STI diagnoses, sexualised drug use and associations with PrEP use among men who have sex with men in the UK

Abstract

Previous research has focused on acceptability of PrEP use, but few community-based studies have been conducted regarding actual use, and PrEP use in the context of sexualised drug use remains understudied. A national online cross-sectional study recruited MSM via social media (April-June 2018). Multivariable logistic regression was used to investigate factors associated with PrEP use. Bivariate analyses compared engaging in condomless anal intercourse (CAI) under the influence of specific drugs and recent STI diagnoses (past 12 months) between MSM taking PrEP and those not. Overall, 6% (99/1,581) MSM reported current PrEP use. Factors associated with PrEP use were increasing age, recent GUM attendance (95% vs. 45%, aOR=6.25, 95%CI 2.05, 19.03), an HIV test in the past three months (89% vs. 23%, aOR=14.22, 95%CI 6.76, 29.90), and recent engagement in chemsex (21% vs. 4%, aOR=3.56, 95%CI 1.78, 7.11). MSM taking PrEP were more likely to have had an STI diagnosis (42% vs. 8%), most commonly chlamydia (26% vs. 3%) and gonorrhoea (25% vs. 4%). Considering the elevated levels of self-reported STI diagnoses among those on PrEP, there was a high level of engagement with sexual health services, which may help reduce onward STI transmission.

Introduction

Since 2015, there has been a sharp decline in new HIV diagnoses among men who have sex with men (MSM) in the UK, particularly among MSM in London.[1] Whilst the decline has been attributed mostly to an increase in HIV testing among this population, as well as the use of antiretroviral therapy for treatment as prevention,[2] the role that pre-exposure prophylaxis (PrEP) could play in ending the HIV epidemic in the UK should not be underestimated.[3] PrEP is the use of antiretroviral medication, either taken daily or around a specific sexual event, to reduce a person's likelihood of acquiring HIV.[4] Recent PrEP guidelines published by the British HIV Association (BHIVA) suggest PrEP be prescribed to MSM at risk of HIV, with testing for HIV and bacterial STIs conducted every three months.[5] NHS England began the PrEP IMPACT trial in October 2017, providing PrEP to 10,000 at-risk participants,[6] although MSM unable to secure a place on the trial could self-source PrEP online through websites designed to source generic versions of tenofovir/emtricitabine, such as IWantPrEPNow.com. Although the number of places on the trial have now been extended to 26,000 (www,prepimpacttrial.org.uk), in Scotland, PrEP provision was commissioned by the NHS in 2017, creating what some have described as a 'postcode lottery' for access to PrEP within the UK.[7]

The PROUD study among MSM in England found that daily PrEP use was 86% effective at reducing HIV acquisition, and although STI rates were higher in the immediate vs. deferred group, this did not reach statistical significance.[8] Despite this, concerns over greater sexual risk taking among PrEP users has risen,[9,10] which may have been intensified by the increase of chlamydia, gonorrhoea and syphilis diagnoses among MSM in the UK over the past decade, with MSM accounting for 75% of syphilis diagnoses in 2018.[11] The threat of antimicrobial resistant gonorrhoea among MSM in England and Wales, as well as the first international case of extensively drug resistant gonorrhoea reported in South East Asia further

elevates this concern.[12] However, it has been argued that provision of PrEP could help reduce incidence of STIs among MSM, as contact with sexual health services for PrEP will also encourage regular STI testing and treatment.[13]

It has been suggested that the increase in STI incidence seen among MSM could be due to an increase in condomless anal intercourse, group sex facilitated by geospatial apps, and chemsex.[14] In the UK, chemsex is a particular form of sexualised drug use (SDU), associated with taking crystal methamphetamine, γ-hydroxybutyrate/γ-butyrolactone (GHB/GBL), mephedrone, and/or ketamine immediately before or during sex to facilitate the experience.[15] Chemsex has been associated with condomless anal intercourse and STI incidence.[16-18] Additionally, other substances used to facilitate the sexual experience such as poppers and erectile dysfunction drugs have also been associated with condomless sex.[19] In Amsterdam, a higher proportion of MSM engaging in chemsex were taking pre-exposure prophylaxis (PrEP) compared to MSM not engaging in chemsex.[20] Chemsex has also been associated with accessing post-exposure prophylaxis (PEP) at a sexual health clinic in Brighton, UK.[21]

