 2022).

Chemsex content analysis

Content analysis, an automated method in which language is evaluated, represented, and analyzed with similar interpretation to that of humans (Salloum, Khan, and Shaalan 2020), is also being increasingly used in published literature to analyze large volumes of qualitative data. Content analyses techniques, using semi-automated content analysis tools such as Leximancer (Leximancer Pty ltd 2021), have been shown to efficiently produce valid, reproducible interpretations of large bodies of literature (Canfell et al. 2022; Engstrom et al. 2022; Smith and Humphreys 2006; Travaglia, Westbrook, and Braithwaite 2009). An additional stage of data extraction was performed on the entries investigating chemsex. Content analysis was specifically performed on the chemsex literature rather than the SDU literature as a whole due to an interest in the sub-culture of chemsex, and greater anticipated homogeneity within the chemsex literature than in the wider SDU literature. Introductions, aims (standardized as the last section of the introduction, if not specified by authors), findings (standardized as the first paragraph of the discussion, if not specified by authors), and conclusions for each entry were extracted verbatim by EB, EB, and OS, alongside DOI and year of publication, and each section was analyzed separately in Leximancer. When one or more sections were not available, or if articles did not match this format, as much text as was available was extracted into the relevant section. When entries did not report primary data, but rather were a commentary/critical piece, the entire text was extracted and analyzed as an introduction. For entries that were not written in English, but did provide an English abstract, as much information as possible was extracted from the abstract into the relevant section. Entries that did not provide an English abstract were excluded.

Leximancer, a semi-automated content analysis tool, was used to synthesize the text in the chemsex papers (Leximancer Pty ltd 2021). Extracted data were loaded into Leximancer using default settings to create an initial concept map. This included Leximancer's default list of English stop words (i.e., words that are frequent and offer little value in understanding the data). Name-like concepts were not identified separately. Concepts were then iteratively reviewed, and more were added to the stop word list, if appropriate (Suplementary Table S2). The concept map and the underlying text (which Leximancer tags with the relevant concepts) were reviewed, and the authors summarized the findings. The change over time in the frequency of the types of drugs mentioned in entries were analyzed through using Leximancer's tagging facility to tag the year of publication, and the frequency of types of drugs over time was extracted and the distribution of mentions within each year was calculated. Leximancer uses machine learning to build concepts and themes by examining the frequency and co-occurrence of terms within text, presenting them visually in a concept map (Leximancer Pty ltd 2021; Smith and Humphreys 2006). Concepts are groupings of words that frequently co-occur in the text. Concepts are then grouped into themes based on co-occurrence. Themes are coterminous with the largest subordinate concept (Leximancer Pty ltd 2021), the theme will be named with the most prevalent concept within it. The relationship between concepts and themes is presented visually in this concept map, comprising large, colored bubbles (themes) with subordinate dots (concepts). The bubble colors are heat maps, with warmer colors (i.e., red, orange) being of more common themes and cooler colors (purple, blue) being of less common themes.

Results

Search

Our search yielded 1,883 records, of which 1,866 were unique. Initial screening identified 521 papers whose primary focus was SDU. Of these, 301 papers specifically addressed chemsex and corresponding full texts were sought for content analysis. Fifty-six entries could not be retrieved by the review team, eight entries did not exist in a format eligible for extraction (e.g., interview transcript), four entries did not have a manuscript or abstract in English, and three further duplicates were identified, leaving 230 entries for content analysis (Figure 1).

Bibliometric analysis

Bibliometric data

Literature identified through our search spanned from 1986 to 2023, with an annual growth rate of 9.7% (Supplementary File S1). The average document age was 5.3 years, reflecting the relative novelty of this area of research. Most records were research articles (56.8%) or meeting abstracts (19.6%).

