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* This includes 1,168 patients naïve to ART, across 12 months (January-December 2021).¹ 47 doctors reporting on 1,168 initiating patients in the UK.¹ Use of Biktarvy as a regimen for all initiating patients from January to December 2021 was 25%.¹

† This study includes 1,169 existing ART patients who switched during these 12 months.² 47 doctors reporting on 1,169 HIV patients switching to a new regimen at the time of visit in the UK.² Use of Biktarvy as a regimen among all switching patients from January to December 2021 was 17%.²

References:

1. Data on file (naïve), Gilead Sciences. January 2022.
2. Data on file (switch), Gilead Sciences. January 2022.
3. Biktarvy Summary of Product Characteristics (England, Scotland and Wales).
4. Biktarvy Summary of Product Characteristics (Ireland and Northern Ireland).

This is a stock image and not a person living with HIV

ART, Anti-retroviral therapy; HIV, Human immunodeficiency virus;
TAF, tenofovir alafenamide.

UK-BVY-0317 May 2022

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ORIGINAL ARTICLE

Public understanding and awareness of and response to monkeypox virus outbreak: A cross-sectional survey of the most affected communities in the United Kingdom during the 2022 public health emergency

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Abstract

Objectives: Our objective was to examine the public response to public health and media messaging during the human monkeypox virus (MPXV) outbreak in the UK, focusing on at-risk communities.

Methods: A co-produced, cross-sectional survey was administered in June and July 2022 using community social media channels and the Grindr dating app. Basic descriptive statistics, logistic regression, and odds ratio *p* values are presented.

Results: Of 1932 survey respondents, 1750 identified as men, 88 as women, and 64 as gender non-conforming. Sexual identity was described as gay/lesbian/queer (80%), bisexual (12%), heterosexual (4%), and pansexual (2%); 39% were aged <40 years; 71% self-identified as White, 3% as Black, 8% as Asian, 2% as LatinX, and 11% as 'Mixed or Other' heritage groups. In total, 85% were employed and 79% had completed higher education. A total of 7% of respondents identified themselves as living with HIV. Overall, 34% reported limited understanding of public health information, 52% considered themselves at risk, 61% agreed that people with MPXV should isolate for 21 days, 49% reported they would first attend a sexual health clinic if symptomatic, 86% reported they would accept a vaccine, and 59% believed that MPXV originated from animals. The most trusted sources of information were healthcare professionals (37%), official health agencies (29%), and mainstream media (12%).

Conclusions: Vaccine acceptability was very high, yet the understanding and acceptance of public health information varied. Social determinants of health inequalities already shaping the UK landscape risk were compounded in this new emergency. Engagement with structurally disadvantaged members of

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affected communities and better dissemination of public health messaging by trusted healthcare professionals are essential for the public health response.

KEYWORDS

community survey, media, monkeypox, MPXV, public health, UK

INTRODUCTION

Mounting an effective response to the human monkeypox virus (MPXV) emergency requires targeted public health programmes that address the needs of the full spectrum of the most affected communities. As we have witnessed in both the HIV and COVID-19 pandemics, the proliferation of misinformation and processes of marginalization posed significant barriers to pandemic control and continue to do so [1] due to delays in diagnosis, treatment, and vaccine uptake. This has compounded health inequalities in minoritized and structurally marginalized communities, including people living with HIV, who have been disproportionately affected in the global outbreak. A global case series of 528 people with MPXV reported that 41% were people living with HIV and that 57% of those without HIV were receiving pre-exposure prophylaxis (PrEP) for HIV [2–6]. These specific communities have been and continue to be blamed for viral spread [7].

The US Center for Disease Control and Prevention, the World Health Organization, and the UK Health and Security Agency (UKHSA) all adopted a public health approach that placed the engagement of affected communities of gay, bisexual, and other men who have sex with men (GBMSM) at the heart of the response, demonstrating a clear understanding of the lessons learned from previous pandemics [8]. This approach is well-supported by research on the co-production of knowledge and resources with affected communities to deepen and facilitate engagement with and support the response [9]. Leveraging knowledge gained from communities strengthens ‘structural competency’, helps counter processes of marginalization, and contributes to strengthening systems of care and service provision [10–12]. Public health leadership has emphasized that creating trust with communities is essential for sustaining interventions in the response to the current MPXV emergency, as it has been proven to be a core component of pandemic response, most notably in the recent case of COVID-19 [13–15].

The UK national government and health authorities are orchestrating the ongoing response. Since the first UK cases of MPXV infection were reported, the national government and national health service (NHS) have published information online (e.g., [UK.gov](#), [NHS.gov](#)), covering key facts about transmission, risk factors, self-isolation measures, vaccines, and where to attend for

diagnosis. This information specifies that sexually active GBMSM are at highest risk for MPXV. However, evidence about how this public health information has been interpreted, especially by GBMSM as the most affected community, is limited.

A 2022 survey of a nationally representative panel of US adults ($n = 1580$) found that nearly one in five adults (19%) were worried about MPXV infection, and the majority (60%) had limited knowledge of vaccine availability. It also revealed concerning findings about misinformation and conspiracy theories, including that MPXV was bioengineered in a laboratory, was intentionally released for political reasons, and is caused by exposure to 5G mobile signal [16]. Similarly, a 2022 study on MPXV information on YouTube found that, of the 100 ‘most viewed’ videos relating to MPXV in May 2022, 11.9% contained misleading information in relation to MPXV epidemiology, transmission, symptoms, testing, treatment, and prognosis [17]. A 2022 online survey designed to assess understanding and acceptance of public health information in MSM (who were predominantly users of HIV PrEP) in the Netherlands showed similarities in intention to self-isolate and take up a vaccine among at-risk groups of PrEP and non-PrEP users. The survey identified differences in intention among respondents based on social determinants such as education and migration status [18]. Research on previous MPXV outbreaks in the USA, Congo, and Nigeria since 2000 has shown that working with affected communities and leveraging digital media can support community uptake of public health measures [19–21]. Although evidence on MPXV is only starting to emerge, structural barriers will nonetheless remain a key issue in all outbreak responses. In the USA, disparities in access to and uptake of vaccines as well as clinical outcomes in people of colour who live with HIV have already been reported [22].

