RESEARCH NOTE

REVISED Methodology of Natsal-COVID Wave 2: A large, quasi-representative, longitudinal survey measuring the impact of COVID-19 on sexual and reproductive health in Britain [version 2; peer review: 3 approved]

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Abstract

Background

The National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) was designed to understand the impact of COVID-19 on Britain's sexual and reproductive health (SRH). Natsal-COVID Wave 1 survey and qualitative follow-up interviews were conducted in 2020. The Wave 2 survey was designed to capture one-year prevalence estimates for key SRH outcomes and measure changes over the first year of the pandemic. We describe the Wave 2 survey methodology and assess the sample representativeness.

Methods

Natsal-COVID Wave 2 was conducted March-April 2021; approximately one year after the start of Britain's first national lockdown. Data were collected using an online web-panel survey administered by Ipsos. The

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sample comprised a longitudinal sample of Wave 1 participants who had agreed to re-contact plus a sample of participants residing in Britain, aged 18-59, including a boost sample comprising people aged 18-29. Questions covered reproductive health, relationships, sexual behaviour and SRH service use. Quotas and weighting were used to achieve a quasi-representative sample of the British population. Comparisons were made with recent national probability surveys, Natsal-3 (2010-12) and Natsal-COVID Wave 1 to understand bias.

Results

A total of 6,658 individuals completed the survey. In terms of gender, age, ethnicity, and rurality, the weighted Natsal-COVID Wave 2 sample was like the general population. Participants were less likely to be married or to report being in good health than the general population. The longitudinal sample (n=2,098) were broadly like participants who only took part in Wave 1 but were older. Among the sexually active, longitudinal participants were less likely to report multiple sexual partners or a new sexual partner in the past year compared to those who only took part in Wave 1.

Conclusions

Natsal-COVID collected longitudinal, quasi-representative population data to enable evaluation of the population-level impact of COVID-19 on SRH and to inform policy.

Keywords
COVID-19, population estimates, online survey, cross-sectional and longitudinal data, sexual behaviour, sexual health, relationships

Essex, Colchester, UK

Any reports and responses or comments on the article can be found at the end of the article.

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REVISED **Amendments from Version 1**

Additional detail has been added to describe sample recruitment. Additionally, a few sentences have been added to the discussion to clarify strengths and limitations of the study.

Any further responses from the reviewers can be found at the end of the article

Background

This research note describes the methodology used to conduct Wave 2 of the National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID). It follows our previous work describing the Wave 1 study methodology[1].

At the time of Natsal-COVID Wave 2 data collection (March–April 2021), COVID-19 lockdown restrictions in Britain were being eased following a second national lockdown between January and March 2021. Some form of restrictions and physical distancing requirements had been in place throughout the preceding year[2]. Physical contact with anyone outside one's household or support bubble was not permitted for the duration of that year.

Natsal-COVID survey Wave 1 and qualitative follow-up interviews were conducted in 2020[1] to understand early changes in sexual and reproductive health (SRH) service use and need, sexual behaviours, and relationships during this time[3–6]. Wave 2 aimed to capture SRH behaviour and outcomes during the first year of the COVID-19 pandemic, including sexual behaviours, sexual function, relationship quality, intimate partner violence, reproductive health outcomes and SRH service use. It was designed to produce one-year prevalence estimates of key SRH outcomes and behaviours. The study also aimed to measure change over time, both between-person variation through repeat cross-sectional analyses and within-person variation through longitudinal analyses. This paper describes the methods used in Wave 2 of Natsal-COVID and assesses the representativeness of the data.

Sample design

Natsal-COVID Wave 1 was an online web-panel survey conducted in July–August 2020, which used quotas and weighting to obtain a quasi-representative sample of 6654 people aged 18–59 years old living in Britain. The Wave 2 sample was drawn first from those who participated in Wave 1 and agreed to re-contact (the longitudinal sample). No quotas were set for this group. To complete the Wave 2 sample, new participants were sampled from Ipsos's online panels. Sample quotas were set by gender, age, region, and social grade. The new sample included a boost of 500 people aged 18–29 years old, ensuring an overall sample of 2000 participants in this age-group. The complete Wave 2 sample was designed to ensure overall representativeness of the population aged 18–59 years old by age, gender, region, and social grade. Full details of sample size calculations for Natsal-COVID have been reported elsewhere[1]. The target longitudinal sample size at Wave 2 was 4,000.

Ethical approval

We obtained ethics approval for the study from University of Glasgow Medical, Veterinary and Life Sciences College Ethics Committee (reference 20019174) and London School of Hygiene and Tropical Medicine Research Ethics committee (reference 22565). Participants provided informed consent to participate via an online consent form before starting the survey.

The questionnaire

The Natsal-COVID Wave 2 questionnaire was adapted from the Wave 1 questionnaire, the development of which has been previously described[1]. The dataset for Wave 1 can be found in the UK Data Archive[7]. Wave 2 additionally included questions about pregnancy, contraception changes, HIV testing, chlamydia testing, abortion, relationship formation and dissolution, and IPV with a focus on the year since the start of the first lockdown (Box 1). Questions relating to experiences of the COVID-19 pandemic were included, mainly drawn from other major COVID-19 studies[8,9]. The full questionnaire is available on the study website under 'Natsal-COVID Survey Questionnaire - Wave 2'.

Box 1. National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) Wave 2 questionnaire content

- Gender identity, sex at birth
- Who you've been living with since lockdown
- General health and disability
- COVID-19: testing positive, vaccination, pandemic impact
- Alcohol consumption
- Mental health - Generalised anxiety disorder two item (GAD-2) and patient health questionnaire two item (PHQ-2) scales, loneliness
- Ethnicity, country of birth
- Sexual identity
- Employment status
- Education
- Number of opposite-sex, same-sex, and transgender partners in different time periods (past 5 years, since lockdown)
- Condomless sex with new opposite-sex, same-sex, and transgender partners since lockdown
- Sexual behaviours since lockdown
- Sexual function
- Pregnancy (including the London Measure of Unplanned Pregnancy)
- Chlamydia testing
- Access to sexual and reproductive health (SRH) services
- Unmet need for SRH services
- Method of accessing sexually transmitted infection (STI) testing services
- Contraception used since lockdown
- Condom access since lockdown
- Changes in sexual relationships since lockdown
- Intimate relationships and difficulties
- Intimate Partner Violence

Natsal surveys have always involved sensitive question topics, *e.g.*, sexual behaviours, reproductive health, SRH service use. The introduction of IPV questions using remote collection methods in Natsal-COVID Wave 2 required careful consideration regarding potential risk to participants and data quality, while acknowledging the importance of collecting these data during the COVID-19 pandemic. A variety of measures were put in place to mitigate the risks. We minimised the number of IPV items, avoided very sensitive questions (*e.g.*, physical force) and included an explicit 'prefer not to answer' option at every question in the module. Immediately before sensitive question modules (including IPV), reminders about the voluntary nature of each question and confidentiality were displayed. Appropriate signposting to support services was provided after each sensitive module and at the end of the survey.

Sample recruitment

Wave 2 survey data were collected from 27 March 2021 to 26 April 2021. Approximately 150,000 panellists, including those from Wave 1 who were willing to be re-contacted, were contacted via email. Of those emailed, 38,731 started the survey; 79% came from Ipsos's own panel, with 'top-up' from three other panel providers used by Ipsos. Ipsos reports never depending solely on any one method or source of recruitment, and they reach different types of people through different methodologies and suppliers. Methods include partnering with affiliate networks which run recruitment campaigns across 40–50 of their own member websites at any given time. Performance measures are used to adjust recruitment sources and they discontinue partnering with sources that provide poor-quality respondents. Of these participants, 11,708 were ineligible or did not provide consent, 17,230 were diverted from completing the survey because their quota was full, 2,376 abandoned the survey before completion, 490 failed quality checks, and 269 experienced a technical error. In total, 6,658 participants completed the survey and are included in the analysis. Of these, 2,098 were longitudinal participants and 4,556 were new. The Ipsos online panels are run with stringent recruitment processes and quality control to ensure individuals can only take part once, are not oversampled and are engaged. Checks are used at recruitment and while people are on the panel to ensure bad and inactive panellists are removed. Cases which display fraudulent or straight lining behaviour during the survey are removed from the data. The recruitment process is shown in Figure 1.

Participants completed the survey on a smartphone (53%), a laptop/desktop (42%) or a tablet (6%).

