Who is engaging with lateral flow testing for COVID-19 in the UK? The COVID-19 Rapid Survey of Adherence to Interventions and Responses (CORSAIR) study

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WHAT IS ALREADY KNOWN ON THIS TOPIC

- Since 9 April 2021, everyone in the UK has been able to access free, regular, rapid lateral flow COVID-19 testing for use when asymptomatic.
- Official estimates of uptake of testing include only those reported to a Government agency.

WHAT THIS STUDY ADDS

- Uptake of lateral flow testing in spring 2021 was low, with approximately 17% of the sample reporting having a COVID-19 test in the last week (excluding those whose latest test was a polymerase chain reaction [PCR] test).
- Ensuring that people know they are eligible for regular asymptomatic testing may drive uptake.
- Communications should emphasise that asymptomatic testing is important regardless of whether you think you have come into contact with somebody who has COVID-19, and that people who have been vaccinated still need to test regularly for COVID-19.

ABSTRACT

Objectives: To investigate rates of uptake of lateral flow testing and reporting of test results in England and Scotland, and the psychological, contextual, and socio-demographic factors associated with testing.

Design: Series of four fortnightly online cross-sectional surveys.

Setting: Data collected 19 April to 2 June 2021.

Participants: People who lived in England and Scotland, aged 18 years or over, excluding people who reported their most recent test was a polymerase chain reaction (PCR) test (n=6646, n≈1,600 per wave).

Main outcome measures: Having completed at least one lateral flow test (LFT) to see whether you have COVID-19 in the last seven days.

Results: We used binary logistic regressions to investigate psychological, contextual and socio-demographic factors associated with lateral flow testing at least once in the last week. Increased uptake of testing was associated with being younger, female, living with a dependent child, being employed and being vaccinated. Work- and study-related factors such as having been out to work in the last week, working in a sector that adopted LFT early, and being a student were also associated with increased uptake. People who reported COVID-19 symptoms in the last week were more likely to have taken a test, as were those who had heard more about regular LFT, knew they were eligible to receive regular LFT, and agreed that LFTs were accurate and an effective way to prevent the spread of COVID-19. Factors associated with not taking a test included agreeing that you do not need to test for COVID-19 unless you have come into contact with a case, and that people who have been vaccinated do not need to be tested regularly.

Conclusions: These data indicate that uptake of lateral flow testing is low. Encouraging testing and making testing easy through workplaces and places of study are likely to increase uptake, although care should be taken not to pressurise employees and students. Increasing knowledge that everyone is eligible for regular asymptomatic testing may drive uptake, as should communications that testing is important regardless of whether people think they have come into contact with a COVID-19 case and that people who have been vaccinated should still test regularly.

Keywords: COVID-19, antigen testing, lateral flow testing, mass asymptomatic testing, uptake, predictors

Abstract word count: 356

INTRODUCTION

As the UK moves to continuous management of COVID-19 instead of disaster prevention, a variety of strategies are being used to slow the spread of infection. It is thought that asymptomatic cases account for 24% of COVID-19 transmission.(1) There is limited evidence of the effectiveness of mass asymptomatic testing programmes at slowing the spread of COVID-19 as most programmes, both in the UK and abroad, have been used in conjunction with other behavioural restrictions making it impossible to quantify the impact of mass testing alone.(2, 3) However, the effectiveness of any intervention will be limited if people do not engage with that behaviour.

Since 9 April 2021, everyone in the UK has been able to access free, regular, rapid lateral flow COVID-19 testing for use when asymptomatic.(4) At the time of writing, the English and Scottish Governments are recommending twice weekly lateral flow testing for all adults. Lateral flow tests (LFTs) for asymptomatic testing can be ordered online, collected from NHS pharmacies and are supplied through schools, colleges and nurseries; some universities and other employers also offer rapid testing.(5) Results of these tests should be reported through a UK Government website.(6) Mass asymptomatic testing was piloted in Liverpool, England between 6 November 2020 and 30 April 2021. Findings indicated that 57% of residents in Liverpool took at least one rapid LFT over the course of the pilot (~6 months), but uptake was substantially lower in more deprived areas (where infection rates were higher) and among non-white minoritized ethnic groups.(7) Testing was likely driven by the intense media campaign in Liverpool, and the novelty of the testing at the time. As well as asymptomatic testing being available, all those with key COVID-19 symptoms have been eligible for a polymerase chain reaction (PCR) test since 18 May 2020.(8) There is considerable confusion among the public about the use of LFT and PCR tests when symptomatic.(9) Previous research indicates that uptake of testing when symptomatic is low.(10)

