Slam Practice: A Review of the Literature

Benoit Schreck^{a, b} Caroline Victorri-Vigneau^{b, c} Marylène Guerlais^c
Edouard Laforgue^{a, b} Marie Grall-Bronnec^{a, b}

^aDepartment of Addictology and Psychiatry, CHU Nantes, Nantes, France; ^bUniversités de Nantes et de Tours, French Institute of Health and Medical Research, INSERM UMR 1246 SPHERE, Nantes, France; ^cDepartment of Clinical Pharmacology, CHU Nantes, Nantes, France

Keywords

Slam · Slamming · Chemsex · Party and play · Men who have sex with men

Abstract

Background: Slamming has been developing since 2011 as a new international phenomenon, mostly among men who have sex with men (MSM). It consists of intravenous drug injection before or during planned sexual activity to sustain, enhance, disinhibit, or facilitate the experience. We aimed to synthesize the available published evidence through a systematic literature review in order to precisely describe this phenomenon and to better characterize the population engaging in this practice and its specific motives. **Methods:** A systematic review of the available literature was conducted to identify all relevant publications using PubMed, PsycINFO, the Cochrane Library, and ScienceDirect. To complete the review, we followed the recommendations of the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” method. We limited the search to studies published between January 2008 and May 2020. **Results:** Our search identified 530 publications, of which 27 were included in the final data synthesis. One study focused on heterosexual and homosexual subpopulations, and all other studies focused on MSM-specific samples. Among MSM, slam prevalence was extremely variable, ranging from 2 to 91%;

regarding other sexually active subjects, prevalence ranged from 7 to 14%. The prevalence of HIV-positive subjects varied widely across studies, ranging from 0.6 to 100%. We found less data about hepatitis C virus serostatus, ranging from 3 to 100%. Methamphetamine and mephedrone were the 2 most used drugs. **Discussion/Conclusion:** The data we found in international literature were very heterogeneous and from poorly reproducible studies. The definition of slamming in the international literature is not always clear, which limits the completeness of the collected data. This topic has been open to studies only recently; however, health professionals must be trained in the management of this practice, considering its risks in the short and medium terms and its addictive potential. We provided and discussed recommendations and potential future directions.

© 2020 S. Karger AG, Basel

Introduction

A “New” Specific Sexual Behaviour

For several years now, there has been an increasing amount of research, clinical, and practitioner evidence, suggesting an increase in the use of new psychoactive substances (NPS), both within heterosexual [1] and men who have sex with men (MSM) populations [1, 2], with a particular focus on mephedrone, 3-MMC, and 4-MEC.

These substances are from the family of synthetic cathinones, with new drugs appearing monthly on the illicit drugs market. In 2018, 130 different cathinones were identified by the European Monitoring Centre for Drugs and Drug Addiction [1]. The arrival of these new substances on the drug scene has been associated with the emergence of new consumption behaviours, especially the practice of chemsex and slam. Chemsex and slam have emerged as new phenomena, mostly among MSM, in Western Europe [3, 4] in 2011, as well as in Southeast Asia [5–7], North America [8, 9], and Australia [10, 11], where it is called “Party and Play” or “intensive sex partying.” All these terms refer to the use of psychostimulant drugs to facilitate sex [1]. Public Health England’s definition of chemsex is “the use of drugs before or during planned sexual activity to sustain, enhance, disinhibit or facilitate the experience. Chemsex commonly involves crystal methamphetamine, GHB/GBL and mephedrone, and sometimes the injection of these drugs, known as slam or slamming” [12]. According to the French Monitoring Centre for Drugs and Drug Addiction, slam is a part of the chemsex field and defined by (i) the use of psychostimulants, (ii) intravenous use, and (iii) use in a sexual context [13]. However, slam definitions may vary depending on the country.

Stimulant drugs such as methamphetamine and cathinones are used in slam for the intense feelings of euphoria and sexual arousal they provide [14]. Patterns of drug use among MSM have changed over the past decade [15]. Associations between drugs and sex are not new; however, sex under the influence of previously popular drugs (ecstasy and cocaine) was often incidental, rather than planned and intentional, as it is the case with the use of methamphetamine and cathinones in slam [16].

With Specific Harms

Slam facilitates engaging in lengthy sex sessions, without condoms, with multiple partners of often unknown HIV and/or hepatitis C virus (HCV) serostatus [17]. Unsafe injection practices by MSM in sex context are of particularly significant concern because they may facilitate HIV transmission, HCV transmission, and multiple sexually transmitted infections (STIs) [18]. Sexual behaviours such as fisting (ano-brachial intercourse), anilingus (anal sex), and uro-scat play can place an individual at a greater risk of blood-borne viruses and gastrointestinal infections [19]. Indeed, drug use has been implicated in HIV/HCV transmission via its association with high-risk sexual practices, particularly anal intercourse without condom among MSM [20]. Furthermore, slam sessions, which can

last days, may involve prolonged traumatic sex for one’s mucosa, with multiple partners identified often through smartphone geospatial networking applications [19].

Underlined by Specific Motives

Men’s reasons for using drugs during sex are variable and complex, and, to date, these motives have not been well explored [15, 21]. Weatherburn et al. [21] distinguished 2 types of motivation for combining sex and drugs. The first major group of motivations stems from the fact that drugs provide the means by which men can have the sex they desire by increasing libido, confidence, disinhibition, and stamina [21]. The second major group of motivations stems from the fact that drugs enhance the qualities of the sex that men value: drugs make other men seem more attractive, increase physical sensations, intensify perceptions of intimacy, and facilitate a sense of sexual adventure [21]. Thus, it seems that slam is a complex behaviour motivated by specific expectations that need to be explored.

The Expressed Need to Assess the Slam Phenomenon

Significant concern has been expressed by healthcare providers, as well as by gay and mainstream media, about the impact of drug use on the physical, mental, and social well-being of gay men and the broader impact on the gay community [21]. Slam appears as a specific form of chemsex, with specific characteristics. Although some data are available in the international literature, slam prevalence and associated data on health harms among MSM are difficult to determine [22, 23]. Furthermore, despite the growing body of research on drug use in a sexual context among MSM, most studies collected data about chemsex [24, 25] and were not specific about slam; they rarely investigated injection drug use and its correlates in detail. Understanding the extent of the slam phenomenon is essential in identifying its harms and developing our practice as caretakers accordingly. We therefore aimed to synthesize available published evidence through a systematic literature review to precisely describe this phenomenon and to better characterize the subpopulations who practice slam and their specific motives.

Methods

Search Strategy

A systematic review of the available literature was conducted to identify all relevant publications using PubMed, PsycINFO, the Cochrane Library, and ScienceDirect. For this review, we complied with the Preferred Reporting Items for Systematic Reviews and

Fig. 1. PRISMA flow diagram.

Meta-Analyses (PRISMA) [26]. We limited the search by identifying studies published between January 2008 and May 2020. The practice of slam seems to have become visible internationally in 2008; this date also corresponds to the appearance of synthetic cathinones on the European drug market [1]. Our search included a combination of the following keywords: “Men who have sex with men,” “MSM,” “Homosexual,” “Gay,” “Chemsex,” “Slamming,” “Slamsex,” “Party and Play,” “Party Drugs,” “GHB,” “GBL,” “Amphetamine,” “Mephedrone,” “3-MMC,” “4-MEC,” “Club Drug,” “Injection drug use,” “Recreational Drug,” “New psychoactive substances.” The search equation was as follows: men who have sex with men OR MSM OR Homosexual * OR gay AND. The keyword after AND was successively replaced for each new search by another keyword mentioned above. We decided to carry out this research by focusing on MSM for 2 reasons: first, slam practice is statistically more frequent in the MSM population, and second, the data available in the literature focus on MSM [27, 28]. Duplicates were eliminated. The search strategy is summarized in Figure 1.

Eligibility Criteria

Articles had to fulfil the following criteria to be included: explicit reference to slam or to intravenous injection of psychoactive substance in a sexual context, the article was written in English or French, and the article was an original article.

Article Selection

First, articles were selected based on their titles and abstracts. Second, the full text of all the included articles was read. Two of the

authors (B.S. and M.G.-B.) performed this work independently using the same bibliographic search. In the event of a disagreement, the articles in question were discussed. Additional publications were found by reviewing citations of included papers.

Data Extraction

Data were extracted from the articles and reported by data type alongside study design, details of the population assessed, sexuality characteristics, reference period, slam prevalence, sociodemographic characteristics, STIs, substances used, and associated risky behaviours.

