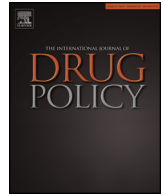




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Research paper

Illicit drug use among gay and bisexual men in 44 cities: Findings from the European MSM Internet Survey (EMIS)



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ABSTRACT

Background: Anecdotal evidence suggests that men who have sex with men (MSM) are increasingly combining sex and illicit drugs (an activity referred to as 'chemsex'), in particular GHB/GBL, ketamine, crystal meth, or mephedrone (here called 4-chems). Use of such drugs has been associated with mental health and sexual health harms. We aim to compare patterns of illicit drug use among MSM in 44 European urban centres.

Methods: In 2010, EMIS recruited 174,209 men from 38 countries to an anonymous online questionnaire in 25 languages. As harm reduction services for drugs and sex are organised at a local level, we chose to compare cities rather than countries. We defined 44 cities based on region/postal code and settlement size. For multivariable regression analyses, three comparison groups of MSM not living in these cities were applied: MSM living in Germany, the UK, and elsewhere in Europe.

Results: Data from 55,446 MSM living in 44 urban centres were included. Use of 4-chems (past 4 weeks) was highest in Brighton (16.3%), Manchester (15.5%), London (13.2%), Amsterdam (11.2%), Barcelona (7.9%), Zurich (7.0%) and Berlin (5.3%). It was lowest in Sofia (0.4%). The rank order was largely consistent when controlling for age, HIV diagnosis, and number of sexual partners. City of residence was the strongest demographic predictor of chemsex-drug use.

Conclusion: Use of drugs associated with chemsex among MSM varies substantially across European cities. As city is the strongest predictor of chemsex-drug use, effective harm reduction programmes must include structural as well as individual interventions.

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Introduction

Illicit drug use among men who have sex with men (MSM) is higher than among age comparable non-MSM (Office for National Statistics (United Kingdom), 2014). While the use of opiates among MSM has typically been low (Bourne, 2012), stimulants such as amphetamines (speed), cocaine and ecstasy/MDMA have been commonplace on gay scenes in many European cities for decades, as have poppers (various alkyl nitrites, including amyl nitrite). There is little evidence to suggest an increase in the proportion of

European MSM using illicit drugs (Bochow, Lenuweit, & Schmidt, 2011; Keogh et al., 2009; Schmidt & Bochow, 2009). However, reports from health and social care providers in several countries suggest increasing use of four newer drugs: the stimulants crystal methamphetamine and mephedrone (a synthetic amphetamine), as well as the dissociative anaesthetics ketamine and gamma-hydroxybutyrate/gamma-butyrolactone (GHB/GBL) (Daly, 2013; Drugscope, 2014; Kirby & Thornber-Dunwell, 2013; Stuart, 2013). These newer drugs possess similar properties to the earlier drugs in terms of increased heart rate, sociability and feelings of euphoria. Like existing stimulants (amphetamines and cocaine), the two newer stimulants (crystal meth and mephedrone) can also enhance sexual arousal and eroticism (Toates, 2009). This has led to their use in sexual contexts, a behaviour known colloquially as 'chemsex' (also called 'Party and play', sometimes abbreviated to 'PnP').

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Motivations for chemsex include enhanced sexual confidence, longevity of contact and an ability to push sexual boundaries (Weatherburn, Hickson, Reid, Torres-Rueda, & Bourne, 2016). Chemsex typically takes place in private homes (facilitated by smart-phone geospatial networking apps) and also in sex-on-premises venues, such as gay saunas or sex clubs (Bourne, Reid, Hickson, Torres-Rueda, & Weatherburn, 2015). Polydrug use is common, as are prolonged sexual sessions, often involving multiple sexual partners. Potential harms include sex that carries a risk of HIV/STI transmission, acute mental distress (particularly from intensive crystal methamphetamine use), and overdosing, especially on GHB/GBL (Bourne, Reid, Hickson, Torres-Rueda, Steinberg et al., 2015; Bourne, Reid, Hickson, Torres-Rueda, & Weatherburn, 2015; Foureur et al., 2013).

Overdose on GHB/GBL typically results in a state of unconsciousness (colloquially known as a ‘G-sleep’) and can lead to respiratory depression or choking. A number of GHB/GBL related deaths have been reported in gay sex-on-premises venues in London, Cologne, Berlin and other European cities (Fieguth, Albrecht, Weller, Kuhnle, & Teske, 2009).

Travel across Europe is common among MSM, both temporarily for clubbing and socialising, and for more permanent migration (The EMIS Network, 2013). Brussels, Paris, London, Amsterdam, Cologne, Berlin, Madrid, and Rome have been highlighted as examples of the connectedness of the organised circuit-party culture that establishes a “continuum between psychotropic experiences and the manifestations of intense multi-partner sexuality” (Gaissad, 2013). This occurs at the circuit-parties themselves and extends to other clubs, sex clubs, saunas, and, increasingly private parties in homes and hotels. As such, there is a need to understand the patterns of drug use, and chemsex, among MSM across the European continent.