Quota filling and weighting of survey data

To increase numbers of participants aged 18–29 years old, all other quotas (gender, region, and social grade) were relaxed toward the end of fieldwork. Cross-sectional and longitudinal weights were produced to achieve a quasi-representative sample of the British population by gender, age, region, social grade, ethnicity, and sexual identity. The cross-sectional weight for the full Wave 2 sample had a weighting efficiency of 83.8% (see Ipsos Wave 2 Technical Report).

Gender in Natsal-COVID

Natsal-COVID is inclusive in its approach to gender, as described for Wave 1[1]. A total of 67 Wave 2 participants were classified as 'trans' where their reported gender identity was different to their sex described at birth. This included 26 trans

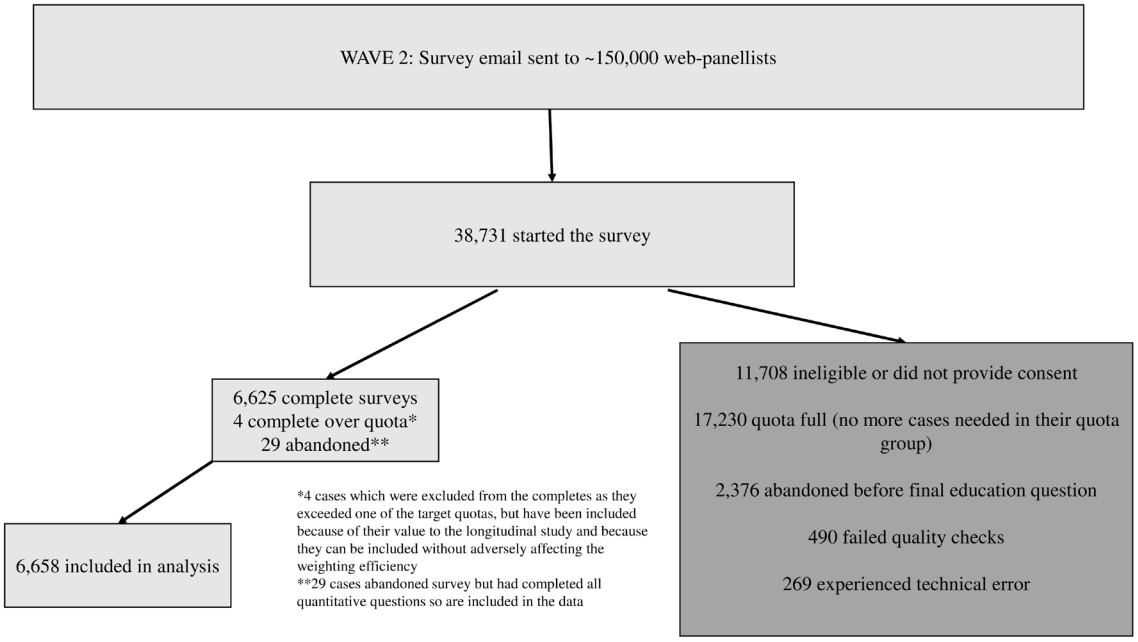

Figure 1. Recruitment process for National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) Wave 2.

men, 19 trans women, and 22 people who identified in another way (Figure 2), giving an overall percentage of 0.9% in the weighted sample. We present data for men (including trans men) and women (including trans women) in our analysis. Individuals who identified 'in another way' were included in analyses where the denominator is all participants but were not included in denominators for men or women.

Representativeness of the Natsal-COVID sample

The Natsal-COVID Wave 2 sample was compared with Wave 1, and with the following probability sample surveys to assess representativeness (Table 1 and Table 2): the 2019 Annual Population Survey (APS)[10] (gender, age, region, ethnicity, marital status, education, disability), the 2018 Health Survey for England (HSE)[11] (general health and rurality), the 2018 APS report[12] (sexual identity), and the 2010-12 Natsal-3 study[13] (sexual behaviours). More recent versions of HSE and APS have been published since we carried out analysis of Natsal-COVID Wave 1 representativeness. However, we decided to use consistent comparators in our assessment of the Natsal-COVID Wave 2 sample to facilitate comparisons with Wave 1. The archived datasets were accessed from the UK Data Archive and Office for National Statistics (ONS) website. Data analysts (ED, SC, JR) had access to the datasets.

As expected, due to quotas and weighting, the weighted Wave 2 sample was similar to Wave 1 and external datasets for gender, age, region, ethnicity, and sexual identity (Table 1). Like Wave 1, the unweighted Wave 2 sample over-represented non-heterosexual identifying participants (men, 11.9%; women, 10.8%). However, the weighted sample (men, 3.8%; women, 3.6%) was comparable to 2018 APS (men, 3.0%; women, 2.6%). Sexual identity was not available in the APS dataset, so we relied on reported tabulated data for a comparable population estimate. We have therefore compared individuals aged 18–59 years old in Natsal-COVID to those aged 16+ (*i.e.*, no upper age limit) in APS. The over-representation of non-heterosexual identities in the unweighted Natsal-COVID sample can be partially explained by the younger age range of participants.

Regarding other sociodemographic variables, patterns were largely similar between Wave 1 and Wave 2. The Wave 2 sample under-represented participants who reported being married (40.4%) compared to the 2019 APS (47.5%) and under-represented those who reported 'very good' or 'good' general health (73.3%) compared to the 2018 HSE (79.9%).

The weighted proportion of Wave 2 participants reporting any previous partnered sexual experience (not necessarily involving genital contact) (93.9%) was lower than in Natsal-3 (98.8%). Among participants with at least one sexual partner in their lifetime, there was a higher proportion of Natsal-COVID Wave 2 participants reporting zero partners in the past five years (16.9%) compared with Natsal-3 (3.8%).

To characterise the sample of individuals who participated in both Waves of Natsal-COVID, we compared the unweighted and weighted characteristics and behaviours (reported at Wave 1) of those who did not participate in Wave 2 (n=4,556) with those who did (the longitudinal sample; n=2,098) (Table 3). For most sociodemographic characteristics, the longitudinal sample was similar to those who participated only in Wave 1. However, participants in the youngest age group (18–24) were under-represented in the longitudinal sample (5.1% unweighted; 9.5% weighted) compared to the wave 1 only sample (19.8% unweighted; 17.2% weighted). Conversely, participants in the oldest age group (45–59) were over-represented in the longitudinal sample (49.5% unweighted; 35.4% weighted) compared to Wave 1 only participants (26.4%

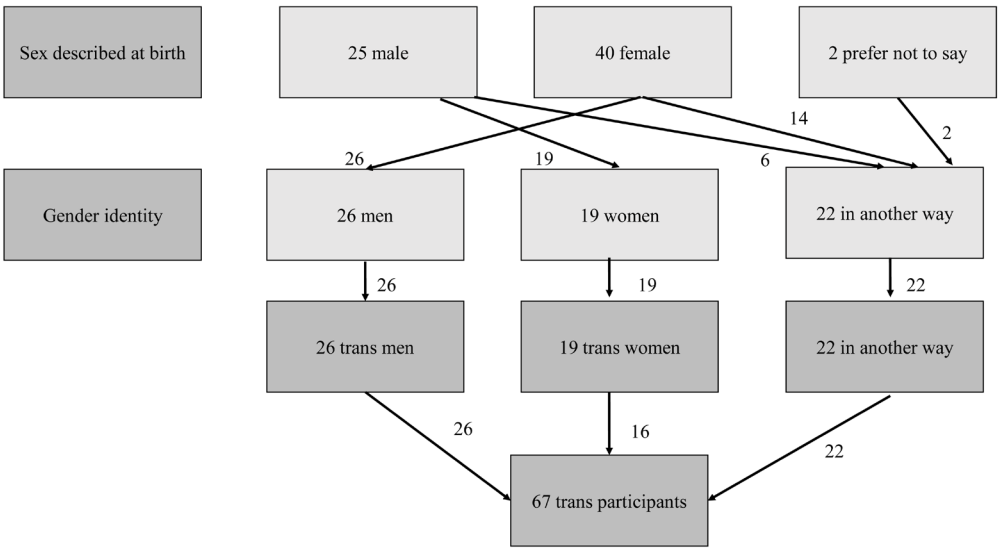

Figure 2. Classification of trans participants in National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) Wave 2.