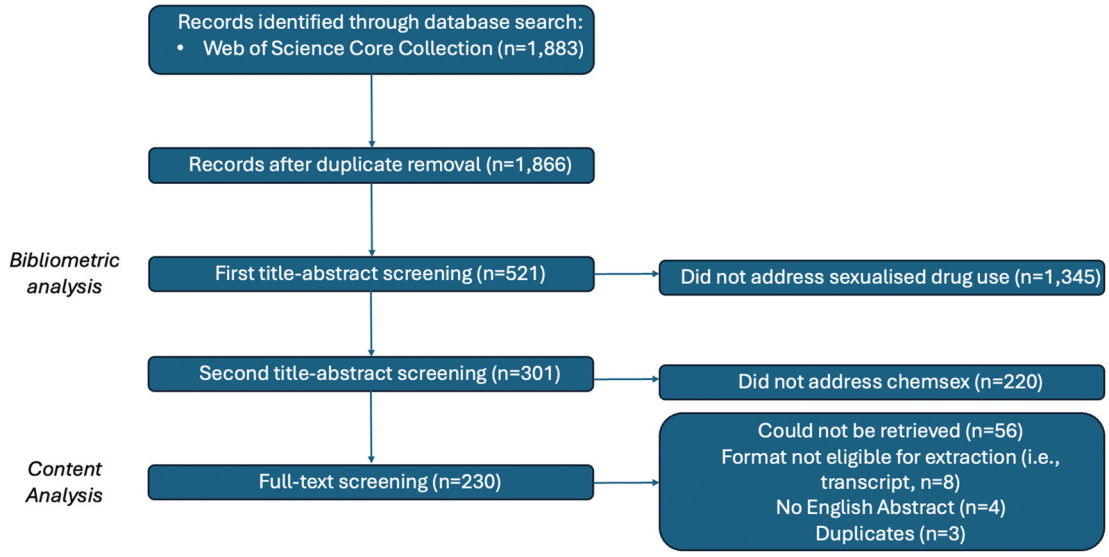

Figure 1. Flowchart of search and analysis plan.

Although 7.7% of entries were from the *International Journal of Drug Policy*, most articles identified by the search were from journals focusing on sexual health and HIV medicine, such as *Sexually Transmitted Infections* (8.4%), *HIV Medicine* (5.0%), and *Sexual Health* (3.5%), suggesting a significant focus on SDU-associated sexual risk, compared to other harms associated with SDU.

Country collaboration

The current body of literature exhibits a small number of authors conducting research in a few countries (Supplementary File S1). Authors based in high-income countries in the global North dominated authorship among the retrieved sources, with 24.3% of corresponding authors from the United Kingdom (UK), 19.2% from the United States of America (USA), and 10.3% from Spain. Few corresponding authors or collaborators were based in low- and middle-income countries. There was little cross-country collaboration, particularly from those countries most productive in the research space (Figure 2). For example, despite the UK being the most productive country for SDU literature, only 9.17% of papers involved collaboration with other countries.

Keyword co-occurrences

The most commonly keywords of articles identified were "chemsex" (29.6% of entries), "MSM"/'men who have sex with men' (18.8%) and "HIV" (12.3%), with most other keywords identifying themes in relation to drug use, sexual health, and MSM.

A key-word co-occurrences network using the Kamada-Kawai algorithm (Figure 3) highlights the main