This paper explores public views on media and public health messaging about MPXV in the UK from the first survey on this topic co-produced by community groups and academics.

MATERIALS AND METHODS

A cross-sectional anonymous survey was administered online between 15 June and 27 July 2022. The survey contained 25 new (non-validated) questions exploring domains

TABLE 1 Demographics of survey responses

Demographics	Category	Frequency and percentage <i>n</i> (%)
Men who have sex with men, <i>N</i> = 1886	No	195 (10.34)
	Yes	1691 (89.66)
Age, <i>N</i> = 1911	18–24	114 (5.97)
	25–29	166 (8.69)
	30–39	464 (24.28)
	40–49	502 (26.27)
	50–59	445 (23.29)
	60+	220 (11.51)
Gender identify, <i>N</i> = 1905	Cis woman	88 (4.62)
	Cis man	1750 (91.86)
	Transgender woman	15 (0.79)
	Transgender man	12 (0.63)
	Non-binary	34 (1.78)
	Other	6 (0.31)
Assigned at birth, <i>N</i> = 1895	Male	1781 (93.98)
	Female	112 (5.91)
	Intersex	2 (0.11)
Current sexual identity, <i>N</i> = 1890	Straight (heterosexual)	81 (4.29)
	Bisexual	221 (11.69)
	Gay/lesbian	1453 (76.88)
	Pansexual	37 (1.96)
	Same gender loving	14 (0.74)
	Queer	64 (3.39)
	Other	20 (1.06)
	Highest level of completed education, <i>N</i> = 1859	Completed school education
Completed a higher education degree		1472 (79.18)
No qualification		27 (1.45)
Other		56 (3.01)
Current work situation, <i>N</i> = 1854	Employed/self-employed full time	1385 (74.7)
	Employed/self-employed part time	188 (10.14)
	Student	66 (3.56) 50 (2.70)

(Continues)

TABLE 1 (Continued)

Demographics	Category	Frequency and percentage <i>n</i> (%)
Afford the basic needs for yourself/your household, <i>N</i> = 1840	Not employed and on benefits	75 (4.05)
	Not employed and not entitled to benefits	90 (4.85)
	Other	166 (9.02)
Consider myself to have a disability, <i>N</i> = 1868	No	1674 (90.98)
	Yes	1571 (84.10)
Currently living with any long-term illnesses, <i>N</i> = 1851	-Yes with HIV	297 (15.90)
	No	137 (7.09)
	Yes	1284 (69.37)
Heritage group, <i>N</i> = 1932	White	567 (30.63)
	Black	1284 (69.37)
	Asian	1284 (69.37)
	LatinX	37 (1.92)
	Other, not disclosed	203 (10.51)

related to public health and media information, such as self-assessment of risk, acquisition of knowledge, understanding of key recommendations for diagnosis and care, views on UK MPXV media messaging, and community representation in the media. Following the recent UK experience of COVID-19, specific questions were also included to assess the presence of misinformation (e.g. about zoonotic origins of MPXV) and to explore the understanding and acceptability of public health measures, including vaccination (not available at the time) and self-isolation measures. Survey questions are listed in Appendix 1.

The survey was co-produced by the SHARE research Collaborative at Queen Mary University of London (QMUL) with two community-based organizations involved in sexual health promotion and advocacy—The Love Tank CIC (mainly supports GBMSM, with a focus on men from racialized minorities, and migrant men) and Sophia Forum (mainly supports women living with or at risk of HIV).

The anonymous survey was disseminated by The Love Tank CIC (@TheLOveTankCIC) and Sophia Forum (@SophiaForum) through their social media channels,

including Twitter (Twitter, Inc., San Francisco, USA), Instagram (Meta Platforms, San Francisco, UK), and Facebook (Facebook, Inc., San Francisco, USA) and through WhatsApp community groups and mailing lists, with further amplification by other community organizations representing communities at risk. The dating app Grindr (Grindr LLC, West Hollywood, USA) provided a pro-bono broadcast link to the survey to its UK users promoting it throughout Friday 1 July 2022.

The survey was administered via a survey platform compliant with the general data protection regulation (SMART Survey LTD, Tewkesbury, UK) and received ethical approval from the Queen Mary University Ethics of Research Committee (QMERC22.239, 6 June 2022). The survey opening page contained information about the aims of the study and custodianship and use of study data. By clicking 'continue' and commencing the survey, individuals were considered to have given consent. Respondents could leave the survey at any time but could not return to an incomplete survey. Signposting for support and information about MPXV was included.

Once the survey was closed, partially responded questionnaires were excluded from analysis. Data analysis was undertaken by members of the QMUL research team (CM, JT, SP, CO, MS) using Stata 17, with iterative feedback on results from the remaining authors. There were varying levels of missing data by survey response, and complete record analysis was implemented with the understanding that missing data may affect inferences. Basic descriptive statistics were created for survey question responses, and logistic regression was used to explore associations. Logistic regression was run without adjustment, and because data on potential confounders

are limited and little literature exists on association pathways within this field, adjustment to models was not implemented. This is an emerging new research area, so multiple regression was not run as the models would likely result in a confusing picture with collinearity issues, lack of understanding of suitable interactions to be included, and difficult to understand pathways and association. Odds ratio *p* values are given for completeness but were not used to statistically test hypotheses as no formal power calculation was implemented and – given the exploratory nature of the analyses – type I inflation would likely be present because of multiple testing. Models are presented as unadjusted, with inferences created to reflect this approach.