Table 1. **National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) Wave 1 and Wave 2 unweighted and weighted distributions of quota and weighting variables compared with external probability surveys.**

		Men (including Trans Men)					Women (including Trans Women)					All				
		% [95% CI]					% [95% CI]					% [95% CI]				
		Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate[1]	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate[1]	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate[1]
Denominators (weighted, unweighted)		3312, 3095		3310, 3187		17520655, 61993	3322, 3541		3320, 3443		17668414, 68988	6658, 6658		6654, 6654		35189069, 130981
		Unweighted %	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*		*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*		*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*	
Gender[2]	Men	-	-	-	-	-	-	-	-	-	-	46.5	49.8 [48.4, 51.1]	47.9	49.8 [48.5,51.0]	49.8 [49.5,50.1]
	Women	-	-	-	-	-	-	-	-	-	-	53.2	49.9 [48.6, 51.2]	51.7	49.9 [48.6,51.2]	50.2 [49.9,50.5]
	Trans	0.8	0.6 [0.4, 0.9]	0.7	0.6 [0.4,0.9]	-	0.5	0.5 [0.3, 0.9]	0.4	0.4 [0.2, 0.7]	-	1.0	0.9 [0.7, 1.2]	0.9	0.8 [0.6,1.1]	-
Age	18–24	15.5	16.1 [14.7, 17.7]	12.6	13.6 [12.3,15.0]	15.6 [15.3,16.0]	15.1	12.7 [11.6, 13.9]	17.3	12.0 [11.1,13.1]	14.8 [14.5,15.2]	15.3	14.5 [13.6, 15.5]	15.2	12.9 [12.1,13.8]	15.2 [15.0,15.5]
	25–34	21.1	21.6 [20.0, 23.2]	24.3	25.5 [23.91,27.2]	25.0 [24.6,25.4]	29.9	26.2 [24.8, 27.7]	33.3	27.6 [26.1,29.2]	24.6 [24.2,25.0]	25.8	23.9 [22.9, 25.0]	29	26.6 [25.5,27.7]	24.8 [24.5,25.1]
	35–44	24.0	25.8 [24.1, 27.5]	23.1	23.8 [22.3,25.5]	22.9 [22.5,23.3]	23.6	23.5 [22.1, 25.0]	21.4	24.5 [23.0,26.1]	23.2 [22.8,23.6]	23.8	24.6 [23.5, 25.8]	22.2	24.1 [23.0,25.3]	23.1 [22.8,23.3]
	45–59	39.4	36.5 [34.7, 38.4]	40.0	37.1 [35.3,38.8]	36.5 [36.0,36.9]	31.5	37.5 [35.8, 39.3]	28	35.89 [34.1,37.7]	37.4 [27.0,37.8]	35.1	36.9 [35.7, 38.2]	33.7	36.4 [35.1,37.6]	36.9 [36.6,37.2]
	Median (IQR) [95th percentile]	39 (28, 51) [58]	39 (28, 49) [58]	40 (29, 51) [58]	39 (29, 49) [58]	38 (28, 49) [57]	36 (28, 47) [58]	39 (29, 50) [58]	34 (26, 46) [58]	39 (29, 50) [58]	39 (29, 50) [57]	38 (28, 49) [58]	39, (28, 49) {58]	37 (28, 48) [58]	39 (29, 49) [58]	39 (29, 49) [57]
Region	England	87.6	86.8 [85.4, 88.1]	89	86.9 [85.4,88.2]	86.9 [86.7,87.2]	87.4	86.6 [85.3, 87.8]	88	86.6 [85.3,87.9]	86.6 [86.4,86.9]	87.5	86.7 [85.8, 87.6]	88.5	86.7 [85.8,87.6]	86.8 [86.6,87.0]
	Wales	4.4	4.7 [3.9, 5.6]	3.9	4.7 [3.9,5.6]	4.7 [4.6,4.8]	4.5	4.7 [4.0, 5.5]	3.9	4.7 [3.9,5.6]	4.7 [4.6,4.8]	4.5	4.7 [4.2, 5.3]	3.9	4.7 [4.1,5.3]	4.7 [4.6,4.8]
	Scotland	8	8.5 [7.4, 9.6]	7.2	8.5 [7.4,9.7]	8.4 [8.1,8.6]	8.1	8.7 [7.7, 9.8]	8.1	8.7 [7.7,9.8]	8.7 [8.5,8.9]	8.1	8.6 [7.9, 9.4]	7.7	8.6 [7.9,9.4]	8.5 [8.4,8.7]
Social grade[2]	A Upper middle class/ B Middle class	34.8	23.1 [21.7, 24.5]	25.6	23.1 [21.6,24.6]	-	23.9	22.2 [20.8, 23.7]	24.2	22.2 [20.8,23.7]	-	29	22.7 [21.7, 23.7]	24.8	22.6 [21.6,23.7]	-
	C1 Lower middle class/C2 Skilled working class	41.1	53.0 [51.1, 54.9]	52.6	53.0 [51.2,54.9]	-	49.6	52.4 [50.6, 54.1]	50.9	52.4 [50.6,54.2]	-	45.7	52.7 [51.4, 54.0]	51.7	52.7 [51.4,54.0]	-
	D Working class/E Lower level of subsistence	24.1	23.9 [22.3, 25.6]	21.8	23.9 [22.3,25.6]	-	26.4	25.4 [23.9, 26.9]	25	25.4 [23.9,27.0]	-	25.3	24.7 [23.6, 25.8]	23.4	24.7 [23.5,25.8]	-

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		Men (including Trans Men)					Women (including Trans Women)					All				
		% [95% CI]					% [95% CI]					% [95% CI]				
		Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate[1]	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate[1]	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate[1]
Ethnicity	White[3]	86.9	85.6 [84.0, 87.0]	89.5	85.6 [84.0,87.1]	84.7 [84.4,85.1]	88	85.7 [84.4, 87.1]	89.4	85.8 [84.3,87.2]	83.8 [83.4,84.1]	87.5	85.7 [84.7, 86.7]	89.4	85.7 [84.6,86.7]	84.3 [84.0,84.5]
	Mixed/multiple[4]	2.4	1.7 [1.3, 2.1]	1.9	1.7 [1.3,2.2]	1.3 [1.2,1.4]	2.6	1.7 [1.4, 2.1]	2.3	1.7 [1.3,2.2]	1.4 [1.3,1.5]	2.5	1.7 [1.4, 2.0]	2.1	1.7 [1.4,2.0]	1.3 [1.3,1.4]
	Asian/Asian British[5]	7.2	8.2 [7.2, 9.4]	6.4	8.2 [7.2,9.4]	8.4 [8.2,8.7]	6.3	8.0 [7.0, 9.1]	5.7	8.0 [6.9,9.2]	8.6 [8.4,8.9]	6.7	8.1 [7.3, 8.9]	6.1	8.11 [7.4,8.9]	8.5 [8.3,8.7]
	Black/Black British[6]	3.1	3.3 [2.6, 4.0]	1.8	3.3 [2.5,4.2]	3.4 [3.3,3.6]	2.5	3.5 [2.8, 4.4]	2.1	3.5 [2.8,4.5]	4.0 [3.8,4.2]	2.8	3.4 [2.9, 4.0]	2	3.4 [2.8,4.0]	3.7 [3.6,3.9]
	Other	0.4	1.3 [0.7, 2.3]	0.4	1.3 [0.7,2.2]	2.1 [2.0,2.3]	0.5	0.9 [0.6, 1.5]	0.5	0.9 [0.6,1.5]	2.2 [2.0,2.3]	0.5	1.1 [0.7, 1.7]	0.5	1.1 [0.8,1.6]	2.1 [2.0,2.2]
Sexual identity	Heterosexual/ straight	88	96.2 [95.7, 96.7]	86.8	96.2 [95.7,96.6]	94.4 [94.1, 94.7]	89.2	96.4 [95.9, 96.8]	89.5	96.4 [95.9,96.8]	94.9 [94.7,95.1]	88.5	96.0 [95.6, 96.3]	87.9	96.0 [95.6, 96.3]	94.6 [94.4, 94.8]
	Gay/Lesbian	6.8	2.3 [2.0, 2.7]	7.9	2.4 [2.1,2.7]	1.9 [1.7,2.1]	2.6	1.1 [0.8, 1.4]	2.2	1.1 [0.8,1.4]	0.9 [0.8,1.0]	4.6	1.8 [1.6, 2.0]	5	1.8 [1.4,2.0]	1.4 [1.3, 1.5]
	Bisexual	4.2	0.9 [0.7, 1.1]	4.6	0.9 [0.8,1.1]	0.6 [0.5,0.7]	6.7	1.8 [1.5, 2.0]	7.2	1.8 [1.5,2.0]	1.1 [1.0,1.2]	5.6	1.4 [1.3, 1.6]	6	1.4 [1.3,1.6]	0.9 [0.8, 1.0]
	Other	0.9	0.6 [0.3, 1.0]	0.8	0.6 [0.4,0.9]	0.5 [0.4,0.6]	1.5	0.8 [0.6, 1.1]	1.3	0.8 [0.5,1.1]	0.6 [0.5,0.7]	1.4	0.8 [0.6, 1.1]	1.1	0.8 [0.6,1.0]	0.6 [0.5, 0.7]

Legend:

CI=confidence intervals.