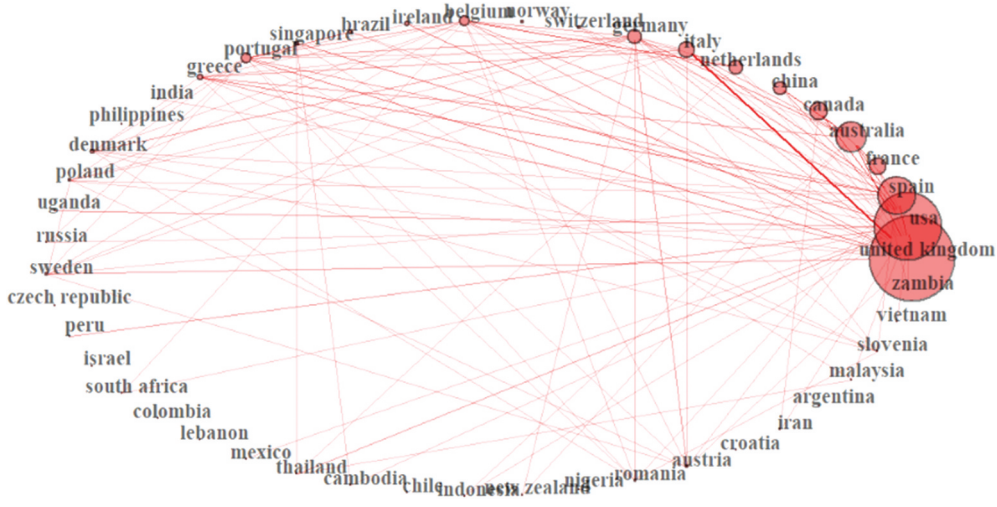

Figure 2. Country collaboration network for literature on SDU.

clusters of research foci within the literature, specifically: SDU identified as chemsex (orange), SDU among MSM which is not identified by authors and/or participants as chemsex (purple), SDU among young men (green), and drug-facilitated sexual assault toward women (red). The brown, pink, and blue clusters do not appear to elucidate a clear demographic or behavioral cluster.

A keyword conceptual structure map (Figure 4) provides an alternative categorization of the literature, once again distinguishing chemsex and SDU from drug- and alcohol-facilitated sexual assault, as well as defining a separate focus on toxicology and biological analyses. Within the MSM SDU cluster, a focus on sexual health and HIV within the research domain begins to emerge,

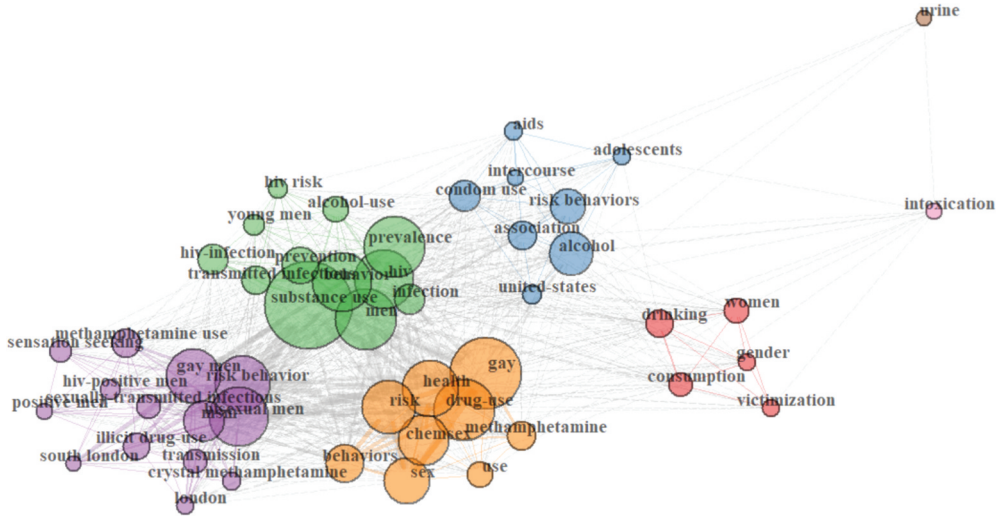

Figure 3. Keyword co-occurrences network.