The study was not funded.

RESULTS

In total, 1932 respondents completed the survey, 1691 (90%) were cis or trans MSM. In terms of gender identity, 1750/1932 identified as men, 88 as women, and 64 as gender non-conforming (12 transgender men, 15 transgender women, 34 non-binary people). Of the 1932 respondents, 1510 (80%) described their sexual identity as gay/lesbian/queer, 221 as bisexual (12%), 81/1932 (4%) as heterosexual, and 37 (2%) as pansexual. A total of 744 (39%) were aged <40 years. In total, 71% (1366) self-identified as White, 3% (67) as Black, 158 as Asian (8%), 2% as LatinX (36), and 11% (203) as 'Mixed or Other' heritage groups. Employment was high at 85%, and 79% had completed higher education. When asked if they lived with a disability or long-term condition, 137 (7%) identified themselves as living with HIV (Table 1).

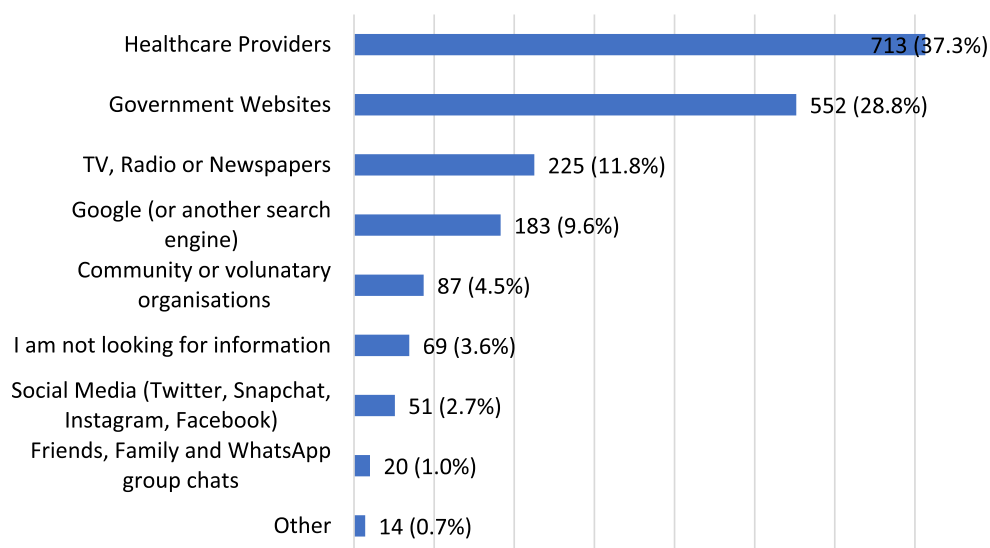


FIGURE 1 The most trusted sources of information.

TABLE 2 Frequency and percentage reporting trust in healthcare providers and government websites

Respondent category	Trust healthcare providers the most n (%)	Trust government websites the most n (%)
Men who have sex with men		
No	72 (36.92)	34 (17.44)
Yes	627 (37.08)	512 (30.28)
Age, years		
≥40	415 (35.56)	319 (27.34)
<40	291 (39.11)	231 (31.05)
Identify as		
Cis-man, transgender man	1114 (36.78)	518 (29.40)
Cis-woman, transgender woman	42 (40.78)	20 (19.42)
Non-binary	12 (35.29)	10 (29.41)
Other	3 (50.00)	1 (16.67)
I was assigned at birth		
Male	651 (36.55)	532 (29.87)
Female	47 (41.96)	18 (16.07)
Sexual identity		
Gay/lesbian, queer, same gender loving	944 (38.34)	455 (29.72)
Bisexual	65 (29.41)	64 (28.96)
Straight (heterosexual)	28 (34.57)	17 (20.99)
Other	23 (40.35)	10 (17.54)
Highest education level		
Completed a higher education degree	575 (37.93)	452 (29.82)
Other	112 (32.65)	89 (25.95)
Current work situation		
Employed	584 (37.10)	465 (29.54)
Other	97 (34.64)	80 (28.57)
Afford basics		
Yes	629 (37.57)	496 (29.63)
No	53 (31.93)	38 (22.89)
Disability		
No	589 (37.49)	469 (29.85)
Yes	103 (34.68)	70 (23.57)
Long-term illness		
No	482 (37.54)	392 (30.53)
Yes	205 (36.16)	146 (25.75)

(Continues)

TABLE 2 (Continued)

Respondent category	Trust healthcare providers the most n (%)	Trust government websites the most n (%)
Heritage group		
White	548 (40.12)	373 (27.31)
Black	21 (31.34)	20 (29.85)
Asian	44 (27.85)	59 (37.34)
Mixed	64 (31.53)	56 (27.59)
LatinX	11 (29.73)	16 (43.24)
Other, not disclosed	25 (24.75)	28 (27.72)

Up to and during the survey period (15 June to 27 July 2022), 49.5% (955) had heard/read a lot about MPXV, 48.8% (941) had heard/read a little, and 1.6% (31) did not know about it. The top three places that people reported hearing about MPXV were online news (1099 [57%]), TV or radio news (51%), and printed press (27%). Among the social media platforms, Twitter was the most common source of MPXV information (21%), followed by Facebook (12%), Instagram (5%), and Snapchat (0.4%). Other reported sources of information were healthcare professionals (HCPs) (11%), dating apps (13%), and sex on premises venues (2%).

HCPs were the most trusted source of information, ranking highest among 713 (37%) respondents, followed by government websites (552 [29%]); TV, radio, and newspapers (225 [12%]); Google searches (183 [10%]); and community organizations (87 [5%]) (Figure 1). Within the top two most trusted sources, trust varied widely according to sexuality (MSM vs. non-MSM), gender, gender identity, age, and education (Table 2).