1. Population estimate comparisons use the 2019 Annual Population Survey (APS). Analysis was restricted to those aged 18–59 resident in Britain. This was not possible for 'sexual identity' where microdata were unavailable and estimates were taken from aggregated data of individuals aged 16+ in the UK.

2. Here, trans men and trans women are included in the trans row; men and women rows refer to those whose gender identity is the same as their sex described at birth. No external comparison data available for the trans population.

3. White includes all those who identify as White English, Welsh, Scottish, Northern Irish, British, Irish, Gypsy or Irish Traveller, or from any other White background.

4. Mixed ethnicity includes those who identify as White and Black African, White and Black Caribbean, White and Asian, or any other mixed or multiple ethnic background.

5. Asian includes those who identify as Indian, Pakistani, Bangladeshi, Chinese or from any other Asian background.

6. Black includes those who identify as African, Caribbean, or from any other Black background.

Table 2. National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) Wave 1 and Wave 2 distributions compared with external probability surveys and Natsal-3 data.

		Men (including Trans Men)					Women (including Trans Women)					All				
		% [95% CI]					% [95% CI]					% [95% CI]				
		Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate
Denominators (weighted, unweighted)		3312, 3095		3310, 3187		17520655, 61993	3322, 3541		3320, 3443		17668414, 68988	6658, 6658		6654, 6654		35189069, 130981
		Unweighted %	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*		*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*		*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*	
Married[1]	Yes	40.6	40.3 [38.4, 42.3]	38.7	39.8 [37.9,41.6]	46.8 [46.4,47.3]	37.3	40.7 [38.9, 42.5]	36	41.4 [39.6,43.2]	48.2 [47.7,48.6]	38.7	40.4 [39.1, 41.7]	37.2	40.5 [39.2,41.7]	47.5 [47.2,47.8]
Education[2,3]	No qualification	5.4	5.7 [4.8, 6.8]	4.1	4.3 [3.5,5.1]	11.7 [10.3,13.2]	4.4	4.5 [3.8, 5.4]	3.2	3.5 [2.8,4.3]	11 [9.7,12.3]	4.8	5.1 [4.5, 5.8]	3.6	3.9 [3.4,4.4]	11.3 [10.4,12.3]
	Below degree	48.3	51.7 [49.6, 53.8]	50	49.9 [48.0,51.9]	54.8 [52.5,57.1]	49.8	50.1 [482, 51.9]	46.6	47.1 [45.2,49.0]	53 [51.0,54.9]	49.1	50.9 [49.5, 52.3]	48.3	48.6 [47.2,49.9]	34.8 [33.4,36.3]
	Degree	46.3	42.6 [40.5, 44.7]	46	45.9 [43.9,47.8]	33.5 [31.4,35.7]	45.8	45.4 [43.6, 47.3]	50.2	49.4 [47.5,51.4]	36.1 [34.2,38.0]	46	44.0 [42.6, 45.4]	48.1	47.6 [46.2,48.9]	53.9 [52.4,55.4]
Rurality[2]	Urban	87.5	87.1 [85.5, 88.5]	87	87.4 [86.0,88.7]	84.3 [82.7,85.7]	84.8	85.2 [83.7, 86.6]	84.8	85.1 [83.6,86.5]	84 [82.6,85.3]	86	86.1 [85.1, 87.1]	85.9	86.3 [85.3,87.3]	84.1 [83.1,85.1]
	Rural	12.5	12.9 [11.5, 14.5]	13	12.6 [11.3,14.0]	15.7 [14.3,17.3]	15.2	14.8 [13.4, 16.3]	15.2	14.9 [13.5,16.4]	16.0 [14.7,17.4]	14	13.9 [12.9, 14.9]	14.1	13.7 [12.7, 14.7]	15.9 [14.9,16.9]
General health status[2]	Good/ Very Good	70.4	70.1 [68.2, 72.0]	73.1	74.0 [72.3,75.7]	81.3 [79.5,82.9]	70	70.5 [68.7, 72.2]	73.3	72.9 [71.1,74.5]	78.6 [77.0,80.1]	70.1	70.2 [68.9, 71.5]	73.1	73.3 [72.1,74.5]	79.9 [78.7,81.1]
	Fair	23.4	23.8 [22.0, 25.6]	21	20.4 [18.9,22.0]	13 [11.7,14.5]	23.1	22.7 [21.1, 24.3]	21.6	21.8 [20.3,23.4]	15.2 [13.8,16.6]	23.3	23.3 [22.1, 24.5]	21.3	21.1 [20.0,22.3]	14.1 [13.1,15.1]
	Bad/ Very bad	6.2	6.1 [5.2, 7.2]	5.9	5.6 [4.8,6.5]	5.7 [4.7,6.9]	6.9	6.8 [5.9, 7.9]	5.2	5.3 [4.5,6.3]	6.2 [5.4,7.2]	6.6	6.5 [5.8, 7.2]	5.6	5.6 [5.0,6.2]	6.0 [5.3,6.7]
Limiting long-term illness/ disability[1]	Yes	31	29.9 [28.1, 31.8]	31.1	28.9 [27.2,30.6]	28.4 [28.0,28.8]	37.6	36.2 [34.5, 37.9]	37	35.8 [34.1,37.6]	32.5 [32.1,32.9]	34.7	33.2 [32.0, 34.5]	34.2	32.5 [31.3,33.7]	30.5 [30.2,30.8]
Ever had any partnered sexual experience (not necessarily involving genital contact)[4,5]	Yes	86.9	86.3 [84.9, 87.6]	91	90.5 [89.3,91.6]	-	88.6	88.2 [87.0, 89.3]	90	89.4 [88.1,90.5]	-	87.8	87.2 [86.3, 88.1]	90.4	89.9 [89,90.6]	-
Ever had any partnered sexual experience (modified for comparison with N-3)[4,5,6]	Yes	94.1	93.8 [92.7, 94.7]	-	-	98.7 [98.4,99.0]	94.2	94.2 [93.2, 94.9]	-	-	98.8 [98.4,99.1]	94.1	93.9 [93.3, 94.5]	-	-	98.8 [98.5,99.9]
Ever had vaginal, anal, oral sex or other genital contact with a partner of any gender[4,5]	Yes	92.5	92.3 [91.2, 93.3]	85.9	85.1 [83.5, 86.5]	96.6 [96.0,97.0]	92.2	92.3 [91.2, 93.2]	83.1	82.7 [81.2, 84.2]	97.1 [96.6,97.5]	92.3	92.2 [91.5, 92.9]	84.4	83.8 [82.7, 84.9]	96.8 [96.5,97.2]
Ever had vaginal, anal, oral sex or other genital contact with a same sex partner[4,5]	Yes	11.8	6.4 [5.5, 7.3]	13.2	6.3 [5.6,7.2]	5.7 [5.0,6.5]	9.2	5.8 [5.1, 6.6]	9.1	5.4 [4.7,6.1]	7.3 [6.7,8.0]	10.4	6.1 [5.5, 6.7]	11	5.8 [5.3,6.4]	6.5 [6.0, 7.1]

		Men (including Trans Men)					Women (including Trans Women)					All				
		% [95% CI]					% [95% CI]					% [95% CI]				
		Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate	Natsal-COVID Wave 2		Natsal-COVID Wave 1		Population estimate
Partner numbers, past 5 years[4,7]	0 partners	17.2	17.3 [15.7, 18.9]	-	-	3.0 [2.5, 3.6]	15.6	16.6 [15.2, 18.1]	-	-	4.5 [4.0,5.1]	16.3	16.9 [15.9, 18.0]	-	-	3.8 [3.4, 4.2]
	1 partner	50.8	51.2 [49.1, 53.3]	-	-	55.8 [54.1, 57.4]	59.3	61.4 [59.6, 63.2]	-	-	64.6 [63.2, 65.9]	55.2	56.2 [54.8, 57.6]	-	-	60.2 [59.2, 61.2]
	2–4 partners	18.0	19.1 [17.4, 20.9]	-	-	23.8 [22.5, 25.3]	17.0	15.4 [14.1, 16.7]	-	-	21.0 [20.0, 22.1]	17.5	17.3 [16.2, 18.4]	-	-	22.4 [21.6, 23.3]
	5+ partners	14.0	12.5 [11.1, 13.9]	-	-	17.3 [16.2, 18.6]	8.1	6.6 [5.8, 7.6]	-	-	9.9 [9.1, 10.6]	10.9	9.6 [8.8, 10.5]	-	-	13.6 [12.9, 14.3]
	Median (IQR) [95th percentile]	1 (1, 2) [10]	1 (1, 2) [10]	-	-	1 (1, 3) [13]	1 (1, 2) [6]	1 (1, 1) [5]	-	-	1 (1, 2) [7]	1 (1, 2) [9]	1 (1, 2) [8]	-	-	1 (1, 2) [10]

Legend:

CI=confidence intervals.