Results

Twenty-seven articles met the criteria for inclusion (Fig. 1, PRISMA flow diagram). The main results are presented in tables summarizing prevalence data (Table 1), subjects’ characteristics (Table 2), substance use’s characteristics (Table 3), and sexual practice’s characteristics (Table 4).

Design

Most studies were quantitative; only 3 presented qualitative data [29–31]. Most papers focused on cross-sectional

Table 1. Summary of available data for the slam prevalence

Study	Description	Sexuality	Population assessed	Location	Reference period	Prevalence
Gilbart et al. [17]	Data from face-to-face semi-structured interviews after diagnosis with Shigella, 2009–2011	MSM	MSM surveyed after Shigella infection in 2009–2011	English and Welsh cities and countryside	During sex	16% (2/12)
Kirby and Thornber-Dunwell [2]	Data from consultations at a London sexual health clinic in 2011 and 2012	MSM	Methamphetamine or mephedrone users	London	Past and current use	2011: 30% 2012: 80%
Batisse et al. [39]	Case notification data from the addictovigilance centre in Paris, 2011–2012	ns	All cases of disorder related to the use of synthetic cathinones	Ile-de-France	Current use	62% (13/21)
Daskalopoulou et al. [38]	Data from a cross-sectional study of 8 clinics for HIV-infected patients in the UK, 2011–2012	MSM	Men aged 18 years or older and infected with HIV	UK	Last 3 months	3% (68/2,248)
McFaul et al. [37]	Retrospective study of admissions for HCV infection in a sexual health clinic, 2010–2014	MSM	All MSM patients admitted with a diagnosis of acute hepatitis C	London	Current use	20% (9/44)
Gilbart et al. [19]	Data from face-to-face semi-structured interviews after diagnosis with Shigella, 2012–2013	MSM	MSM surveyed after Shigella infection in 2012–2013	English and Welsh cities and countryside	The 2 weeks prior to infection episode	24% (8/34)
Kurka et al. [41]	Data from an evaluation of the improvement of services for MSM who use illicit drugs in 4 sexual health and HIV clinics, 2014	MSM	All MSM admitted to 4 Brighton clinics in 2014	Brighton and surroundings	Last month	25% (62/245)
Batisse et al. [36]	Case notification data from the French addictovigilance network, 2008–2013	MSM (sexuality reported for 70% of cases)	All cases of psychostimulant use in a sexual context of the NotS database, “DRAMES,” and “chemical submission” surveys	France	Current use	63% (31/51)
Batisse et al. [44]	Data from medical care of patients, 2014–2015	MSM	Patients seen at Marmottan Hospital for a cathinone use disorder	Paris	Current use	ns
Lea et al. [10]	Data from a periodic cross-sectional survey by questionnaire with trend calculations for 2005–2014	MSM	Men aged 16 years or older who have been using methamphetamine and have had sex with another man in the past 5 years	Australia	Last 6 months	One-time use*: 19–29%; <i>p</i> trend <0.001; relative increase of 53% Regular use*: 32–43%; <i>p</i> trend = 0.03; relative increase of 36%
Mohammed et al. [42]	Data from the national surveillance of 6 sexual health clinics to explore the extent of sexualized drug use in MSM, 2013–2014	MSM	All MSM admitted to 6 English sexual health clinics in 2013–2014	London, Bristol, Bedford, Southend	Last 3 months	2% (12/519)
Elliot et al. [34]	Questionnaires completed for patients admitted to the emergency department and HIV admission unit of a clinic	MSM	All patients received for 10 weeks in the HIV admission unit (October 2014 to January 2015) and for 48 h in the emergency department	London	Past and current use	38% (5/13)

Table 1 (continued)

Study	Description	Sexuality	Population assessed	Location	Reference period	Prevalence
Batisse et al. [40]	Case notification data from the French addictovigilance network, 2008–2017	MSM	All cases of psychostimulant use in a sexual context of the NotS database, “DRAMES,” and “chemical submission” surveys	France	Current use	ns
Bui et al. [32]	National prospective online cohort on drug use among Australian MSM	MSM	Men aged 16.5 years and over, identified as gay, bisexual, or having sex with at least 1 man in the last year in 2014–2015	Australia	Last 6 months	91% (85/93)
Guadamuz and Boonmongkon [31]	Qualitative study of 40 narrative interviews, 10 group discussions, over a period of 3 years	MSM	Men aged 18–29 years, having used methamphetamine and having anal sex with another man in the last 6 months	Thailand	Past and current use	ns
Heinsbroek et al. [43]	Data from an anonymous questionnaire for intravenous drug users in the UK (except Scotland), 2013–2016	Heterosexual, WSW and MSM	Sexually active injecting drug users in the past year attending 1 of 60 participating services for the management of intravenous drug users in the UK (excluding Scotland)	England, Wales, and Northern Ireland	Last 12 months	MSM: 15% (45/299) HIV-positive MSM: 69% (11/16) Heterosexual men: 8% (259/3,215) WSW: 14% (17/122) Heterosexual women: 7% (92/1,336)
Lim et al. [30]	Qualitative study of 20 interviews of MSM recruited by gay social networks, 2014–2015	MSM	Men who used methamphetamine monthly in the last 3 months and had sex with another man in the last 6 months	Kuala Lumpur	Last 6 months	5% (1/20)
Marillier et al. [61]	Data from 2 questionnaires (A and B) in 3 Parisian healthcare centres, 2016	MSM	All users 18 years of age or older with a chemsex practice	Marmottan Hospital, Montevideo Clinic, CAARUD AIDES les Halles, Paris	Current use	Questionnaire A: 88% (15/17) Questionnaire B: 58% (11/19)
Pakianathan et al. [35]	Retrospective study of admissions to 2 sexual health clinics, 2014–2015	MSM	All admitted MSM patients with chemsex practice	London	Current use	28% (70/251)
Palaniswami et al. [33]	Prospective case series study of HIV-infected MSM suspected to have newly acquired HCV infection in the Mount Sinai Medical Center, 2014–2016	MSM	HIV-infected MSM with early HCV infection	New York City	Current use	28% (7/25)
Pufall et al. [45]	Cross-sectional online self-questionnaire survey of people living with HIV in the UK, 2014	MSM	All males aged 18 years or older attending 1 of 30 national health service HIV clinics in England and Wales who had sex with another man during the year	England and Wales	Current use	10% (34/392)
Barrett et al. [46]	A self-completed online survey for MSM, conducted over a 3-month period in 2015	MSM	All MSM (including trans men) aged 18 years or over and living in Ireland	Ireland	Past and current use	2% (50/3,090)

Table 1 (continued)

Study	Description	Sexuality	Population assessed	Location	Reference period	Prevalence
Dolengevich-Segal et al. [48]	A self-completed online survey, 2016–2017	MSM	Homosexual or bisexual men aged 18 years or older, infected with HIV and admitted to 22 HIV clinics in the Madrid area	Madrid	Last 12 months	16% (34/216)
Schecke et al. [47]	A self-completed online survey for MSM, conducted over a 3-month period in 2018	MSM	All male aged 18 years or older identified as gay, bisexual or MSM	Germany	Last 12 months	50% (115/231)
Van Hout et al. [29]	Qualitative study of 10 interviews of MSM recruited by gay social networks, 2017	MSM	All men aged 18 years or older with a chemsex practice	Dublin	Current use	10% (1/10)
Trouiller et al. [49]	A cross-sectional behavioural self-questionnaire survey for MSM attending gay venues conducted over a 4-month period in 2015	MSM	All men aged 18 years or older and reported at least 1 sexual relation with a man in the past 12 months	Lille, Lyon, Montpellier, Nice, and Paris	Last 12 months	2% (61/2610)

MSM, men who have sex with men; HCV, hepatitis C virus.

tional studies; 2 were cohort studies [32, 33] and 1 was a case-control study [34]. Most studies presented data prospectively; 10 were retrospective studies [17, 19, 35–42]. Only 1 study focused on a general population of homosexual and heterosexual men and women [34]. Another study focused on men and women who used drugs [43]. Other studies focused on more specific subpopulations: MSM attending addiction management services [44, 61], MSM drug users [10, 31, 32, 44, 61], MSM admitted to HIV care units [33, 34, 38, 41, 45–48], MSM consulting in sexual health clinics [2, 35, 37, 41, 42, 46, 47], MSM infected with HCV [33, 37], MSM infected with *Shigella* [17, 19], MSM being reported to national surveillance systems [36, 39, 40], MSM attending gay venues (bar, sauna, and backroom) [49], and MSM using gay social networks [29, 30, 46, 47].