Table 2 shows that people assigned female at birth reported a lot more trust in HCPs (42%) than did people assigned male (37%). However, this was reversed for government websites, with 30% of people assigned male at birth trusting them compared with only 16% for female assigned at birth. There were also differences regarding trust in HCPs based on heritage, with White heritage groups being most trusting of HCPs.

In total, 34% reported not understanding the current public health information very well, around half understood it 'fairly well', and only 17% reported understanding it 'very well' (Table 3).

More men (cis and trans men) than women (cis and trans women) said that they understood the information 'very well' (17% vs. 8%). More LatinX people than those from Black heritage groups said they understood the information 'very well' (35% vs. 12%). People who said

TABLE 3 Responses to 'how well do you feel you understand current public health information about monkeypox?'

Respondent category	Not very well n (%)	Fairly well n (%)	Very well n (%)
Men who have sex with men			
No	63 (32.98)	100 (52.36)	28 (14.66)
Yes	574 (34.35)	811 (48.53)	286 (17.12)
Age, years			
≥40	362 (31.4)	575 (49.87)	216 (18.73)
<40	281 (38.39)	348 (47.54)	103 (14.07)
Identify as			
Cis-man, transgender man	596 (34.23)	843 (48.42)	302 (17.35)
Cis-woman, transgender woman	36 (36.00)	56 (56.00)	8 (8.00)
Non-binary	7 (21.21)	19 (57.58)	7 (21.21)
Other	2 (33.33)	4 (66.67)	0 (0.00)
I was assigned at birth			
Male	601 (34.17)	854 (48.55)	304 (17.28)
Female	38 (34.55)	60 (54.55)	12 (10.91)
Intersex	0 (0.00)	1 (50.00)	1 (50.00)
Sexual identity			
Gay/lesbian, queer, same gender loving	513 (33.93)	744 (49.21)	255 (16.87)
Bisexual	82 (37.44)	98 (44.75)	39 (17.81)
Straight (heterosexual)	27 (33.75)	43 (53.75)	10 (12.50)
Other	638 (34.19)	912 (48.87)	316 (16.93)
Highest education level			
Completed a higher education degree	487 (32.45)	751 (50.03)	263 (17.52)
Other	135 (40.18)	148 (44.05)	53 (15.77)
Current work situation			
Employed	522 (33.55)	762 (48.97)	272 (17.48)
Other	102 (37.23)	133 (48.54)	39 (14.23)
Afford basics			
Yes	536 (32.35)	827 (49.91)	294 (17.74)
No	79 (48.77)	64 (39.51)	19 (11.73)
Disability			
No	523 (33.74)	767 (49.48)	260 (16.77)
Yes	107 (36.52)	131 (44.71)	55 (18.77)
Long-term illness			
No	425 (33.46)	623 (49.06)	222 (17.48)
Yes	200 (35.91)	265 (47.58)	92 (16.52)

TABLE 3 (Continued)

Respondent category	Not very well n (%)	Fairly well n (%)	Very well n (%)
Heritage group			
White	438 (32.54)	681 (50.59)	227 (16.86)
Black	25 (37.88)	33 (50.00)	8 (12.12)
Asian	60 (38.71)	75 (48.39)	20 (12.90)
Mixed	81 (40.10)	86 (42.57)	35 (17.33)
LatinX	10 (27.03)	14 (37.84)	13 (35.14)
Other, not disclosed	34 (35.79)	42 (44.21)	19 (20.00)

they could not afford basic needs and those without a university degree were less likely to say that they had understood the information 'very well'.

In total, 21% did not know if they were at risk, around half (51%) considered themselves at risk, and 27% did not consider themselves at risk. A total of 982 (66%) respondents reported some level of personal risk concern about MPXV, and 70% of MSM were more concerned about getting MPXV compared with only 37% of non-MSM (odds ratio [OR] 1.38; 95% confidence interval [CI] 1.02–1.74).

Overall, 60% (1147/1911) 'agreed' or 'somewhat agreed' that MPXV originates from animals, 31% (597) neither agreed nor disagreed, and 114 (6%) disagreed. People who could not afford basic needs compared with those who could (OR 0.48; 95% CI 0.35–0.67) and those without a higher education degree compared with responders with a degree (OR 0.74; 95% CI 0.58–0.94) were less likely to 'agree' or 'somewhat agree' that MPXV came from animals. MSM respondents were far more likely to say they 'agree' or 'somewhat agree' that MPXV came from animals than were non-MSM (OR 1.52; 95% CI 1.13–2.05). Table 4 shows the ORs for each demographic group unadjusted.

Half of the respondents (951) replied that they would attend a sexual health clinic if they thought they had MPXV; the remainder (554 [29%]) said they would attend their general practice or accident and emergency (A&E) department (107 [6%]), a pharmacy (23 [1%]), or a voluntary organization (9 [0.5%]). In total, 260 (14%) replied that they would go 'nowhere'. Notably, those aged <40 years were most likely to say they would go 'nowhere' (i.e. not engage with healthcare) if they had MPXV compared with respondents aged >40 years (OR 2.00; 95% CI 1.53–2.61), see Table 4. There was little difference in responses between the MSM and non-MSM respondents.