1. Population estimate comparisons use the 2019 Annual Population Survey (APS). Analysis was restricted to those aged 18–59 resident in Britain.

2. Comparison data from 2018 Health Survey for England 2018 (HSE). Analysis was restricted to those aged 18–59 resident in Britain.

3. Natsal-COVID participants chose an option from the following list: (1) primary school, (2) secondary school (age under 15), (3) GNVQ / GSVQ / GCSE/ SCE standard, (4) NVQ1/NVQ2, (5) NVQ3/ SCE Higher Grade/ Advanced GNVQ/ GCE A/AS or similar, (6) NVQ4 / HNC / HND / Bachelor's degree or similar, and (7) NVQ5 or post-graduate diploma. A 3-category education variable, based on a variable used by 2018 Health Survey for England (HSE), including "no qualification," "below degree", and "degree" was derived using the following: No qualification: 1–2; Below degree: 3–5; Degree: 6–7.

4. Comparison data from Natsal-3. Analysis was restricted to those aged 18–59 resident in Britain.

5. All respondents (including sexually inexperienced).

6. Sexual experience questions differed between Natsal-COVID and Natsal-3. Natsal-COVID includes reporting any sexual experience (self-defined) or any vaginal, oral or anal sex, or genital contact with a partner. Natsal-3 includes reporting sexual intercourse with an opposite sex partner or oral, anal or genital contact with a same sex partner.

7. All respondents reporting at least one sexual partner in their lifetime (vaginal, anal, oral sex, or other genital contact).

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Table 3. National Surveys of Sexual Attitudes and Lifestyles COVID study (Natsal-COVID) Wave 1 only sample compared with the longitudinal sample (Wave 1 and Wave 2).

		Men (including Trans Men)				Women (including Trans Women)				All			
		% [95% CI]				% [95% CI]				% [95% CI]			
		Wave 1 only		Wave 1 and Wave 2 (longitudinal)		Wave 1 only		Wave 1 and Wave 2 (longitudinal)		Wave 1 only		Wave 1 and Wave 2 (longitudinal)	
Denominators (weighted, unweighted)*		2280, 2149		1035, 1038		2212, 2386		1057, 1057		4512, 4556		2095, 2098	
		Unweighted %	Weighted % [95% CI]	Unweighted %	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*	*Unweighted %*	*Weighted % [95% CI]*
Gender	Men	-	-	-	-	-	-	-	-	47.2	50.5 [49.0, 52.1]	49.5	49.4 [46.6, 52.2]
	Women	-	-	-	-	-	-	-	-	52.4	49.0 [47.5, 50.6]	50.4	50.4 [47.6, 53.3]
	Trans[2]	0.9	0.7 [0.4, 1.2]	0.4	0.2 [0.1, 0.6]	0.4	0.4 [0.2, 0.8]	0.5	0.8 [0.3, 2.8]	1.1	1.0 [0.8, 1.4]	0.6	0.7 [0.3, 1.6]
Age	18–24	16.7	17.8 [16.1, 19.7]	4.1	10.8 [7.7, 14.9]	22.3	16.2 [14.8, 17.6]	6	8.3 [6.3, 10.7]	19.8	17.2 [16.1, 18.4]	5.1	9.5 [7.6, 11.8]
	25–34	29.3	30.1 [28.0, 32.2]	14.1	27.8 [23.3, 32.7]	36.3	31.1 [29.2, 33.1]	26.6	33.4 [30.0, 36.9]	33	30.6 [29.2, 32.0]	20.4	30.7 [27.8, 33.6]
	35–44	22.1	22.8 [20.9, 24.8]	25.1	25.3 [21.9, 28.9]	19.7	23.6 [21.8, 25.6]	25	23.7 [20.9, 26.7]	20.8	23.1 [21.8, 24.5]	25.1	24.5 [22.3, 26.8]
	45–59	32	29.3 [27.3, 31.1]	56.6	36.2 [32.5, 40.0]	21.6	29.1 [27.0, 31.2]	42.5	34.7 [31.7, 37.8]	26.4	29.1 [27.7, 30.5]	49.5	35.4, [33.0, 27.8]
	Median (IQR) [95th percentile]	36 (27, 48) [58]	35 (27, 47) [58]	47 (37, 55) [58]	38 (28, 49) [57]	31 (25, 42) [57]	35 (27, 47) [58]	42 (31, 51) [58]	38 (28, 49) [58]	33 (26, 45) [58]	35 (27, 47) [58]	44 (34, 54) [58]	38 (28, 49) [58]
Region	England	88	85.5 [83.7, 87.2]	91	86.9 [82.4, 90.4]	87.2	86.1 [84.4, 87.6]	89.9	86.7 [83.8, 89.1]	87.6	85.8 [84.6, 86.9]	90.5	86.8 [84.3, 89.0]
	Wales	4.4	5.4 [4.4, 6.7]	2.7	4.4 [2.2, 8.6]	4.1	4.6 [3.7, 5.7]	3.4	4.6 [3.1, 6.9]	4.3	5.0 [4.3, 5.8]	3.1	4.5 [3.1, 6.6]
	Scotland	7.6	9.1 [7.7, 10.6]	6.3	8.7 [6.1, 12.1]	8.7	9.4 [8.1, 10.7]	6.7	8.6 [6.8, 10.9]	8.2	9.2 [8.3, 10.2]	6.5	8.7 [7.0, 10.6]
Social grade	A Upper middle class/ B Middle class	24.8	22.2 [20.5, 24.1]	27.1	22.4 [19.2, 26.0]	23.8	21.8 [20.1, 23.6]	24.9	19.2 [16.9, 21.7]	24.3	22.0 [20.8, 23.3]	25.9	20.7 [18.7, 22.9]
	C1 Lower middle class/C2 Skilled working class	54.8	55.6 [53.4, 57.9]	48	52.5 [48.0, 56.9]	50	51.5 [49.3, 53.7]	53	55.0 [51.6, 58.5]	52.3	53.6 [52.0, 55.2]	50.5	53.8 [51.0, 56.6]
	D Working class/E Lower level of subsistence	20.3	22.1 [20.2, 24.2]	25	25.1 [21.3, 29.4]	26.2	26.7 [24.8, 28.7]	22.1	25.8 [22.7, 29.1]	23.4	24.4 [23.0, 25.8]	23.5	25.4 [22.9, 18.2]
Ethnicity	White[1]	88.2	83.6 [81.6, 85.5]	92.1	86.3 [81.8, 89.7]	88.6	84.8 [82.9, 86.5]	91.3	85.3 [81.9, 88.1]	88.3	84.2 [82.8, 85.5]	91.7	85.8 [83.1, 88.1]
	Mixed/multiple[2]	2.1	1.8 [1.3, 2.5]	1.5	1.9 [1.0, 3.6]	2.3	1.7 [1.3, 2.2]	2.1	2.0 [1.2, 3.2]	2.3	1.8 [1.5, 2.2]	1.8	2.0 [1.3, 2.9]
	Asian/Asian British[3]	7.1	9.1 [7.8, 10.7]	5	8.0 [5.2, 12.1]	6.2	8.5 [7.2, 10.0]	4.7	8.3 [6.2, 11.0]	6.6	8.8 [7.8, 9.9]	4.8	8.1 [6.3, 10.4]
	Black/Black British[4]	2.1	3.8 [2.8, 5.1]	1.3	2.9 [1.6, 5.2]	2.4	4.1 [3.1, 5.3]	1.5	3.6 [2.2, 6.1]	2.2	3.9 [3.2, 4.8]	1.4	3.2 [2.2, 4.8]
	Other	0.5	1.6 [0.9, 2.9]	0.2	0.9 [0.2, 3.8]	0.6	1.0 [0.6, 1.8]	0.4	0.8 [0.3, 2.1]	0.6	1.3 [0.9, 2.0]	0.3	0.9 [0.4, 2.1]