Among MSM using geospatial apps in London, over half of participants were willing or very willing to use PrEP, and recent STI diagnosis was associated with willingness.[22] Additionally, those aged 18 to 24 were more likely to agree that they would not take PrEP if it were to become available as they would forget to take it every day.[22] In Leicester, UK, PrEP acceptability was associated with greater perceived HIV risk, recent STI acquisition, greater sexual risk and frequency of HIV testing.[23] In a global systematic review of PrEP acceptability among MSM, those who were younger, better educated, wealthier, and aware of PrEP were more likely to accept PrEP, whereas concerns about side effects, adherence and stigma were identified as barriers.[24]

Whilst research has been conducted on the acceptability and intention of taking PrEP among MSM, research has rarely focused on factors associated with actual PrEP use. Identifying factors associated with PrEP use will also inform understanding of the barriers to care for those who may need it. The aim of this research is to understand factors associated with self-reported PrEP use among MSM across the UK, and to investigate the sexual health behaviours of those currently taking PrEP, particularly sexualised drug use.

Methods

Participants

The LGBT Sex and Lifestyles Survey was a national cross-sectional study aimed at LGBT people over the age of 18, living in the UK. A convenience sample was obtained using sponsored Facebook advertising and through LGBT community organisations' social media accounts between April-June 2018. Potential participants were shown the adverts if they engaged in any LGBT associated content on Facebook. Four adverts aimed at MSM, WSW, trans people and LGBT generally were used to recruit participants. Participants were invited to take part if they had ever had sex with someone of the same gender or identified as trans. Potential participants were then directed to the online survey and asked two screening questions, ensuring that the 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. This analysis focuses on those respondents who were MSM. Ethical approval for this study was obtained from the Liverpool John Moores University Research Ethics Committee (approval reference:18/PHI/011).

Measures

The survey was divided into three sections: demographics (gender, age, ethnicity, country of birth, employment, education level, sexuality); sexual health and drug use, and

psychological wellbeing. Participants were grouped as MSM if they identified as male and reported having sex with men. An adapted two-stage gender monitoring question was used,[25] which first asked which of the following best describes how you think of yourself: male (including trans man); female (including trans woman); non-binary; in another way, please specify; and prefer not to say. This was followed by asking if their gender identity is the same as the gender they were assigned at birth.

Sexual health and drug use questions were adapted from cross-sectional surveys on similar topics.[26,27] Participants were asked if they had attended a GUM/sexual health clinic in the past 12 months, and if they had been diagnosed with chlamydia, gonorrhoea, genital warts, herpes, LGV, syphillis, shigella, or Hepatitis C in the past 12 months. Participants were asked their HIV status and participants who were not living with HIV were asked when did they last have an HIV test (in the last 3 months, 3-12 months, 1-5 years, greater than 5 years, never). Those who were not living with HIV were also asked if they are currently taking PrEP.

Aligned with previous research, questions about drug use and SDU were asked with regards to specific drugs.[28] Participants were first asked if they had taken any of the 14 listed drugs (including alcohol) in the past 12 months. Participants were then asked if they had been under the influence of alcohol or cannabis in the past 12 months, and if they had taken amphetamine, cocaine, crack cocaine, ecstasy, heroin, GHB/GBL, ketamine, mephedrone, methamphetamine, Viagra or other erectile dysfunction drug (EDD), poppers, or another unspecified drug just before or during sex in the past 12 months. This was followed by a question asking whether the participant engaged in condomless anal intercourse (CAI) the last time they had taken specific drug for sex. The chemsex group was defined as having taken GHB/GBL, ketamine, mephedrone and/or meth-amphetamine just before or during sex. All other drugs besides alcohol were grouped as other sexualised drug use.

Sexual satisfaction was measured using an adapted version of the New Sexual Satisfaction Scale.[29] The 12 items were measured on a 5-point scale ("Not at all satisfied", "A little satisfied", "Moderately satisfied", "Very satisfied", "Extremely satisfied"). Cronbach's Alpha for this measure was 0.92. The questions were adapted by replacing "my partner" to "the person I have sex with" to emphasise sexual satisfaction in general, and not just specific to one partner.