In total, 1184 (62%) agreed that people should isolate for 21 days to avoid passing on MPXV to others, 181 (9%) disagreed, and 556 (29%) were not sure. Factors associated with not agreeing that people should isolate

TABLE 4 Unadjusted logistic regressions exploring the association between demographics and the four proxy questions to assess the efficacy of the public health messaging

Respondent category	I believe monkeypox came from animals originally. ('agree', 'somewhat agree') against ('neither agree nor disagree', 'somewhat disagree', 'disagree')	If I thought I had the monkeypox virus, the first place I would go is nowhere	I would accept a vaccine to prevent me from getting monkeypox if I was exposed	I agree that people should isolate for 21 days to avoid passing monkeypox on to others
	OR (95% CI) p value	OR (95% CI) p value	OR (95% CI) p value	OR (95% CI) p value
Men who have sex with men				
No	REF	REF	REF	REF
Yes	1.52 (1.13–2.05) 0.006	0.72 (0.48–1.08) 0.109	1.91 (1.09–3.34) 0.024	1.00 (0.59–1.69) 0.993
Age, years				
≥40	REF	REF	REF	REF
<40	0.86 (0.71–1.04) 0.123	2.00 (1.53–2.61) < 0.001	0.94 (0.63–1.39) 0.750	0.90 (0.65–1.24) 0.524
Identify as				
Cis-man, transgender Man	REF	REF	REF	REF
Cis-woman, transgender woman	0.74 (0.50–1.10) 0.136	1.12 (0.64–1.98) 0.684	0.54 (0.27–1.12) 0.098	1.25 (0.59–2.65) 0.559
Non-binary	0.68 (0.34–1.36) 0.281	1.49 (0.61–3.65) 0.386	0.59 (0.18–1.99) 0.398	1.11 (0.33–3.76) 0.864
Other	0.64 (0.13–3.20) 0.591	1.29 (0.15–11.08) 0.817		0.08 (0.01–0.84) 0.036
I was assigned at birth				
Male	REF	REF	REF	REF
Female	0.72 (0.49–1.06) 0.097	1.35 (0.81–2.25) 0.257	0.53 (0.27–1.05) 0.069	1.42 (0.64–3.15) 0.388
Intersex	0.65 (0.04–10.40) 0.760	6.51 (0.41–104.51) 0.186		
Sexual identity				
Gay/lesbian, queer, same gender loving	REF	REF	REF	REF
Bisexual	0.85 (0.64–1.13) 0.253	1.41 (0.96–2.06) 0.077	0.53 (0.31–0.90) 0.020	1.73 (0.96–3.13) 0.070
Straight (heterosexual)	0.71 (0.45–1.11) 0.132	1.22 (0.65–2.29) 0.544	0.26 (0.13–0.51) < 0.001	1.01 (0.47–2.17) 0.979
Other	0.65 (0.38–1.10) 0.109	1.33 (0.64–2.76) 0.446	0.73 (0.22–2.41) 0.603	1.20 (0.47–3.11) 0.700
Highest education level				
Completed a higher education degree	REF	REF	REF	REF
Other	0.74 (0.58–0.94) 0.013	1.11 (0.79–1.55) 0.548	0.59 (0.37–0.93) 0.022	1.73 (1.07–2.79) 0.026
Current work situation				
Employed	REF	REF	REF	REF

(Continues)

TABLE 4 (Continued)

Respondent category	I believe monkeypox came from animals originally. ('agree', 'somewhat agree') against ('neither agree nor disagree', 'somewhat disagree', 'disagree')	If I thought I had the monkeypox virus, the first place I would go is nowhere	I would accept a vaccine to prevent me from getting monkeypox if I was exposed	I agree that people should isolate for 21 days to avoid passing monkeypox on to others
	OR (95% CI) p value	OR (95% CI) p value	OR (95% CI) p value	OR (95% CI) p value
Other	0.93 (0.71–1.20) 0.556	0.95 (0.65–1.38) 0.783	1.38 (0.75–2.56) 0.305	2.42 (1.34–4.34) 0.003
Afford basics				
Yes	REF	REF	REF	REF
No	0.48 (0.35–0.67) < 0.001	1.23 (0.79–1.92) 0.357	0.29 (0.18–0.48) < 0.001	1.07 (0.61–1.88) 0.817
Disability				
No	REF	REF	REF	REF
Yes	0.80 (0.63–1.03) 0.088	0.84 (0.58–1.24) 0.384	0.68 (0.42–1.11) 0.128	1.93 (1.16–3.21) 0.012
Long-term illness				
No	REF	REF	REF	REF
Yes	0.89 (0.73–1.09) 0.272	0.77 (0.57–1.04) 0.090	1.07 (0.69–1.65) 0.769	1.27 (0.89–1.82) 0.183
Heritage group				
White	REF	REF	REF	REF
Black	0.84 (0.51–1.39) 0.501	0.61 (0.26–1.43) 0.256	0.33 (0.16–0.69) 0.004	0.97 (0.42–2.20) 0.936
Asian	0.91 (0.65–1.27) 0.584	0.69 (0.40–1.18) 0.178	0.90 (0.44–1.84) 0.768	2.23 (1.06–4.67) 0.034
Mixed	1.06 (0.78–1.43) 0.713	0.85 (0.55–1.33) 0.480	1.37 (0.65–2.90) 0.407	1.51 (0.86–2.65) 0.153
LatinX	1.78 (0.86–3.71) 0.122	1.20 (0.49–2.92) 0.689	2.05 (0.28–15.19) 0.482	1.38 (0.41–4.62) 0.606
Other, not disclosed	0.80 (0.53–1.22) 0.306	1.01 (0.55–1.86) 0.969	0.27 (0.14–0.49) < 0.001	0.67 (0.35–1.30) 0.239

Note: This table presents unadjusted associations. With limited available data on potential confounders and little literature on association pathways within this field, we have not implemented adjustment to models. This may mean that some of the indicated associations are being confounded, which is why we have discussed inferences with incorporated uncertainty. Bold values indicate significant findings. Abbreviations: CI, confidence interval; OR, odds ratio.