Slam Prevalence

The prevalence of slam was generally the highest in subpopulations of MSM who used drugs; it was as high as 91% in these subpopulations [10, 32, 36, 39, 43, 50, 61]. Among MSM living with HIV, slam prevalence was extremely variable, ranging from 3 to 38% [33, 34, 38, 45, 48]. Regarding MSM, recruited by gay social networks or attending gay venues, who filled out survey on their practices, the prevalence also varied greatly between studies, ranging from 2 to 50% [29, 30, 47, 49]. Among MSM users attending sexual health clinics, the prevalence was gener-

ally around 25% [2, 35, 37, 41, 42]. The prevalence of slammers among MSM infected with *Shigella* was close to 20% [17, 19]. Regarding other sexually active subjects (excluding MSM), the prevalence was of 8% among heterosexual men, 14% among WSW, and 7% among heterosexual women [43] (Table 1). Reference periods assessed included current [29, 33, 35–37, 39, 40, 44, 45, 50, 61], current and past [2, 31, 34, 46], the last month [41], the last 3 months [38, 42], the last 6 months [10, 30, 32], the last 12 months [43, 47–49], the 2 weeks preceding a *Shigella* infection [19], and time span of the practice in subjects' lives [17].

Subjects' Characteristics

The results related to the characteristics of the subjects are presented in Table 2. The average or median age of users who practiced slam was only reported in 7 studies, and the age ranged from 30 to 48 years [32, 36, 39, 40, 44, 46, 49]. The practice of slam among participants was associated with having a full-time job [10], but compared with participants who had not engaged in slamming, those who engaged in slam were almost 4 times more likely to experience financial struggle [49] and were less likely to have a university degree [10].

HIV serostatus was reported in 20 studies; HIV-positive prevalence varied widely across studies, ranging from 0.6 [43] to 100% [33, 38]. The risk of being infected with HIV was 5 times higher among slammers [49] and 2 times

Table 2. Characteristics of subjects

Study	Population assessed	Sociodemographic characteristics	STI risk	Sexual choice characteristics of slammers
Kirby and Thornber-Dunwell [2]	Methamphetamine or mephedrone users		HIV: HIV-positive 75%, 60% of whom do not take antiretroviral therapy HCV: 60% of new infections are IVDU	
Batisse et al. [39]	All cases of disorder related to the use of synthetic cathinones	Mean age: 39 years	HIV: HIV-positive 66% (14/21) HCV: HCV-positive 38% (8/21)	
Daskalopoulou et al. [38]	Men aged 18 years or older and infected with HIV		HIV: HIV-positive 100% (2,248/2,248)	
Kurka et al. [41]	All MSM admitted to 4 Brighton clinics in 2014		HIV: HIV-positive 22% (7/31)	
McFaul et al. [37]	All MSM patients admitted with a diagnosis of acute hepatitis C		HIV: HIV-negative HCV: HCV-positive 100% (44/44) Bacterial STI: 27% (12/44) Rectal infections: 25% (11/44)	Sex partner with hepatitis C: 20.5% (9/44)
Batisse et al. [36]	All cases of psychostimulant use in a sexual context of the NotS database, “DRAMES,” and “chemical submission” surveys	Mean age: 40 years	HIV: HIV-positive 82% (32/39) HCV: HCV-positive 50% (16/32)	
Batisse et al. [44]	Patients seen at Marmottan Hospital for a cathinone use disorder	Mean age: 48 years	HIV: HIV-positive 71% (10/14)	
Lea et al. [10]	Men aged 16 years or older who have been using methamphetamine and have had sex with another man in the past 5 years	Full-time employment: OR 1.4 (95% CI: 1.1–1.7) Obtaining a university degree: OR 0.6 (95% CI: 0.5–0.8)	HIV: HIV-positive 21% (182/850) Cocaine users: OR 1.9 (95% CI: 1.4–2.6) HCV: HCV-positive 3% (28/850) Regular methamphetamine users: OR 2.6 (95% CI: 1.2–5.5) STI in the last 12 months Regular methamphetamine users: OR 1.5 (95% CI: 1.1–2.1)	
Elliot et al. [34]	All patients received for 10 weeks in the HIV admission unit (October 2014 to January 2015) and for 48 h in the emergency department		HIV: HIV-positive 100% (5/5)	
Batisse et al. [40]	All cases of psychostimulant use in a sexual context of the NotS database, “DRAMES,” and “chemical submission” surveys	Mean age: 39 years	HIV: HIV-positive 45% (106/235) HCV: HCV-positive 20% (47/235)	

Table 2 (continued)

Study	Population assessed	Sociodemographic characteristics	STI risk	Sexual choice characteristics of slammers
Bui et al. [32]	Men aged 16.5 years and over, identified as gay, bisexual or having sex with at least 1 man in the last year in 2014–2015	Mean age: 39 versus 32 years ($p < 0.001$)	HIV: HIV-positive 46% (43/93), versus 5% among other MSM participants ($p < 0.001$) HCV: HCV-positive 16% (15/93), versus 1% among other MSM participants ($p < 0.001$)	Engagement with homosexual men (recent injectors vs. other participants): Average social engagement score: 6 versus 5; $p = 0.021$ Engagement with homosexual men who inject drugs (recent injectors vs. other participants): Average social engagement score: 6 versus 4; $p < 0.001$ Gay friends consumers: 68 versus 31%; $p < 0.001$
Heinsbroek et al. [43]	Sexually active injecting drug users in the past year attending 1 of 60 participating services for the management of intravenous drug users in the UK (excluding Scotland)		HIV: HIV-positive All users: 1% (47/4,972) MSM: 5% (16/299) Heterosexual men: 0.6% (20/3,215) WSW: 0.8% (1/122) Heterosexual women: 0.7% (10/1,336)	
Lim et al. [30]	Men who used methamphetamine monthly in the last 3 months and had sex with another man in the last 6 months		HIV: HIV-positive 30% (6/20) Unknown status: 30% (6/20)	
Pakianathan et al. [35]	All admitted MSM patients with chemsex practice		HIV: HIV-positive 9% (16/187) HCV: HCV-positive 3% (8/286)	
Palaniswami et al. [33]	HIV-infected MSM with early HCV infection		HIV: HIV-positive 100% (7/7) HCV: HCV-positive 100% (7/7)	
Pufall et al. [45]	All males 18 years of age or older attending 1 of 30 national health service HIV clinics in England and Wales, who had sex with another man during the year		HIV: HIV-positive 100% (392/392) More frequent HIV antiretroviral therapy ($p = 0.02$) HCV: Overall HCV-positive: 9% (38/392) Slam HCV-positive: 36% (12/34) AOR 9.39 (95% CI: 3.01–29.3) Bacterial STI in 12 months: AOR 6.1 (95% CI: 2.7–13.6)	
Barrett et al. [46]	All MSM (including trans men) aged 18 years or over and living in Ireland	Median age: 37 versus 30 years ($p = 0.012$)	HIV: HIV-positive 15% (7/50)	
Dolengevich-Segal et al. [48]	Homosexual or bisexual men aged 18 years or older, infected with HIV and admitted to 22 HIV clinics in the Madrid area		HIV: HIV-positive 100% (34/34) HCV: HCV-positive 62% (21/34) Syphilis: 88% (30/34) Gonorrhoea: 62% (21/34) Suboptimal adherence to antiretroviral therapy 9% (3/34)	
Van Hout et al. [29]	All men aged 18 years or older with a chemsex practice		HIV: HIV-positive 50% (5/10) HCV: HCV-positive 10% (1/10)	

Table 2 (continued)

Study	Population assessed	Sociodemographic characteristics	STI risk	Sexual choice characteristics of slammers
Trouiller et al. [49]	All men aged 18 years or older and reported at least 1 sexual relation with a man in the past 12 months	Median age: 33 versus 41 years ($p < 0.001$) Difficult financial situation (struggling): 37 versus 8% ($p < 0.001$); OR 3.6 (95% CI = 1.3–10.3; $p = 0.020$) Mental health score: 52/100 versus 67/100 ($p < 0.001$); OR 1.4 (95% CI: 1.1–1.7; $p = 0.011$) (for a 10-point decrease) Use of antidepressant in the last 12 months: 26 versus 12% ($p = 0.034$)	HIV: HIV-positive: 49 versus 13% ($p < 0.001$); OR 5.0 (95% CI: 1.7–14.3; $p = 0.006$) HCV: HCV-positive: 8 versus 0.7% ($p < 0.001$); OR 14.3 (95% CI: 3.3–61.5; $p < 0.001$) At least 1 STI in the last 12 months: 54 versus 17% ($p < 0.001$) HIV pre-exposure prophylaxis: 33 versus 4% ($p < 0.001$)	Visiting a dating website for gay men: 80 versus 56% ($p < 0.015$)

MSM, men who have sex with men; HCV, hepatitis C virus; STI, sexually transmitted infection.

higher among cocaine slam users [10] than other participants.