Across most of Europe, health services are organised at a city level for both drug harm reduction and sexual health services. In this paper we compare drug use across a large number of European cities, focussing on the drugs thought to be associated with chemsex: GHB/GBL, ketamine, crystal meth, or mephedrone (hereafter collectively ‘4-chems’). We compare the time-density of chemsex-drug use across major European urban centres by describing the recency with which the drugs were used within groups of men, identify where their use is most prevalent, and examine associations of 4-chems with visiting settings where sex with multiple concurrent partners is common.

In a second step, we compare the proportion of respondents who used chemsex drugs in the last 4 weeks to three comparison groups, while adjusting for relevant demographic and behavioural factors.

Methods

The European MSM Internet Survey (EMIS) was an anonymous, self-administered online survey conducted simultaneously in 25 languages across 38 countries. Inclusion criteria were: living in Europe; identifying as a man (including transgender/transsexual men) or transgender/transsexual woman; aged at or above the age of homosexual consent in their country of residence; and sexually attracted to men and/or reporting sex with a man in the last year and/or expectation of sex in the future; passing internal data consistency checks.

Men were recruited through over 230 social networking and dating websites for MSM. Typical completion time was 20 minutes. No financial incentives were given. No IP addresses were collected. The survey was accessible between 6 June and 31 August 2010. The English version of the questionnaire and further information are available at www.emis-project.eu. EMIS was approved by the Research Ethics Committee of the University of Portsmouth, UK

(REC application number 08/09:21). Detailed methods have also been published (The EMIS Network, 2013; Weatherburn et al., 2013).

Units of analysis

Men were allocated to a European city based on two pieces of self-reported data: area of residence (county, province, post-code, district, region, municipality, *département*, territory, collectivity, or *oblast*); and settlement size. Respondents with missing data on area or settlement size were excluded. To be included in the analysis a city required at least 400 EMIS respondents (except in Germany where 900 were required, EMIS having very heavily recruited in Germany). We also included Brighton (in England, n=290) due to its unique reputation as a gay urban centre, as well as Ljubljana (Slovenia, n=298) and Tallinn (Estonia, n=341) to represent these two EU member state capitals.

For multivariable regression analysis, men not residing in qualifying cities were assigned to one of three groups: other-Germany (the reference group, being the largest sub-sample), other-UK and other-Europe.

Measures

All measures were self-reported. Substance use and setting use were asked independently in separate parts of the questionnaire. Both used the Recency Scale Format.

Recency scales

Recency curves are a comprehensive way to look at time dynamics of population behaviour on the basis of cross-sectional data. The Recency Scale Format, or RSF (e.g. “When was the last time you X’ed”), was developed within the EMIS planning process. Several EMIS partners had previously run national surveys using Fixed Time Format (FTF; e.g. “Have you X’ed in the last 6 month?” or “How many times have you X’ed in the last 6 months?”), however the time periods chosen varied across countries and within countries for different events. RSF questions produce data that can be split at the timescales offered in the response set. In the case of EMIS we used a quasi-logarithmic scale: Within the last 24 h/ 7 days/4 weeks/6 months/12 months/5 years/More than 5 years ago/Never.

At the individual level the RSF does not give a measure of frequency. However, RSF produces data that can be aggregated to give cumulative proportions engaged in the event within each time period. EMIS partners therefore accepted the loss of frequency in order to have a question that would provide all partners with data comparable to their previous national surveys.

As large, low access-threshold community-based online surveys provide point-in-time pictures for a population (rather than being diagnostic tools for individuals), the RSF also brings other benefits. The RSF produces more valid data for people frequently involved in the event of concern (who are usually the group of greatest interest) than does the Fixed Time Format. For example, with FTF of a year, people involved in the event multiple times are likely to estimate their answer, while those involved a few times will better remember the precise number of events. Conversely, RSF captures the proportion who were involved in the event in the last 24 h, a property of the population, rather than any individual. Finally, with the RSF the same scale can be used for all events, reducing labelling variation and coding documentation, and increasing event comparability.

The ordinal data in RSF provides a variety of time-related information in cross-sectional designs. The exposed fraction is the cumulative proportion answering affirmatively up to and including

'more than 5 years ago'; the unexposed fraction is the proportion responding 'never'. The frequency of the event in the population involved in it is reflected in the size of the increases between time points, small increases indicating more frequent use. Newly introduced events are reflected in small or no further increases in the cumulative proportion beyond the time of introduction. Cessation of events in the population is reflected in a small proportion involved recently but a large proportion ever involved.

