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**Citation** (please note it is advisable to refer to the publisher's version if you intend to cite from this work)

**Hibbert, MP, Brett, CE, Porcellato, LA and Hope, VD (2019) Psychosocial and sexual characteristics associated with sexualised drug use and chemsex among men who have sex with men (MSM) in the UK. Sexually Transmitted Infections. ISSN 1368-4973**

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**Psychosocial and sexual characteristics associated with sexualised drug use  
and chemsex among men who have sex with men (MSM) in the United  
Kingdom**

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**Word count: 2,997**

## **Abstract**

**Objectives:** To understand how the emerging public health issue of chemsex relates to broader patterns of sexualised drug use (SDU) among men who have sex with men (MSM), which has been understudied.

**Methods:** Potential participants were invited to take part in an anonymous cross-sectional online survey through Facebook advertising and community organisations' social media posts (April-June 2018). Multivariable logistic regression was used to compare MSM who engaged in recent SDU (past 12 months) with those who did not, and those who engaged in chemsex (GHB/GBL, crystal methamphetamine, mephedrone, ketamine) with those who engaged in other SDU (e.g. poppers, cocaine, cannabis).

**Results:** Of the 1,648 MSM included: 41% reported recent SDU; 15% of these (6% of total, n=99) reported chemsex. Factors associated with SDU were recent STI diagnosis (aOR=2.44, 95%CI 1.58-3.76), sexual health clinic attendance (aOR=2.46, 95%CI 1.90-3.20), image and performance enhancing drug use (aOR=3.82, 95%CI 1.87-7.82), greater number of condomless anal male partners, lower satisfaction with life and greater sexual satisfaction.

Predictors of chemsex compared to other SDU were: not being UK-born (aOR=2.02, 95%CI 1.05-3.86), living in a densely populated area (aOR=2.69, 95%CI 1.26-5.74), low sexual self-efficacy (aOR=4.52, 95%CI 2.18-9.40) and greater number of condomless anal male partners. Living with HIV, taking PrEP and experiencing or being unsure of experiencing sexual contact without consent were significantly associated with SDU and chemsex in bivariate analyses but not multivariable.

**Conclusion:** Health and behavioural differences were observed between MSM engaging in chemsex, those engaging in SDU, and those engaging in neither. Whilst some MSM engaging in chemsex and SDU appeared content with these behaviours, the association with life

satisfaction and sexual self-efficacy indicates psychosocial support is needed for some. The association with sexual risk and sexual consent also indicates the importance of promoting harm reduction among this population (e.g. condoms, PrEP, drug knowledge).

## Introduction

The use of drugs among men who have sex with men (MSM) has historically been researched in the context of the HIV epidemic, due to the increased sexual risk as well as the increased risk of blood borne viruses associated with needle sharing when injecting drugs.[1, 2] Sexualised drug use (SDU) refers to the use of drugs before or during sex to facilitate or enhance sexual activity, pleasure or intimacy. Estimates of the prevalence of SDU among MSM vary greatly depending on definition, measurement and recruitment methods used.[3] Chemsex (sometimes referred to as ‘party and play’) is a particular form of SDU among MSM where men engage in sex for long periods of time, with multiple sexual partners, with crystal methamphetamine,  $\gamma$ -hydroxybutyrate/ $\gamma$ -butyrolactone (GHB/GBL), mephedrone, cocaine and/or ketamine taken immediately before or during sex.[4] The rise of chemsex as a public health issue may be due to an increase in the number of people engaging in this behaviour and its associated sexual risk taking, which has been reported by sexual health services and men who engage in chemsex,[5, 6] both suggesting geospatial networking applications and online sites to meet sexual partners have enabled this increase. Quantitative research has also found a higher use of ‘barebacking’ (condomless sex) geospatial sexual networking applications among MSM engaging in chemsex.[7]