HCV serostatus was less conveyed (13 studies); HCV-positive prevalence was highly variable, ranging from 3 [10] to 100% [33, 37]. Compared with participants who had not engaged in slamming, those who engaged in slam were 14 times more likely to be infected with HCV [49]. The risk of being infected with HCV was almost 3 times higher among regular users of methamphetamine [10] than non-users.

Only 5 studies reported STI diagnosis; almost one-quarter [37] to four-fifths [48] of subjects were infected, while being infected with an STI was significantly associated with slamming [49]. The risk of being infected with an STI was 1.5 times [10] to 6 times higher [45] among slam users. Moreover, one-third of slammers reported using HIV pre-exposure prophylaxis (PrEP), and they used it significantly more than participants who had not engaged in slamming [49]. PrEP is the use of an antiretroviral medication (tenofovir plus emtricitabine) to prevent the acquisition of HIV infection by uninfected persons considered at risk for HIV infection.

Regarding slammers' sexual and relationship choices, one-fifth had had at least 1 sexual partner infected with HCV in their lifetime [37]; slammers were significantly more likely to visit a dating website for gay men [49], to have gay friends, and to get involved with homosexual men, more specifically with homosexual men who inject drugs [32].

Substance Use's Characteristics

The results related to the characteristics of substance use are presented in Table 3. The type of psychostimulant substances used was noted in only 11 studies, and they were mainly methamphetamine [2, 10, 32, 33, 38, 45, 47, 48] and mephedrone [36, 43, 45, 48, 49]. Polydrug use was found in three-fifths to four-fifths of users [36, 48]. The risk of injecting mephedrone and ketamine among MSM and WSW was 2–10 times higher than among heterosexual men and women [43]. Moreover, methamphetamine-injecting MSM were twice as likely to consume poppers, 10 times more likely to consume GHB, and 2 times more likely to consume drugs for erectile dysfunction [10]. According to a study, there was a significant and positive association between the number of drugs already used and the recency of injection [32]. Syringe or small-equipment sharing was explored very differently among the studies and concerned no subject [33], to almost 20% of subjects in some studies [32, 38, 47, 49] to almost the majority of subjects in other studies [43, 48]. This highly risky behaviour was significantly more frequent among MSM and WSW than among heterosexual men and women [43]. Three-quarters of users reported using a new syringe or needle when injecting, while two-thirds reported bringing their own syringes and utensils to parties [47]. Furthermore, recent injection involved fewer than 1 in 10 users, but almost half of these participants used injection drugs at least once a month [32]. Regarding the origin of injection equipment, almost one-third came from community associations, one-third from sex-

Table 3. Characteristics of substance use

Study	Population assessed	Used substances	Risk behaviours associated with substance use
Kirby and Thornber-Dunwell [2]	Methamphetamine or mephedrone users	Methamphetamine, mephedrone, and gamma-butyrolactone	Sharing of syringe: 70%
Daskalopoulou et al. [38]	Men aged 18 years or older and infected with HIV	Type of substances: Methamphetamine: 10% Cocaine: 23%	Sharing of syringe or small equipment with another user of unknown HIV status: 6%
Batisse et al. [36]	All cases of psychostimulant use in a sexual context of the NotS database, "DRAMÉS," and "chemical submission" surveys	Type of substances: Mephedrone: 51% (26/51) 4-MEC: 28% (14/51) 3-MMC: 2% (1/51) MDPV: 16% (8/51) NRG-3: 39% (20/51) NRG-2: 2% (1/51) Naphyrone: 2% (1/51) Methylone: 4% (2/51) MDMA: 2% (1/51) Cocaine: 4% (2/51) Polydrug use: 62% (31/51)	
Lea et al. [10]	Men aged 16 years or older who have been using methamphetamine and have had sex with another man in the past 5 years	Type of substances: Poppers: OR 2 (95% CI: 1.5–2.3) Erectile dysfunction medications: OR 2 (95% CI: 1.7–2.7) GHB: OR 10 (95% CI: 7.2–12.4) Evolution of methamphetamine use 2010: 10% 2014: 11%	Evolution of the mode of administration from 2010 to 2014: +50% of use of the intravenous route
Bui et al. [32]	Men aged 16.5 and over, identified as gay, bisexual, or having sex with at least 1 man in the last year in 2014–2015	Type of substances Recent injectors: methamphetamine 91% Injectors older than 6 months: amphetamine 89% Number of drugs already used Recent injectors versus injectors older than 6 months Mean (standard deviation): 8 (1) versus 4 (3); $p < 0.001$ Association between a higher number of drugs already used and recent injection: APR = 1.3 (95% CI: 1.2–1.4) Age of substance use Recent injectors versus injectors older than 6 months, mean (standard deviation): 17 years (9) versus 8 years (10), $p < 0.001$	Prevalence of recent injection: 5% (93/1,995) Frequency of the injection: At least once a week: 17% At least once a month: 43% Origin of the injection equipment: Needle exchange programmes: 41% Sex partners: 33% Self-help associations: 31% Sharing of syringe or small equipment: 9%
Heinsbroek et al. [43]	Sexually active injecting drug users in the past year attending 1 of 60 participating services for the management of intravenous drug users in the UK (excluding Scotland)	Type of substances MSM versus heterosexual men: Mephedrone, AOR 2.22 (95% CI: 1.54–3.22) Ketamine, AOR 1.98 (95% CI: 1.29–3.05) WSW versus heterosexual women Mephedrone, AOR 1.81 (95% CI: 0.98–3.34) Ketamine, AOR 5.58 (95% CI: 2.74–11.4)	Sharing of syringe or small material MSM: 49% (114/299) Heterosexual men: 38% (924/3,215), $p < 0.001$ WSW: 33% (32/97) Heterosexual women: 23% (225/978), $p = 0.03$ WSW with homosexual sex only: 41% (28/68) WSW having heterosexual sex also: 14% (4/29), $p = 0.009$
Palaniswami et al. [33]	HIV-infected MSM with early HCV infection	Methamphetamine	Sharing of syringe or small equipment: none

Table 3 (continued)

Study	Population assessed	Used substances	Risk behaviours associated with substance use
Pufall et al. [45]	All males 18 years of age or older attending 1 of 30 national health service HIV clinics in England and Wales, who had sex with another man during the year	Type of substances: Methamphetamine 69% (24/34) Mephedrone 64% (22/34)	
Dolengevich-Segal et al. [48]	Homosexual or bisexual men aged 18 years or older, infected with HIV and admitted to 22 HIV clinics in the Madrid area	Type of substances: Mephedrone or other cathinones 100% (34/34) Cocaine 74% (25/34) MDMA 53% (18/34) GHB 80% (27/34) Methamphetamine 50% (17/34) Ketamine 62% (21/34) Poppers 88% (30/34) Polydrug use: 82% (28/34) Drug dependence: 38% (13/34) Withdrawal symptoms: Slam versus non-injecting sexualized drug use: OR 5.0 (95% CI: 2.13–11.57; $p < 0.001$) Craving: Slam versus non-injecting sexualized drug use, OR 7.0 (95% CI 3.21–15.43; $p < 0.001$)	Sharing needles and other drug paraphernalia: 97% (33/34) Rectal use: 59% (20/34)
Schecke et al. [47]	All male aged 18 years or older identified as gay, bisexual or MSM	Methamphetamine	Only using own needles and syringes Always: 80% (185/231) Often: 20% (46/231) Using a new syringe and needle for every injection Always: 75% (173/231) Often: 19% (44/231) Sometimes: 6% (14/231) Bring own needles, syringes, and other utensils for consumption to parties Always: 64% (148/231) Often: 13% (30/231) Sometimes: 11% (25/231) Never: 11% (25/231)
Trouiller et al. [49]	All men aged 18 years or older and reported at least 1 sexual relation with a man in the past 12 months	Type of substances: Mephedrone 55% (34/61) GHB/GBL 49% (30/61) Amphetamines 43% (26/61) Cocaine 43% (26/61)	More than 1 injection per hour during a typical slamming session: 55% (34/61) Sharing: Syringes/needles: 7% (5/97) Paraphernalia: 16% (16/97) At least 1 element: 22% (21/97)

MSM, men who have sex with men; HCV, hepatitis C virus.

ual partners, and the last third from needle exchange programmes [32]. Compared with participants who had engaged in non-injecting sexualized drug use, those who engaged in slam were 5 times more likely to have experienced withdrawal symptoms, 7 times more likely to have experienced intense craving [48], and more than half injected more than once per hour during a typical slamming session [49].