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		Men (including Trans Men)				Women (including Trans Women)				All			
		% [95% CI]				% [95% CI]				% [95% CI]			
		Wave 1 only		Wave 1 and Wave 2 (longitudinal)		Wave 1 only		Wave 1 and Wave 2 (longitudinal)		Wave 1 only		Wave 1 and Wave 2 (longitudinal)	
Sexual identity	Heterosexual/straight	86.6	96.1 [95.5, 96.6]	87.1	93.1 [89.4, 95.6]	88.6	96.3 [95.7, 96.8]	91.4	95.5 [94.0, 96.7]	87.3	95.8 [95.3, 96.2]	89.2	94.2 [92.3, 95.7]
	Gay/Lesbian	7.5	2.2 [1.9, 2.6]	8.8	4.8 [2.6, 8.6]	2	0.9 [0.6, 1.2]	2.4	1.6 [0.8, 3.1]	4.7	1.7 [1.4, 1.9]	5.6	3.2 [1.0, 5.1]
	Bisexual	4.9	1.0 [0.8, 1.3]	3.9	1.8 [1.0, 3.2]	8.1	2.0 [1.7, 2.4]	5.1	2.3 [1.7, 3.3]	6.7	1.7 [1.4, 1.9]	4.5	2.1 [1.5, 2.8]
	Other	1	0.7 [0.4, 1.2]	0.2	0.3 [0.1, 1.4]	1.3	0.8 [0.5, 1.3]	1.1	0.5 [0.3, 1.0]	1.3	0.9 [0.7, 1.2]	0.8	0.6 [0.3, 1.1]
Married	Yes	35.8	36.4 [34.3, 38.6]	44.5	41.3 [37.1, 45.7]	31.6	37.2 [35.0, 39.4]	45.7	42.7 [39.3, 46.1]	33.5	36.7 [35.1, 38.2]	45.1	42.0 [39.3, 44.7]
Education[5]	No qualification	5	5.3 [4.3, 6.5]	3.3	3.8 [2.5, 5.7]	3.9	4.1 [3.3, 5.1]	3.1	3.6 [2.5, 5.3]	4.4	4.7 [4.0, 5.4]	3.2	3.7 [2.8, 4.9]
	Below degree	49.9	49.9 [47.6, 52.2]	50.1	50.8 [46.4, 55.2]	46.6	46.7 [44.6, 48.9]	44.9	44.7 [41.2, 48.2]	48.2	48.4 [46.8, 50.0]	47.6	47.8 [45.0, 50.6]
	Degree	45.1	44.8 [42.6, 47.1]	46.6	45.4 [41.1, 49.8]	49.5	49.2 [47.0, 51.4]	51.9	51.7 [48.2, 55.2]	47.4	46.9 [45.4, 48.5]	49.2	48.5 [45.7, 51.3]
Rurality	Urban	87.3	87.8 [86.2, 89.3]	84.8	86.6 [83.6, 89.1]	85.5	85.4 [83.6, 86.9]	81	81.6 [78.7, 84.1]	86.4	86.7 [85.5, 87.8]	82.9	84.1 [82.1, 86.0]
	Rural	12.7	12.2 [10.7, 13.8]	15.2	13.4 [10.9, 16.4]	14.5	14.6 [13.1, 16.4]	19	18.4 [15.9, 21.3]	13.6	13.3 [12.2, 14.5]	17.1	15.9 [14.0, 17.9]
General health status	Good/ Very Good	5.3	5.1 [4.2, 6.1]	7.5	5.6 [4.2, 7.3]	4.8	5.0 [4.1, 6.0]	5.7	5.2 [3.9, 6.7]	5.2	5.1 [4.5, 5.9]	6.6	5.5 [4.5, 6.6]
	Fair	20.5	19.8 [18.0, 21.6]	21.8	18.2 [15.2, 21.6]	21.2	21.5 [19.8, 23.4]	23.2	22.9 [20.1, 25.9]	20.8	20.6 [19.4, 21.9]	22.5	20.5 [18.4, 22.8]
	Bad/ Very bad	74.2	75.1 [73.1, 77.0]	70.7	76.3 [72.6, 79.6]	74	73.5 [71.5, 75.4]	71.1	72.0 [68.8, 75.0]	74	74.2 [72.8, 75.6]	70.9	74.0 [71.6, 76.3]
Limiting long-term illness/ disability	Yes	29.6	27.6 [25.6, 29.7]	34.1	27.6 [24.2, 31.4]	36.9	35.6 [33.5, 37.8]	37.4	34.7 [31.5, 38.0]	33.5	31.7 [30.3, 33.2]	35.8	31.3 [28.9, 33.8]
Ever had any partnered sexual experience (not necessarily involving genital contact)[6]	Yes	89.9	89.3 [87.8, 90.7]	93.2	90.6 [87.2, 93.1]	89	88.2 [86.6, 89.6]	92.2	90.9 [88.4, 92.9]	89.3	88.7 [87.6, 89.7]	92.6	90.6 [88.6, 92.3]
Ever had vaginal, anal, oral sex or other genital contact with a partner of any gender)[6]	Yes	83.8	82.7 [80.7, 84.6]	89.8	87.2 [83.5, 90.2]	81.5	80.8 [78.8, 82.7]	86.5	83.9 [80.6, 86.7]	82.5	81.7 [80.3, 83.0]	88.1	85.4 [83.0, 87.5]
Ever had vaginal, anal, oral sex or other genital contact with a same sex partner[4]	Yes	13.3	6.6 [5.6, 7.6]	12.9	9.2 [6.2, 13.4]	9.8	5.7 [4.9, 6.7]	7.7	4.8 [3.6, 6.3]	11.4	6.1 [5.5, 6.8]	10.3	6.9 [5.2, 9.1]

