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ORIGINAL RESEARCH

Chems4EU: chemsex use and its impacts across four European countries in HIV-positive men who have sex with men attending HIV services

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Abstract

Introduction: Chemsex in a European context is the use of any of the following drugs to facilitate sex: crystal methamphetamine, mephedrone and gamma-hydroxybutyrate (GHB)/gamma-butyrolactone (GBL) and, to a lesser extent, cocaine and ketamine. This study describes the prevalence of self-reported recreational drug use and chemsex in HIV-positive men who have sex with men (MSM) accessing HIV services in four countries. It also examines the problematic impacts and harms of chemsex and access to chemsex-related services.

Methods: This is a cross-sectional multi-centre questionnaire study of HIV-positive MSM accessing nine HIV services in the UK, Spain, Greece and Italy.

Results: In all, 1589 HIV-positive MSM attending HIV services in four countries completed the questionnaire. The median age of participants was 38 years (interquartile range: 32–46 years) and 1525 (96.0%) were taking antiretroviral therapy (ART). In the previous 12 months, 709 (44.6%) had used recreational drugs, 382 (24.0%) reported chemsex and 104 (6.5%) reported injection of chemsex-associated drugs ('slamsex'). Of the 382 engaging in chemsex, 155 (40.6%) reported unwanted side effects as a result of chemsex and 81 (21.2%) as a result of withdrawal from chemsex. The reported negative impacts from chemsex were on work (25.1%, 96), friends/family (24.3%, 93) and relationships (28.3%, 108). Fifty-seven (14.9%) accessed chemsex-related services in the past year, 38 of whom (67%) felt the service met their needs.

Discussion: A quarter of participants self-reported chemsex in the past 12 months. There were high rates of harms from chemsex across all countries,

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including negative impacts on work, friends/family and relationships. Although a minority of those engaging in chemsex accessed support, most found this useful.

KEYWORDS
chemsex, HIV, MSM, recreational drug

INTRODUCTION

In 2017, over 25 000 people were newly diagnosed with HIV in the European Union (EU) [1]. Although the annual figure of new diagnoses has declined slightly over the past decade, men who have sex with men (MSM) still comprise 38% of this total and as such are an important risk group for HIV transmission in the EU.

A higher proportion of MSM use recreational drugs than the general population, a trend reported internationally [2–4]. Additionally, chemsex, a phenomenon of sexualized drug use, in a European context, is the use of any of the following specific drugs (chems) to facilitate or enhance sex: crystal methamphetamine, mephedrone and gamma-hydroxybutyrate (GHB)/gamma-butyrolactone (GBL) and, to a lesser extent, cocaine and ketamine [4,5]. Slamsex is a colloquial term used by some MSM to denote the practice of injecting intravenously any of these drugs during chemsex.

Chemsex sessions are often facilitated through the use of smartphone geospatial networking applications (apps), may last several days and involve multiple partners engaging in condomless sexual intercourse with the potential for mucosal trauma given the sexual practices some men report. In HIV-positive MSM, chemsex is associated with increased odds of a bacterial sexually transmitted infection (STI) and of condomless anal intercourse, including with an HIV-negative or unknown HIV status partner even where the participant's viral load was detectable [6]. In HIV-negative MSM, chemsex is additionally associated with the acquisition of HIV [7,8].

Besides the transmission of infection, chemsex may be associated with other harms including mental, physical and psychosocial as well as potential drug–drug interactions with those taking antiretroviral therapy (ART) [9,10]. For instance, there has been a reported increase in deaths due to GHB/GBL overdose in London, UK [11]. The adverse impacts of drugs associated with chemsex on mental health, relationships and employment have also been described [7,12].

Across the EU, there is variability in the provision of dedicated substance use services for MSM. Although some services, notably 56 Dean Street in London, do provide dedicated in-clinic support for those engaging in chemsex, this is far from the norm [13]. At present, it is unclear if there is an unfilled need for these services in countries where they are lacking.

Internet-based surveys have provided useful estimates of the prevalence of chemsex drug use amongst MSM in Europe [14,15] and the prevalence in HIV-positive MSM has been reported in the UK and Spain [4,6]; however, this is lacking in other European countries such as Italy and Greece.

Despite knowing that rates of chemsex are higher among MSM with diagnosed HIV [16], little is known about how such use impacts their broader well-being and the extent of unmet healthcare needs, which we now seek to address in this study in HIV-positive MSM accessing HIV services in four countries: UK, Spain, Italy and Greece [17,18].

METHODS

We performed a cross-sectional multi-centre study of HIV-positive MSM accessing HIV services in four countries that were part of the EU at the time of data collection. Adults (aged 18 years or older) attending one of nine HIV services in four EU countries were approached and invited to participate in the study using an anonymous self-reported paper questionnaire from 16 April 2018 to 1 May 2019.

If individuals accepted enrolment, they signed a consent form and were handed the questionnaire to complete.

Each centre endeavoured to sample patients evenly throughout all weekly clinic sessions, thus ensuring diversity of completion by time of day and day of the week.

Objectives

Our primary objective was to measure the prevalence of reported chemsex drug use in HIV-positive MSM accessing HIV services in each of the four countries: UK, Spain, Greece and Italy.

Our secondary objectives were: (1) to measure self-reported prevalence of sexual risk-taking behaviour and STI diagnoses in the previous year; (2) to examine the impacts of chemsex as they are subjectively and objectively perceived; and (3) to measure uptake of chemsex-related services.