Sexual Practice's Characteristics

The results related to the characteristics of sexual practice are presented in Table 4. Among Australian MSM who used drugs, recent injectors (during the last 6 months) were more likely to have an older slam practice than were other participants [32]. Recent injectors had resorted to transactional sex 3 times more often than those who had used intravenous drugs over 6 months prior [32]. More-

Table 4. Characteristics of sexual practice

Study	Population assessed	Seniority of the practice	Motivations to practice slam	Type of sex
McFaul et al. [37]	All MSM patients admitted with a diagnosis of acute hepatitis C			Number of sexual partners: Mean (median): 7 (2) Unprotected anal sex: 93% Group sex: 45%
Lea et al. [10]	Men aged 16 years or older who have been using methamphetamine and have had sex with another man in the past 5 years			Unprotected anal sex: OR 1.4 (95% CI: 1.1–1.7)
Bui et al. [32]	Men aged 16.5 and over, identified as gay, bisexual, or having sex with at least 1 man in the last year in 2014–2015	Time elapsed since the initiation of sex parties with drugs (recent injectors vs. other participants): APR 1.0 (95% CI: 1.01–1.04)	Reasons for the use of methamphetamine (recent injectors vs. other participants): “Make it easier for me to get fucked”: 32 versus 13% ($p < 0.001$) “To help me have sex for longer”: 40 versus 19% ($p < 0.001$) “To become less inhibited”: 60 versus 27% ($p < 0.001$) “For a party and play”: 81 versus 39% ($p < 0.001$) “To party for a long time”: 57 versus 35% ($p < 0.001$) Sex with financial transaction (recent injectors vs. injectors over 6 months): Transaction <6 months ago: 28 versus 10% ($p < 0.001$) Transaction >6 months ago: 14 versus 6% ($p < 0.001$) Levels of sexual sensation-seeking (recent injectors vs. other participants): mean score of 33 versus 29 ($p < 0.001$)	Number of sexual partners (recent injectors vs. injectors over 6 months): One sexual partner or no sexual partner in the last 6 months: 1 versus 32% ($p < 0.001$) More than 10 sexual partners: 57 versus 24% ($p < 0.001$), APR 3.2 (95% CI: 1.3–7.9) Group sex (recent injectors vs. injectors over 6 months): 62 versus 23% ($p < 0.001$), APR 1.4 (95% CI: 1.1–1.9) Unprotected anal sex (recent injectors vs. injectors over 6 months): 73 versus 25% ($p = 0.001$), APR 1.8 (95% CI 1.34–2.43)
Heinsbroek et al. [43]	Sexually active injecting drug users in the past year attending 1 of 60 participating services for the management of intravenous drug users in the UK (excluding Scotland)		Sex with financial transaction Mephedrone: AOR 1.8 (95% CI: 1.3–2.5) Ketamine: AOR 1.6 (95% CI: 1.1–2.2) Cocaine: AOR 1.4 (95% CI: 1.1–1.9)	Number of sexual partners More than 10 sexual partners: MSM versus heterosexual men: 27 versus 4% ($p < 0.001$) WSW versus heterosexual women: 21 versus 8% ($p < 0.001$)
Pufall et al. [45]	All males 18 years of age or older attending 1 of 30 national health service HIV clinics in England and Wales, who had sex with another man during the year			Unprotected anal sex: AOR 6.11 (95% CI: 1.2–30.6)
Dolengevich-Segal et al. [48]	Homosexual or bisexual men aged 18 years or older, infected with HIV, and admitted to 22 HIV clinics in the Madrid area			Slam versus non-injecting sexualized drug use Stable partner: 27 versus 46% ($p = 0.039$) Fisting: 74 versus 39% ($p = 0.001$) Fisting without a glove: 68 versus 28% ($p = 0.001$) Condomless sexual relations: 93 versus 48% ($p = 0.001$) More than 20 sexual partners in the previous 6 months: 70 versus 40% ($p = 0.002$)

Table 4 (continued)

Study	Population assessed	Seniority of the practice	Motivations to practice slam	Type of sex
Trouiller et al. [49]	All men aged 18 years or older and reported at least 1 sexual relation with a man in the past 12 months	Median number of months since the first slamming session: 12		Use of geosocial networking applications: 84 versus 58% ($p = 0.005$) More than 50 sex partners in the last year: 27 versus 11% ($p = 0.027$) Unprotected anal intercourse: 66 versus 27% ($p < 0.001$), OR 3.7 (95% CI: = 1.2–11.9; $p = 0.020$) BDSM sexual practices: 35 versus 12% ($p = 0.002$)

MSM, men who have sex with men.

over, the risk of having transactional sex was nearly twice as high among the UK injectors of mephedrone, ketamine, and cocaine [43] compared to subjects who used drugs in a sexual context other than intravenously. Regarding reasons for methamphetamine use, Australian MSM participants who had recently injected were significantly more likely than other participants to report using methamphetamine for disinhibition and endurance [32]. Fisting prevalence among slam users infected with HIV in Madrid [48] and the level of sexual sensation-seeking among Australian MSM slammers [32] were significantly higher than in non-slammers. A quarter of the slammers in Madrid had a stable partner, and almost three-quarters of the slammers declared having had >20 partners in the previous 6 months [48]. Moreover, one-quarter of the French slammers attending gay venues reported >50 sex partners in the last year and there was a significant difference from non-slammers [49]. The mean of sexual partners was >7 per year among MSM slammers infected with HCV [37]. MSM and WSW injectors from the UK and Australia were significantly more likely to have had over 10 sexual partners in the last 6 months compared to other participants [32, 43]; furthermore, recent injectors were 3 times more likely to have had >10 sexual partners during that time [32]. Almost two-fifths of French slammers attending gay venues reported BDSM sexual practices, and there was a significant difference from non-slamming users [49]. Nearly half of slammers infected with HCV had group sex (sex with more than 1 partner at the same time) [37]; recent Australian MSM injectors had nearly 3 times more group sex than those who had used intravenous drugs over 6 months prior; they were 1.5 times more likely to have this type of sex [32]. Over

70% of Australian MSM drug users and slammers infected with HIV or HCV had had unprotected anal sex during the year [32, 37, 48]. The risk of having unprotected anal sex among MSM methamphetamine users, French MSM attending gay venues, and MSM living with HIV was 1.4 times [10], 4 times [49], and 6 times higher [45], respectively, among slammers compared to non-slammers. Among Australian MSM who used drugs, recent injectors were nearly twice as likely to have unprotected anal sex [32] than those who had used intravenous drugs over 6 months prior.