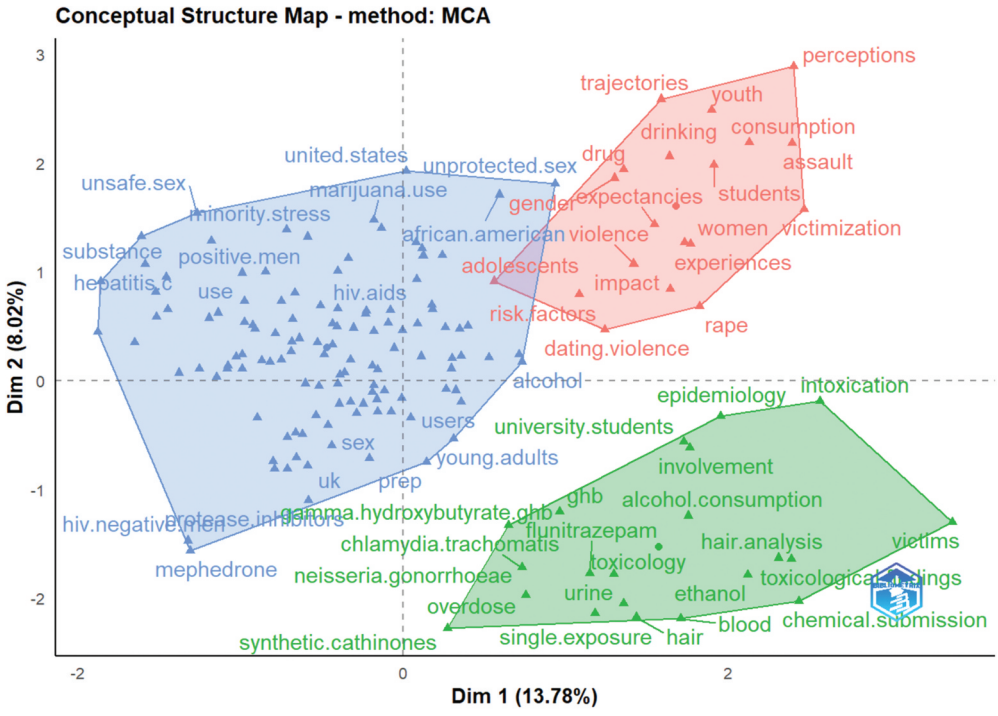

Figure 4. Conceptual Structure Map of Keywords. This structure map was derived with the MCA method.

with "HIV/AIDS," "hepatitis C," and "unprotected sex"/ unsafe sex' appearing within the keyword cluster.

Leximancer content analysis

'Introductions'

The introduction sections of 230 articles were analyzed, producing the concept map shown in Figure 5. The included studies frequently talk about chemsex among MSM, and London is a frequently discussed setting. The *chemsex* theme is highly overlapped by a GHB theme, including details of the drugs that are used in chemsex (GHB, methamphetamine, and mephedrone). The theme to the left of the concept map, *HIV*, addresses the behaviors (e.g., group sex) and risks (e.g., STIs) associated with chemsex. Introductions also discuss treatment and prevention measures, such as the use of pre-exposure prophylaxis (PrEP). The green theme, *social*, at the top of the concept summarizes social measures to provide support to chemsex users. Finally, the *individual* theme highlights the role of identity and the impact of psychological adversity and profiles on using chemsex, as well as how people respond to its effects.

Three drugs were commonly mentioned: mephedrone, GHB, and methamphetamine. The number of times each of these concepts was tagged in articles published in each year was extracted from Leximancer, and the distribution within each year