Settings

The settings question piped in the respondent's country of residence (given earlier in the questionnaire), as the measure was required to plan national prevention programmes. The question took the format "When did you last visit <setting> in <country of residence>?" The settings are a combination of places where health promotion actions might occur and places where men meet other men for sex.

The first 8 settings were: (1) A gay community centre, organisation or social group; (2) a gay cafe, bar or pub; (3) a gay disco or nightclub; a backroom of a bar, gay sex club, (4) a public gay sex party; (5) a gay sex party in a private home; (6) a gay sauna; (7) a porn cinema; (8) a cruising location where men meet for sex (street, roadside service area, park, beach, baths, lavatory). The final setting was phrased "AND FINALLY, APART FROM THIS TIME IN FRONT OF A COMPUTER, when did you last visit any website for gay and bisexual men including dating, information and porn sites?".

Substances

Men were asked about 16 substances, (including a set of 5 that were not illegal to possess at the time of the survey in most European countries), followed by a filter question and another set of 11 drugs (illegal to possess in most countries). Multiple names for a drug were offered where they existed.

All men were asked "How long has it been since you last consumed the following substances: Please say when you last did something, even if this was not typical for you." The item format was "When was the last time you consumed <substance>?" The first 5 substances were: Alcohol; Tobacco products; Poppers (nitrite inhalants); Viagra[®], Cialis[®], Levitra[®] or other substances that help to keep an erection; Sedatives or tranquilizers (Valium[®], Rivotril[®], Rohypnol[®]). Men were then asked "Have you EVER taken any other recreational or illicit drugs?" Those indicating yes were asked the same item format for: Cannabis, grass, weed, hash, marijuana; Ecstasy, E, XTC, MDMA; Amphetamines, speed; Crystal methamphetamine, crystal, meth, Tina; Heroin or related drugs, poppy straw, kompot, fentanyl; Mephedrone, 4-MMC, meow, bubbles; GHB, GBL, liquid ecstasy; Ketamine, special K; LSD, acid; Cocaine; Crack cocaine. The drugs are a combination of organic compounds, plant matter, synthesised plant compounds, proprietary medications, and synthesised chemicals. Their legal statuses vary across Europe.

Item selection and coding

This analysis focuses on ten of the 16 substances asked about. First a group of four substances that have recently become popularly associated with MSM 'chemsex': GHB/GBL, ketamine; crystal methamphetamine; and mephedrone. We consider these separately and as a combined (any one or more of the four) '4-chems' variable. For comparison, we also consider six other substances: tobacco (legal everywhere), poppers (normalised), cannabis (very common), cocaine, amphetamines, and ecstasy/MDMA (longer-standing club/sex-drugs).

We examined associations of 4-chems with two types of sexual setting: a backroom or a bar, gay sex club, or a public gay sex party; and a gay sex party in a private home.

Analysis

Associations are represented by adjusted odds ratios (AOR) with 95% confidence intervals. For multivariable regression, the primary outcome was having used any of the 4-chems in the last 4 weeks. We adjusted for known confounders such as age and HIV diagnosis (Bracchi et al., 2015; Fernández-Dávila, 2016; Melendez-Torres et al., 2016; Petersson, Tikkanen, & Schmidt, 2016; The EMIS Network, 2013), and, in addition, for the number of sexual partners, to control for possible recruitment biases and ensure that a higher likelihood of chemsex drug use was not a consequence of recruiting men with more sexual partners.

In EMIS, the sites recruiting the largest numbers of men varied by country. Therefore the most common recruitment sites also differ by city. Because countries and respective recruitment sites were strongly associated, we could not include recruitment site in the overall regression analysis. However, in order to examine the influence of recruitment site on drug use, we ran two separate sensitivity analyses among respondents living in Germany and the UK, in each including recruitment site as an additional variable.

Results

EMIS recruited 174,209 qualifying MSM. We excluded 13,257 men (7.6%) missing area of residence and/or settlement size, leaving an analytic sample of 160,952 MSM (including 572 individuals identifying as transgender). We identified 44 cities, shown in Table 1. Together these 44 cities were home to 55,446 respondents (34.4% of the analytic sample). The remaining 105,506 men were distributed between other-Germany (n = 36,609), other-UK (n = 8,291) and other-Europe (n = 60,606).

Recency of use of eleven drugs across Europe

Fig. 1 shows the cumulative proportion of men in the entire 44 cities sample who had used each of ten aforementioned substances (tobacco, cannabis, poppers, amphetamines, cocaine, ecstasy/MDMA, GHB/GBL, ketamine, crystal methamphetamine, mephedrone), and alcohol. For comparison it also shows the proportion having had sex with a man within the same time periods.

Sex and alcohol consumption show recency curves typical for, near universal, regular but not daily behaviours. Prevalence in the last 24 h is high (approximately 25% and 40% respectively) and rise steeply such that over 80% had engaged in the past 4 weeks and over 90% in the last 6 months.