Discussion/Conclusion

Through our review, we have shown that this topic has been little studied, given that the slam phenomenon appeared only 10 years ago. We found that slam prevalence data varied greatly in the international literature, probably because of the heterogeneous design of the studies (quantitative, qualitative data, cross-sectional, case-control, and cohort), the way in which data were collected, the populations assessed, and so forth. Few studies included a large number of subjects [38, 46, 49], leading to difficulties in obtaining accurate measures. We mainly found prevalence results from small samples of studies focused on very specific subpopulations: generally, MSM drug users or MSM admitted to HIV care units or consulting in sexual health clinics. The great diversity of percentages can also be explained by the evaluation period (reference period), which is different across studies (lifetime, past year, last month, regular practice, etc.). It is difficult to establish whether the number of slammers has been increasing ev-

ery year, as the studies are not reproducible, but there seems to be a trend suggesting an ever more frequent slam practice by MSM at the international level. The fact that more studies are present could also indicate that there is more interest for this topic from a research/practice point of view. The phenomenon seems to have become more visible since 2011, year when we find the greatest number of studies measuring slam prevalence [2, 38, 39]. Finally, the data about slam prevalence seem similar to those found for chemsex [10, 30, 51–54]. Furthermore, studies were mainly UK-focused and from urban clinics that provided care for people living with HIV/AIDS. The majority of the available data were collected through cross-sectional surveys, providing a snapshot at one point in time. Nevertheless, we managed to extract relevant data. Most subjects were young and employed; many were infected with HIV, HCV, or STIs. Studies focused mainly on MSM, and moreover, they focused on small samples from subgroups of MSM rather than the whole population; we observe that data found in international literature cover a large number of practices and very specific subpopulations. Mephedrone and methamphetamine appeared to be the most often used drugs among participants, and polydrug use was frequently reported. The predilection for methamphetamine or mephedrone uses in slamming depends on the country and on the drug-use patterns in the gay community of each country explored. For example, methamphetamine is almost absent in France or only sold in Paris at very high prices, explaining the preferential use of stimulants such as cathinones in the practice of slam, while methamphetamine is widely available in the USA [8, 9, 55, 56], Australia [10, 32], and Asia [5, 7, 30]. Therefore, slam is not necessarily associated with NPS in all countries, and its emergence is closely linked to the availability of cathinones and the appearance of mephedrone in 2007. Moreover, 3-MMC and 4-MEC [1, 13] have supplanted mephedrone, which currently remains the reference molecule when slam is discussed in the literature (this is related to the delay between the publication of articles and the rapid evolution of the NPS market). Regarding sexual practices, participants reported primarily injecting psychostimulant drugs in the context of sex to enhance sexual pleasure and improve sexual performance, a practice described as “intensive sex partying.” Men who reported injecting drugs in the context of sex were more likely to have group sex, a high number of sex partners, transactional sex, and unprotected anal sex. It seems that the novelty of practice (recent slamming) is also associated with more risk-taking (search for multiple partners, unprotected sex with strangers, and prostitution).

Strengths and Weakness of Our Literature Review

To our knowledge, this is the first review of its kind, aiming to summarize available data on slamming among MSM in the international literature and to highlight gaps that limit its comparability and synthesis. Regarding weak points, there are very few selected articles and data were collected heterogeneously. Throughout the search in the published literature, we also found significant variations in the definition of slam or injection drug use in a sexual context. These definitions are not always clear, which could explain why we found only 27 articles and thus have limited data. Slamming was sometimes incorrectly referred to as “sex under the influence of any illicit drug” without qualifying that it actually refers to the use of drugs before or during planned sexual activity to sustain, enhance, disinhibit, or facilitate the experience. Thus, studies are not reproducible not only because of their design but also because of the different definitions of slam.

This systematic review was carried out according to recommendations. This is a recently described phenomenon; however, this review could allow us to draw a “portrait” of slam users. It provides a basis from which to build a better understanding of the extent of slamming among MSM and other populations (such as WSW or other populations where slamming may arise) and offers recommendations as to how best to target future data collection.

Recommendations for Harm Reduction

Our findings help to identify fields for harm reduction and health promotion interventions among MSM who inject drugs in a sexual context. First, it is necessary to discuss their health issues in order to understand their needs and what to offer them. The key point is to adopt an integrative medical approach, according to the biopsychosocial model of addiction. Support could be provided at 2 levels, community-based and health professional levels.

Community-Based Health Recommendations

The 4 main missions of health workers are information, screening, prevention, and harm reduction. Indeed, sexual and drug harm reductions are essential and must accompany screening and prevention [16, 50, 55, 57]; in France, it is mainly the AIDES association that has developed specific support. AIDES workers organize self-support groups and sexual health events, including the realization of HIV and HCV rapid antibody tests. Furthermore, association workers provide single-use injection kits, with coloured syringes to avoid sharing; donate condoms; and provide lubricant and STI self-testing kits. The

association also creates and gives flyers and booklets for slammers, which contain tips and tools on substance use in a sexual context, on sexual health, and on risk reduction in the context of slamming. All this information is available on its website, and it created a 24-h emergency hotline for chemsexers. It is also essential to transmit messages using direct language, to provide factual information, and to conduct interviews with peers to allow identification [57]. This community-based health approach could greatly reduce the fear of being judged or misunderstood about one's practices; it facilitates the spreading of verified information on prevention and harm reduction, particularly on injecting-risk education, support, and drug testing by thin-layer chromatography [2, 15, 57].

Recommendations for Practice

Health professionals (physicians, nurses, and psychologists) must discuss with the user about his/her relationship to drugs and detect substance use disorders. They have 3 main missions: to treat infections; to motivate to enter treatment, when addictive disorders exist (substance use and sex); and to treat sexual dysfunctions, using an integrative approach. Clinicians must assess both drug use and sexuality as well as their positive and negative consequences (psychic, physical, and social), as part of a motivational interview. They should use motivational interviewing, as it is effective in changing attitudes and behaviour for which ambivalence, or no wish to change is present. Drug abstinence or reduction of drug consumption should be advised to patients. Health professionals should support them in the process of regaining their sexuality without drugs. Amphetamine withdrawal management is based on the prescription of symptomatic treatments. However, for those who are not ready to pursue abstinence, drug harm reduction interventions may be useful to reduce sexual risks in the context of slam. The harm reduction approach aims to increase knowledge about frequent drug overdose, harmful drug combinations, needle-sharing risks, and the undesirable effects of cathinone use. Professionals could work with patients on the transition or on rotation with other ways of administering drugs that would be associated with lower risks (intranasally or orally).

Sexological care is also essential because the presence of sexual dysfunctions is common and could partially explain the recourse to the practice; indeed, studies have shown that the substances are used for sexual stimulation, among other things [14, 21, 55, 58]. Professionals should also check blood-borne virus status and STIs, ask ques-

tions about sexual intercourse practices, and look for other possible damages. Regarding sexual and infectious harm reductions, we could offer different ways of protecting against contamination: condom use, HIV PrEP, gloves, disposable no needle-sharing injection equipment, regular STI screening (every 3 months), and sex toys to be used personally. It would also be advisable to limit the duration or intensity of anal sex, considering the pain it can provoke.

Outstanding Issues

Slamming seems to concern few drug users and does not seem representative of the drug user subpopulation; however, there are no epidemiological data on the general population. Future studies should be conducted in the general population, with a longitudinal design to monitor the evolution of the practice.

Further work is therefore required to establish a precise and unifying definition of slam that will facilitate international comparisons. Drug policy is different in each country, which complicates the interpretation of the results and therefore the characterization of the practice, allowing it to remain hidden. We believe that the definition of slamming needs to be more precise. We suggest that the definition encompasses all the following elements: sexual context, psychostimulant drug use, intravenous injection [49, 59], and the use of drugs before or during planned sexual activity to sustain, enhance, disinhibit, or facilitate the experience [4].

Available studies did not collect accurate data on the use of psychoactive substances in sexual contexts; namely, they neglected to characterize the substance use (dosage, frequency of use in the same session, negative effects, tolerance, craving, weaning characteristics, and substance use disorder), its evolution, and all the negative consequences that users face. There is a lack of pharmacological data on users' preferences for methamphetamine and cathinones in slam practice. From our clinical experience, we could advance the following facts: unlike other conventional psychostimulants such as cocaine, which could be consumed for a sexual aim but also for a social purpose and disinhibition, these substances seem to provide an intense sexual pleasure, an excitement, an extreme enjoyment, and an unbridled sexual appetite. They seem to allow some users to experiment with new sexual practices, especially group sex, BDSM, receptive anal penetrations, and fist fucking. Others, without necessarily changing their practices or adopting extreme sexual behaviour (hard), would discover a more intense sexuality with stronger sensations. It is necessary to better understand

the pharmacological mechanisms that underlie these behaviours.

Most studies focused on the use of psychoactive substances but did not question the notion of drug addiction or sex addiction. Indeed, few studies included patients treated in addiction centres for addictive behaviours. We do not have any information about slam practice in relation to the notion of hypersexuality or sex addiction, sexual dysfunctions, or evolution of sexual practice. Only 1 study [30] mentioned users' motivations for practicing slam; moreover, no study explored users' personalities.

About this MSM subpopulation, diagnosing a drug use disorder, sex addiction, or sexual dysfunction is a necessary precondition to the decision of therapeutic management. At present, care plans for patients who use drugs and patients with sex addiction are differentiated; the current proposals for standard care for addictions, which separate substance use disorder and sexual addiction, do not correspond to those patients with a dual diagnosis [49]; they need a global comprehensive management of their addictive behaviours. Future studies should set up tools to screen for addictive disorders (sex and substance use) and sexual dysfunctions in MSM users.