Setting

The HIV services that participated were as follows: UK (four services): 56 Dean Street, Chelsea & Westminster NHS Foundation Trust, London; Kent Community NHS Foundation Trust; Northamptonshire Healthcare NHS Foundation Trust; Stevenage & Watford clinics, Chelsea & Westminster NHS Foundation Trust, Hertfordshire; Spain (three services): Hospital Universitari de Bellvitge, Barcelona; Hospital Universitari Vall d'Hebron, Barcelona; Hospital Universitario La Paz, Madrid; Italy (one service): Tor Vergata University Hospital, Rome; and Greece (one service): Kapodistrian University of Athens.

Details of the number of individuals living with HIV that attend each centre and the chemsex support services they offer are given in Table S1.

Questionnaire

The questionnaire was first designed in English. Once reviewed and approved by test patients and community members, it was translated into three other languages (Spanish, Italian and Greek).

The questionnaire was paper-based and was completed by consenting participants in the language of the consenting clinic's country; it comprised 36 questions over 13 sides of A4 and took participants up to 15 min to complete.

Entry criteria

The entry criteria were self-reported MSM aged 18 years or more attending HIV outpatient care, who could provide informed consent.

Baseline characteristics

All participants were asked to self-report the following: age, gender and if they were born in the country in which they were completing the questionnaire. In relation to their HIV infection all were asked whether they were on ART and, if so, the result of their last HIV viral load and how many doses of HIV medication they had missed in the last 2 weeks.

Sexual behaviour

All participants were asked to self-report the number of sexual partners they had in the last 12 months, if they had group sex (i.e. with two or more male partners at one time – in the last 12 months), and if they had practised fisting (last 12 months). Additional questions included: a diagnosis with any bacterial STI (gonorrhoea, chlamydia, syphilis – last 12 months) and if they had ever been diagnosed with hepatitis C.

Recreational drug use

All participants were asked to self-report whether they had used any recreational drugs in the last 12 months and, if so, to select which ones from the following list: amphetamine, cannabis, cocaine, crystal methamphetamine, ecstasy, GHB/GBL, heroin (or related drugs), ketamine, LSD, mephedrone and other; in cases where 'other' was selected, participants were encouraged to specify the drug by free text.

Chemsex use

Participants who self-reported any recreational drug use were further asked about the use of any of the following drugs to facilitate sex ('chemsex') – GHB/GBL, ketamine, crystal methamphetamine, mephedrone and cocaine – and the frequency of use (never, sometimes, often, always, don't know) for each drug.

Personal harms during, or as a result of, chemsex were explored with a series of questions relating to the last 12 months: (a) experienced unwanted side-effects, (b) any effects that feel like drug withdrawal, (c) having had to seek emergency medical care, (d) injury related to injecting drugs, (e) drug overdose and (f) sex with someone without the participant's full consent. Individuals were also asked to self-report if their chemsex use had a negative impact on the following – (a) work, (b) family and/or friends, (c) intimate relationships – and whether they had accessed any

professional services in relation to their chemsex use (last 12 months) and, if so, whether the service met their needs.

Slamsex use

Those engaging in chemsex were asked if they had injected or slammed any of the following five drugs (GHB/GBL, ketamine, crystal methamphetamine, mephedrone, cocaine) specifically for the purpose of having sex in the last year and, if so, the frequency of use (never, sometimes, often, always, don't know) for each drug. They were also asked if they had shared needles and if they had been injected or slammed by someone else for the purpose of having sex (in the last 12 months).

Sample size

We selected a sample size of 500 in each country as this allowed us to estimate the prevalence of reported chemsex use with a reasonable degree of provision. For example, assuming that 10% of MSM report chemsex use then a sample of 500 participants would provide a 95% confidence interval (CI) for the true population proportion of 7.4–12.6%. We believe that the width of this CI is sufficiently narrow to provide helpful information for healthcare planning.

Assuming a 10% overall rate of reported chemsex use, we expected to see 200 reported chemsex cases in the sample which would provide a sufficiently sized dataset on which to base analyses of associations with lifestyle and demographic factors.

Data processing

Data were entered into an Excel spreadsheet at each of the nine centres, anonymized and transferred electronically to Chelsea & Westminster Foundation Trust for data-cleaning and analysis.

Statistical analyses

Data were systematically cleaned for inconsistencies and analyses were carried out in Stata statistical software v.13. The category 'unknown' was used to denote where the respondent either self-reported 'don't know' or the response was left blank. In order to explore factors associated with chemsex use, we stratified demographic and lifestyle factors by whether or not an individual self-reported chemsex and tested for differences between the two groups using χ^2 test (for categorical data) or Kruskal–Wallis test (for continuous data). To see the effect of injecting drug use, we further stratified those engaging in chemsex by whether an individual had self-reported injecting chems in the previous 12 months or not and tested for differences between both groups using the same tests as for chemsex use (see earlier).

We used logistic regression to explore factors associated with chemsex use. Factors that were significantly associated with the use of chemsex ($p < 0.05$) in the univariate model were used to develop a multivariable logistic regression model.

A second multivariate model was developed using the data of those who indicated they were taking ART, 'multivariate (ART only)' so that we could investigate the associations between chemsex use and self-reported missed ART doses.

Ethics

Chems4EU was funded by a grant from Gilead's Voice programme. The project was reviewed by the London Fulham NHS Research Ethics Committee (Project ID 17/LO/1781) and the local ethics committee of each participating centre. The funder had no role in the design of the study, analysis or interpretation of the results.