In contrast the tobacco curve exemplifies a common (but not universal), regular and near daily behaviour. Prevalence in the last 24 h again starts high (at 40%) but rises modestly to just over 50% in the past 6 months. The majority of men who smoked in the past 6 months also smoked in the past 24 h.

Poppers and all of the illicit drugs show similar patterns of uncommon, irregular use, differing in the prevalence of usage. A low starting point and steady increase suggest substantial minorities of MSM with infrequent use.

Apart from alcohol and tobacco, poppers and cannabis had most men using at every time-point. The substance with the smallest proportion of users was crystal methamphetamine, with fewer than 5% having used it in the past 4 weeks.

The recency of any sex with another man looks markedly different from all the drug curves, suggesting the two behaviours (drug use and sex) are unrelated at the population level. While

Table 1

Use of any of 4-chems (GHB/GBL, ketamine, crystal meth and/or mephedrone) in the last four weeks across 44 European cities, and three groups living outside those cities.

City	N	%	p	AOR ^a	95% confidence interval	
German comparison (DE) ^b	36,609	1.2	Reference	1.00		
UK comparison	8,291	4.1	0.000	3.46	2.98	4.02
Other European comparison	60,606	1.8	0.000	1.44	1.29	1.62
Brighton (UK)	290	16.3	0.000	10.69	7.52	15.20
Manchester (UK)	586	15.5	0.000	10.61	8.15	13.82
London (UK)	4,816	13.1	0.000	8.28	7.25	9.46
Amsterdam (NL)	957	11.2	0.000	5.62	4.44	7.13
Barcelona (ES)	1,946	8.0	0.000	4.36	3.56	5.32
Zurich (CH)	1,009	7.0	0.000	3.82	2.91	5.03
Valencia (ES)	422	4.3	0.000	3.11	1.89	5.10
Dublin (IE)	882	4.4	0.000	3.06	2.16	4.34
Madrid (ES)	2,630	5.0	0.000	2.97	2.41	3.66
Berlin (DE)	5,920	5.3	0.000	2.89	2.48	3.37
Brussels (BE)	1,192	4.3	0.000	2.63	1.94	3.56
Rome (IT)	1,578	4.0	0.000	2.62	1.98	3.46
Warsaw (PL)	818	3.7	0.000	2.57	1.75	3.79
Paris (FR)	3,412	5.1	0.000	2.52	2.09	3.04
Budapest (HU)	1,158	3.2	0.000	2.51	1.77	3.58
Vienna (AT)	1,671	3.6	0.000	2.46	1.86	3.26
Riga (LV)	418	2.4	0.010	2.32	1.22	4.41
Cologne/Bonn (DE)	2,168	3.8	0.000	1.99	1.55	2.55
Prague (CZ)	864	2.4	0.005	1.91	1.21	3.00
Bologna (IT)	492	3.3	0.015	1.91	1.13	3.20
Birmingham (UK)	338	3.0	0.054	1.89	0.99	3.63
Milan (IT)	1,657	3.4	0.000	1.81	1.35	2.42
Lyon (FR)	436	2.8	0.081	1.69	0.94	3.06
Ljubljana (SI)	298	1.7	0.313	1.59	0.65	3.90
Munich (DE)	2,144	2.5	0.003	1.57	1.17	2.10
Frankfurt (DE)	1,250	2.6	0.046	1.47	1.01	2.14
Helsinki (FI)	657	1.7	0.282	1.40	0.76	2.57
Copenhagen (DK)	696	2.6	0.193	1.38	0.85	2.25
Halle/Leipzig (DE)	984	1.7	0.242	1.36	0.82	2.26
Stockholm (SE)	1,160	1.6	0.318	1.27	0.80	2.03
Moscow (RU)	1,609	2.1	0.208	1.26	0.88	1.82
Hamburg (DE)	2,143	2.0	0.211	1.23	0.89	1.70
Oslo (NO)	763	1.4	0.538	1.21	0.66	2.23
Lisbon (PT)	1,537	1.7	0.733	1.08	0.71	1.64
Turin (IT)	539	1.3	0.539	0.79	0.37	1.69
Athens (GR)	1,406	1.5	0.292	0.78	0.50	1.24
Porto (PT)	562	0.9	0.381	0.67	0.28	1.64
Tallinn (EE)	312	0.6	0.511	0.63	0.16	2.53
Bucharest (RO)	629	0.8	0.271	0.61	0.25	1.48
Belgrade (RS)	442	0.7	0.311	0.55	0.176	1.739
Istanbul (TR)	991	0.7	0.095	0.53	0.25	1.12
Kiev (UA)	514	0.6	0.157	0.44	0.14	1.37
Sofia (BG)	483	0.4	0.134	0.34	0.09	1.39
St Petersburg (RU)	667	0.5	0.057	0.33	0.11	1.04
Age <25	38,867	1.8	Reference	1.00		
Age 25–39	79,151	3.1	0.833	0.99	0.90	1.09
Age 40+	42,934	3.0	0.000	0.69	0.63	0.77
No HIV diagnosis	147,933	2.0	Reference	1.00		
Diagnosed HIV	11,949	12.5	0.000	4.96	4.61	5.33
No sexual partner (last 12 months)	13,956	1.1	Reference	1.00		
One	30,508	0.9	0.346	0.91	0.74	1.11
2–5	48,034	1.4	0.001	1.36	1.14	1.64
6–10	25,345	2.5	0.000	2.20	1.83	2.65
10+	40,728	6.5	0.000	4.73	3.98	5.62