Statistical analyses

All analyses were conducted using SPSS 25 (IBM Corp., Armonk, NY). Forward stepwise multivariable logistic regression analyses were used to explore factors associated with current PrEP use among MSM (entry $p<0.05$, removal $p>0.10$). Any factor significant at the bivariate level ($p<0.10$) was included in the multivariable analysis. Where participants had not answered a specific question (not reported), these data were not included in the bivariate and multivariable analyses. Descriptive chi-square analyses were used to compare engagement in CAI among those engaging in anal intercourse under the influence of specific substances between MSM who reported being on PrEP and those who did not, as well as comparing STI/BBV diagnoses in the past 12 months between MSM who reported being on PrEP and those who did not. Fisher's Exact test was used where cell values were less than or equal to five.

Results

Of the 4,690 surveys started, 3,676 completed the questionnaire (completion rate 78%). There were 1,663 (45%) participants who identified as MSM, and MSM who completed the questionnaire were more likely to be university educated (53% vs. 61%, $p<0.05$), but did not differ on any other demographic variables from those MSM who started the survey but did not complete where data were available (n=344). The median time taken to

complete the survey was 12 minutes. Seventy-five (5%) were MSM living with HIV, and seven did not answer the PrEP question, so a total of 1,581 MSM (95%) were included in the analysis. Of those included, 85% (n=1,349) identified as gay/homosexual, had a median age of 28 (IQR=22-34, range 18-76), 96% (n=1,510) were of white ethnicity and 6% (n=99) reported currently taking PrEP. There were 102 (6.5%) trans men who identified as MSM included in the analysis, one of which reported currently taking PrEP. MSM living in Scotland (n=18/169, 11%) were significantly more likely to report current PrEP use compared to MSM outside of Scotland (n=81/1407, 6%)($p<0.05$).

Table 1 displays the bivariate and multivariable analysis for factors associated with taking PrEP. In the multivariable analysis, taking PrEP was associated with being aged 25 and over, having attended a GUM clinic in the past 12 months, having an HIV test in the past 3 months, and having engaged in chemsex in the past 12 months. Having a highest educational achievement at 16 was associated with a reduced likelihood of current PrEP use. MSM currently taking PrEP were more likely to report engaging in any anal intercourse than those not taking PrEP (100%, n=99/99 vs. 84%, n=1240/1482, $p<0.001$; median=15, IQR=6-30 vs median=1, IQR=1-4) and more likely to report engaging in condomless anal intercourse (96% n=94/98 vs. 62% n=913/1480, $p<0.001$; median=8, IQR=3-19.5 vs median=1, IQR=0-1).The multivariable analysis was repeated for MSM who had engaged in CAI only, and found the same factors were associated with PrEP use among those who had engaged in CAI.

The questions about alcohol and drug use were answered by 1,572 MSM, 6% (n=99) of which were currently taking PrEP (n=1,473 not currently taking PrEP). To investigate substance use in a sexual context in relation to PrEP use, drug use, sexualised drug use, and event-level condom use under the influence of specific drugs by current PrEP use are given in Table 2. Participants taking PrEP were more likely to have taken cocaine, crystal meth, esctacy, GHB/GBL, mephedrone, poppers and EDDs, and were more likely to report having

had sex under the influence of alcohol and cannabis, and more likely to have taken cocaine, GHB/GBL, mephedrone and poppers immediately before or during sex. Among those participants who had engaged in anal intercourse under the influence of alcohol or cannabis, those who engaged in CAI were more likely to be taking PrEP. Additionally, among those who had taken poppers or EDDs immediately before or during anal intercourse, those who engaged in CAI were also statistically more likely to be taking PrEP.

Figure 1 displays self-reported STI/BBV diagnoses in the past 12 months between MSM who are currently taking PrEP and those who are not. MSM currently taking PrEP were more likely to have been diagnosed with any STI/BBV in the past 12 months, particularly chlamydia, gonnorhoea, herpes, LGV, and syphillis. No participants in this analysis reported having been diagnosed with shigella in the past 12 months. Of those diagnosed with an STI/BBV, being diagnosed with two or more STI/BBV in the past 12 months was more common among MSM on PrEP (n=18/41, 44%) than MSM not on PrEP (n=26/116, 22%)($p<0.01$). The most common combination of diagnoses was chlamydia and gonorrhoea (n=27/44, 61%).