RESULTS

Participant characteristics

In all, 1589 HIV-positive MSM attending HIV services in four countries completed the questionnaire (UK, 512; Spain, 491; Greece, 427; Italy, 159) (Table 1). The median age of participants was 38 years (interquartile range, IQR: 32–46 years). A total of 1571 (98.9%) described their gender as male and 15 (0.9%) as trans. Almost all individuals (1525, 96.0%) were taking ART, of whom 1283 (84.1%) stated that they were undetectable at their last viral load test. In the previous 2 weeks, 298 (19.5%) stated they had missed at least one dose of ART. In the previous 12 months, 464 (29.2%) had been diagnosed with a bacterial STI. Nearly one in 10 (9.6%, 153) had ever been diagnosed with hepatitis C. Over a quarter (25.6%, 407) stated they had only had one sexual partner and 1102 (69.4%) had more than one sexual partner in the last 12 months. Over one in 10 (12.9%, 205) stated that they had fisted or been fisted in the past 12 months. The majority of individuals (63.6%, 1010) stated that they were happy with their sex life.

Recreational drug use

Over 40% (709, 44.6%) of participants had used any recreational drugs in the past 12 months: cannabis was the most

TABLE 1 Demographic, clinical and lifestyle factors of 1589 HIV-positive men who have sex with men who completed the questionnaire, stratified by the country where they completed the questionnaire

	All	UK	Spain	Greece	Italy
Total	1589	512	491	427	159
Age [median (IQR)]	38 (32–46)	40 (32–48)	40 (33–47)	36 (32–42)	39 (32–45)
Gender [*n* (%)]					
Male	1571 (98.9)	512 (100)	480 (97.8)	425 (99.5)	154 (96.9)
Trans	15 (0.9)	0 (0)	10 (2.0)	0 (0)	5 (3.1)
Blank	3 (0.2)	0 (0)	1 (0.2)	2 (0.5)	0 (0)
On ART? [*n* (%)]					
Yes	1525 (96.0)	477 (93.2)	476 (96.9)	419 (98.1)	153 (96.2)
No	41 (2.6)	16 (3.1)	13 (2.6)	7 (1.6)	5 (3.1)
Blank	23 (1.4)	19 (3.7)	2 (0.4)	1 (0.2)	1 (0.6)
If on ART, last HIV viral load[b] [*n* (%)]					
Detectable	94 (6.1)	31 (6.5)	25 (5.3)	23 (5.5)	15 (9.8)
Undetectable	1283 (84.1)	436 (91.4)	444 (93.3)	277 (66.1)	126 (82.4)
Don't know	118 (7.7)	7 (1.5)	5 (1.1)	100 (23.9)	6 (3.9)
Blank	30 (2.0)	3 (0.6)	2 (0.4)	19 (4.5)	6 (3.9)
If on ART[b], number of missed doses in past 2 weeks [*n* (%)]					
0	1165 (76.4)	360 (75.5)	375 (78.8)	323 (77.1)	107 (70.0)
1–2	251 (16.5)	76 (15.9)	77 (16.2)	64 (15.3)	34 (22.2)
3–4	20 (1.3)	8 (1.7)	5 (1.1)	7 (1.7)	0 (0)
5–6	6 (0.4)	3 (0.6)	2 (0.4)	1 (0.2)	0 (0)
7+	21 (1.4)	5 (1.0)	8 (1.7)	6 (1.4)	2 (1.3)
Don't know	1 (0.1)	0 (0)	0 (0)	1 (0.2)	0 (0)
Blank	61 (4.0)	25 (5.2)	9 (1.9)	17 (4.1)	10 (6.5)
Bacterial STI in past 12 months[a] [*n* (%)]					
No	1075 (67.7)	319 (62.3)	331 (67.4)	318 (74.5)	107 (67.3)
Yes	464 (29.2)	174 (34.0)	153 (31.2)	93 (21.8)	44 (27.7)
Don't know	31 (2.0)	7 (1.4)	5 (1.0)	15 (3.5)	4 (2.5)
Blank	19 (1.2)	12 (2.3)	2 (0.4)	1 (0.2)	4 (2.5)
Ever had hepatitis C? [*n* (%)]					
No	1396 (87.9)	446 (87.1)	412 (83.9)	398 (93.2)	140 (88.1)
Yes	153 (9.6)	49 (9.6)	73 (14.9)	20 (4.7)	11 (6.9)
Don't know	20 (1.3)	4 (0.8)	3 (0.6)	6 (1.4)	7 (4.4)
Blank	20 (1.3)	13 (2.5)	3 (0.6)	3 (0.7)	1 (0.6)
Number sexual partners in past 12 months [*n* (%)]					
0	31 (2.0)	9 (1.8)	9 (1.8)	10 (2.3)	3 (1.9)
1	407 (25.6)	109 (21.3)	144 (29.3)	114 (26.7)	40 (25.2)
2–3	265 (16.7)	78 (15.2)	93 (18.9)	67 (15.7)	27 (17.0)
4–5	211 (13.3)	87 (17.0)	44 (9.0)	60 (14.1)	20 (12.6)
6–10	186 (11.7)	72 (14.1)	49 (10.0)	51 (11.9)	14 (8.8)
11–15	118 (7.4)	40 (7.8)	36 (7.3)	25 (5.9)	17 (10.7)
16–20	99 (6.2)	25 (4.9)	41 (8.4)	23 (5.4)	10 (6.3)
> 21	223 (14.0)	73 (14.3)	63 (12.8)	60 (14.1)	27 (17.0)
Blank	49 (3.1)	19 (3.7)	12 (2.4)	17 (4.0)	1 (0.6)

(Continues)

TABLE 1 (Continued)