The European MSM Internet Survey (EMIS) found that the three European cities with the highest prevalence of the use chemsex associated drugs were Brighton (16.3%), Manchester (15.5%) and London (13.2%).[8] Behaviourally, engaging in chemsex has been associated with more sexual partners, group sex, condomless anal intercourse, fisting, sharing sex toys, injecting drug use and higher alcohol consumption.[4, 7, 9] Whilst MSM reporting chemsex are more likely to be living with HIV, MSM who do not have HIV and report engaging in chemsex are more likely to have accessed post-exposure prophylaxis (PEP).[7, 10] In Amsterdam, a higher proportion of MSM engaging in chemsex were taking pre-

exposure prophylaxis (PrEP) compared to MSM not engaging in chemsex.[11] Among MSM living with HIV, illicit drug use has been associated with reduced antiretroviral therapy (ART) adherence and a detectable viral load, making transmission of HIV possible, and polydrug use was associated with increased condomless anal intercourse with a serodiscordant partner.[12, 13] When MSM have specified particular drug use, GHB, crystal methamphetamine, and non-chemsex related drugs (e.g. erectile dysfunction drugs, poppers) have been associated with condomless anal intercourse among MSM in England.[14]

Reasons for engagement in chemsex that have been suggested in qualitative interviews are the stigma around HIV, internalised homophobia, and the intense sexual experience of chemsex.[15] However, quantitative research recruiting MSM through Facebook advertising did not find an association between internalised homophobia, experiences of discrimination, and sex under the influence of drugs in the UK.[16] Research to date into understanding SDU and its associated implications for sexual health has had a focus on health protection and health promotion, whereas the impact on mental health and psychological wellbeing has been somewhat neglected. During qualitative interviews with MSM engaging in chemsex in London, it was reported that chemsex was having an impact on some men's personal relationships and professional conduct.[17] In Australia, being dependent on methamphetamine was associated with depression and anxiety compared to non-dependant users, but this was not measured in a sexual context.[18] In Dublin, a quarter of MSM attending a sexual health clinic reported that chemsex was having a negative impact on their lives, 17% reported losing consciousness whilst engaging in chemsex, and 6% reported their partners had lost consciousness,[19] and MSM have reported in qualitative interviews feeling uncomfortable in these situations, due to issues regarding a person's ability to consent to sex.[17]

Research into chemsex and other forms of SDU among MSM in the UK to date has mostly been situated in urban areas and/or sexual health clinics.[3] To inform public health responses, this study examines both chemsex and SDU across the UK, comparing differences in sexual and psychosocial characteristics between MSM who do not engage in any forms of SDU, those who engage in SDU, and those who engage in chemsex.

## **Method**

### Design

This analysis uses data from a sample of MSM recruited via a national cross-sectional online questionnaire aimed at LGBT people aged 18 or over in the UK. Ethical approval for this study was obtained by the Liverpool John Moores University Research Ethics Committee (approval reference: 18/PHI/011). A convenience sample was obtained using sponsored Facebook advertising and promotion on social media via relevant LGBT organisations. Four LGBT organisations across the UK promoted the survey on their social media accounts (COAST, London Friend, the Gay Men’s Health Collective and The National LGB&T Partnership). A sample size calculation using the Public Health England estimate that 2.5% of the population in England are lesbian, gay, or bisexual,[20] a margin of error of 5% and 95% confidence interval, indicated a minimum target sample size for MSM was 384.

### Participants

Four sponsored adverts were run on Facebook for 6 weeks between April-June 2018, targeting MSM, women who have sex with women (WSW), trans people, or LGBT people generally. Facebook users were shown the sponsored advert for the “Sex and Lifestyles survey” if they engaged with one or more MSM or LGBT topics on Facebook. Participants were invited to take part in the survey if they had ever had a sexual partner of the same gender and/or they identified as trans. Participants would then be directed to the online

survey and asked two screening questions, ensuring that participants were aged eighteen or over and currently lived in the UK. To aid recruitment participants had the option to enter a prize draw for a £50 or one of two £25 Amazon vouchers.

## Measures

The questionnaire was divided into three areas: demographics, sexual health and drug use, and psychological wellbeing. MSM participants were those who identified as male and who gave their sexual orientation as gay or bisexual, or who stated they had sex with men. Sexual health questions were adapted from research on similar topics.[21] Aligned with previous research, questions about drug use and SDU were asked with regards to specific drugs.[22] Participants were first asked if they had taken any of the 14 listed drugs (including alcohol) in the past 12 months. SDU was grouped as participants who had stated they had been under the influence of cannabis during sex in the past 12 months, or stated having taken amphetamine, cocaine, crack cocaine, ecstasy, heroin, GHB/GBL, ketamine, mephedrone, methamphetamine, Viagra or other erectile dysfunction drug, poppers, or another unspecified drug just before or during sex in the past 12 months. The chemsex group was defined as having taken GHB/GBL, ketamine, mephedrone and/or methamphetamine just before or during sex.