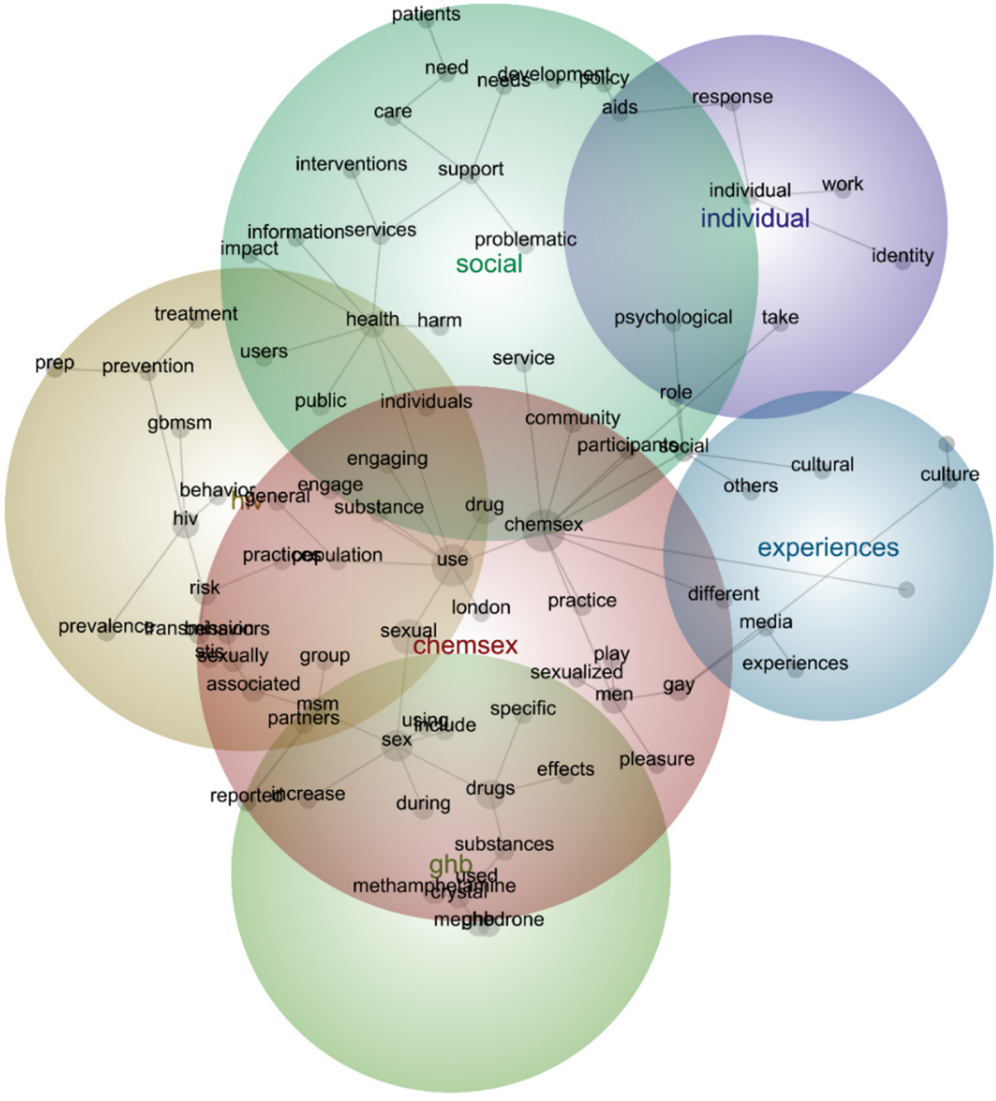

Figure 5. Leximancer concept map of the introduction section of entries addressing chemsex.

was calculated, as shown in Supplementary Table S1. Methamphetamine was the most frequently mentioned drug across all years.

'Aims'

The "Aims" sections of 202 articles informed the concept map (Supplementary Figure S1). Prominent themes in the analyzed studies' aims sections include chemsex, MSM, and health. Within these, many studies investigated the "prevalence" of various behaviors (e.g., participating in chemsex), or respondents' "experience" of various aspects of chemsex, implying both qualitative and quantitative analyses are being conducted.

'Findings'

A total of 188 studies were analyzed for the Findings concept map (Suplementary Figure S2). Within the core chemsex theme, concepts include the drugs commonly associated with chemsex (e.g., methamphetamine), and risks associated with chemsex (e.g., HIV acquisition). The next most prominent theme concerned chemsex participants, and there was a notable overlap between this and the chemsex theme. The third most common theme was GHB, highlighting the key role of this substance in chemsex. Other drugs mentioned within this theme include alcohol, cocaine, mephedrone, and MDMA (3,4-methylenedioxymethamphetamine). PrEP was another common theme, with concepts in this theme (e.g., increased;