Our findings help in identifying paths for harm reduction and health promotion interventions among MSM who inject drugs in a sexual context. Professionals must ensure confidentiality and protect the anonymity of these men who bear at least 2 or 3 stigmatized identities: gay, drug users, and possibly HIV-positive/HCV-positive. The intersecting stigma may drive this subpopulation and this behaviour underground [57]. Drug-using MSM often suffer from shame and guilt, and slam could be an escape from this stigma. Carrying out qualitative studies to give a voice to slammers and thus better understand the motivations for risky behaviour could be the first step in destigmatizing users. Thus, future qualitative studies should investigate psychosocial factors (role of stigma, depression, social isolation, and homophobia) and the needs of this subpopulation of MSM in order to know what type of care to offer them [21, 60].

In the end, there is a need for a coordinated response among HIV treatment, mental health, addiction, and sexual health services. Physicians and nurses should know about slam practice because serious health problems can derive from this. Community-based health associations seem to be at the forefront, but health professionals need to be trained in this sexual practice to help associations distribute harm reduction messages and take care of slammers. A public health policy should be supported to limit harm and damage and to avoid the stigmatization of this subpopulation.

Acknowledgement

We would like to sincerely thank A.F. Goalic for her assistance in the manuscript preparation.

Statement of Ethics

For this review, we complied with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors received no specific funding for this work.

Author Contributions

B.S. and M.G.-B. conceived the search, collected the data, designed and performed the analysis, and wrote the paper. C.V.-V., E.L., and M.G. helped draft the manuscript and participated in the discussion. All authors read and approved the final manuscript.

References

- 1 [European drug report. Trends and developments](#). Lisbon: European Monitoring Centre for Drugs and Drug Addiction; 2019 Jun. p. 98.
- 2 Kirby T, Thornber-Dunwell M. High-risk drug practices tighten grip on London gay scene. [Lancet](#). 2013 Jan 12;381(9861):101–2.
- 3 Schmidt AJ, Bourne A, Weatherburn P, Reid D, Marcus U, Hickson F. Illicit drug use among gay and bisexual men in 44 cities: findings from the European MSM Internet Survey (EMIS). [Int J Drug Policy](#). 2016;38:4–12.
- 4 Bourne A, Reid D, Hickson F, Torres Rueda S, Weatherburn P. The Chemsex study: drug use in sexual settings among gay and bisexual men in Lambeth, Southwark and Lewisham [Internet]. 2014 [cited 2018 Oct 30]. Available from: <http://researchonline.lshtm.ac.uk/2197245/>.

- 5 Vu NTT, Holt M, Phan HTT, La LT, Tran GM, Doan TT, et al. Amphetamine-type-stimulants (ATS) use and homosexuality-related enacted stigma are associated with depression among men who have sex with men (MSM) in two major cities in Vietnam in 2014. *Subst Use Misuse*. 2017;52(11):1411–9.
- 6 Lim SH, Cheung DH, Guadamuz TE, Wei C, Koe S, Altice FL. Latent class analysis of substance use among men who have sex with men in Malaysia: findings from the Asian Internet MSM Sex Survey. *Drug Alcohol Depend*. 2015;151:31–7.
- 7 van Griensven F, Thienkrua W, McNicholl J, Wimonasate W, Chaikummao S, Chonwattana W, et al. Evidence of an explosive epidemic of HIV infection in a cohort of men who have sex with men in Thailand. *Aids*. 2013 Mar 1;27(5):825–32.
- 8 Reback CJ, Fletcher JB, Shoptaw S, Grella CE. Methamphetamine and other substance use trends among street-recruited men who have sex with men, from 2008 to 2011. *Drug Alcohol Depend*. 2013;133(1):262–5.
- 9 Yu G, Wall MM, Chiasson MA, Hirshfield S. Complex drug use patterns and associated HIV transmission risk behaviors in an internet sample of U.S. men who have sex with men. *Arch Sex Behav*. 2015 Feb 1;44(2):421–8.
- 10 Lea T, Mao L, Hopwood M, Prestage G, Zablotska I, de Wit J, et al. Methamphetamine use among gay and bisexual men in Australia: trends in recent and regular use from the Gay Community Periodic Surveys. *Int J Drug Policy*. 2016;29:66–72.
- 11 Hurley M, Prestage G. Intensive sex partying amongst gay men in Sydney. *Cult Health Sex*. 2009 Aug 1;11(6):597–610.
- 12 Public Health England. Substance misuse services for men who have sex with men involved in chemsex. [Internet]. Public Health England; 2015. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/669676/Substance_misuse_services_for_men_who_have_sex_with_men_involved_in_chemsex.pdf.
- 13 Milhet M, Néfau T. Chemsex, slam [Internet]. OFDT; 2017 [cited 2018 Oct 28]. 32 p. (Théma TREND). Available from: <https://www.ofdt.fr/publications/collections/rapports/thema/chemsex-slam/>.
- 14 Kurtz SP. Post-circuit blues: motivations and consequences of crystal meth use among gay men in Miami. *AIDS Behav*. 2005 Mar 1;9(1):63–72.
- 15 Ahmed A-K, Weatherburn P, Reid D, Hickson F, Torres-Rueda S, Steinberg P, et al. Social norms related to combining drugs and sex ('chemsex') among gay men in South London. *Int J Drug Policy*. 2016;38:29–35.
- 16 Bourne A, Reid D, Hickson F, Torres-Rueda S, Steinberg P, Weatherburn P. "Chemsex" and harm reduction need among gay men in South London. *Int J Drug Policy*. 2015 Dec 1;26(12):1171–6.
- 17 Gilbert VL, Simms I, Gobin M, Oliver I, Hughes G. High-risk drug practices in men who have sex with men. *Lancet*. 2013 Apr;381(9875):1358–9.
- 18 Jin F, Matthews GV, Grulich AE. Sexual transmission of hepatitis C virus among gay and bisexual men: a systematic review. *Sex Health*. 2016 Oct 7;14(1):28–41.
- 19 Gilbert VL, Simms I, Jenkins C, Furegato M, Gobin M, Oliver I, et al. Sex, drugs and smart phone applications: findings from semistructured interviews with men who have sex with men diagnosed with *Shigella flexneri* 3a in England and Wales. *Sex Transm Infect*. 2015 Dec;91(8):598–602.
- 20 Sewell J, Miltz A, Lampe FC, Cambiano V, Speakman A, Phillips AN, et al. Poly drug use, chemsex drug use, and associations with sexual risk behaviour in HIV-negative men who have sex with men attending sexual health clinics. *Int J Drug Policy*. 2017;43:33–43.
- 21 Weatherburn P, Hickson F, Reid D, Torres-Rueda S, Bourne A. Motivations and values associated with combining sex and illicit drugs ('chemsex') among gay men in South London: findings from a qualitative study. *Sex Transm Infect*. 2017 May;93(3):203–6.
- 22 Lea T, Reynolds R, De Wit J. Mephedrone use among same-sex attracted young people in Sydney, Australia. *Drug Alcohol Rev*. 2011;30(4):438–40.
- 23 Wei C, Guadamuz TE, Lim SH, Huang Y, Koe S. Patterns and levels of illicit drug use among men who have sex with men in Asia. *Drug Alcohol Depend*. 2012 Jan 1;120(1–3):246–9.
- 24 Tomkins A, George R, Kliner M. Sexualised drug taking among men who have sex with men: a systematic review. *Perspect Public Health*. 2019 Jan;139(1):23–33.
- 25 Maxwell S, Shahmanesh M, Gafos M. Chemsex behaviours among men who have sex with men: a systematic review of the literature. *Int J Drug Policy*. 2019;63:74–89.
- 26 Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009 Jul 21;6(7):e1000097.
- 27 McCall H, Adams N, Mason D, Willis J. What is chemsex and why does it matter? *BMJ*. 2015;351:h5790.
- 28 Edmundson C, Heinsbroek E, Glass R, Hope V, Mohammed H, White M, et al. Sexualised drug use in the United Kingdom (UK): a review of the literature. *Int J Drug Policy*. 2018 May;55:131–48.
- 29 Van Hout MC, Crowley D, O'Dea S, Clarke S. Chasing the rainbow: pleasure, sex-based sociality and consumerism in navigating and exiting the Irish Chemsex scene. *Cult Health Sex*. 2019 Sep;21:1074–86.
- 30 Lim SH, Akbar M, Wickersham JA, Kamarulzaman A, Altice FL. The management of methamphetamine use in sexual settings among men who have sex with men in Malaysia. *Int J Drug Policy*. 2018;55:256–62.
- 31 Guadamuz TE, Boonmongkon P. Ice parties among young men who have sex with men in Thailand: pleasures, secrecy and risks. *Int J Drug Policy*. 2018;55:249–55.
- 32 Bui H, Zablotska-Manos I, Hammoud M, Jin F, Lea T, Bourne A, et al. Prevalence and correlates of recent injecting drug use among gay and bisexual men in Australia: results from the FLUX study. *Int J Drug Policy*. 2018;55:222–30.
- 33 Palaniswami PM, El Sayed A, Asriel B, Carollo JR, Fierer DS; New York Acute Hepatitis CSN. Ledipasvir and sofosbuvir in the treatment of early hepatitis C virus infection in HIV-infected men. *Open Forum Infect Dis*. 2018;5(10):ofy238.
- 34 Elliot ER, Singh S, Tyebally S, Gedela K, Nelson M. Recreational drug use and chemsex among HIV-infected in-patients: a unique screening opportunity. *HIV Med*. 2017;18(7):525–31.
- 35 Pakianathan M, Whittaker W, Lee MJ, Avery J, Green S, Nathan B, et al. Chemsex and new HIV diagnosis in gay, bisexual and other men who have sex with men attending sexual health clinics. *HIV Med*. 2018 [Online ahead of print].
- 36 Batisse A, Peyrière H, Eiden C, Courné M-A, Djezzar S. Usage de psychostimulants dans un contexte sexuel: analyse des cas rapportés au réseau français des centres d'addictovigilance Évaluation des risques liés à la pratique du SLAM. *Thérapie* [Internet]. [cited 2016 May 13]. Available from: <http://www.sciencedirect.com/science/article/pii/S0040595716300129>.
- 37 McFaul K, Maghlaoui A, Nzuruba M, Farnworth S, Foxton M, Anderson M, et al. Acute hepatitis C infection in HIV-negative men who have sex with men. *J Viral Hepat*. 2015;22(6):535–8.
- 38 Daskalopoulou M, Rodger A, Phillips AN, Sherr L, Speakman A, Collins S, et al. Recreational drug use, polydrug use, and sexual behaviour in HIV-diagnosed men who have sex with men in the UK: results from the cross-sectional ASTRA study. *Lancet HIV*. 2014;1(1):e22–31.
- 39 Batisse A, Fortias M, Bourgogne E, Grégoire M, Sec I, Djezzar S. Case series of 21 synthetic cathinones abuse. *J Clin Psychopharmacol*. 2014 Jun;34(3):411–3.
- 40 Batisse A, Peyrière H, Cazanave C, Donna-dieu-Rigole H. "ChemSex," consommation en contexte sexuel: quelles substances? Quelle prévention? Données du réseau français d'addictovigilance. *Thérapie*. 2018 Dec;73(6):559.
- 41 Kurka T, Soni S, Richardson D. High rates of recreational drug use in men who have sex with men. *Sex Transm Infect*. 2015 Sep;91(6):394.
- 42 Mohammed H, Were J, King C, Furegato M, Nardone A, Hughes G, et al. Sexualised drug use in people attending sexual health clinics in England. *Sex Transm Infect*. 2016;92(6):454.