A range of factors may affect whether people engage with lateral flow testing. These can be categorised using the Capability, Opportunity, Motivation and Behaviour (COM-B) model.(11) Capability encompasses the psychological and physical capacity to engage in a behaviour. It includes, for example, knowledge as to what the appropriate behaviour is (e.g. knowing that you are eligible for regular testing) and when to enact it. Opportunity relates to factors outside the person, for example testing being required by one’s employer, or

belonging to a group that was eligible for asymptomatic testing prior to the nationwide rollout (e.g. health and social care workers, teachers, students and people who work in transport such as hauliers) (12-15) and that, in turn, may be associated with socio-economic status or ethnicity. Motivation describes the psychological processes that energise or inhibit a behaviour and includes the perceived risk associated with a disease outbreak, which may in turn be linked to greater exposure to other people (e.g. during socialising),(16) believing that you have immunity against COVID-19,(17) believing that you could engage in a behaviour if you wanted to (self-efficacy), and perceiving the behaviour to be effective.

The aim of this study was to investigate rates of uptake of lateral flow testing and reporting of results in England and Scotland, and the psychological, contextual, and socio-demographic factors associated with testing.

METHODS

Design

Since January 2020, BMG Research has been conducting a series of nationally representative (UK) cross-sectional surveys (weekly or fortnightly) on behalf of the Department of Health and Social Care throughout the COVID-19 outbreak. We analysed these data as part of the CORSAIR study [the COVID-19 Rapid Survey of Adherence to Interventions and Responses study]).(10) For this study, we used data collected between 19 April and 2 June 2021 (waves 48 to 51).

Participants

Participants (n≈2,000 per wave) were eligible for the study if they were aged 16 years or over and lived in the UK and were recruited from two specialist research panel providers, Respondi (n=50,000) and Savanta (n=31,500). Quotas were applied based on age and gender (combined) to ensure the sample was broadly representative of the population. After completing the survey, participants were then unable to participate in the subsequent three waves; thus, all participants included in this study were unique. Participants were reimbursed in points which could be redeemed in cash, gift vouchers or charitable donations (up to 70p).

We limited the sample to people living in England or Scotland as Wales and Northern Ireland are following a different testing schedule. We excluded those under 18 years of age as many would be eligible for asymptomatic testing under school testing regimes.

To investigate uptake of lateral flow testing, we excluded people who reported that their most recent test was a PCR test or they did not know what type their most recent test was and who reported that they had completed a PCR test or who did not know what type of test they completed after developing COVID-19 symptoms.

Study materials

Lateral flow testing

Participants were asked "when was the last time [they] had a test for coronavirus". Response options ranged from "within the last 24 hours" to "I've never had a coronavirus test".

People who reported having a COVID-19 test in the last week were asked a series of follow-up questions. These included how many times they had taken a COVID-19 test in the last seven days" (responses from "once" to "ten times or more"); how they received their most recent COVID-19 test (response options included receiving it from a care home, one's place of work, a school, further education college, or university, a hospital/clinical setting, having ordered it online, collecting a pack from a local test site or taking an assisted test at a local test site, or when travelling internationally); where they reported their test result, if at all (response options included the GOV.UK website, by phone with NHS Test and Trace, to one's employer, a school, further education college, or university, and to friends and family); what the result of their most recent test was (response options: "I tested positive", "I tested negative", "The test was void (inconclusive)", "I have not received my results yet"); and which type of test they had most recently taken (response options: "PCR test", "lateral flow test" or "don't know/unsure"). For this question, participants were given an explanation of each test ("PCR tests are sent to a lab for processing and results are sent to you usually by text or email. This includes home test kits which you need to mail in or drop off. Rapid lateral flow tests provide results within 30 minutes of taking the test (these might also be referred to as rapid antigen tests). Both tests involve swabbing the back of your nose and throat").