Table 1. Bivariate and multivariable analyses of factors associated with current PrEP use among all MSM and those MSM who have engaged in recent CAI.

	Current PrEP use among all participants					Bivariate	Multivariable†	Current PrEP use among those who have engaged in CAI in the past 12 months					Bivariate	Multivariable††
	No (n=1,485)		Yes (n=99)			OR (95% CI)	aOR (95% CI)	No (n=913)		Yes (n=94)			OR (95% CI)	aOR (95% CI)
	n or *mean*	% or *SD*	n or *mean*	% or *SD*	Row %			n or *mean*	% or *SD*	n or *mean*	% or *SD*	Row %		
Sexuality														
Homosexual	1258	85%	91	92%	7%	ref.		814	89%	88	94%	10%	ref.	
Bisexual	147	10%	3	3%	2%	0.28 (0.09, 0.90)		68	7%	1	1%	1%	0.14 (0.02, 0.99)	
Heterosexual	1	0.1%	0	0%	0%	-		0	0%	0	0%		-	
Queer	45	3%	4	4%	8%	0.70 (0.43, 3.49)		17	2%	4	4%	19%	2.18 (0.72, 6.61)	
Not reported*	34	2%	1	1%	3%			14	2%	1	1%	7%		
Age group														
18-24	523	35%	11	11%	2%	ref.	ref.	315	35%	9	10%	3%	ref.	ref.
25-34	571	38%	49	49%	8%	4.08 (2.10, 7.93)	4.52 (2.11, 9.68)	375	41%	47	50%	11%	4.39 (2.12, 9.09)	5.31 (2.30, 12.26)
35-49	298	20%	32	32%	10%	5.11 (2.54, 10.28)	7.51 (3.35, 16.87)	188	21%	31	33%	14%	5.77 (2.69, 12.39)	9.95 (4.07, 24.28)
50+	90	6%	7	7%	7%	3.70 (1.40, 9.79)	8.28 (2.59, 26.43)	32	4%	7	7%	18%	7.66 (2.67, 21.94)	23.93 (5.71, 100.22)
Not reported*	3	0.2%	0	0%	0%			3	0.3%	0	0%	0%		
Ethnicity														
White	1417	95%	93	94%	6%	ref.		875	96%	88	94%	9%	ref.	
Person of colour	65	4%	6	6%	8%	1.41 (0.59, 3.33)		36	4%	6	6%	14%	1.66 (0.68, 4.04)	
Not reported*	3	0.2%	0	0%	0%			2	0.2%	0	0%	0%		
Country of Birth														
UK	1291	87%	83	84%	6%	ref.		798	87%	78	83%	9%	ref.	
Not UK	161	11%	14	14%	8%	1.35 (0.75, 2.44)		99	11%	14	15%	12%	1.45 (0.79, 2.65)	
Not reported*	33	2%	2	2%	7%			16	2%	2	2%	11%		
Education														
University or higher	858	58%	71	72%	8%	ref.	ref.	532	58%	69	73%	11%	ref.	ref.
Qualifications at 18	434	29%	24	24%	5%	0.67 (0.42, 1.08)	1.12 (0.62, 2.01)	264	29%	21	22%	7%	0.61 (0.37, 1.02)	0.87 (0.46, 1.68)
Qualifications at 16 or lower	153	10%	3	3%	2%	0.24 (0.07, 0.76)	0.13 (0.03, 0.58)	91	10%	3	3%	3%	0.25 (0.08, 0.83)	0.10 (0.02, 0.52)
Not reported*	40	3%	1	1%	3%			26	3%	1	1%	4%		
Work Status														
Full time	927	62%	70	71%	7%	ref.		608	67%	66	70%	10%	ref.	
Part time	106	7%	4	4%	4%	0.50 (0.18, 1.40)		64	7%	4	4%	6%	0.58 (0.20, 1.63)	
Student	254	17%	10	10%	4%	0.52 (0.27, 1.03)		135	15%	9	10%	6%	0.61 (0.30, 1.26)	
Unemployed	56	4%	2	2%	3%	0.47 (0.11, 1.98)		31	3%	2	2%	6%	0.59 (0.14, 2.54)	
Other	132	9%	13	13%	9%	1.30 (0.70, 2.42)		68	7%	13	14%	16%	1.76 (0.92, 3.36)	
Not reported*	10	0.7%	0	0%	0%			7	0.8%	0	0%	0%		
Relationship status														
Living with partner	528	36%	26	26%	5%	ref.		385	42%	25	27%	6%	ref.	
Relationship not living with partner	304	20%	9	9%	3%	0.60 (0.28, 1.30)		193	21%	9	10%	4%	0.72 (0.33, 1.57)	
Relationship with multiple	29	2%	5	5%	15%	3.50 (1.25, 9.78)		18	2%	5	5%	22%	4.28 (1.47, 12.47)	