- 43 Heinsbroek E, Glass R, Edmundson C, Hope V, Desai M. Patterns of injecting and non-injecting drug use by sexual behaviour in people who inject drugs attending services in England, Wales and Northern Ireland, 2013–2016. *Int J Drug Policy*. 2018;55:215–21.
- 44 Batisse A, Grégoire M, Marillier M, Fortias M, Djezzar S. Usage de cathinones à Paris. *L'Encéphale* [Internet]. 2016 Feb [cited 2016 May 13]. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0013700615001633>.
- 45 Pufall EL, Kall M, Shahmanesh M, Nardone A, Gilson R, Delpach V, et al. Sexualized drug use ('chemsex') and high-risk sexual behaviours in HIV-positive men who have sex with men. *HIV Med*. 2018;19(4):261–70.
- 46 Barrett P, O'Donnell K, Fitzgerald M, Schmidt AJ, Hickson F, Quinlan M, et al. Drug use among men who have sex with men in Ireland: prevalence and associated factors from a national online survey. *Int J Drug Policy*. 2019;64:5–12.
- 47 Schecke H, Lea T, Bohn A, Köhler T, Sander D, Scherbaum N, et al. Crystal methamphetamine use in sexual settings among German men who have sex with men. *Front Psychiatry*. 2019;10:886.
- 48 Dolengevich-Segal H, Gonzalez-Baeza A, Valencia J, Valencia-Ortega E, Cabello A, Tellez-Molina MJ, et al. Drug-related and psychopathological symptoms in HIV-positive men who have sex with men who inject drugs during sex (slamsex): data from the U-SEX GESIDA 9416 study. *PLoS One*. 2019 Dec 4;14(12):e0220272.
- 49 Trouiller P, Velter A, Saboni L, Sommen C, Sauvage C, Vaux S, et al. Injecting drug use during sex (known as “slamming”) among men who have sex with men: results from a time-location sampling survey conducted in five cities, France. *Int J Drug Policy*. 2020 May;79:102703.
- 50 Marillier M, Batisse A, Richeval C, Labrouve V, Martinez M, Allorge D, et al. CHEMSEX, NPS & risk reduction management: preliminary results of a pilot study. *Toxicol Anal Clin*. 2017 Feb;29(1):47–56.
- 51 Power J, Mikołajczak G, Bourne A, Brown G, Leonard W, Lyons A, et al. Sex, drugs and social connectedness: wellbeing among HIV-positive gay and bisexual men who use party-and-play drugs. *Sex Health*. 2018 Apr;15(2):135–43.
- 52 Ireland G, Higgins S, Goorney B, Ward C, Ahmad S, Stewart C, et al. Evaluation of hepatitis C testing in men who have sex with men, and associated risk behaviours, in Manchester, UK. *Sex Transm Infect*. 2017 Sep;93(6):404–9.
- 53 Melendez-Torres GJ, Bourne A, Reid D, Hickson F, Bonell C, Weatherburn P. Typology of drug use in United Kingdom men who have sex with men and associations with socio-sexual characteristics. *Int J Drug Policy*. 2018;55:159–64.
- 54 Sewell J, Cambiano V, Miltz A, Speakman A, Lampe FC, Phillips A, et al. Changes in recreational drug use, drug use associated with chemsex, and HIV-related behaviours, among HIV-negative men who have sex with men in London and Brighton, 2013–2016. *Sex Transm Infect*. 2018;94(7):494–501.
- 55 Wilkerson JM, Noor SW, Breckenridge ED, Adeboye AA, Rosser BR. Substance-use and sexual harm reduction strategies of methamphetamine-using men who have sex with men and inject drugs. *AIDS Care*. 2015;27(8):1047–54.
- 56 Wilkerson JM, Noor SW, Rhoton JM, Li D, Rosser BRS. Differentially classified methamphetamine-using men who have sex with men: a latent class analysis. *Drug Alcohol Depend*. 2018;192:129–36.
- 57 Bakker I, Knoop L. Towards a continuum of care concerning chemsex issues. *Sex Health*. 2018;15(2):173.
- 58 Dolatshahi B, Farhoudian A, Falahatdoost M, Tavakoli M, Rezaie Dogahe E. A qualitative study of the relationship between methamphetamine abuse and sexual dysfunction in male substance abusers. *Int J High Risk Behav Addict*. 2016 Jun 13 [cited 2020 May 24];5(3):e29640.
- 59 Giraudon I, Schmidt AJ, Mohammed H. Surveillance of sexualised drug use: the challenges and the opportunities. *Int J Drug Policy*. 2018;55:149–54.
- 60 Deimel D, Stöver H, Höfelbarth S, Dichtl A, Graf N, Gebhardt V. Drug use and health behaviour among German men who have sex with men: results of a qualitative, multi-centre study. *Harm Reduct J*. 2016;13(1):36.
- 61 Marillier Maude, Batisse Anne, Richeval Camille, Labrouve Vincent, Martinez Magali, Allorge Delphine, et al. CHEMSEX, NPS & risk reduction management: Preliminary results of a pilot study. *Toxicol Anal Clin*. 2017;29(1):47–56.