All participants were asked how much they had previously heard about "free, regular rapid testing for people even if they don't have coronavirus symptoms, which uses a technology called 'lateral flow testing'" on a four-point scale from "nothing at all" to "a great deal". They were also asked if "as far as [they knew, they were] eligible to receive rapid COVID-19 tests twice a week to check for coronavirus even if [they didn't] have symptoms (also known as lateral flow testing)?". Possible responses were "yes", "no" and "don't know".

Contextual factors

All participants were asked if they had had any symptoms in the past seven days from a list of ten (new, continuous cough; high temperature / fever; runny nose; diarrhoea; nausea / feeling sick; vomiting; sneezing; loss of appetite; loss of sense of smell; loss of taste). In the final wave of data collection, this question changed to ask if participants had developed any symptoms in the past ten days (response options remained identical).

We also identified people in groups who had been eligible for asymptomatic testing before it became available to everyone (people who indicated that they worked or volunteered in health or social care, education and childcare, or transport). Participants were identified as students if they specified that their employment status was "student / on a government training programme (Nation Traineeship/Modern Apprentice)".

Participants were asked how many times in the last seven days they had been out of their home to go to work and to meet up with friends or family that they did not live with (responses capped at 30). In the last wave of data collection, this question was changed to ask how many times in the past seven days they had "left the house to go out to work (number of days)" and "met up with" friends or family they did not live with (responses capped at 30). We recoded the number of times people had been out for work into a binary variable (been out to work in the last week vs not).

Psychological factors

Participants were asked how much, if at all, they agreed that: they were confident that lateral flow tests were accurate; regularly testing people without symptoms is an effective way to prevent COVID-19 transmission; you do not need to take a lateral flow test unless you have come into contact with a COVID-19 case; and that people who have been vaccinated do not need to be tested for COVID-19 regularly. All questions were asked on a scale from "strongly disagree" to "strongly agree".

Perceived risk of COVID-19 was measured by asking participants to what extent they thought COVID-19 posed a risk to "you personally" and "people in the UK" on a five-point scale from "no risk at all" to "major risk".

Socio-demographic factors

Participants were asked for their sex, age, employment status, socio-economic grade, highest educational or professional qualification, ethnicity, first language and COVID-19 vaccination status. Participants were also asked whether they had any dependent children in their

household and whether they or a member of their household had a chronic illness. We computed a quadratic term for age. Region and index of multiple deprivation was derived from participants' postcode.(18)

Participants were also asked if they had had, or currently had, COVID-19. We recoded responses to give a binary variable (think have had COVID-19 ["I've definitely had it, and had it confirmed by a test", "I think I've probably had it"] vs think have not had COVID-19 ["I don't know whether I've had it or not", "I think I've probably not had it", "I've definitely not had it"]).

We measured financial hardship by asking participants to what extent in the past seven days they had been struggling to make ends meet, skipping meals they would usually have, and were finding their current living situation difficult (Cronbach's α=.83).

Ethics

This work was conducted as a service evaluation of the Department of Health and Social Care's public communications campaign and, following advice from King's College London Research Ethics Subcommittee, was exempt from ethical approval.

Patient and public involvement

Lay members served on the advisory group for the project that developed our prototype survey material; this included three rounds of qualitative testing.(19) Due to the rapid nature of this research, the public was not involved in the further development of the materials during the COVID-19 pandemic.

Power

A sample size of 7,000 allows a 95% confidence interval of about plus or minus 1% for the prevalence estimate for a survey item with a prevalence of 50%.

Analysis

We report uptake of lateral flow testing, how people received their most recent test, and out-of-home behaviour following a positive test result descriptively.