Single	621	42%	59	60%	9%	1.93 (1.20, 3.10)		316	35%	55	59%	15%	2.68 (1.63, 4.40)	
Not reported*	3	0.2%	0	0%	0%			1	0%	0	0%	0%		
London														
Outside London	1253	84%	71	72%	5%	ref.		761	83%	66	70%	8%	ref.	
London	224	15%	28	28%	11%	2.21 (1.39, 3.49)		148	16%	28	30%	16%	2.18 (1.36, 3.51)	
Not reported*	8	0.5%	0	0%	0%			4	0.4%	0	0%	0%		
Attended GUM														
No	794	53%	5	5%	1%	ref.	ref.	434	48%	2	2%	0%	ref.	ref.
Yes	660	44%	94	95%	12%	22.62 (9.15, 55.93)	6.28 (2.06, 19.19)	468	51%	92	98%	16%	42.66 (10.45, 174.20)	9.40 (2.15, 41.18)
Not sure	19	1%	0	0%	0%	-	-	7	1%	0	0%	0%	-	
Not reported*	12	0.8%	0	0%	0%			4	0.4%	0	0%	0%		
HIV testing														
Never	287	19%	2	2%	1%	ref.	ref.	544	60%	8	9%	1%	ref.	ref.
In the last 3 months	348	23%	88	89%	20%	23.85 (11.88, 47.90)	14.13 (6.72, 29.71)	251	27%	86	91%	26%	23.30 (11.12, 48.82)	15.29 (6.92, 33.80)
Over 3 months ago	847	57%	9	9%	1%	0.66 (0.14, 3.06)	3.07 (0.55, 17.13)	118	13%	0	0%	0%	-	
Not reported*	3	0.2%	0	0%	0%			0	0%	0	0%			
Chemsex past 12 months														
No	1415	95%	78	79%	5%	ref.	ref.	856	94%	73	78%	58%	ref.	ref.
Yes	58	4%	21	21%	27%	6.57 (3.79, 11.37)	3.55 (1.78, 7.09)	52	6%	21	22%	81%	4.74 (2.70, 8.29)	3.19 (1.53, 6.66)
Not reported	12	0.8%	0	0%	0%			5	0.5%	0	0%	0%		
Other sexualised drug use														
No	931	63%	29	29%	3%	ref.		509	56%	25	27%	5%	ref.	
Yes	542	36%	70	71%	11%	4.15 (2.66, 6.47)		399	44%	69	73%	15%	3.52 (2.19, 5.67)	
Not reported*	12	0.8%	0	0%	0%			5	0.5%	0	0%	0%		
Sex under the influence of alcohol														
No	513	35%	19	19%	4%	ref.		249	27%	19	20%	7%	ref.	
Yes	960	65%	80	81%	8%	2.25 (1.35, 3.75)		659	72%	75	80%	10%	1.49 (0.88, 2.51)	
Not reported*	12	0.8%	0	0%	0%			5	0.5%	0	0%	0%		
Sexual satisfaction	*41.2*	*9.1*	*43.9*	*8.6*		*1.04 (1.01, 1.06)*		42.3	8.36	44.1	8.57		*1.03 (1.00, 1.06)*	

† Factors included in the multivariable analysis (N=XXX) : Sexuality, Age group, Education, Work Status, Relationship Status, London, Attended GUM, HIV testing, Chemsex past 12 months, Other sexualised drug use, sex under the influence of alcohol, Sexual satisfaction.