Bold AORs indicate those that are significantly different from the German comparison group.

^a Adjusted odds ratio (AOR).^b Comparison groups: EMIS respondents living in Germany (DE) but outside the presented cities (=Reference); EMIS respondents living in the UK, and elsewhere in Europe but outside the presented cities.

using drugs may often be accompanied by having sex, the majority of sex does not feature drugs.

Recency of 4-chems in 44 cities

Fig. 2b–k shows the recency curves for ten specific drugs in the 12 cities with the highest use of that drug in the past 4 weeks and

the one city with the lowest use. Fig. 2a shows the same for the 4-chems as a group.

For tobacco (Fig. 2k), the city with the lowest use was Birmingham, and the top twelve cities were all in Eastern Europe, including the East German agglomeration of Halle/Leipzig.

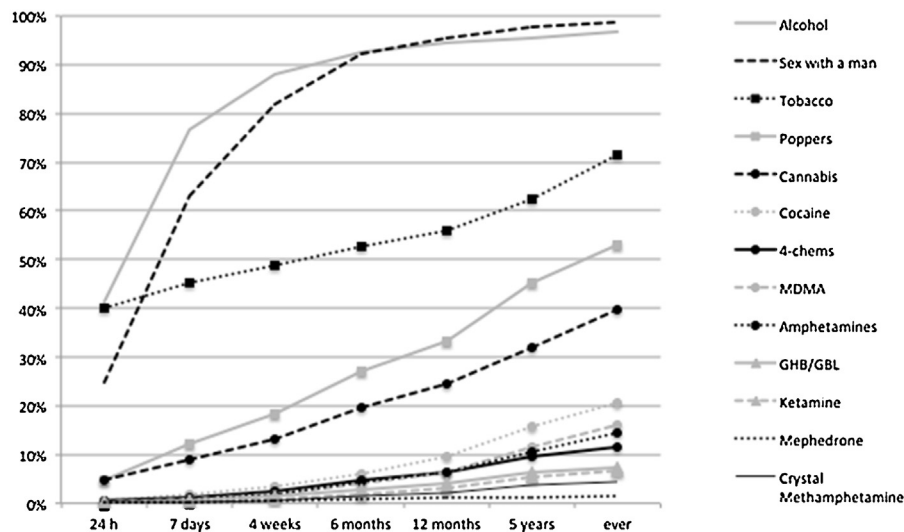


Fig. 1. Cumulative median (44 cities) recency (%) of use of 11 individual substances, 4-chems, and sex with a man.

For all drugs except tobacco, the city with the smallest proportion of users is located in South-East Europe (Sofia, Belgrade, or Istanbul).

Use of 4-chems was particularly prevalent in three UK cities (Brighton, Manchester and London), Amsterdam, and the three Spanish cities (Barcelona, Madrid, and Valencia). These seven cities appear among the top twelve cities for all four of the 4-chems (Fig. 2a–e), as well as for cocaine and (with the exception of Valencia) ecstasy/MDMA (Fig. 2g–h). This contrasts with the use of amphetamines, which is most common in German and other central European cities (Fig. 2i).

The large increase in the use of ketamine between 12 months and 5 years ago (Fig. 2c) in UK cities, Spanish cities, and Amsterdam suggests widespread cessation of use about a year before the survey (2010).

For mephedrone (Fig. 2d), there is a wide gap between UK cities and other cities, suggesting the substance started to be used in the UK about a year before the survey, but was very uncommon elsewhere in Europe at the time of data collection in 2010.

The substance with the smallest proportion of users was crystal methamphetamine (Fig. 2e), with less than 5% of MSM in total having used it in the past 4 weeks. Its use was highest in London and Spanish cities. Of note, this is one of the few substances where Eastern European cities such as Prague and Riga entered the top 12, although its use was still uncommon.

Compared to the differences across cities in the commonality of drugs, that for sex with a man (Fig. 2l) is much smaller (i.e. in the figure the lines are more tightly bunched), suggesting that sex, unlike drug use, is not as strongly determined by city of residence.