We ran multivariable logistic regression analyses to investigate contextual, psychological, and socio-demographic factors associated with having completed at least one COVID-19 test in the last week, controlling for survey wave, region, gender, age (raw and quadratic), presence of a dependent child in the household, having a chronic illness oneself, having a

household member who has chronic illness, employment status, socio-economic grade, index of multiple deprivation, highest educational or professional qualification, ethnicity, first language, having had COVID-19 before, vaccination status, and financial hardship. For these analyses, we excluded people who reported that they did not know when their last COVID-19 test was. As we hypothesised that peoples' beliefs about the necessity for regular asymptomatic testing of people who had been vaccinated for COVID-19 might differ based on vaccination status, we investigated associations between this belief and increased uptake of testing separately in those who reported having no, one, or two doses of a COVID-19 vaccine. We also hypothesised that participants who received a positive COVID-19 test or whose test result was inconclusive may perceive the risk of COVID-19 to themselves differently to those who had received a negative test. Therefore, we also investigated associations between perceived risk to oneself and increased uptake of testing excluding people whose most recent test result was positive or inconclusive.

Due to the large number of analyses (n=16) conducted on a single outcome, we used a Bonferroni correction and only report narratively results where $p<.003$. Tables give raw p-values.

RESULTS

Since the introduction of guidance recommending twice weekly asymptomatic testing for all adults, 16.9% (95% CI 16.0% to 17.8%, n=1123/6646) of people reported that they had had a lateral flow COVID-19 test in the last week, excluding those whose most recent test was a PCR test (Table 1). Of these, 65.2% had completed two or more tests in the last week (11.0% total sample).

Table 1. Uptake of lateral flow testing

When was the last time you had a test for coronavirus? We're interested in your most recent test, even if you didn't have symptoms [Total n=6646]	% (N)	*Asked to people who reported having a covid test in the last seven days.* And how many times have you taken a test for coronavirus in the last seven days? [Total n=1123]	% (N)
Within the last 24 hours	4.1 (273)	Once	34.3 (385)
1-3 days ago	7.4 (492)	Twice	47.2 (530)
4-7 days ago	5.4 (358)	Three times	9.4 (106)
One to two weeks ago	7.1 (469)	Four to five times	3.7 (42)
Two to four weeks ago	6.9 (458)	Six to seven times	2.8 (32)
One month to three months ago	10.0 (666)	Eight to nine times	0.7 (8)
Three months to six months ago	7.8 (519)	Ten times or more	1.2 (14)
More than six months ago	6.3 (417)		
I've never had a coronavirus test	43.0 (2861)		

Don't know	2.0 (133)	Don’t know	0.5 (6)

Most people reported the result of their most recent test to someone, with 64% reporting that they registered it with an official Government agency (Table 2).

Table 2. Where people register the results of their latest test

Asked to people who reported having a COVID-19 test in the last seven days. How, if at all, did you report the result of your test? Tick all that apply [Total N=1123]	% (n)
I registered my result on GOV.UK	50.0 (561)
I registered my result by phone with NHS Test & Trace	17.0 (191)
I informed my employer	15.4 (173)
I informed the school, nursery or further education college where I or a member of my family study	6.9 (77)
I informed friends/family I was planning to meet after taking the test	6.3 (71)
I informed friends/family I had recently met before taking the test	5.0 (56)
I informed the university where I or a member of my family study	2.5 (28)
Other	2.0 (23)
I did not report the result to anyone	15.8 (177)
Registered test result with GOV.UK or NHS Test & Trace	64.1 (720)
Registered result with anyone (GOV.UK, NHS Test & Trace, one’s employer, or the school, nursery, further education college, or university where the participant or a member of their family study)	77.2 (867)

Associations with increased uptake of lateral flow testing

Increased uptake of lateral flow testing was associated with: being female, younger age, having a dependent child in your household, being employed, being vaccinated, having experienced COVID-19 symptoms in the last seven to ten days, being a student, having been out to work in the last week, working in a sector that adopted lateral flow testing early (health or social care, education and childcare, travel), having heard more about regular lateral flow testing, knowing that you are eligible for regular lateral flow testing, being confident that lateral flow tests are accurate, agreeing that regularly testing people without symptoms is an effective way to prevent the spread of COVID-19, and perceiving a greater risk of COVID-19 to people in the UK (Table 4).