	All	UK	Spain	Greece	Italy
Fisted or been fisted in past 12 months [*n* (%)]					
No	1317 (82.9)	405 (79.1)	437 (89.0)	332 (77.8)	143 (89.9)
Yes	205 (12.9)	81 (15.8)	40 (8.1)	69 (16.2)	15 (9.4)
Don't know	10 (0.6)	2 (0.4)	5 (1.0)	3 (0.7)	0 (0)
Blank	57 (3.6)	24 (4.7)	9 (1.8)	23 (5.4)	1 (0.6)
Are you happy with your sex life? [*n* (%)]					
Very happy	381 (24.0)	107 (20.9)	153 (31.2)	86 (20.1)	35 (22.0)
Quite happy	629 (39.6)	189 (36.9)	185 (37.7)	175 (41.0)	80 (50.3)
Unsure/neutral	398 (25.0)	134 (26.2)	109 (22.2)	124 (29.0)	31 (19.5)
Quite unhappy	96 (6.0)	47 (9.2)	23 (4.7)	17 (4.0)	9 (5.7)
Very unhappy	39 (2.5)	16 (3.1)	12 (2.4)	8 (1.9)	3 (1.9)
Blank	46 (2.9)	19 (3.7)	9 (1.8)	17 (4.0)	1 (0.6)

Abbreviations: ART, antiretroviral therapy; IQR, interquartile range; STI, sexually transmitted infection.

[a]Bacterial STI includes chlamydia, gonorrhoea and syphilis.

[b]Denominator is number self-reporting on ART.

frequently used drug overall (399, 56.3%) followed by cocaine (301, 42.5%) and GHB/GBL (247, 34.8%) (Table 2a). Recreational drug use was more common in the UK (271/512, 52.9%), followed by Spain (223/491, 45.4%), Greece (160/427, 37.4%) and Italy (55/159, 34.6%).

Chemsex

Almost a quarter (24.0%, 382) of individuals reported chemsex in the previous 12 months. Following a similar pattern to recreational drug use, the highest proportion was in the UK (168/512, 32.8%), followed by Spain (113/491, 23.0%), Greece (82/427, 19.2%) and the least reports in Italy (19/159, 11.9%) (Table 2b). Among men engaging in chemsex, the most commonly used drug was GHB/GBL (268, 70.2%), followed by crystal methamphetamine (256, 67.0%), cocaine (227, 59.4%), mephedrone (185, 48.4%) and ketamine (122, 31.9%). The most common chemsex drug used by country was: UK (crystal methamphetamine: 125, 74.4%), Spain (GHB/GBL: 84, 74.3%), Greece (GHB/GBL: 55, 67.1%) an Italy (cocaine: 15, 78.9%).

Slamsex

Around one in 15 (104, 6.5%) reported slamsex within the previous 12 months (Table S2). The highest proportion of slamsex was in the UK (68/512, 13.3%), followed by Greece (20/427, 4.7%), Spain (14/491, 2.8%) and Italy (2/159, 1.3%) (Table S3). The most commonly injected drug for slamsex was crystal methamphetamine (87, 83.7%) followed by mephedrone (46, 44.2%), cocaine (30, 28.8%), GHB/GBL (27, 26.0%) and ketamine (25; 24.0%).

Reported impact of chemsex

Of 382 participants who had engaged in chemsex within the past 12 months, 155 (40.6%) reported unwanted side-effects as a result of this drug use, 81 (21.2%) reported unwanted side-effects as a result of withdrawal from chemsex, and 27 (7.1%) reported that they had sought emergency medical care as a result of chemsex. Further to this, 23 (6.0%) reported suffering a chemsex-related injection injury, 28 (7.3%) a chemsex-related drug overdose and 23 (6.0%) self-reported non-consensual sex during a chemsex session (Table 3). In the previous 12 months, those engaging in chemsex reported a negative impact from their chemsex on work (96, 25.1%), friends and/or family (93, 24.3%) and intimate relationships (108, 28.3%).

In relation to chemsex, 57 (14.9%) accessed professional services in the past year, ranging from 19% (32/168) in the UK to 5% (1/19) in Italy. Of these, 38 (67%) felt the service met their needs, and this was similar across all four countries (Table 3).

Associations with chemsex

Participants from Spain, Greece and Italy were less likely to engage in chemsex than those in the UK (Tables 4 and 5). In multivariate analysis, individuals who reported having a bacterial STI in the previous year [50.0% vs. 22.6%, respectively; adjusted odds ratio (aOR) = 2.35; 95%

TABLE 2 (a) Drugs taken by individuals who self-reported recreational drug use in the previous 12 months, stratified by country of completion of questionnaire; (b) drugs taken by individuals who self-reported chemsex use in the previous 12 months, stratified by country of completion of questionnaire. Data are presented as *n* (%)