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		Men (including Trans Men)				Women (including Trans Women)				All			
		% [95% CI]				% [95% CI]				% [95% CI]			
		Wave 1 only		Wave 1 and Wave 2 (longitudinal)		Wave 1 only		Wave 1 and Wave 2 (longitudinal)		Wave 1 only		Wave 1 and Wave 2 (longitudinal)	
Partner numbers, lifetime[8]	1 partner	13	13.3 [11.6, 15.2]	12.3	16.7 [12.6, 21.9]	17.1	17.8 [15.9, 20.0]	16.4	17.1 [14.3, 20.2]	15.1	15.4 [14.1, 16.9]	14.3	16.9 [14.3, 19.8]
	2 partners	10.9	11.8 [10.1, 13.6]	7.7	10.5 [7.8, 14.1]	13	12.2 [10.6, 14.0]	12.6	12.1 [9.8, 14.9]	12	12.0 [10.8, 13.2]	10.2	11.3 [9.4, 13.5]
	3–4 partners	14.5	15.7 [13.8, 17.9]	14	14.9 [12.0, 18.4]	18.5	19.3 [17.3, 21.4]	15	16.3 [13.5, 19.4]	16.6	17.5 [16.0, 18.9]	14.5	15.6 [13.5, 17.9]
	5+ partners	61.6	59.2 [56.5, 61.9]	66	57.8 [52.8, 62.7]	51.4	50.7 [48.1, 53.3]	56	54.6 [50.7, 58.5]	56.3	55.1 [53.3, 57.0]	61.1	56.2 [53.0, 59.3]
	Median (IQR) [95th percentile]	7 (3, 16) [100]	6 (3, 15) [60]	7 (3, 15) [66]	6 (2, 12) [50]	5 (2, 10) [31]	5 (2, 10) [30]	5 (2, 10) [30]	5 (2, 10) [25]	5 (2, 12) [50]	5 (2, 12) [45]	6 (3, 13) [50]	5 (2, 11) [35]
Ever had vaginal, anal, oral sex or other genital contact with partner of any gender, July 2019-July 2020[6]	Yes	71.6	70.6 [68.3, 72.9]	69.1	69.3 [65.0, 73.3]	71.6	69.5 [67.2, 71.7]	67.8	68.1 [64.5, 71.5]	71.6	70.0 [68.4, 71.6]	68.3	68.6 [65.8, 71.2]
Partner numbers, July 2019-July 2020[9]	1 partner	74.6	77.3 [74.7, 79.7]	85.7	86.2 [81.9, 89.6]	85.1	88.0 [86.2, 89.6]	92.7	91.1 [87.6, 93.8]	80	82.3 [80.7, 83.8]	89.1	88.7 [86.0, 90.9]
	2 partners	11.9	11.8 [10.0, 13.8]	7	6.6 [4.6, 9.5]	7.5	6.5 [5.3, 7.9]	4.4	6.5 [4.2, 10.1]	9.7	9.3 [8.2, 10.6]	5.7	6.6 [4.9, 8.7]
	3–4 partners	5.8	5.0 [3.8, 6.5]	2.8	3.3 [1.7, 6.4]	4.4	3.3 [2.5, 4.4]	1.3	1.1 [0.5, 2.5]	5	4.2 [3.5, 5.1]	2.1	2.2 [1.3, 3.8]
	5+ partners	7.7	6.0 [4.7, 7.4]	4.5	3.9 [2.1, 7.2]	3	2.2 [1.6, 3.1]	1.6	1.2 [0.6, 2.4]	5.3	4.2 [3.5, 5.0]	3.1	2.6 [1.5, 4.2]
	Median (IQR) [95th percentile]	1 (1, 2) [10]	1 (1, 1) [9]	1 (1, 1) [5]	1 (1, 1) [5]	1 (1, 1) [4]	1 (1,1) [3]	1 (1, 1) [2]	1 (1, 1) [2]	1 (1, 1) [6]	1 (1, 1) [5]	1 (1, 1) [3]	1 (1, 1) [3]
1 or more new partner(s), July 2019-July 2020[9]	Yes	36.4	35.2 [32.4, 38.1]	22.8	30.1 [24.6, 36.3]	25.7	22.2 [20.0, 24.5]	15.4	17.4 [14.0, 21.4]	30.8	28.9 [27.1, 30.8]	19.2	23.8 [20.4, 27.5]

Legend:

CI=confidence intervals.

1. White includes all those who identify as White English, Welsh, Scottish, Northern Irish, British, Irish, Gypsy or Irish Traveller, or from any other White background.

2. Mixed ethnicity includes those who identify as White and Black African, White and Black Caribbean, White and Asian, or any other mixed or multiple ethnic background.

3. Asian includes those who identify as Indian, Pakistani, Bangladeshi, Chinese or from any other Asian background.

4. Black includes those who identify as African, Caribbean, or from any other Black background.

5. Natsal-COVID participants chose an option from the following list: (1) primary school, (2) secondary school (age under 15), (3) GNVQ / GSVQ / GCSE/ SCE standard, (4) NVQ1/NVQ2, (5) NVQ3/ SCE Higher Grade/ Advanced GNVQ/ GCE A/AS or similar, (6) NVQ4 / HNC / HND / Bachelor's degree or similar, and (7) NVQ5 or post-graduate diploma. A 3-category education variable, based on a variable used by 2018 Health Survey for England (HSE), including "no qualification," "below degree", and "degree" was derived using the following: No qualification: 1–2; Below degree: 3–5; Degree: 6–7.

6. All respondents.

7. All respondents reporting at least one sexual partner in their lifetime (vaginal, anal, oral sex, or other genital contact).

8. All respondents reporting at least one sexual partner in the past year (vaginal, anal, oral sex, or other genital contact).

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unweighted; 29.1% weighted). Among sexually active participants, a smaller proportion of the longitudinal sample reported multiple partners between July 2019 and July 2020 (10.9% unweighted; 11.3% weighted) compared with Wave 1 only participants (20.0% unweighted; 17.7% weighted). The longitudinal sample were also less likely to report any new partners in the same timeframe (19.2% unweighted; 23.8% weighted) than those who only took part in Wave 1 (30.8% unweighted; 28.9% weighted).

Discussion

Natsal-COVID is a large, multi-wave, national study that was undertaken when data were urgently needed to understand the impact of the pandemic on SRH services and inform policy. Initial findings from Natsal-COVID Wave 1 have been used in SRH policy and practice in Britain[14,15]. Natsal-COVID Wave 2 data generated one-year prevalence estimates for a range of key SRH behaviours and outcomes one year after the start of the first COVID-19 lockdown in Britain. The second wave of the survey also provides an opportunity to examine change over time during the first year of the pandemic.

Key sociodemographic characteristics and reported sexual behaviours were generally similar in the weighted Natsal-COVID data when compared to external probability surveys and Natsal-3. However, we noted bias in several important characteristics that remained after weighting. The Natsal-COVID Wave 2 sample under-represented individuals who were married and those who self-reported 'very good' or 'good' general health. Among those with at least one sexual partner in their lifetime, a higher proportion of Natsal-COVID Wave 2 participants reported having no sexual partners in the past five years compared with Natsal-3 (conducted ten years ago). This difference could reflect pandemic restrictions, differences in the question wording, mode effects (*i.e.*, online versus in-person), sampling bias or, most likely, a combination of these factors.

Prior to weighting, like Wave 1, Natsal-COVID Wave 2 had a higher proportion of participants identifying as non-heterosexual compared to 2019 APS. The over-representation of people with non-heterosexual identities in the unweighted Natsal-COVID data is consistent with previous web-panel surveys[16,17]. However, weighted percentages of non-heterosexual individuals were comparable between Natsal-COVID Wave 2 and 2019 APS.

The profile of participants who took part in both waves of Natsal-COVID (the longitudinal sample) demonstrated high survey attrition. Sample bias could be due to differential attrition, particularly among younger adults. Among sexually active participants, the longitudinal sample were less likely to report multiple sexual partners in the past year or a new sexual partner in the past year compared to participants who only participated in Wave 1 of Natsal-COVID. These differences in sexual behaviour estimates are likely attributable to sample bias predominately driven by age. Researchers conducting longitudinal analysis using Natsal-COVID data should bear in mind sample attrition and its associated bias when interpreting findings. The application of weights to the longitudinal sample reduced the magnitude of difference but did not correct them entirely.

Natsal-COVID did not use probability sampling methods and therefore inference to the general population should be undertaken with caution[18]. There are known sources of bias in web-panel surveys that may affect survey estimates[17,19]. Although the Natsal-COVID findings are likely to be largely generalisable, caution in the interpretation of prevalence estimates is advised particularly when analysing the longitudinal sample. Additionally, the population surveys which we have used as benchmark estimates are subject to measurement and representation errors. Natsal-3 was also conducted more than ten years ago, so differences in the sexual behaviour estimates may also be attributable to temporal changes.

In conclusion, the Natsal-COVID Wave 2 survey has enabled us to identify impacts of the COVID-19 pandemic throughout the year following the first national lockdown in Britain and to monitor change over time in the same period.

Data availability

Underlying data

The Natsal-COVID Wave 1 dataset has been deposited with the UK Data Archive (an open access repository) with safeguarded access (SN 8865 - National Survey of Sexual Attitudes and Lifestyles COVID-19 Study, 2020). The dataset is available to users registered with the UK Data Service. http://doi.org/10.5255/UKDA-SN-8865-2[7].

Wave 2 data will be deposited at the same location within 10–12 weeks. Given the sensitive nature of the content of the data, a thorough disclosure risk assessment and the application of disclosure control measures are necessary prior to safe deposit. In the meantime, interested researchers or reviewers may contact the Natsal team (natsal@ucl.ac.uk) for interim access, with appropriate considerations about confidentiality and data protection.

Other datasets (2019 Annual Population Survey, 2018 Health Survey for England and 2010–12 Natsal-3 study) used in this analysis are publicly available via the UK Data Archive.

Datasets can be accessed through registration with the UK Data Service

UK Data Service: Annual Population Survey, January–December, 2019. http://doi.org/10.5255/UKDA-SN-8632-5[10].

UK Data Service: Health Survey for England, 2018. http://doi.org/10.5255/UKDA-SN-8649-2[11].

UK Data Service: National Survey of Sexual Attitudes and Lifestyles, 2010-2012. http://doi.org/10.5255/UKDA-SN-7799-2[13].