Sexual satisfaction was measured using an adapted version of the New Sexual Satisfaction Scale,[23] and sexual self-efficacy (participants' confidence in practicing safer sex consistently) was measured using a previously validated tool for use with MSM.[24] Questions regarding motivations for engaging in SDU and sex under the influence of alcohol were adapted from motivations and attitudes towards chemsex questions.[9] Psychological wellbeing was measured using a variety of previously validated scales: the Internalised Homophobia scale;[25] Objectified Body Consciousness scale to measure body image



satisfaction;[26] a 3-item loneliness scale;[27] the Satisfaction With Life Scale [SWLS; 28] and the Kessler Psychological Distress Scale.[29]

## Analysis

All analyses were conducted using SPSS 25. Forward stepwise multivariable logistic regression analyses were used to explore factors associated with engaging in SDU compared to not engaging in SDU, and factors associated with engaging in chemsex as opposed to SDU (entry  $p < 0.05$ , removal  $p > 0.10$ ). Factors significant at the univariate level ( $p < 0.05$ ) were included in the multivariable model. Descriptive chi-square analyses were used to compare motivations for and effects of engaging in, chemsex, other types of SDU, and sex under the influence of alcohol.

## Results

Of the 4,690 surveys started, 96 participants did not meet the eligibility criteria, and 1,014 did not complete the survey sufficiently to be included in analyses (completion rate of 78%). Overall, the median time taken to complete the survey was 12 minutes. Of the 3,676 participants included, 1,663 were identified as MSM, and 1,648 of these MSM (99%) had completed the drug use and sex questions to be included in the analysis. MSM who completed the survey were more likely to be university educated (53% vs. 61%,  $p < 0.05$ ), but did not differ on any other demographic variables where data were available. One MSM identified as heterosexual and was therefore not included in the analysis. The majority of MSM identified as gay/homosexual (86%), were of white ethnicity (95%), with a mean age of 30.7 (SD = 10.4, range 18-76), and 43% stated they were single/not in a relationship. Half of participants had attended a GUM clinic in the past 12 months, 4% were living with HIV, 6% were taking PrEP, and 5% reported having had sexual contact without consent in the past

12 months. There was no statistical difference between London (45%, n=121/264) and outside of London (39%, n=545/1375) for SDU, and no statistical difference between MSM reporting recent chemsex between London (11%, n=30/263) and other densely populated areas (9%, n=25/287).

SDU was reported by 41% of MSM: 28% of MSM had taken amyl nitrates (poppers) immediately before/during sex; 13% had been under the influence of cannabis during sex; 12% had taken viagra before or during sex, and 10% had taken cocaine before or during sex. Less prevalent drugs taken before or during sex were ecstasy (4%), GHB/GBL (3%), mephedrone (3%), methamphetamine (2%), ketamine (2%), amphetamines (1%), and other drug not specified (1%). GHB/GBL, ketamine, methamphetamine and mephedrone were grouped as chemsex drugs and 99 (6%) MSM had engaged in chemsex drug use just before or during sex.

Table 1 displays the multivariable analysis describing sexual and psychosocial characteristics of MSM who had engaged in any SDU in the past 12 months, compared to MSM who did not report any SDU. Due to the strong association between the number of male anal intercourse partners and number of condomless male anal intercourse partners in the past 12 months, only the latter was included in the multivariable analysis, due to greater sexual risk. Factors associated with SDU in the multivariable analysis were being aged 35 years and over, having a recent STI diagnosis, recently attending a GUM clinic, having a greater number of condomless male anal intercourse partners, recent image and performance enhancing drug use, having a lower satisfaction with life and greater sexual satisfaction.

This analysis was then repeated for factors associated with chemsex compared to other SDU in the past 12 months (Table 2). Factors associated with chemsex in the multivariable analysis were being a person of colour, living in a more densely populated area,

having 6 or more condomless male anal intercourse partners and having low sexual self-efficacy.