	All	UK	Spain	Greece	Italy
(a) Self-reported recreational drug use ($N = 709$)					
Total	709	271	223	160	55
Cannabis	399 (56.3)	126 (46.5)	116 (52.0)	119 (74.4)	38 (69.1)
Cocaine	301 (42.5)	134 (49.4)	92 (41.3)	105 (65.6)	20 (36.4)
GHB/GBL	247 (34.8)	116 (42.8)	71 (31.8)	48 (30.0)	12 (21.8)
Crystal methamphetamine	238 (33.6)	134 (49.4)	48 (21.5)	53 (33.1)	3 (5.5)
Ecstasy	198 (27.9)	91 (33.6)	71 (31.8)	35 (21.9)	1 (1.8)
Mephedrone	136 (19.2)	70 (25.8)	30 (13.5)	33 (20.6)	3 (5.5)
Ketamine	123 (17.3)	63 (23.2)	37 (16.6)	20 (12.5)	3 (5.5)
Amphetamine	80 (11.3)	36 (13.3)	26 (11.7)	15 (9.4)	3 (5.5)
LSD	20 (2.8)	4 (1.5)	8 (3.6)	8 (5.0)	0 (0)
Heroin	5 (0.7)	1 (0.4)	3 (1.3)	1 (0.6)	0 (0)
Other	36 (5.1)	1 (0.4)	30 (13.5)	5 (3.1)	0 (0)
(b) Self-reported chemsex use ($N = 382$)					
	382	168	113	82	19
GHB/GBL					
Yes	268 (70.2)	117 (69.6)	84 (74.3)	55 (67.1)	12 (63.2)
No	50 (13.1)	23 (13.7)	8 (7.1)	19 (23.2)	0 (0)
Don't know	7 (1.8)	0 (0)	6 (5.3)	1 (1.2)	0 (0)
Blank	57 (14.9)	28 (16.7)	15 (13.3)	7 (8.5)	7 (36.8)
Crystal methamphetamine					
Yes	256 (67.0)	125 (74.4)	80 (70.8)	47 (57.3)	4 (21.1)
No	56 (14.7)	23 (13.7)	8 (7.1)	24 (29.3)	1 (5.3)
Don't know	3 (0.8)	0 (0)	3 (2.7)	0 (0)	0 (0)
Blank	67 (17.5)	20 (11.9)	22 (19.5)	11 (13.4)	14 (73.7)
Cocaine					
Yes	227 (59.4)	89 (53.0)	78 (69.0)	45 (54.9)	15 (78.9)
No	84 (22.0)	45 (26.8)	12 (10.6)	27 (32.9)	0 (0)
Don't know	7 (1.8)	0 (0)	7 (6.2)	0 (0)	0 (0)
Blank	64 (16.8)	34 (20.2)	16 (14.2)	10 (12.2)	4 (21.1)
Mephedrone					
Yes	185 (48.4)	78 (46.4)	64 (56.6)	39 (47.6)	4 (21.1)
No	99 (25.9)	50 (29.8)	18 (15.9)	31 (37.8)	0 (0)
Don't know	4 (1.0)	0 (0)	4 (3.5)	0 (0)	0 (0)
Blank	94 (24.6)	40 (23.8)	27 (23.9)	12 (14.6)	15 (78.9)
Ketamine					
Yes	122 (31.9)	40 (23.8)	69 (61.1)	11 (13.4)	2 (10.5)
No	134 (35.1)	69 (41.1)	15 (13.3)	50 (61.0)	0 (0)
Don't know	3 (0.8)	0 (0)	2 (1.8)	1 (1.2)	0 (0)
Blank	123 (32.2)	59 (35.1)	27 (23.9)	20 (24.4)	17 (89.5)

Abbreviations: GHB, gamma-hydroxybutyrate; GBL, gamma-butyrolactone.

TABLE 3 Self-reported impact of chemsex on lifestyle for 382 chemsex users, stratified by country of completion of questionnaire. Data are presented as *n* (%)

	All	UK	Spain	Greece	Italy
Total	1589	512	491	427	159
Chemsex[b]	382 (24.0)	168 (32.8)	113 (23.0)	82 (19.2)	19 (11.9)
Slamsex[b]	104 (6.5)	68 (13.3)	14 (2.9)	20 (4.7)	2 (1.3)
Unwanted side-effects[a]					
Yes	155 (40.6)	67 (39.9)	47 (41.6)	34 (41.5)	7 (36.8)
No	194 (50.8)	88 (52.4)	53 (46.9)	41 (50.0)	12 (63.2)
Don't know	29 (7.6)	10 (6.0)	12 (10.6)	7 (8.5)	0 (0)
Blank	4 (1.0)	3 (1.8)	1 (0.9)	0 (0)	0 (0)
Unwanted side-effects from drug withdrawal[a]					
Yes	81 (21.2)	47 (28.0)	29 (25.7)	5 (6.1)	0 (0)
No	259 (67.8)	103 (61.3)	69 (61.1)	68 (82.9)	19 (100)
Don't know	37 (9.7)	14 (8.3)	14 (12.4)	9 (11.0)	0 (0)
Blank	5 (1.3)	4 (2.4)	1 (0.9)	0 (0)	0 (0)
Sought emergency medical care[a]					
Yes	27 (7.1)	11 (6.5)	12 (10.6)	1 (1.2)	3 (15.8)
No	347 (90.8)	153 (91.1)	98 (86.7)	80 (97.6)	16 (84.2)
Don't know	3 (0.8)	0 (0)	2 (1.8)	1 (1.2)	0 (0)
Blank	5 (1.3)	4 (2.4)	1 (0.9)	0 (0)	0 (0)
Injury related to injecting drugs[a]					
Yes	23 (6.0)	12 (7.1)	8 (7.1)	2 (2.4)	1 (5.3)
No	351 (91.9)	152 (90.5)	103 (91.2)	78 (95.1)	18 (94.7)
Don't know	2 (0.5)	0 (0)	1 (0.9)	1 (1.2)	0 (0)
Blank	6 (1.6)	4 (2.4)	1 (0.9)	1 (1.2)	0 (0)
Drug overdose[a]					
Yes	28 (7.3)	11 (6.5)	8 (7.1)	8 (9.8)	1 (5.3)
No	340 (89.0)	151 (89.9)	102 (90.3)	71 (86.6)	16 (84.2)
Don't know	10 (2.6)	3 (1.8)	2 (1.8)	3 (3.7)	2 (10.5)
Blank	4 (1.0)	3 (1.8)	1 (0.9)	0 (0)	0 (0)
Sex without full consent[a]					
Yes	23 (6.0)	13 (7.7)	5 (4.4)	4 (4.9)	1 (5.3)
No	337 (88.2)	146 (86.9)	103 (91.2)	77 (93.9)	11 (57.9)
Don't know	18 (4.7)	6 (3.6)	4 (3.5)	1 (1.2)	7 (36.8)
Blank	4 (1.0)	3 (1.8)	1 (0.9)	0 (0)	0 (0)
Chemsex has negatively impacted on your:[b]					
Work					
Yes	96 (25.1)	53 (31.5)	29 (25.7)	10 (12.2)	4 (21.1)
No	267 (69.9)	104 (61.9)	82 (72.6)	68 (82.9)	13 (68.4)
Don't know	14 (3.7)	7 (4.2)	1 (0.9)	4 (4.9)	2 (10.5)
Blank	5 (1.3)	4 (2.4)	1 (0.9)	0 (0)	0 (0)
Friends/family					
Yes	93 (24.3)	44 (26.2)	33 (29.2)	12 (14.6)	4 (21.1)
No	265 (69.4)	111 (66.1)	74 (65.5)	66 (80.5)	14 (73.7)
Don't know	20 (5.2)	10 (6.0)	5 (4.4)	4 (4.9)	1 (5.3)