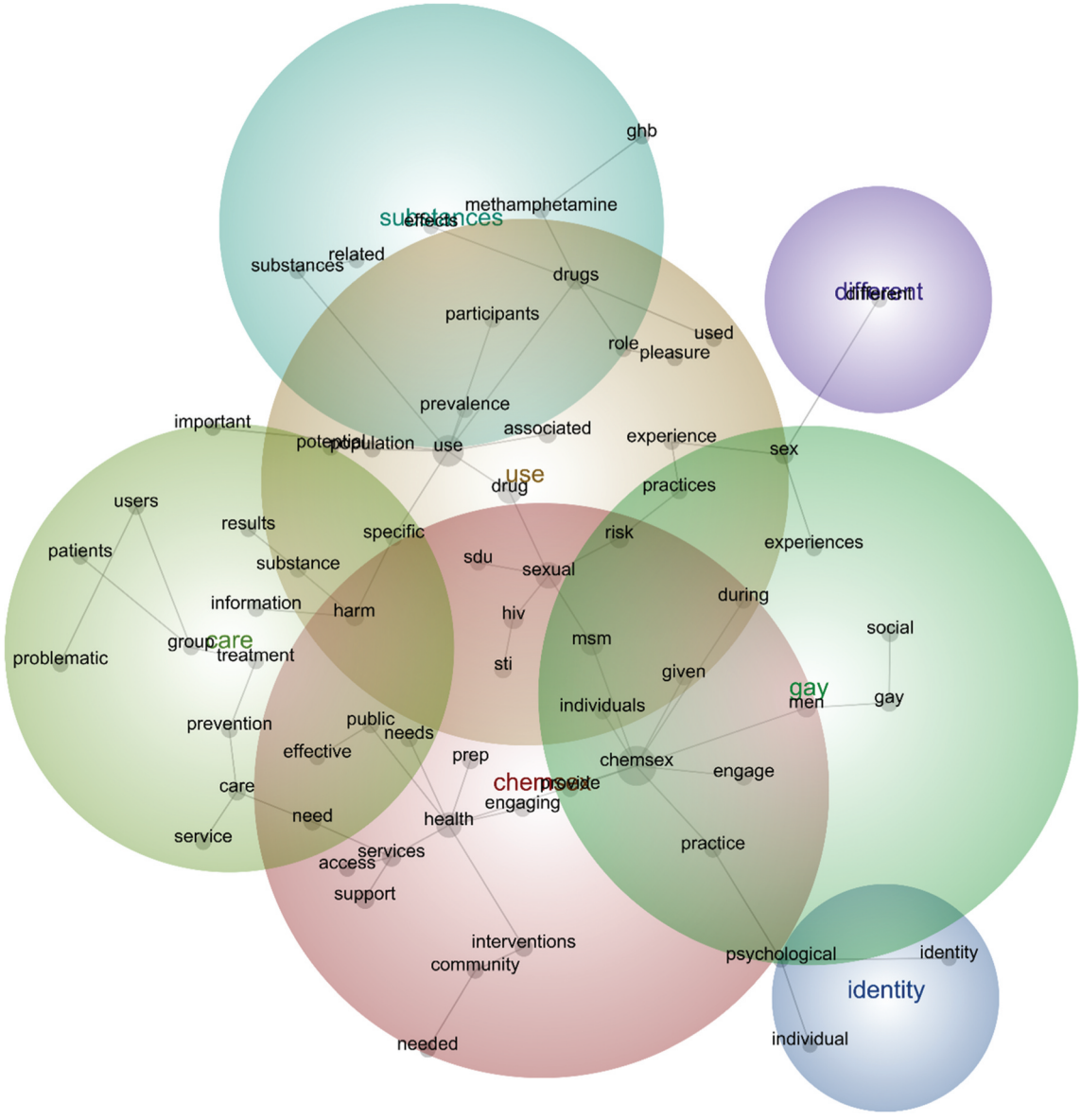

Figure 6. Leximancer concept map of the conclusions section of entries addressing chemsex.

likely; MSM) potentially reflecting participants' awareness of PrEP and its discussion within the chemsex space.