Three quarters (74%) of the sample had engaged in any type of SDU or sex under the influence of alcohol. Figure 1 compares motivations for and effects of engaging in chemsex, other SDU and sex under the influence of alcohol in the past 12 months. Chi-square analyses showed MSM engaging in chemsex were more likely to do so because it gave them an intense sexual experience, allowed them to have sex for longer, were more likely to have sex without a condom and do things they would not do sober, compared to other SDU and those having sex under the influence of alcohol. MSM engaging in chemsex were also more likely to report engagement was having a negative impact on their life, and were doing so because of pressure from friends.

Table 1. Univariate and multivariable analyses for factors associated sexualised drug use in the past 12 months.

	MSM not engaged in sexualised drug use (n=978)		MSM engaged in sexualised drug use (n=670)		Row %	Univariate	Adjusted model
	n or mean	% or SD	n or mean	% or SD		OR (95% CI)	aOR (95% CI)
<b>Sexuality</b>							
Homosexual	824	84%	587	88%	42%	ref.	
Bisexual	108	11%	44	7%	29%	0.57 (0.40, 0.83)**	
Queer	24	2%	26	4%	52%	1.52 (0.86, 2.68)	
<b>Age group</b>							
18-24	359	37%	174	26%	33%	ref.	ref.
25-34	403	41%	240	36%	37%	1.23 (0.97, 1.56)	1.08 (0.81, 1.44)
35-49	171	17%	186	28%	52%	2.24 (1.70, 2.96)***	2.51 (1.81, 3.50)***
>=50	44	4%	68	10%	61%	3.19 (2.10, 4.85)***	4.00 (2.43, 6.59)***
<b>Ethnicity</b>							
White	934	96%	637	95%	41%	ref.	
Person of colour	42	4%	32	5%	43%	1.12 (0.70, 1.79)	
<b>Country of Birth</b>							
UK	855	87%	577	86%	40%	ref.	
Not UK	106	11%	76	11%	42%	1.06 (0.78, 1.45)	
<b>Education</b>							
University or higher	578	59%	401	60%	41%	ref.	
Qualifications at 18	290	30%	176	26%	38%	0.88 (0.70, 1.10)	
Qualifications at 16 or lower	87	9%	75	11%	46%	1.24 (0.89, 1.74)	
<b>Work Status</b>							
Full time	615	63%	426	64%	41%	ref.	
Part time	69	7%	44	7%	39%	0.92 (0.62, 1.37)	
Student	185	19%	79	12%	30%	0.62 (0.46, 0.83)**	
Unemployed	35	4%	24	4%	41%	0.99 (0.58, 1.69)	
Other (sick leave, retired, carer)	70	7%	91	14%	57%	1.88 (1.34, 2.62)***	
<b>Relationship status</b>							
Living with partner	355	36%	232	35%	40%	ref.	
Relationship not living with partner	197	20%	120	18%	38%	0.93 (0.70, 1.23)	
Relationship with multiple	17	2%	18	3%	51%	1.62 (0.82, 3.21)	
Single	408	42%	299	45%	42%	1.12 (0.90, 1.40)	
<b>Population density per hectare</b>							
<5	225	23%	136	20%	38%	ref.	
5 - 20	219	22%	127	19%	37%	0.96 (0.71, 1.30)	
20 - 41	233	24%	166	25%	42%	1.18 (0.88, 1.58)	
>41	287	29%	236	35%	45%	1.36 (1.04, 1.79)*	
<b>Internalized homophobia</b>							
Low	616	63%	444	66%	42%	ref.	
High	354	36%	213	32%	38%	0.84 (0.68, 1.03)	
<b>Discrimination sexuality</b>							
None	534	55%	340	51%	39%	ref.	
Any setting	414	42%	297	44%	42%	1.13 (0.92, 1.38)	
<b>Perceived health</b>							