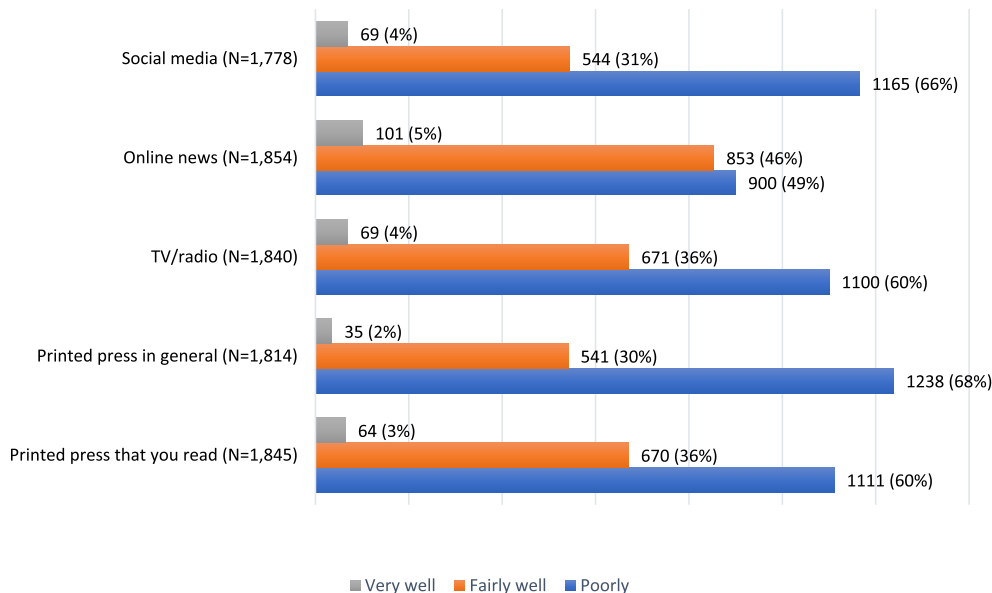


FIGURE 2 How well do you feel monkeypox is being discussed in the listed media?

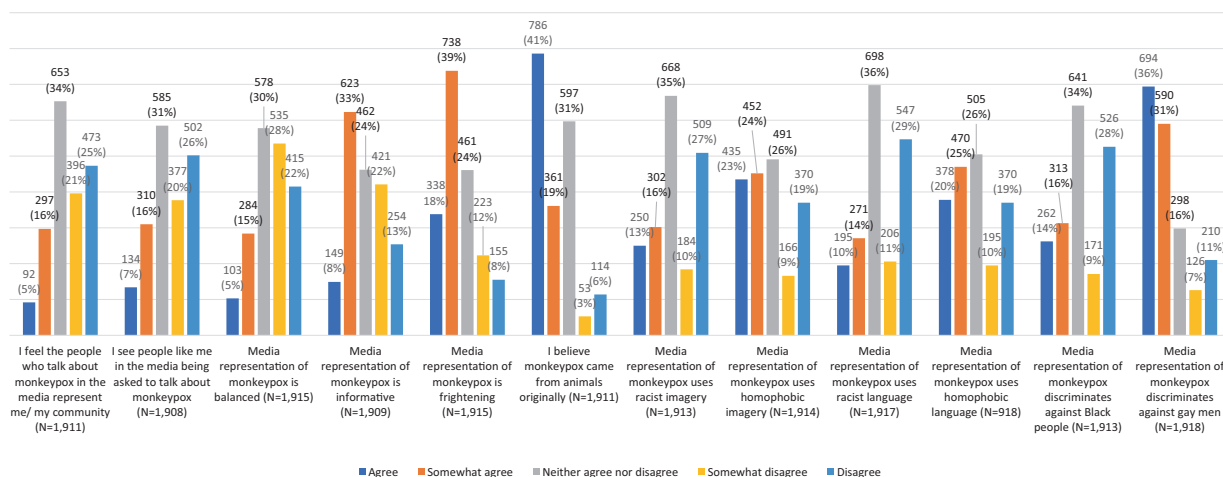


FIGURE 3 Level of agreement to each statement listed

appeared to be connected to not having a higher education degree versus having a degree (OR 1.73; 95% CI 1.07–2.79), not being employed versus being employed (OR 2.42; 95% CI 1.34–4.34), having a disability versus not (OR 1.93; 95% CI 1.16–3.21), and identifying as being from Asian versus White heritage groups (OR 2.23; 95% CI 1.06–4.67). There appeared to be little difference between MSM and non-MSM respondents, see Table 4.

A total of 1659 (86%) respondents reported that they would accept a vaccine for MPXV if offered, 114 (6%) would not, and 149 (8%) were not sure. MSM respondents were more likely to answer that they would accept a vaccine than were non-MSM (OR 1.91; 95% CI 1.09–3.34). Factors that appeared to be associated with a lower intention to take up a vaccine include identifying as bisexual

(OR 0.53; 95% CI 0.31–0.90) or heterosexual (OR 0.26; 95% CI 0.13–0.51) compared with identifying as gay/lesbian, queer, or same-gender loving. Similarly, those who could not afford basic needs expressed a lower intention to take a vaccine (OR 0.29; 95% CI 0.18–0.48).

Compared with respondents who identified as being from White heritage groups, those identifying as being from Black and ‘other/did not disclose’ heritage groups also appeared less inclined to take up the vaccine (OR 0.33; 95% CI 0.16–0.69 and OR 0.27; 95% CI 0.14–0.49, respectively). There was little evidence of response differences between other demographic groups (results in Table 4).