Comparing use of 4-chems in 44 cities with national comparison groups

Men in EMIS who did not live in these 44 cities were termed the comparison group, and split into those living in Germany (the largest national sub-group), those living in the UK, and those living elsewhere in Europe.

We applied a multivariable regression model, comparing the 44 city sub-samples with three comparison groups, adjusting for differences in age, history of HIV diagnosis, and the number of sexual partners.

Men aged 25 to 39 years did not differ from younger men, but men aged forty years or older had a 31% reduced odds for chemsex-drug use in the past 4 weeks. HIV diagnosis was strongly associated

with chemsex-drug use (AOR=4.96), as was having 10 or more sexual partners in the previous 12 months (AOR=4.73 when compared to no sexual partners). The odds for 4-chems use steadily increased with the number of sexual partners.

In the sensitivity analyses, recruitment site was not significantly associated with chemsex-drug use in either Germany ($p = 0.999$) or the UK ($p = 1.000$).

The strongest independent demographic predictor for chemsex-drug use was the city of residence. About one per cent of MSM in the German comparison group reported chemsex-drug use in the past 4 weeks. Compared to the German comparison group, MSM living in the UK cities of Brighton, Manchester, and London had an 8- to 11-fold higher odds for having used 4-chems in the past 4 weeks. These were followed by Amsterdam (AOR=5.62), Barcelona (AOR=4.36), Zurich (AOR=3.82), Valencia (AOR=3.11), Dublin (AOR=3.06), Madrid (AOR=2.97), and Berlin (AOR=2.89).

In about half of the cities, use of 4-chems was not significantly higher than in the German comparison group. Men in the UK comparison group were over three times more likely to have used 4-chems than were men living in the German comparison group.

Setting use and chemsex-drug use

Visiting a back-room, gay sex club or public sex party (hereafter sex-on-premises-venues, SOPVs) in the previous 4 weeks was particularly common in Amsterdam (28.1%), Berlin (25.3%), Zurich (24.8%), Barcelona (23.3%), Paris (23.1%), Madrid (20.7%), Cologne/Bonn (20.6%), Bologna (19.6%), Vienna (19.5%), and Brussels and Milan (19.2%); and least common in Ljubljana (2.3%), Bucharest (2.2%), and Belgrade (0.7%). As the setting use questions were restricted to respondents' country of residence, the proportions were very small in cities where such venues are rare or absent.

Private sex parties compensate for the unavailability of SOPVs and complement their availability. Accordingly, Eastern European cities with less visible gay leisure sex businesses appeared in the highest-ranking positions for men attending a private sex party in the past 4 weeks. However, use of this setting was also particularly common in Sofia (10.1%), Manchester (9.2%), Amsterdam (9.0%), Brighton (9.0%), Paris (8.7%), Moscow (8.4%), Madrid (8.3%), Warsaw (8.1%), Kiev (8.1%), Barcelona (8.0%), London (7.9%), and Zurich (7.7%).

In the Amsterdam subsample, 59% of those who attended a private sex party in the past 4 weeks reported chemsex-drug use in the same time-period (not necessarily in the same event). In