Not having had a test was associated with not knowing that you were eligible for regular lateral flow testing, agreeing that you only need to take a lateral flow test if you have come into contact with somebody who has COVID-19, and that people who have been vaccinated do not need to be tested for coronavirus regularly (in people who reported at least one dose of the vaccine; Table 4). There was significant variation by region, with Scotland showing lower uptake of lateral flow testing.

Table 4. Factors associated with having completed at least one COVID-19 test in the last week. Bolding indicates findings significant at p<0.003.

Factor	Level	Had not completed a COVID-19 test in the last week, n (%) [total n=5390]	Had completed a lateral flow COVID-19 test in the last week, n (%) [total n=1123]	Adjusted odds ratio (95% CI) for having completed a LFT †	p-value
Survey wave	19 to 21 April 2021 (wave 48)	1381 (84.6)	252 (15.4)	Reference	-
	4 to 5 May 2021 (wave 49)	1334 (81.3)	306 (18.7)	1.13 (0.93 to 1.38)	.22
	17 to 19 May 2021 (wave 50)	1326 (82.6)	280 (17.4)	1.04 (0.85 to 1.27)	.69
	1 to 2 June 2021 (wave 51)	1349 (82.6)	285 (17.4)	0.97 (0.79 to 1.19)	.78
	Overall	-	-	$\chi^2(3)=2.8$	.42
Region	East Midlands	443 (83.6)	87 (16.4)	Reference	-
	East of England	564 (80.3)	138 (19.7)	1.23 (0.90 to 1.68)	.19
	London	638 (80.7)	153 (19.3)	1.13 (0.83 to 1.55)	.43
	North East	251 (81.8)	56 (18.2)	1.22 (0.83 to 1.80)	.31
	North West	669 (84.2)	126 (15.8)	1.02 (0.75 to 1.40)	.89
	Scotland	608 (90.3)	65 (9.7)	**0.53 (0.37 to 0.76)**	**.001**
	South East	726 (80.3)	178 (19.7)	1.24 (0.92 to 1.67)	.15
	South West	504 (84.3)	94 (15.7)	1.04 (0.74 to 1.44)	.83
	West Midlands	489 (79.5)	126 (20.5)	1.35 (0.98 to 1.85)	.07
	Yorkshire and the Humber	498 (83.3)	100 (16.7)	1.08 (0.78 to 1.50)	.65
	Overall	-	-	**$\chi^2(9)=35.6$**	**<.001**
Gender	Male	2508 (85.0)	442 (15.0)	Reference	-
	Female	2868 (80.9)	676 (19.1)	1.32 (1.14 to 1.51)	**<.001**
Age	Raw age	N=5390, M=50.6, SD=16.5	N=1123, M=44.9, SD=15.9	0.76 (0.72 to 0.81)	**<.001**
Age – quadratic (age-mean)^2	-	-	-	1.0003 (1.0000 to 1.0006)	.06
Dependent child in household	None	3829 (85.3)	660 (14.7)	Reference	-
	Child present	1561 (77.1)	463 (22.9)	**1.29 (1.10 to 1.51)**	**.001**
Has a chronic illness (oneself)	None	3974 (82.2)	819 (17.8)	Reference	-
	Present	1478 (83.6)	209 (16.4)	1.18 (1.00 to 1.39)	.05
Household member has chronic illness	None	4482 (82.7)	936 (17.3)	Reference	-
	Present	790 (82.0)	173 (18.0)	1.04 (0.86 to 1.26)	.71
Employment status	Not working	2544 (88.5)	330 (11.5)	Reference	-
	Working	2783 (78.1)	781 (21.9)	**1.94 (1.63 to 2.32)**	**<.001**
Socio-economic grade	ABC1	3844 (83.6)	754 (16.4)	Reference	-
	C2DE	1438 (80.5)	348 (19.5)	1.10 (0.94 to 1.29)	.21