Conclusions

Conclusions from 206 studies were included (Leximancer concept map in Figure 6). Within the two primary themes that emerged ("chemsex" and "care"), there is a strong focus on health care and ensuring there are effective public services to support people who practice chemsex, both in terms of treatment and prevention (e.g., information, access, support). Some entries include the need for the development of best-practice guidelines and ensuring health care staff including general practitioners are adequately informed, while other articles advocate specialized chemsex health centers. The studies call out the need for community interventions, ensuring support services can be accessed, and the need for HIV and STIs prevention within chemsex care.

Discussion

Our study reports the findings of the first bibliometric review and content analysis investigating SDU and chemsex, respectively. We synthesized the bibliographic data from 521 studies investigating SDU, finding a growing body of literature, but one whose thematic foci are potentially narrow, focusing on the global North and on distinct communities, specifically MSM and women who have experienced drug-facilitated sexual assault. The subsequent content analysis on 301 papers investigating chemsex found similar homogeneity in the geographic and demographic representation of the literature and identified a clear focus of the literature on the adverse sexual health outcomes of chemsex.

The placement of both SDU and chemsex within the domain of sexual health and HIV has implications for the perception of chemsex within policy and practice. As identified in the bibliometric data, the most common journals publishing work on SDU concerned sexual health and HIV medicine, and the content analysis of chemsex identified a clear focus of the literature on HIV/STIs and their association with chemsex, implying that the sexual health outcomes of SDU and chemsex are disproportionately addressed in the extant literature. Importantly, content analysis identified a potential future direction of research is on the prevention of HIV and STI transmission in this setting, particularly surrounding the provision of PrEP. Although sexual health outcomes are an important facet of the public health implications of SDU and chemsex, being associated with increased HIV prevalence (Hibbert et al. 2021; Pakianathan et al. 2018; Strong et al. 2022) and STI diagnoses (Hibbert et al. 2021; MacGregor et al. 2021; Pufall et al. 2018), considering chemsex and SDU solely in terms of their implications for sexual health ignores the multifaceted health consequences of the practices. Chemsex participants report a wide range of sequelae, including adverse mental health (i.e. psychosis (Moreno-Gámez, Hernández-Huerta, and Lahera 2022), suicidality (Strasser et al. 2023)), social outcomes (i.e., negatively impacting on work, family, and other relationships (Whitlock et al. 2021)) and physical health (i.e., cardiovascular disease (Kevil et al. 2019), soft-tissue and vascular injury (Delaney, Stanley, and Bolster 2020), complications arising from overdose (Bourne et al. 2015)). It is important to consider the wide spectrum of health consequences of SDU and chemsex engagement to ensure holistic support for participants.

The way sexual health is being discussed within SDU and chemsex literature has important implications for the perception of the practices, and subsequent service design and delivery. Both the keyword conceptual structural maps from the bibliometric analysis and the Leximancer concept maps draw out terms such as *"risk behaviours," "harm,"* and *"negative"* in relation to SDU and chemsex, which reflect a sex-negative narrative (Curley et al. 2022). Engagement in chemsex and SDU is primarily pleasure-driven (Bourne et al. 2015; Nimbi et al. 2021; Weatherburn et al. 2017), and thus interventions focused on promoting the risks of chemsex engagement, negating the role of pleasure in driving engagement, are likely to lack efficacy, as has been seen in aspects of sexual health (Ford et al. 2019). The content analysis identified a call for efficacious public health services to support chemsex users. To support this, a harm reduction approach should be pursued in chemsex services, in which the social reality of individuals' decision-making being driven by a pursuit of pleasure is recognized, and services are adapted accordingly (Race 2008).

MSM were clearly identified as the population most researched within both SDU and chemsex literature. Although chemsex is mostly defined by sole participation from MSM (Blomquist et al. 2020; Bourne et al. 2015), SDU does not have this same inherent demographic restriction. However, bibliometric analysis identified "MSM" as the second most relevant keyword within the SDU literature, and terms relating to "MSM" emerged as a common cluster within SDU bibliometric analyses. This implies a narrow demographic focus of the SDU literature, negating the existence of SDU among key populations, such as transgender and non-binary communities (Connolly 2021; Hibbert et al. 2021), and cisgender, heterosexual individuals who engage in consensual SDU (Moyle et al. 2020). Future SDU research should consider these groups,

investigating the motivators, potential harms, and experiences of the broad range individuals engaging in SDU.