A majority of respondents overall thought MPXV was being ‘poorly’ discussed across all media outlets: social

TABLE 5 Reported opinions on Media by men who have sex with men (MSM) status, reported gender, and age

Answer	MSM	non-MSM *	OR *Ref	95% CI
Agree/somewhat agree media is balanced	22%	9%	2.88	1.73–4.80
Agree/somewhat agree media is informative	42%	26%	2.04	1.46–2.85
Agree/somewhat agree media represents them or their community	22%	11%	2.26	1.41–3.60
Agree/somewhat agree media discriminates against Black people	28%	46%	0.46	0.34–0.62
Answer	Cis-man + transgender man*	Cis-woman + transgender woman	OR *Ref	95% CI
Agree/Somewhat Agree media is balanced	21%	9%	0.36	0.18–0.72
Agree/Somewhat Agree media is informative	42%	25%	0.46	0.29–0.74
Agree/Somewhat Agree media represents them or their community	21%	17%	0.76	0.45–1.29
Agree/Somewhat Agree media discriminates against Black people	28%	50%	2.57	1.72–3.83
Answer	Age < 40	Age 40+ *	OR *Ref	95% CI
Agree/somewhat agree media is balanced	17%	22%	0.71	0.56–0.90
Agree/somewhat agree media is informative	36%	43%	0.73	0.61–0.89
Agree/somewhat agree media represents them or their community	21%	20%	1.04	0.83–1.31
Agree/somewhat agree media discriminates against Black people	35%	27%	1.52	1.24–1.85

Abbreviations: CI, confidence interval; OR, odds ratio.

*indicates odds ratio reference category.

media (66%), online news (49%), TV/radio (60%), printed press in general (68%), and printed press that they read (60%) (Figure 2).

Respondents held fairly critical views of the media representation of MPXV (Figure 3), particularly of some of the homophobic and racist connotations of the media messaging about the outbreak (Figure 3).

On further analysis, 45% of respondents, regardless of sexual identity status, said that they did not feel people who talk about MPXV in the media represent them (Table 4). There was little difference in responses between MSM and non-MSM respondents, suggesting that people generally did not feel well represented in the media response (Figure 3).

Table 5 shows further breakdowns of these findings by demographic characteristics. MSM (compared with non-MSM) were more likely to 'agree'/'somewhat agree' that the media representation of MPXV is balanced (22% vs. 9%; OR 2.88; 95% CI 1.73–4.80), is informative (42% vs. 26%; OR 2.04; 95% CI 1.46–2.85), and represents them or their community (22% vs. 11%; OR 2.26; 95% CI 1.41–3.60) but less likely to 'agree'/'somewhat agree' that the media reporting of MPXV discriminates against Black people (28% vs. 46%; OR 0.46; 95% CI 0.34–0.62).

There were differences in how heritage groups perceived discrimination against Black people and gay men,

with those from Black heritage groups stating that they 'agree'/'somewhat agree' that the media discriminate against Black people (62%); whereas Asian (77%) and LatinX individuals (76%) most frequently reported that they 'agree'/'somewhat agree' that the media discriminate against gay men.

DISCUSSION

To our knowledge, this was the first co-produced survey assessing public views on the early phase of media and public health messaging about the MPXV outbreak. It is also the first peer-reviewed survey in the UK. The survey reflects predominantly the perspectives of GBMSM – the most affected community in this outbreak. Respondents were highly educated and reported high levels of understanding and awareness of MPXV. Key findings point to shortcomings in the communication and trust of the early public health response, especially among groups who already face social and structural barriers to care.

Sources of trusted information were not uniform. While HCPs were unanimously the most trusted source, people assigned female sex at birth were more trusting of HCPs and less trusting of government websites. Those

who self-identified as White were more likely to trust government websites than were other heritage groups. Public mistrust in science has been highlighted as a particular issue for racially minoritized populations in multiple studies, particularly in the context of the COVID-19 pandemic [5, 23, 24].

Differences based on social determinants, such as lack of higher education and unemployment, were associated with worse self-assessed understanding of public health information. This finding concurs with those from a survey in the Netherlands, which also identified differences in intention among respondents based on social determinants such as education and migration status [18].

The concerning number (40%) of respondents that did not answer that they believed in the zoonotic origins of MPXV suggests confusion, lack of information, and the potential circulation of conspiracy theories about MPXV. This finding concurs with those of the above-mentioned recent large US survey of the general population [16]. Misinformation around COVID-19 and vaccination has pervaded the current MPXV public health emergency. The NHS online information provided in the UK does not explicitly state the zoonotic origins of MPXV, and this omission may have contributed to this lack of knowledge [25].

Key UK public health messages at the time of this survey covered where to attend for MPXV symptoms. This is a particularly important piece of information in infectious disease emergencies. Members of the public have been advised to attend sexual health clinics if symptomatic with MPXV, including on Department of Health and Social Care, NHS, and UKHSA websites. However, only 49.5% of survey respondents understood or indicated their intention to follow this advice. There is a need to better understand the barriers within the different groups to appropriate help-seeking within sexual health clinics. A&E and primary care clinics continue to be seen as first-choice options, challenging the ongoing response and infection control issues.

There were heritage-based differences in intentions to attend clinics, which may reflect broader health inequalities as observed amongst racially minoritized communities in the UK. Working with multiple communities to explore access to other spaces to receive care helps to address structural barriers that continue to be experienced. This is particularly important given the concerning emerging reports of inequalities in both access to and uptake of MPXV mass vaccination efforts in the USA [26]. Mass vaccination does not cater to minoritized communities who experience high degrees of stigma. Alternative approaches include successful outreach MPXV vaccination events co-delivered by the NHS and community groups and offered at alternative places such as

Black Pride in London, where 260 individuals were vaccinated in an afternoon in August 2022 [27].