The datasets held in the UK Data Service are under safeguarded access and can be accessed by accepting the End User Licence.

The published 2019 Annual Population Survey sexual identity tables are available as a downloadable Excel file on the ONS website[12]. This dataset is available under the terms of the Open Government License v3.0.

Acknowledgements

We want to thank the study participants and Reuben Balfour (Ipsos).

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Open Peer Review

Current Peer Review Status: ✔ ✔ ✔

Version 1

Reviewer Report 04 October 2023

https://doi.org/10.21956/wellcomeopenres.19765.r65798

✔ **Pablo Cabrera Álvarez**
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This research note provides a comprehensive overview of the methodology of the wave 2 of the Natsal-COVID study. The primary objective of this second wave was to capture one-year prevalence estimates for a range of sexual and reproductive health measures. The survey, which took place in March-April 2021, involved both a re-issue of the wave 1 questionnaire to respondents willing to be recontacted and the recruitment of a fresh sample from a web panel. In addition to detailing the methodology, this paper includes a representativeness analysis using a diverse set of measures from high-quality probability samples. Additionally, the authors address the principal limitations of the research design and their potential impact on data analysis, building upon the explanations provided in the research note on wave 1 recruitment (Dema et al., 2022).

The paper provides a detailed and clear overview of the wave 2 design, which will be helpful for researchers and other data users. Now, I discuss four minor points that might help the authors to refine the paper:

- **Brief description of the panel recruitment methodology**. The recruitment methodology of the panel is likely to affect the quality of survey estimates (see Mercer and Lau, 2023; Cornesse et al., 2020). It is understood that a comprehensive explanation of the panel recruitment methodology may be beyond the scope of this research note, but it would be informative to have a few more details about the panel recruitment methodology (if these details are available to the authors).

- **The benchmark estimates are also subject to error**. The benchmark estimates used in the representativeness analysis come from probability surveys and are also subjected to measurement and representation errors. Furthermore, when considering Natsal-3 (2010-12), in addition to survey errors, it should be factored in the influence of time and its potential effects on the target population. This temporal aspect may partially account for some of the observed differences.

- **Confidence intervals (CIs) in the representativeness analysis**. In the representativeness analysis, where comparisons are made between Natsal-COVID survey estimates and benchmark data (Tables 1 and 2), the 95% confidence intervals are provided for the estimates from the probability surveys and the Natsal-COVID survey. The authors could provide some information about how they estimated the standard errors, especially in the case of the estimates from the Natsal-COVID study, a nonprobability sample (see Wu, 2022). Providing some insight into the estimation of confidence intervals would help readers better interpret the information presented in the table.

- **Quota sampling and panel attrition**. In the discussion section (page 13, paragraph 3 of the PDF), the authors suggest that attrition between waves 1 and 2 may be attributed to quotas not being applied in the recruitment of the longitudinal sample. However, the paper that presents the design of wave 1 states that quotas were used in recruitment (Dema et al., 2022), and it is not clear how the quotas could be implemented in the second wave of a longitudinal study since they would harm the sample size and the feasibility of conducting longitudinal analyses. An explanation of this point could help clarify their idea.

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Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Survey methodology.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 18 Dec 2023

Emily Dema

Thank you for your useful suggestions for this paper, which we have taken on board. Please see below specific responses to your suggestions. **Brief description of the panel recruitment methodology** The Ipsos online panels are run with stringent recruitment processes and quality control to ensure individuals can only take part once, are not oversampled and are engaged. Checks are used at recruitment and while people are on the panel, to ensure bad and inactive panellists are removed. Cases which display fraudulent or straight lining behaviour during the survey are removed from the data. The sample is designed to be representative of the national population (including those who are not online) by age and gender, region, working status and social grade. The panellists are recruited from a variety of sources. Ipsos reports never depending solely on any one method or source of recruitment, and they reach different types of people through different methodologies and suppliers. Methods include partnering with affiliate networks which run recruitment campaigns across 40-50 of their own member websites at any given time. New websites/sources are tested before recruitment campaigns are launched. The objective is to maintain a changing but well-controlled number of sources––enough to provide a variety of recruits, while maintaining control over who is participating in campaigns. Other methods for recruitment include unsolicited visits to the panel website, text ads, internet search engines, banners, email campaigns, other panels and offline methods. Performance measures are used to adjust recruitment sources and they discontinue partnering with sources that provide poor-quality respondents. We have updated the Sample Recruitment section to include this additional level of detail. "Ipsos reports never depending solely on any one method or source of recruitment, and they reach different types of people through different methodologies and suppliers. Methods include partnering with affiliate networks which run recruitment campaigns across 40-50 of their own member websites at any given time. Performance measures are used to adjust recruitment sources and they discontinue partnering with sources that provide poor-quality respondents"; p4 in the pdf version "The Ipsos online panels are run with stringent recruitment processes and quality control to ensure individuals can only take part once, are not oversampled and are engaged. Checks are used at recruitment and while people are on the panel to ensure bad and inactive panellists are removed. Cases which display fraudulent or straight lining behaviour during the survey are removed from the data"; p4 in the pdf version **The benchmark estimates are also subject to error** We have added text about the limitations of temporality and benchmark estimates to the discussion section. "Additionally, the population surveys which we have used as benchmark estimates are also subject to measurement and representation errors. Natsal-3 was also conducted more than ten years ago, so differences in the sexual

behaviour estimates may also be attributable to temporal changes"; p13 in the pdf version **Confidence intervals (CIs) in the representativeness analysis** All analysis was based on the complex survey functions in Stata, using the weights we derived for Natsal-Covid waves 1 and 2 and the weights supplied with the benchmark surveys. We have not added further detail to the text. **Quota sampling and panel attrition** We have updated the discussion wording to clarify this point. "Sample bias could be due to differential attrition in the longitudinal sample, particularly among younger adults"; p13 in the pdf version

Competing Interests: No competing interests were disclosed.

Reviewer Report 02 October 2023

https://doi.org/10.21956/wellcomeopenres.19765.r67364

Sylvester Reuben Okeke
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This very interesting and relevant methodology paper reports a second wave of data on prevalence of key SRH outcomes. The paper also compares the second wave data with the first wave data to track changes in SRH outcomes over a one-year period.

The methodological strength of this manuscript is its rigour, which is evident in use of a representative sample, methods of data collection and analytical techniques. Notably, authors identified and reported known sources of bias and caveats within which the research results and conclusions are to be understood and interpreted.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Global Public Health, Sexual and Reproductive Health, Population Health, Blood-borne Viruses and Sexually Transmissible Infections, Adolescents Sexual and Reproductive Health and Rights, Research Methods.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 22 February 2023

https://doi.org/10.21956/wellcomeopenres.19765.r54470

Holly Hope
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The Natsal-COVID Wave 2 methodology paper clearly describes the design and procedures of data collection and compares the wave 2 ands wave 1 cohort characteristics. The limitations of the methods are detailed in the discussion so that researchers using the dataset for longitudinal versus cross sectional analyses are aware of limits to generalisability. Where information is not presented in this publication it is signposted in the references.

This is an important study for a number of reasons; we now know that the UK live birth rate temporarily dropped during pandemic; to what extent that reflected changes in sexual and reproductive health practices is an important question that this dataset could address. The reporting by sexual and gender identity reflects the society we live in and ideally all contemporary surveys should be designed to report on the experience and views of LGTBQ+ people.

There are few contemporary longitudinal datasets that capture information on IPV, making this dataset very useful.

I hope that further waves of data are collected so that we can understand to what extent there are long term pandemic effects on intimate relationships and sexual health.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Psychiatric epidemiology, reproductive health, behavioural science and women's health.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Comments on this article

Version 1

Reviewer Response 19 Dec 2022

Sally McManus

This useful paper clearly sets out the methodological approach taken in the second wave of the Natsal Covid Study. The authors provide context for research practice at that time (when restrictions were in place which prevented face-to-face interviewing), detail the alternative methods developed, and provide thoughtful examination of any potential resulting bias or other limitations. This includes appropriate comparisons with other sources of probability sample survey estimates. Links are provided to full documentation, further study information, and where archived data is housed for access. Collection of sensitive information is discussed thoughtfully, including in relation to asking about intimate partner violence and inclusive gender questions.

Competing Interests: I have affiliations with the National Centre for Social Research and UCL,

where some co-authors are based. I also worked on a previous wave of Natsal (2000) and have collaborated with some co-authors.