Fair/good/very good	877	90%	580	87%	40%	ref.	
Very poor/poor	101	10%	90	13%	47%	1.35 (1.00, 1.82)	
<b>Psychological distress</b>							
Normal	206	21%	153	23%	43%	ref.	
Moderate	220	22%	154	23%	41%	0.94 (0.70, 1.26)	
High	267	27%	152	23%	36%	0.77 (0.57, 1.02)	
Very high	275	28%	203	30%	42%	0.99 (0.75, 1.31)	
<b>Diagnosed STI in the past 12 months</b>							
None	903	92%	511	76%	36%	ref.	ref.
STI diagnosis	42	4%	135	20%	76%	5.68 (3.95, 8.17)***	2.44 (1.58, 3.76)***
Not stated	33	3%	24	4%	42%	1.29 (0.75, 2.20)	1.45 (0.77, 2.71)
<b>Attended GUM in the past 12 months</b>							
No	594	61%	199	30%	25%	ref.	ref.
Yes	368	38%	457	68%	55%	3.71 (3.00, 4.58)***	2.46 (1.90, 3.20)***
Not sure	9	1%	9	1%	50%	2.99 (1.17, 7.62)*	3.61 (1.15, 11.34)*
<b>No. of men anal intercourse in the past 12 months</b>							
0-1	622	63%	182	27%	23%	ref.	
2-5	261	27%	190	28%	42%	2.49 (1.94, 3.19)***	
6-10	52	5%	126	19%	71%	8.28 (5.76, 11.90)***	
>10	40	4%	171	26%	81%	14.61 (9.97, 21.40)***	
<b>No. of men without condom anal intercourse in the past 12 months</b>							
0-1	811	83%	362	54%	31%	ref.	ref.
2-5	137	14%	170	25%	55%	2.79 (2.16, 3.60)***	1.77 (1.31, 2.40)***
6-10	17	2%	63	9%	79%	8.33 (4.80, 14.43)***	4.31 (2.38, 7.80)***
>10	7	1%	74	11%	91%	23.75 (10.83, 52.06)***	8.42 (3.67, 19.29)***
<b>Sexual contact without consent in the past 12 months</b>							
No	925	95%	595	89%	39%	ref.	
Yes	37	4%	41	6%	53%	1.72 (1.09, 2.72)*	
Unsure	12	1%	24	4%	67%	3.11 (1.54, 6.26)**	
<b>HIV status</b>							
Negative	807	83%	496	74%	38%	ref.	
Negative, on PrEP	28	3%	71	11%	72%	4.12 (2.63, 6.48)***	
Positive	19	2%	55	8%	74%	4.71 (2.76, 8.03)***	
Don't know	124	13%	48	7%	28%	0.63 (0.44, 0.90)*	
<b>Sexual self-efficacy</b>							
High	934	96%	615	92%	40%	ref.	
Low	34	3%	44	7%	56%	2.03 (1.28, 3.22)**	
<b>Taken image or performance enhancing drugs in the past 12 months?</b>							
No	959	98%	629	94%	40%	ref.	ref.
Yes	19	2%	36	5%	65%	2.89 (1.64, 5.08)***	3.82 (1.87, 7.82)***
<b>Body satisfaction</b>	42.0	11.8	41.3	12.7		1.00 (0.99, 1.00)	
<b>Loneliness score</b>	5.5	1.8	5.5	1.8		1.01 (0.96, 1.07)	
<b>Satisfaction with life</b>	20.6	7.1	19.6	7.6		0.98 (0.97, 1.00)**	0.97 (0.95, 0.99)***
<b>Sexual satisfaction</b>	40.6	9.2	42.5	8.7		1.02 (1.01, 1.04)***	1.03 (1.01, 1.04)***

\*p<0.05

\*\*p<0.01

\*\*\*p<0.001

Table 2. Univariate and multivariable analyses for factors associated with engaging in chemsex in the past 12 months compared to other sexualised drug use.