Index of multiple deprivation	1st quartile (least deprived) to 4th quartile (most deprived)	N=5390, M=2.6, SD=1.1	N=1123, M=2.6, SD=1.1	0.93 (0.87 to 0.99)	.02
Highest educational or professional qualification	GCSE/vocational/A-level/No formal qualifications	3625 (82.9)	749 (17.1)	Reference	-
	Degree or higher (Bachelors, Masters, PhD)	1765 (82.5)	374 (17.5)	0.91 (0.78 to 1.07)	.24
Ethnicity	White British	4549 (82.7)	954 (17.3)	Reference	-
	White other	323 (83.9)	62 (16.1)	0.87 (0.61 to 1.25)	.45
	Black and minority ethnicity	484 (82.2)	105 (17.8)	0.83 (0.64 to 1.08)	.16
	Overall	-	-	$\chi^2(2)=2.1$	.34
English as first language	No	415 (83.2)	84 (16.8)	Reference	-
	Yes	4975 (82.7)	1039 (17.3)	1.19 (0.86 to 1.65)	.29
Had COVID-19 before	Think not	4600 (83.8)	888 (16.2)	Reference	-
	Think yes	790 (77.1)	235 (22.9)	1.23 (1.03 to 1.47)	.02
Vaccination status	Not vaccinated	1628 (82.9)	336 (17.1)	Reference	-
	1 dose	1937 (83.2)	392 (16.8)	**1.52 (1.25 to 1.86)**	**<.001**
	2 doses	1825 (82.2)	395 (17.8)	**2.45 (1.96 to 3.07)**	**<.001**
	Overall	-	-	**$\chi^2(2)=61.7$**	**<.001**
Financial hardship	Range 3 (least) to 15 (most)	N=5311, M=7.3, SD=3.0	N=1107, M=7.5, SD=3.0	0.99 (0.97 to 1.01)	.38
COVID-19 symptoms in last week / ten days	No	5258 (83.2)	1061 (16.8)	Reference	-
	Yes	132 (68.0)	62 (32.0)	**1.89 (1.34 to 2.66)**	**<.001**
Being a student	No	5189 (83.0)	1061 (17.0)	Reference	-
	Yes	138 (73.4)	50 (26.6)	**2.65 (1.76 to 4.00)**	**<.001**
Been out to work in last week	No	3702 (88.3)	490 (11.7)	Reference	-
	Yes	1688 (72.7)	633 (27.3)	**2.30 (1.94 to 2.73)**	**<.001**
Number of times been out to meet people from another household socially	Range 0 to 30	N=5390, M=0.9, SD=1.5, median=0	N=1123, M=1.2, SD=1.6, median=1	1.05 (1.01 to 1.10)	.03
Work in a sector that adopted LFT early	No	4700 (86.3)	744 (13.7)	Reference	-
	Yes	690 (64.5)	379 (35.5)	**2.54 (2.14 to 3.02)**	**<.001**
Amount heard about regular LFT	4-point scale from "nothing at all" to "a great deal"	N=5253, M=2.8, SD=0.8	N=1112, M=3.3, SD=0.7	**2.28 (2.06 to 2.51)**	**<.001**
As far as you know, are you eligible to receive rapid COVID-19 tests twice a week to check for coronavirus even if you don't have symptoms (also known as lateral flow testing)?	No	928 (90.5)	97 (9.5)	Reference	-
	Don't know	1718 (95.0)	91 (5.0)	**0.59 (0.43 to 0.8)**	**.001**
	Yes	2744 (74.6)	935 (25.4)	**2.98 (2.35 to 3.78)**	**<.001**
	Overall	-	-	**$\chi^2(2)=240.5$**	**<.001**
I am confident that lateral flow tests are accurate	5-point scale from "strongly disagree" to "strongly agree"	N=5131, M=3.3, SD=1.0	N=1097, M=3.6, SD=0.9	**1.40 (1.29 to 1.51)**	**<.001**
Regularly testing people without symptoms is an effective way to prevent the spread of coronavirus	5-point scale from "strongly disagree" to "strongly agree"	N=5225, M=3.9, SD=0.9	N=1115, M=4.3, SD=0.8	**1.96 (1.77 to 2.16)**	**<.001**