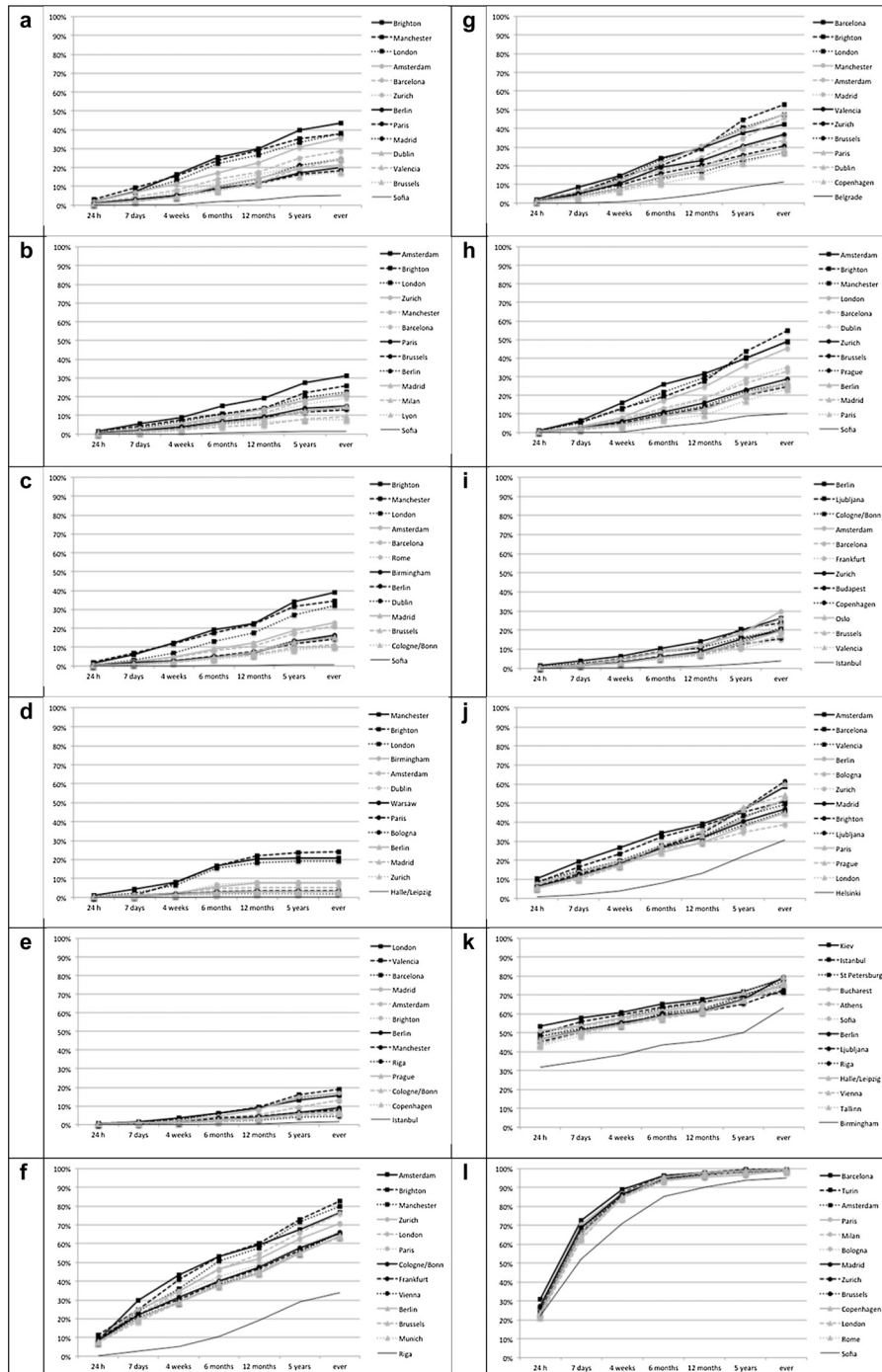


Fig. 2. Cumulative recency (%) of substance use among MSM in the 12 European cities where use (in the past 4 weeks) was highest and the one city where use was lowest. *Left:* (a) 4-chems (any of b–e); (b) GHB/GBL; (c) ketamine; (d) mephedrone; (e) crystal meth; (f) nitrite inhalants (Poppers). *Right:* (g) cocaine; (h) MDMA; (i) amphetamines; (j) cannabis; (k) tobacco; (l) sex with a man.

London, Barcelona, and Berlin, the respective proportions were 43%, 30%, and 24%.

The differences between cities in recency of chemsex-drug use remained when considering only MSM who recently visited an SOPV (Fig. 3a), or a private sex party (Fig. 3b).

Discussion

This paper examines the use of alcohol and drugs among MSM in 44 major European cities in 2010, with a particular focus on the 4-chems (crystal meth, mephedrone, GHB/GBL, and ketamine).

Adjusting for age, HIV diagnosis and number of sexual partners, we observed substantial city-level variation in the proportions of MSM using 4-chems. Use of 4-chems was particularly prevalent in UK cities, Amsterdam, and Spanish cities. Men who recently visited private sex parties had the highest proportions of chemsex-drug use, with about 50% of such men in London and Amsterdam.

The legal and commonly available drugs alcohol and tobacco were by far the most commonly used drugs, and tobacco in particular was likely to be causing more harm to MSM public health than any other substance. Men with HIV who smoke will

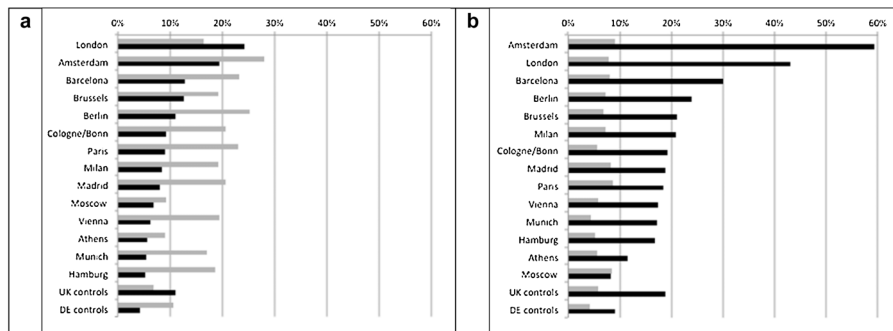


Fig. 3. Use of 4-chems among (a) users of backrooms/sex club/public sex parties, and (b) users of private sex parties.