(Continues)

TABLE 3 (Continued)

	All	UK	Spain	Greece	Italy
Blank	4 (1.0)	3 (1.8)	1 (0.9)	0 (0)	0 (0)
Intimate relationships					
Yes	108 (28.3)	48 (28.6)	38 (33.6)	15 (18.3)	7 (36.8)
No	252 (66.0)	109 (64.9)	70 (61.9)	63 (76.8)	10 (52.6)
Don't know	17 (4.5)	8 (4.8)	4 (3.5)	4 (4.9)	1 (5.3)
Blank	5 (1.3)	3 (1.8)	1 (0.9)	0 (0)	1 (5.3)
Access professional services in relation to your chemsex[b]					
Yes	57 (14.9)	32 (19.0)	18 (15.9)	6 (7.3)	1 (5.3)
No	310 (81.2)	131 (78.0)	89 (78.8)	74 (90.2)	16 (84.2)
Don't know	8 (2.1)	1 (0.6)	3 (2.7)	2 (2.4)	2 (10.5)
Blank	7 (1.8)	4 (2.4)	3 (2.7)	0 (0)	0 (0)
If yes, did the service meet your needs?					
Yes	38 (66.7)	20 (62.5)	13 (72.2)	4 (66.7)	1 (100)
No	9 (15.8)	5 (15.6)	2 (11.1)	2 (33.3)	0 (0)
Don't know	6 (10.5)	3 (9.4)	3 (16.7)	0 (0)	0 (0)
Blank	4 (7.0)	4 (12.5)	0 (0)	0 (0)	0 (0)

[a]During, or as a result of, chemsex within the last 12 months

[b]Within the last 12 months

CI: 1.77–3.12], of ever being diagnosed with hepatitis C [14.7% vs. 8.0%; aOR = 1.70; 95% CI: 1.12–2.57], having more than 10 sexual partners in the previous 12 months [48.7% vs. 21.0%; aOR = 11.61; 95% CI: 1.54–87.37], and having engaged in fisting in the past 12 months [31.9% vs. 6.9%; aOR = 4.87; 95% CI: 3.42–6.93] were more likely to report chemsex use. In addition, those reporting to be very unhappy with their sex life [4.5% vs. 1.8%; aOR = 3.39; 95% CI: 1.47–7.78] were more likely to be engaged in chemsex. There was no association with age, reported gender or ART status. In those on ART, however, those engaging in chemsex were more likely to report missed ART doses (with these reporting three or more missed doses in the past fortnight) compared with those who do not engage in chemsex [5.5% vs. 2.3%; aOR = 2.54; 95% CI: 1.30–4.97].

Associations with slamsex

Participants who reported engaging in chemsex and who also reported slamsex ($n = 104$), as compared with those who did not ($n = 278$), were significantly more likely to be from the UK (65.4% vs. 36.0% respectively), to have been diagnosed with a bacterial STI in the previous year (61.5% vs. 45.7%), to have ever had hepatitis C (23.1% vs. 11.5%) and to have engaged in fisting in the previous 12 months (44.2% vs. 27.3%) (Table S3). They were also significantly more likely to be unhappy with their sex life (21.2% vs. 8.7%). There were no differences by reported age, gender, ART status or number of sexual partners.

Reported impact of slamsex

Of 104 participants engaging in chemsex who reported slamsex within the previous 12 months, 57 (54.8%) reported unwanted side-effects as a result of chemsex, 39 (37.5%) reported unwanted side-effects as a result of withdrawal from chemsex drugs and 19 (18.3%) reported that they had sought emergency medical care as a result of chemsex, with 21 (20.2%) suffering a chemsex-related injection injury, 13 (12.5%) a chemsex-related drug overdose and 14 (13.5%) self-reporting non-consensual sex during a chemsex session (Table S4). In the previous 12 months, slamsex users reported negative impacts from their chemsex on work (43.3%, 45), friends and/or family (46.2%, 48) and intimate relationships (46.2%, 48).

DISCUSSION

Chemsex in the previous 12 months was reported by 24% of HIV-positive MSM attending HIV services in the nine clinics in four countries surveyed, with the most commonly used chemsex drug being GHB/GBL, closely followed by crystal methamphetamine. There was wide variation in the

TABLE 4 Demographic, clinical and lifestyle factors of 1589 participants stratified by whether or not they engaged in chemsex