I do not need to take a lateral flow test unless I have come into contact with somebody who has coronavirus	5-point scale from "strongly disagree" to "strongly agree"	N=5061, M=2.6, SD=1.0	N=1114, M=2.0, SD=1.1	**0.51 (0.47 to 0.55)**	**<.001**
People who have been vaccinated do not need to be tested for coronavirus regularly	5-point scale from "strongly disagree" to "strongly agree"				
	In people who have not been vaccinated	N=1480, N=2.8, SD=1.1	N=329, M=2.7, SD=1.1	0.90 (0.80 to 1.01)	.08
	In people who have had one vaccine dose	N=1790, M=2.5, SD=1.0	N=385, M=2.0, SD=1.1	**0.54 (0.47 to 0.61)**	**<.001**
	In people who have had two vaccine doses	N=1644, M=2.6, SD=1.0	N=392, M=2.0, SD=1.1	**0.53 (0.47 to 0.60)**	**<.001**
Perceived risk of COVID-19 to self	5-point scale from "no risk at all" to "major risk"	N=5343, M=3.0, SD=1.1	N=1117, M=3.0, SD=1.1	1.04 (0.98 to 1.11)	.23
	Excluding people who tested positive and whose test result was inconclusive	N=5343, M=3.0, SD=1.1	N=1058, M=3.0, SD=1.1	1.03 (0.96 to 1.10)	.42
Perceived risk of COVID-19 to people in the UK	5-point scale from "no risk at all" to "major risk"	N=5326, M=3.5, SD=1.0	N=1114, M=3.6, SD=0.9	**1.13 (1.05 to 1.22)**	**.001**

† Adjusting for wave, region, gender, age (raw and quadratic), presence of a dependent child in the household, having a chronic illness oneself, having a household member who has chronic illness, employment status, socio-economic grade, index of multiple deprivation, highest educational or professional qualification, ethnicity, first language, having had COVID-19 before, vaccination status, and financial hardship.

Abbreviations: LFT=lateral flow test

DISCUSSION

These data suggest that uptake of lateral flow testing is low, with approximately 17% of the sample reporting having a test in the last week. This is slightly lower than another survey finding that 25% of English and Scottish adults reported taking regular COVID-19 tests (defined as at least once or twice a week; data collected 29 July 2021) although that was not in a nationally representative sample.(20) These data are not directly comparable with the Liverpool pilot, which reported uptake of testing over the complete duration of the pilot (almost 6 months), rather than uptake of people per week.(7) In the first month of the pilot, 35% of people reported having taken up either LFT or PCR test.(21) Analyses of tests reported to the UK Government indicate that the number of LFTs registered had steadily declined from approximately 5.7 million LFTs (15 to 21 April 2021 (22)) to around 3.5 million (27 May and 2 June 2021).(23) This number includes tests taken by children and does not include tests that have not been officially registered on the UK Government website. However, our data would imply around 10 million LFTs should be reported each week by people aged over 17 years in England and Scotland alone, suggesting that our survey respondents may be more compliant (uptake of testing and / or reporting of testing) than the general population. This is corroborated by official figures estimating that approximately 21% of lateral flow tests are reported.(24) Our data indicate that 64% of participants' most recent tests had been registered with an official Government agency.