Grey bars: (a) % of EMIS respondents visiting a back-room, a gay sex club or a public sex party in the past 4 weeks; (b) % of EMIS respondents visiting private sex party in the past 4 weeks. Black bars: use of GHB/GBL, ketamine, crystal meth, and/or mephedrone in the past 4 weeks among MSM in the respective sub-group.

lose more life years to smoking than they will to HIV (Helleberg et al., 2013).

Many MSM who use drugs have unmet harm reduction needs (Bourne, Reid, Hickson, Torres Rueda, & Weatherburn, 2014; Foureur et al., 2013). Drug services across the continent are typically organised to meet the needs of opiate users and may not have the skills or resources to engage with MSM about a much broader range of drugs, which are often taken in sexual settings that drug service staff may be unfamiliar with. This data may be valuable to organisations – both MSM specific and generic – in those countries of highest drug use prevalence who are seeking to develop services to meet the specific needs of this population.

However, that city of residence is so strongly associated with drug use should point us towards structural drivers for drug use and hence structural interventions, rather than solely psychological explanations and psychotherapeutic interventions, if we wish to change drug use patterns at the level of populations of MSM.

Such structural drivers could be differences in drug availability due to difference in drug production, trafficking, and distribution; differences in national, regional, or local norms and cultures around drug use, or both.

One particular strength of this analysis is that sub-samples of MSM residing in different European cities can be compared, even if EMIS data is not representative for MSM in Europe. Our sensitivity analyses (data not shown) suggested that recruitment site had no influence on the findings, e.g. no differences could be seen in the UK when comparing respondents recruited through Gaydar, Manhunt, or PlanetRomeo.

Compared to all MSM, our estimates for drug use are likely to be over-estimates, given we recruited on gay dating sites and drugs are associated with gay socio-sexual scenes. However, the overall high proportion of self-reported use of nitrite inhalants suggests that drug use among our respondents is not under-reported. Large representative samples of MSM are practically unfeasible (Prah et al., 2016). Given the EMIS sample size, these findings represent the best available estimates for drug use among MSM in Europe in 2010. Of note, these findings are on drug use, not problematic drug use or drug dependence. Proportions of MSM with *problematic* drug use would be smaller than the proportions presented in this paper.

Our study is limited in that data was collected in the summer of 2010, since when patterns of drug use may have changed. Mephedrone, in particular, may now be far more ubiquitous, having only recently reached the UK market in 2009. However, more recent increases in use of crystal meth or other chemsex drugs in the UK and Germany appear minor or absent (Drewes & Kruspe, 2016; Hickson, Reid, Hammond, & Weatherburn, 2016; Melendez-Torres et al., 2016)

In the Spanish-speaking sub-sample, use of crystal-meth might be overestimated, as ecstasy/MDMA in Spanish is also known as *cristalina*. However, among MSM living in Spain, we found no significant differences by language of survey completion, in the proportions using crystal-meth.

Another limitation is that use of chemsex drugs is only a proxy, but not the same as, engagement in chemsex itself. Some of the 4-chems use will be unrelated to sex.

Last but not least, another limitation lies within the definition of cities. The geographic areas of the included cities vary slightly due to differences in the geographic resolution of postal codes or national sub-regions. We addressed this problem by including self-reported settlement size in the definition of cities. However, even when doing this, the crudeness of residence measures (e.g. the German 2-digit postal code) did not allow separating German agglomerations such as Cologne/Bonn, or Halle/Leipzig. Small differences between cities should thus not be over-interpreted.

Conclusions and implications

Use of drugs associated with sex between men varied substantially across European cities in 2010. A minority of MSM had experience of chemsex drugs. In all European cities, fewer than 20% of men had used any of 4-chems in the four weeks preceding the survey, and less than 5% had used crystal methamphetamine.

Drug addiction counselling and treatment as well as harm reduction services for MSM using chemsex drugs should be made available and should be advertised in cities with respective drug use patterns. They can be integrated with STI, mental health (such as <http://www.chemsexsupport.com>), or drug-checking services (such as www.saferparty.ch) or at least have clear referral pathways between them.

Drug use patterns appear to be culturally and socially determined, as the city (and country) of residence was the strongest predictor for recent use of chemsex drugs. This suggests structural interventions are required to change the pattern of drug use at the population level.

Contributions

Axel J. Schmidt coordinated the European MSM Internet Survey and the EMIS Network, performed the statistical analyses and drafted the manuscript. Adam Bourne advised on and contributed to the manuscript. Peter Weatherburn coordinated the survey promotion and contributed to the manuscript. David Reid was responsible for the technical implementation of the online survey, managed the databases and contributed to the manuscript. Ulrich

Marcus instigated EMIS and contributed to the manuscript. Ford Hickson introduced the concept of recency graphs in EMIS, oversaw the on-line implementation of the survey and contributed to the manuscript.

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The EMIS Network

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Conflict of interest

None.

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