	MSM engaged in other sexualised drug use (n=570)		MSM engaged in chemsex (n=99)			Univariate	Adjusted model
	n or mean	% or SD	n or mean	% or SD	Row %	OR (95% CI)	aOR (95% CI)
<b>Sexuality</b>							
Homosexual	497	87%	90	91%	15%	ref.	
Bisexual	40	7%	4	4%	9%	0.55 (0.19, 1.58)	
Queer	23	4%	3	3%	12%	0.72 (0.21, 2.45)	
<b>Age group</b>							
18-24	154	27%	20	20%	11%	ref.	
25-34	198	35%	42	42%	18%	1.63 (0.92, 2.90)	
35-49	152	27%	34	34%	18%	1.72 (0.95, 3.13)	
>=50	65	11%	3	3%	4%	0.36 (0.10, 1.24)	
<b>Ethnicity</b>							
White	548	96%	89	90%	14%	ref.	
Person of colour	22	4%	10	10%	31%	2.80 (1.28, 6.11)*	
<b>Country of Birth</b>							
UK	497	87%	80	81%	14%	ref.	ref.
Not UK	57	10%	19	19%	25%	2.07 (1.17, 3.66)*	2.02 (1.05, 3.86)*
<b>Education</b>							
University or higher	337	59%	64	65%	16%	ref.	
Qualifications at 18	154	27%	22	22%	13%	0.75 (0.45, 1.27)	
Qualifications at 16 or lower	63	11%	12	11%	16%	1.00 (0.51, 1.97)	
<b>Work Status</b>							
Full time	356	62%	70	71%	16%	ref.	
Part time	38	7%	6	6%	14%	0.80 (0.33, 1.97)	
Student	73	13%	6	6%	8%	0.42 (0.18, 1.00)	
Unemployed	20	4%	4	4%	17%	1.02 (0.34, 3.07)	
Other (sick leave, retired, carer)	78	14%	13	13%	14%	0.85 (0.45, 1.61)	
<b>Relationship status</b>							
Living with partner	202	35%	31	31%	13%	ref.	
Relationship not living with partner	105	18%	15	15%	13%	0.93 (0.48, 1.80)	
Relationship with multiple	14	2%	4	4%	22%	1.85 (0.57, 6.00)	
Single	250	44%	49	49%	16%	1.27 (0.78, 2.07)	
<b>Population density per hectre</b>							
<5	126	22%	10	10%	7%	ref.	ref.
5 - 20	120	21%	7	7%	6%	0.74 (0.27, 1.99)	0.59 (0.21, 1.69)
20 - 41	139	24%	27	27%	16%	2.45 (1.14, 5.26)*	1.86 (0.82, 4.21)
>41	181	32%	55	56%	23%	3.83 (1.88, 7.80)***	2.69 (1.26, 5.74)*
<b>Internalized homophobia</b>							
Low	373	65%	71	72%	16%	ref.	
High	189	33%	24	24%	11%	0.67 (0.41, 1.09)	
<b>Discrimination sexuality</b>							

None	294	52%	46	46%	14%	ref.	
Any setting	248	44%	49	49%	16%	1.26 (0.82, 1.95)	
<b>Perceived health</b>							
Fair/good/very good	499	88%	81	82%	14%	ref.	
Very poor/poor	72	13%	18	18%	20%	1.54 (0.87, 2.72)	
<b>Psychological distress</b>							
Normal	130	23%	23	23%	15%	ref.	
Moderate	131	23%	23	23%	15%	0.99 (0.53, 1.86)	
High	133	23%	19	19%	13%	0.81 (0.42, 1.55)	
Very high	172	30%	31	31%	15%	1.02 (0.57, 1.83)	
<b>Diagnosed STI</b>							
None	448	79%	63	64%	12%	ref.	
STI diagnosis	99	17%	36	36%	27%	2.59 (1.63, 4.12)***	
Not stated	24	4%	0	0%	0%	-	
<b>Attended GUM</b>							
No	186	33%	13	13%	7%	ref.	
Yes	374	65%	83	84%	18%	3.18 (1.72, 5.85)***	
Not sure	7	1%	2	2%	22%	4.09 (0.77, 21.70)	
<b>No. of men anal intercourse in the past 12 months</b>							
0-1	175	31%	7	7%	4%	ref.	
2-5	171	30%	19	19%	10%	2.78 (1.14, 6.78)*	
6-10	105	18%	21	21%	17%	5.00 (2.06, 12.16)***	
>10	119	21%	52	53%	30%	10.92 (4.80, 24.87)	
<b>No. of men without condom anal intercourse in the past 12 months</b>							
0-1	338	59%	23	23%	6%	ref.	ref.
2-5	143	25%	27	27%	16%	2.78 (1.54, 5.00)**	2.15 (0.85, 5.41)
6-10	49	9%	14	14%	22%	4.20 (2.03, 8.70)***	4.02 (1.60, 10.12)**
>10	39	7%	35	35%	47%	13.19 (7.08, 24.56)***	7.86 (3.38, 18.30)***
<b>Sexual contact without consent in the past 12 months</b>							
No	512	90%	83	84%	14%	ref.	
Yes	34	6%	7	7%	17%	1.27 (0.55, 2.96)	
Unsure	15	3%	9	9%	38%	3.70 (1.57, 8.73)**	
<b>HIV status</b>							
Negative	443	78%	53	54%	11%	ref.	
Negative, on PrEP	50	9%	21	21%	30%	3.51 (1.96, 6.29)***	
Positive	35	6%	20	20%	36%	4.78 (2.57, 8.87)***	
Don't know	43	8%	5	5%	10%	0.97 (0.37, 2.56)	
<b>Sexual self-efficacy</b>							
High	538	94%	77	78%	13%	ref.	ref.
Low	25	4%	19	19%	43%	5.31 (2.79, 10.10)***	4.52 (2.18, 9.40)***
<b>Taken image or performance enhancing drugs in the past 12 months?</b>							
No	538	94%	91	92%	14%	ref.	
Yes	30	5%	6	6%	17%	1.18 (0.48, 2.92)	
<b>Body satisfaction</b>	41.0	12.6	42.9	13.1		1.01 (1.00, 1.03)	
<b>Loneliness score</b>	5.5	1.8	5.5	1.7		1.00 (0.89, 1.13)	
<b>Satisfaction with life</b>	19.7	7.7	19	7.1		0.99 (0.96, 1.02)	