	Non-chems user	Chems user	*p*
Total	1207	382	
Age (years) [median (IQR)]	38 (32–46)	39 (32–45)	0.85
Country			
UK	344 (28.5)	168 (44.0)	< 0.001
Spain	378 (31.3)	113 (29.6)	
Greece	345 (28.6)	82 (21.5)	
Italy	140 (11.6)	19 (5.0)	
Gender			
Male	1195 (99.0)	376 (98.4)	0.22
Trans	9 (0.7)	6 (1.6)	
Unknown	3 (0.2)	0 (0)	
On ART?			
Yes	1163 (96.4)	362 (94.8)	0.30
No	27 (2.2)	14 (3.7)	
Unknown	17 (1.4)	6 (1.6)	
If on ART, last HIV viral load			
Detectable	70 (6.0)	24 (6.6)	0.08
Undetectable	969 (83.3)	314 (86.7)	
Unknown	124 (10.7)	24 (6.6)	
If on ART, number of missed doses in past 2 weeks			
0	925 (79.5)	240 (66.3)	< 0.001
1–2	165 (14.2)	86 (23.8)	
≥ 3	27 (2.3)	20 (5.5)	
Unknown	46 (4.0)	16 (4.4)	
Bacterial STI in past 12 months[a]			
Yes	273 (22.6)	191 (50.0)	<0.001
No	898 (74.4)	177 (46.3)	
Unknown	36 (3.0)	14 (3.7)	
Ever had hepatitis C?			
Yes	97 (8.0)	56 (14.7)	<0.001
No	1074 (89.0)	322 (84.3)	
Unknown	36 (3.0)	4 (1.0)	
Number sexual partners in past 12 months			
0	30 (2.5)	1 (0.3)	< 0.001
1	372 (30.8)	35 (9.2)	
2–3	220 (18.2)	45 (11.8)	
4–5	157 (13.0)	54 (14.1)	
6–10	134 (11.1)	52 (13.6)	
11–15	82 (6.8)	36 (9.4)	
16–20	60 (5.0)	39 (10.2)	
>21	112 (9.3)	111 (29.1)	
Unknown	40 (3.3)	9 (2.4)	
Fisted or been fisted in past 12 months			

(Continues)

TABLE 4 (Continued)

	Non-chems user	Chems user	*p*
Yes	83 (6.9)	122 (31.9)	< 0.001
No	1072 (88.8)	245 (64.1)	
Unknown	52 (4.3)	15 (3.9)	
Are you happy with your sex life?			
Very happy	317 (26.3)	64 (16.8)	< 0.001
Quite happy	487 (40.3)	142 (37.2)	
Unsure/neutral	276 (22.9)	122 (31.9)	
Quite unhappy	67 (5.6)	29 (7.6)	
Very unhappy	22 (1.8)	17 (4.5)	
Unknown	38 (3.1)	8 (2.1)	

Note: The category 'unknown' denotes that the respondent either self-reported 'don't know' or the response was left blank.

Abbreviations: ART, antiretroviral therapy; IQR, interquartile range; STI, sexually transmitted infection.

[a]Bacterial STI includes chlamydia, gonorrhoea and syphilis.

prevalence of chemsex drug use as well as the specific drugs used between countries, with most men reporting chemsex being resident in the UK and the lowest number residing in Italy. Existing published data of HIV-positive MSM reports similar chemsex prevalence in the UK [6] and Spain [4]. In Italy, despite the smaller sample than in other centres in this study, the chemsex prevalence was comparable to other Italian data: a survey of sexual health clinic attenders at San Gallicano in Rome reported similar recreational drug use in MSM of 39.8% with the most commonly used 'sex drug' in MSM being cocaine (13%) [19].

A major, novel finding of this study consists of self-reported impacts and harms of chemsex among HIV-positive MSM. The most commonly reported impacts were unwanted side-effects in 40.6% of participants. Of those engaging in chemsex, 21.2% reported symptoms of drug withdrawal and a concerning percentage reported overdose (7.3%) and non-consensual sex (6.0%). Around one-quarter reported negative impacts on work, friends/family and relationships. The harms experienced in the context of chemsex were remarkably similar across all four countries, despite differing patterns of drugs used, suggesting that, irrespective of reported prevalence of chemsex use, needs and impacts are similar. In addition, our analysis demonstrates that engagement in chemsex adversely affects sexual health (associated with more self-reported STIs, both bacterial and viral, including hepatitis C, and associated with being more unhappy with one's sex life) and potentially HIV management through missed ART doses. In addition, those engaging in chemsex were more likely to have a greater number of sexual partners and to engage in fisting. These associations are consistent with existing published data from around the world [2–4,6,7,13].

A second major finding is that a minority of those engaging in chemsex self-reported having accessed support for their chemsex. Overall, only one in seven participants had accessed professional support services, with variability between countries from 19% in the UK to 5% in Italy; two-thirds found these services met their needs. The difference between countries may reflect the difference in provision of support in participating centres from no service (Rome) to an in-clinic specific chemsex support service (56 Dean Street) (Table S1).

Slamsex was uncommon in Greece (4.7%), Spain (2.9%) and Italy (1.3%) but more common in the UK, at 13.3% of those surveyed. The EMIS survey 2017 of European MSM reported that 1.2% had injected drugs in the previous 12 months, in a similar pattern to our data – most commonly crystal methamphetamine (52%) and mephedrone (31%) [15]. The lower prevalence of injecting drug use in the EMIS survey may reflect a lower proportion of known HIV-positive respondents (10%) [15].

It is notable that all rates of harms were more likely to be self-reported in slamsex users than in those engaging in chemsex who did not inject (Tables S3 and S4). In particular, 18% of those reporting slamsex had accessed emergency medical care in relation to their drug use in the previous 12 months compared with 3% of participants who reported chemsex but who did not inject drugs.

There are very few published studies on slamsex and many have a small sample of those engaging in slamsex (e.g. the Positive Voices study with 34) [6,20] and a strength of this study is that it has a larger subset, with 104 slamsex users.