Both bibliometric and content analyses identified a clear clustering of the literature in the global North, with a distinct lack of research investigating SDU and chemsex in low- and middle-income countries (LMICs), and little cross-country collaboration. Within the chemsex content analysis, we see the geographical focus narrow further, with London emerging as a frequently discussed setting. This could result from a lack of working, consensus definition for chemsex (Amundsen et al. 2023; Santoro et al. 2020). Despite the term originating in the UK (Bourne et al. 2015; McCall et al. 2015), practices that match many features of chemsex have been reported in multiple settings internationally. For example, one Thai study investigating the use of crystallized methamphetamine in sex parties (referred to as *"ice parties"*), describe an archetypal chemsex setting, and provides insights into the experiences of pleasure, harm, and violence associated with the practice, with valuable implications for the body of chemsex literature (Guadamuz and Boonmongkon 2018). However, this practice is not associated with other chemsex literature due to its authors' lack of identification of the investigated practice as chemsex. The social sciences are subject to bias in knowledge creation such that the settings publishing the most literature on a topic skew the subject matter definition toward how it is defined in those settings (Gordon, Miller, and Rollock 1990). An uncomprehensive and geographically restrictive definition will lead to a limited understanding of the phenomena, and global policy and practice that does not adequately address all SDU participants. It is important that as chemsex research expands beyond the UK, US, and European settings, a cohesive, working definition of chemsex is established to broaden the geographical horizons of the field, and bring together the currently fragmented body of literature, to facilitate research and policy that can adequately capture the geographical and cultural diversity of chemsex.

There are important limitations to this study. Single-author title and abstract screening was performed. We only searched for English language papers and, due to restrictions on integrating data from multiple databases in bibliometrix, only searched one database. Consequently, some relevant literature may have been overlooked. Our bibliometric analysis is also not able to draw conclusions on the demographics of the subjects of SDU research. Conclusions on the geographical diversity of research were based on the country of the authorship team and not the country of those who participate in SDU, despite these likely being highly correlated. The content analysis conducted using Leximancer is also likely to lead to conclusions about the body of literature that are less sensitive and nuanced than that of a manually conducted content analysis. However, the software facilitated the analysis of a much greater body of literature than would have been possible through a manual content analysis.

Conclusions

The research domains of SDU and chemsex are expanding, but our findings suggest that the current focus of the literature is narrow, with a predominant focus on MSM, high-income countries and on the sexual health implications of SDU. It is important that future research recognizes SDU and chemsex in a more holistic sense, emphasizing the widespread health and social implications of participation among multiple different communities to ensure service provision is adequately prepared to address all facets of SDU and chemsex. To facilitate this, we recommend an increased focus on multiple different demographic groups and their relation to SDU, and to ensure research is community-led and adaptive to the experiences and needs of those participating in SDU and chemsex.

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Data availability statement

Bibliometric data are available in Supplementary File 3. Content analysis data are available upon request.

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Contribution statement

LM: Conceptualization, Methodology, Formal Analysis, Data Curation, Writing – Original Draft, Writing – Review and Editing, Project Administration

JCY: Methodology, Formal Analysis, Writing – Review and Editing

TE: Methodology, Formal Analysis, Writing – Review and Editing

CP: Methodology, Formal Analysis, Writing – Review and Editing

EB: Data Curation, Writing – Review and Editing

EB: Data Curation, Writing – Review and Editing

OS: Data Curation, Writing – Review and Editing

JF: Methodology, Writing – Review and Editing, Supervision

DJC: Conceptualization, Methodology, Writing – Original Draft, Writing – Review and Editing, Supervision

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