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<b>Sexual satisfaction</b>	42.3	8.9	43.6	7.5	1.02 (0.99, 1.04)
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\*p<0.05

\*\*p<0.01

\*\*\*p<0.001



Figure 1. Comparing reasons for engagement and effect of chemsex, other sexualised drug use, and sex under the influence of alcohol.

\* $p < 0.05$

\*\* $p < 0.01$

\*\*\* $p < 0.001$

## Discussion

This study investigated the sexual and psychosocial characteristics associated with engaging in SDU and chemsex among an internet sample of UK MSM, and provides novel insights into how the relationships with wellbeing and self-efficacy vary between these groups. Engaging in SDU was associated with more condomless anal intercourse with male partners than those who did not engage in SDU, and engaging in chemsex was associated with more condomless anal intercourse than other types of SDU. Engaging in SDU was also associated with the use of image and performance enhancing drugs in the past 12 months, but this difference was not observed when comparing those who engage in chemsex with engaging in other SDU.

This cross-sectional study obtained a large sample of MSM from across the UK to investigate chemsex and SDU. Previous research into SDU and chemsex has mostly been based in densely populated areas, usually recruiting from sexual health clinics.[3] It was observed that broad SDU did not differ by population density, but chemsex was reported more often in densely populated areas, highlighting geographic differences in the type of SDU MSM engage in. This is of significance to sexual health clinics nationally, as both SDU and chemsex were associated with sexual risks, and issues around sexual consent.

Whilst using Facebook as a method of recruitment enabled the large sample size, the sample was slightly young, and the sample is biased to participants with social media accounts. Due to the large proportion of MSM identifying as white, the results may not be representative of MSM of colour, which has been noted as an issue in other UK-based LGBT research [30]. A possible way for future research to overcome this is to use organisations specific to LGBT people of colour. Being born outside the UK was a predictor of engaging in chemsex, therefore future research in this area should aim to recruit MSM of colour, as well

as those being born outside of the UK to investigate the possible intersectionality between sexuality, ethnicity and country of birth.

Similar to previous research, MSM engaging in SDU were more likely to have engaged in condomless anal intercourse.[4, 7, 9, 14] MSM engaging in SDU were also more likely to have attended a GUM clinic in the past 12 months and received an STI diagnosis.[7, 10, 11] However, when comparing MSM engaging in chemsex with MSM engaging in other types of SDU, this difference did not hold at the multivariable level, possibly due to the overlap with number of condomless anal intercourse partners. MSM engaging in chemsex were more likely to be taking PrEP compared to MSM engaging in other SDU, which is similar to findings in Amsterdam,[11] but possibly due to the overlap between taking PrEP and number of condomless anal intercourse partners, this was not significant at the multivariable level.