†† Factors included in the multivariable analysis (N=XXX): Sexuality, Age group, Education, Work Status, Relationship Status, London, Attended GUM, HIV testing, Chemsex past 12 months, Other sexualised drug use, Sexual satisfaction.

* Excluded from analyses.

Table 2. Drug use, sexualised drug use and event-level condom use under the influence of drugs by PrEP use among MSM.

	Current PrEP use				
	No (n=1,473)		Yes (n=99)		
	n	%	n	%	p value
Alcohol					
Taken	1388	94%	91	92%	0.346
Had sex under the influence of	960	69%	80	88%	<0.001
Of those who had anal intercourse					
Condom used	230	29%	8	11%	0.001
CAI	577	71%	68	89%	
Cannabis					
Taken	439	30%	29	29%	0.914
Had sex under the influence of	191	44%	19	67%	0.021
Of those who had anal intercourse					
Condom used	52	33%	1	6%	0.042
CAI	106	67%	15	94%	
Cocaine					
Taken	301	20%	31	31%	0.010
Taken immediately before or during sex	122	41%	20	65%	0.010
Of those that had anal intercourse					
Condom used	23	21%	2	11%	0.528
CAI	88	79%	17	89%	
Crystal meth					
Taken	18	1%	13	13%	<0.001
Taken immediately before or during sex	13	72%	11	85%	0.667
Of those that had anal intercourse					
Condom used	1	8%	0	0%	1.00
CAI	11	92%	11	100%	
Ecstasy					
Taken	176	12%	21	21%	0.007
Taken immediately before or during sex	46	26%	9	43%	0.106
Of those that had anal intercourse					
Condom used	8	21%	2	22%	1.00
CAI	30	79%	7	78%	
GHB/GBL					
Taken	37	3%	17	17%	<0.001
Taken immediately before or during sex	25	68%	16	94%	0.043
Of those that had anal intercourse					
Condom used	6	26%	0	0%	0.064
CAI	17	74%	16	100%	
Mephedrone					
Taken	55	4%	17	17%	<0.001
Taken immediately before or during sex	29	53%	14	82%	0.046
Of those that had anal intercourse					
Condom used	4	15%	0	0%	0.278
CAI	22	85%	14	100%	
Poppers					
Taken	460	31%	61	62%	<0.001
Taken immediately before or during sex	366	80%	56	92%	0.022
Of those that had anal intercourse					
Condom used	109	33%	4	7%	<0.001
CAI	226	67%	51	93%	
EDD					
Taken	161	11%	32	32%	<0.001
Taken immediately before or during sex	147	91%	31	97%	0.473
Of those that had anal intercourse					
Condom used	43	31%	0	0%	<0.001
CAI	95	69%	31	100%	

Taken percentage is of total taking/not taking PrEP. Had sex under the influence of/taken immediately before or during sex percentage is of those who reported taking the substance. Condom use/CAI percentage is of those who reported sex under the influence or taken immediately before or during sex, excluding those that did not report anal intercourse.
Fisher's Exact test used where cells <=5
CAI – Condomless anal intercourse

Figure 1. STI/BBV diagnoses in the past 12 months and PrEP use among MSM.

Fisher's Exact test used where cells <=5

Discussion

The aim of this study was to investigate the sexual health behaviours of MSM taking PrEP. It was found that 89% of MSM on PrEP in this sample were adhering to BHIVA guidelines by having attended for an HIV test in the past 3 months, and this rose to 98% among those that had engaged in CAI.[5] MSM in Scotland were more likely to report taking PrEP, potentially reflecting the inequality of access to PrEP within the UK.[7] PrEP was associated with higher reported STI diagnoses, and whilst the differences may appear striking at first, it is important to note that unlike the PROUD study, our sample of MSM on PrEP was not compared to a sample with similar sexual risk taking, due to the small number of STI diagnoses reported.[8] Therefore, it may be that our sample of MSM on PrEP are protecting themselves against HIV acquisition and would be at increased risk of STI diagnosis regardless of their PrEP use. Higher levels of STIs have been observed among MSM taking PrEP internationally,[10] and the higher levels of self-reported STI diagnoses could be due to increased engagement with care, as MSM on PrEP were more likely to have attended a GUM clinic in the past 12 months compared to those who were not, and guidelines state MSM on PrEP should attend sexual health care every three months.[5] This could be seen as a benefit of PrEP, as engaging in services more frequently may help prevent onward transmission of STIs.[13] Sexual satisfaction was associated with PrEP use in the bivariate analyses, but not in the multivariable, possibly due to a relationship between this and sexualised drug use.[30] This suggests that MSM taking PrEP are more sexually satisfied, although the reasons for this are unclear and future research on this is needed.