This survey examined a selected group of HIV-positive MSM engaged with clinical services so caution should be used in drawing conclusions about recreational, chemsex and slamsex prevalence in each of the four countries. This is especially the case for Greece and Italy where only one centre in each country was surveyed. In particular, the eligible cohort at Tor Vergata was small as recruitment was

TABLE 5 Univariate and multivariate odds ratios exploring the factors associated with using chemsex

	Univariable OR (95% CI)		Multivariable aOR (95% CI)		Multivariable (ART only) aOR (95% CI)	*p*
Country						
UK		<0.0001		<0.0001		<0.0001
Italy	0.28 (0.17–0.46)		0.28 (0.16–0.49)		0.24 (0.13–0.45)	
Greece	0.49 (0.36–0.66)		0.47 (0.33–0.66)		0.49 (0.34–0.70)	
Spain	0.61 (0.46–0.81)		0.70 (0.51–0.97)		0.71 (0.51–0.99)	
If on ART, number of missed doses in past 2 weeks						
0		< 0.0001				0.002
1–2	2.01 (1.49–2.70)				1.66 (1.17–2.36)	
≥3	2.85 (1.57–5.18)				2.54 (1.30–4.97)	
Unknown	1.34 (0.75–2.41)				1.45 (0.73–2.85)	
Bacterial STI in past 12 months[a]						
No		< 0.0001		< 0.0001		< 0.0001
Yes	3.55 (2.78–4.54)		2.35 (1.77–3.12)		2.26 (1.69–3.03)	
Unknown	1.97 (1.04–3.73)		2.77 (1.24–6.20)		2.50 (1.05–5.91)	
Ever had hepatitis C?						
Yes		< 0.0001		0.002		0.007
No	1.93 (1.35–2.74)		1.70 (1.12–2.57)		1.67 (1.09–2.56)	
Unknown	0.37 (0.13–1.05)		0.20 (0.06–0.71)		0.20 (0.04–0.97)	
Number of sexual partners in the previous 12 months						
0		< 0.0001		< 0.0001		< 0.0001
1	2.82 (0.37–21.33)		2.89 (0.38–22.12)		2.77 (0.36–21.27)	
2–3	6.14 (0.82–46.17)		4.70 (0.62–35.85)		4.69 (0.61–35.92)	
4–5	10.32 (1.37–77.49)		6.97 (0.91–53.16)		6.29 (0.82–48.14)	
6–10	11.64 (1.55–87.58)		7.34 (0.96–56.09)		7.23 (0.94–55.44)	
>10	21.97 (2.97–162.54)		11.61 (1.54–87.37)		10.62 (1.41–80.18)	
Blank	6.75 (0.81–56.21)		4.15 (0.30–57.17)		3.93 (0.23–68.09)	
Fisted or been fisted in past 12 months						
No		< 0.0001		< 0.0001		< 0.0001
Yes	6.43 (4.71–8.78)		4.87 (3.42–6.93)		4.74 (3.30–6.81)	
Unknown	1.26 (0.70–2.28)		2.01 (0.82–4.93)		1.71 (0.61–4.75)	
Are you happy with your sex life?						
Very happy		< 0.0001		< 0.0001		0.001
Quite happy	1.44 (1.04–2.00)		1.35 (0.93–1.96)		1.38 (0.94–2.01)	
Unsure/neutral	2.19 (1.55–3.08)		2.14 (1.45–3.17)		2.22 (1.48–3.32)	
Quite unhappy	2.14 (1.29–3.58)		1.60 (0.89–2.90)		1.54 (0.83–2.85)	
Very unhappy	3.83 (1.92–7.61)		3.39 (1.47–7.78)		3.37 (1.36–8.32)	
Unknown	1.04 (0.46–2.34)		1.27 (0.18–9.18)		1.07 (0.10–11.80)	

Note: The category 'unknown' denotes that the respondent either self-reported 'don't know' or the response was left blank.

Abbreviations: aOR, adjusted odds ratio; ART, antiretroviral therapy; CI, confidence interval; OR, odds ratio; STI, sexually transmitted infection.

[a]Bacterial STI includes chlamydia, gonorrhoea and syphilis.

slower than anticipated during the study period and so the Italian sample size was less than half that of the other countries surveyed. As the survey was a self-reported questionnaire, some of the information, such as that around sexually transmitted infections, is likely to be less accurate than that from medical record review. We lack data on the numbers of individuals approached who declined to participate and although we attempted to offer

the survey systemically as described we cannot rule out selection bias. In all four countries, the sample comprises HIV-positive MSM in predominantly large urban centres with big gay communities (London, Madrid, Barcelona, Athens, Rome) and hence findings may not be directly generalizable to the broader MSM population in Europe. This study did not explore the motivations for participants to access (or not) professional services for their chems. As the majority of people did not access chemsex services, it would be important to explore further why this is the case.

This project has not been able to comment on health outcomes such as hospital admissions related to engagement in chemsex, GP and emergency department attendances and morbidity and mortality. A next step might be to follow up a cohort of those engaging in chemsex, and in particular those who inject, to document such outcomes as well as attendance at chemsex support services to find out the effect of drug use on individuals' health and the health services they attend.

In conclusion, this study indicates the particular importance of sexual health and psychological needs of HIV-positive MSM engaging in chemsex, paying particular attention to those engaging in injecting drug use practices.

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CONFLICT OF INTEREST

GW reports personal fees from Gilead, MSD and ViiV outside the submitted work. JIB reports grants and personal fees from Gilead, personal fees from ViiV healthcare, personal fees and non-financial support from MSD, outside the submitted work. PP reports personal fees from Gilead, Janssen, MSD and ViiV, outside the submitted work. AM reports personal fees from BMS, Gilead, ViiV and Janssen, grants, personal fees and non-financial support from MSD, personal fees and non-financial support from Abbvie, outside the submitted work. The other authors report no conflict of interest.

AUTHOR CONTRIBUTIONS

GGW and KC conceived the project. GGW, KC, AB and DS wrote and trialled the survey tool. HO cleaned and performed statistical analysis of the data. All authors contributed to recruitment of participants and the writing of the draft for publication.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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