Although the stigma of living with HIV has been suggested as motivation for engaging in chemsex,[15] living with HIV was not significantly associated with SDU or chemsex once other factors were controlled for, similar to other UK research.[7] However, this could be due to an overlap with confounding variables, and due to the higher proportion of MSM living with HIV engaging in chemsex, support services for MSM living with HIV need to be aware of the possible impacts of this behaviour. A previous qualitative study had suggested internalised homophobia and experiences of discrimination as possible reasons for engaging in chemsex,[15] but this was not observed here.

Engaging in SDU was associated with lower life satisfaction, but there was no significant difference in life satisfaction between those engaging in chemsex, and those engaging in other types of SDU. Previous research has mostly focused on the physical health effects of SDU, and neglected possible psychological associations. Additionally, MSM

engaging in chemsex were more likely to report their SDU having a negative impact on their life. The proportion of MSM engaging in chemsex reporting a negative impact is similar to research in Ireland;<sup>[9]</sup> however this is the first study to investigate how this differs between chemsex, other forms of SDU and sex under the influence of alcohol. Those engaging in SDU reported greater sexual satisfaction, compared to those not engaging in SDU, but no difference was observed between engaging in chemsex and in other SDU. Although, MSM engaging in chemsex were more likely to report doing so because of the intense sexual experience and being able to have sex for longer. This suggests the perceived benefits, risks, and possible negative impacts from engaging in SDU and chemsex are complex.

In the bivariate analyses, MSM engaging in SDU were more likely to report having experienced or being unsure of having sexual contact without consent in the past 12 months, and when comparing chemsex with other SDU, MSM engaging in chemsex were more likely to report being unsure of sexual contact without consent. These associations did not remain in the multivariable analyses, possibly due to small numbers reporting recent sexual contact without consent, and this being associated with other factors. Despite this, these findings still highlight a possible issue of how consent is affected during SDU and chemsex.

These results highlighted how SDU and chemsex can impact the health and wellbeing of MSM, and differences in motivations for engaging in these behaviours. Whilst it is encouraging to find a higher percentage of MSM engaging in SDU and chemsex were more likely to take PrEP, further research is needed to understand possible interactions between PrEP adherence, drug interactions, and possible barriers for MSM engaging in SDU and chemsex taking PrEP, due to the elevated sexual risk associated with these behaviours. Furthermore, these results should promote awareness among clinicians around the issue of consent and SDU, and ensure referral pathways and patient safeguarding strategies are in place.

In conclusion, this research highlights a complex interaction between motivations, perceived benefits and negative impacts for engaging in SDU and chemsex. Despite the vast majority of participants stating they were content and in control of their sex life, engaging in SDU was associated with a lower life satisfaction and engaging in chemsex was associated with lower sexual self-efficacy. Due to the associated sexual risk taking, issues around sexual consent and possible harms from drug use, it is important to promote harm reduction among this population (e.g. condoms, PrEP, drug knowledge and safer drug use), whilst having support services in place for anyone wanting to stop, or who are experiencing negative effects of engaging in these behaviours.

**Word count: 2,997**

### **Key messages**

- Motivations for and associated benefits and risks of engagement in sexualised drug use and chemsex among MSM are complex.
- Sexual assault was associated with sexualised drug use and chemsex, therefore greater awareness of this risk should be promoted among MSM and support services.
- Harm reduction should be promoted among MSM engaging in sexualised drug use and chemsex as well as referral pathways for those experiencing negative effects.

### **Acknowledgements**

The researchers would like to thank everyone who participated in the survey, as well as CliniQ, COAST, GALOP, the Gay Men's Health Collective and The National LGB&T Partnership for their contribution to the design and recruitment of the survey.

### **Funding**

This study was funded as a PhD project from Liverpool John Moores University. No other funding interests to declare.

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### Contributors

MH conducted the literature review and drafted the manuscript. Design of the survey, data collection and statistical analysis was conducted by MH with input and supervision from CB LP and VH. All authors contributed to and approved the final draft.

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