Most respondents agreed that people should isolate for 21 days if they acquire MPXV. However, social determinants related to ability, education, and unemployment once again negatively affected people's intentions around willingness to self-isolate. As we witnessed during the COVID-19 response in high-income liberal democracies, conditions of employment and housing elevate risk and limit preventive options, restricting the ability to avoid close contact and isolate after infection [28]. It is possible that isolation-related experiences during the recent COVID-19 pandemic had an impact on willingness to self-isolate once again. Unwanted disclosure of sexual identity in the household could be another reason for individuals' reluctance to self-isolate at home.

Despite care attendance and isolation hesitancy, the study shows very high vaccine acceptability among both those who did and those who did not perceive themselves to be at risk for MPXV. This is a striking finding for a survey conducted when vaccines for MPXV were not yet widely available and with little information in circulation about how they work, where they could be accessed, and by whom.

However, given the demographic characteristics of the sample, there is a need to consider the potential for health inequalities based on heritage and basic income among the minority of respondents unwilling to be vaccinated. Once again, these findings echo what was seen with COVID-19 immunization. Legacies of racism and prejudice also affect vaccine awareness and acceptability [1, 29]. Community-based health promotion and a diversity of interventions (not only clinic-centred) are central to an inclusive immunization response if it is to reach those most affected [20].

Whether respondents saw media representations as impartial or as discriminatory against Black people and/or gay men varied according to demographics. However, media coverage was largely seen as poor overall and across the board was not considered representative of most affected groups. Given that most people reported hearing about MPXV via traditional media, this is of significant concern and can be improved by co-producing communication strategies with communities.

Strengths and weaknesses of the survey analysis

The study sample is overwhelmingly White, male, educated, and in employment. While it is highly reflective of the population affected by MPXV in the UK, it is not a representative sample of the whole population. Survey

data also contained missing data, which is unlikely to be missing at random, and thus we are limited to conclude only on the data survey respondents wished to give. As the survey was conducted only a few weeks into the outbreak in the UK, we did not ask about MPXV status as the cases were few and far between at that stage. This is a limitation as it is likely MPXV status or experience of MPXV could have had an impact on survey responses.

The study had the advantage of being the first to be entirely co-produced and distributed through key community organizations who are at the forefront of the MPXV response in the UK. This meant that the study was able to reach a large sample of potentially highly affected community members in a short period of time, most especially those on PrEP for HIV through The Love Tank CIC, and women living with HIV via Sophia Forum. Moreover, the sample included a significant proportion of women and gender non-conforming respondents compared with similar surveys usually recruiting only MSM, as well as a diversity of heritage groups, which allowed for some comparisons. The survey was designed to respond rapidly to the need to understand the evolving situation in June and July 2022, and the large recruitment is evidence of the high levels of interest and concerns amongst affected communities at the time.

CONCLUSIONS AND RECOMMENDATIONS

Based on our findings, we have five key recommendations. First, there is a need to maintain vigilance about media representations during the outbreak and ongoing response. Public health officials are not responsible for the reaction of media outlets to new disease outbreaks. However, there is a need to carefully consider scientific communications and to actively predict and counter potential points of misinformation such as the origins of viruses. Conspiracy theories serve to entrench existing stigmatizing views about particular communities and prevent acceptance of interventions, specifically vaccines.

Second, a very low number of respondents felt represented in any way by people they saw in the media discussing MPXV. This is likely to exacerbate mistrust in the public health response and foster further misunderstanding of the situation. It is essential to include a diversity of members of different affected communities in media interventions and a plurality of representative voices.

Third, it is of the highest importance to ensure that resources for both public health and media dissemination are co-designed with the most at-risk communities, including racially minoritized, gender non-conforming, and young people. Failure to communicate through a

variety of, for example, age-appropriate or culturally competent channels can increase disengagement.

Fourth, in this process, it is essential to consider the effects of social mobility, poverty, and wider social and structural determinants of health and their immediate effect on healthcare engagement and access. These include constraints on individuals' abilities to adhere to public health measures (e.g. self-isolation) in the context of other risks (e.g. unwanted disclosure of sexual identity), circumstance (e.g. living arrangements), or conflicting priorities (e.g. the need to generate income).

Finally, in new public health emergencies, public agencies should publish real-time weekly demographic data, including age, gender identity, ethnicity, and HIV status, on access and engagement with health services and uptake of mass vaccination events, to adapt the response by working with minoritized communities who can assess why community members are not engaging with interventions.

Further research is needed to explore access to, experiences of, and engagement in care for MPXV, especially in more diverse and vulnerable populations. Lessons from previous viral outbreaks and pandemic responses evidence the need to address rather than exacerbate health inequalities during new infectious disease emergencies.

AUTHOR CONTRIBUTIONS

Sara Paparini, Chikondi Mwendera, Sophie Strachan, Will Nutland, and Chloe Orkin conceptualized and designed the study. Sara Paparini, Chikondi Mwendera, Sophie Strachan, Will Nutland, and Chloe Orkin were responsible for data collection. Sara Paparini, Chikondi Mwendera, John Thornhill, Melanie Smuk, and Chloe Orkin analysed the data. Ryan Whitacre conducted the literature review. All authors contributed to interpretation of the data. Sara Paparini, Ryan Whitacre, and Chloe Orkin drafted the manuscript. All authors contributed ideas that shaped the manuscript and important intellectual content. All authors critically reviewed the manuscript and manuscript revisions.

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CONFLICT OF INTEREST

None of the authors have any competing interests to declare in relation to monkeypox research. Chloe Orkin has previously received honoraria for advisory boards; travel scholarships from Gilead Sciences, Viiv Healthcare, Janssen, and MSD; and research grants to her institution from Gilead Sciences, Viiv Healthcare, Janssen, Astra Zeneca, and MSD. She has received lecture fees from Clinical Care Options, Medscape, Viral Education, and Peer Voices. John Thornhill has previously received honoraria for lectures, presentations, and speaker's bureaus and payment for conference attendance from Gilead Science, FLS, and ViiV Healthcare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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