Similar to other UK based research about the acceptability of PrEP,[22] but contrary to an international review,[24] younger MSM (18-24 years) were less likely to be taking PrEP compared to older MSM. This could be due to a UK specific barriers for younger MSM and concerns about adherence,[22] age related differences in sexual risk, or a difference between intention to take PrEP and actual PrEP use. Despite the possible difference between intention and behaviour, lower education attainment was associated with lower uptake of PrEP, and has previously been associated with lower intention to use PrEP.[24,31] A possible method to overcome this would be to provide education to all MSM engaging with sexual health services about PrEP, and if their engagement with services is poor, then community outreach to raise awareness of PrEP may be needed to reach these MSM. There is a large difference between the proportion of MSM in previous research stating acceptability of PrEP use,[24,31,32] and the proportion of MSM using PrEP in this study, which could also reflect the gap between intention and behaviour.[33] Alternatively, this could be a reflection of the limited number of spaces for the PrEP IMPACT trial in England and Wales, although MSM have been purchasing PrEP privately and through online pharmacies prior to this trial.[6] Interestingly, four MSM who reported taking PrEP did not report any CAI in the past 12 months, which may be due to intention to have CAI in the future, or as an extra protective measure alongside condoms, as these MSM had engaged in anal intercourse.

Both recent chemsex and sexualised drug use were associated with PrEP use at bivariate level, but only chemsex was associated with PrEP use in the multivariable analysis, probably due to chemsex being a higher risk component of sexualised drug use. This higher proportion of PrEP use among MSM engaging in chemsex has been observed among MSM in Amsterdam.[20] When analysing drug and condom use, it was unsurprising that MSM on PrEP engaging in sex under the influence of alcohol or cannabis, or who had taken poppers or EDDs immediately before or during sex, were more likely to have CAI, as past CAI and

intention to have CAI are criteria for access PrEP in England.[6] Whilst higher proportions of MSM on PrEP using chemsex related drugs for sex had CAI (e.g. GHB/GBL, crystal methamphetamine and mephedrone), these findings were not significant, possibly due to the small numbers taking these drugs, or that a high proportion of MSM not on PrEP taking these drugs for sex also engage in CAI. Future research regarding PrEP and sexualised drug use is needed, to analyse whether engagement in sexualised drug use has an impact on adherence or drug effectiveness, especially for chemsex, due to the prolonged sexual activity and types of drugs used.[15]

Whilst Facebook advertising and using community organisations' social media accounts facilitated the large sample size and recruitment of MSM across the UK, it is important to acknowledge that recruitment was limited to MSM who engaged with social media. People of colour are under represents in this sample (compared to the general UK population) and the results will not fully reflect MSM who are people of colour. Low awareness and uptake of PrEP has been observed among Black MSM in the USA,[34] however we were unable explore this, and future UK research should aim to investigate if a similar pattern exists. Information about actual PrEP usage, such as adherence, source, and previous or duration of usage, were not collected and so these could not be explored in this study. Furthermore, data on frequency of clinic attendance would provide more information regarding whether MSM are repeatedly adhering to guidelines. Due to the cross-sectional method used, this study relied on self-report measures. Although where possible standard tools and questions were used, responses may still be subject to recall bias.

In conclusion, the present study has demonstrated that whilst MSM taking PrEP across the UK are more likely to engage in high risk sexual behaviours, they are also engaging with sexual health services. This not only has an impact on their own sexual health, but will help reduce STI transmission. There is a growing concern that PrEP might be

contributing to the increase in STI diagnoses among MSM. However, for HIV-negative MSM consistently engaging in CAI, taking PrEP and increased engagement with sexual health services are currently the best available approaches to reducing HIV/STI transmission.

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Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

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