Factors related to employment or study were associated with uptake of lateral flow testing, with people being more likely to report having a test in the last week if they were employed, had been out to work in the last week, if they worked in a sector that recommended asymptomatic testing before the national guidance was implemented, and if they were a student. This could be because people were encouraged or compelled to take tests through their workplace, because they were more familiar with testing, or because they were more worried or perceived a greater risk of exposure to COVID-19 as they were going out to their place of work or study.(25) The current findings suggest that encouraging employees to take tests could drive uptake. However, this should be approached with caution. There are ethical issues to consider in employers putting pressure on their employees, and there is a potential resulting lack of income if workers are unable to attend their place of work if they decline.(26) Mandation of testing may result in negative attitudes towards testing becoming more entrenched.(27) Uptake could also be increased by making testing easier, e.g. at or very

near to places of work or study, drop-in rather than appointment-based and with explicit paid time off for testing.

Uptake of lateral flow testing was higher in people who reported experiencing COVID-19-like symptoms in the last week. People with COVID-19-like symptoms should request a PCR, rather than rely on an LFT. It is clear that this requirement is not always being followed.(9) Communications should emphasise that people with key COVID-19 symptoms should request a PCR test, as should those who test positive using an LFT.

Socio-demographic factors associated with uptake of lateral flow testing included being younger, living with a dependent child, lower socio-economic grade, and thinking that you have had COVID-19 before. Previous research has found these factors to be consistently associated with non-adherence to behaviours that prevent the spread of COVID-19.(10, 17, 28) However, the association between increased lateral flow testing and lower age has also been found in other data.(20) One possible explanation may be that younger people are less likely to work from home.(26, 29) Therefore, these findings may be an artefact of people testing in relation to their work or study. Official figures of registered tests indicate that asymptomatic testing in school aged children, who are "expected to test twice weekly" (15) under the supervision of their parents, is driving uptake, with numbers of tests conducted falling during the school holidays.(23) Parents may be likely to test themselves for COVID-19 while supervising their child's test. We are unsure why those who think they have had COVID-19 before are more likely to engage with lateral flow testing. Increased uptake of testing was associated with having been vaccinated. This may reflect general adherence, with those being more likely to engage in preventive behaviours also being more likely to be vaccinated (itself a preventive behaviour).

These data indicate that people were more likely to engage in lateral flow testing if they had heard more about, and knew they were eligible for, regular LFTs. This is consistent with uptake of preventive behaviours in previous pandemics.(30) Similar to predictions from the Protection Motivation Theory,(31) perceiving testing to be more accurate and effective were associated with increased uptake.(32) Conversely, people who agreed that you only need to take a test if you have come into contact with a COVID-19 case, and that people who have been vaccinated do not need to be tested regularly were less likely to have taken a test in the last week. The latter belief was particularly strongly associated with low uptake in those who had been vaccinated. Taken together, these results suggest that media campaigns raising

awareness that all adults are eligible for the mass asymptomatic testing programme are likely to increase uptake.

Although socio-demographic characteristics of the sample were broadly reflective of the UK population, we cannot be certain that the behaviour and beliefs of those that complete internet surveys are representative of those of the general population. This is reflected in the higher reporting of lateral flow tests in our sample compared to that reported by official agencies. However, associations within the data are still likely to be informative.(33) Since data reflected self-reported behaviour, reports may be biased, and influenced by social desirability or poor recall. Given that we asked about behaviour in the past week, the influence of poor recall should be low. We also mitigated this by defining uptake as having completed one test in the last week, while Government guidelines suggest two COVID-19 tests per week should be completed. Although we have data on where participants received their lateral flow tests, we did not ask why they took their most recent tests.

Our study suggests that uptake of lateral flow testing in the population is low. People with symptoms were more likely to have completed a test in the past week. Communications should highlight that people with COVID-19 symptoms should request a PCR test rather than taking an LFT. Work- and study-related factors are associated with uptake of lateral flow testing. Encouragement of employees and students, especially those attending their place of work or study, to engage in asymptomatic testing may increase uptake. However, employers and educational institutions should exercise caution so as not to place undue pressure on employees and students to test. Interventions to prevent the spread of COVID-19 are unlikely to be effective if people do not engage with the behaviour. Ensuring that people know they are eligible for regular asymptomatic testing may drive uptake. These results suggest that communications emphasising that lateral flow testing is important regardless of whether you think you have come into contact with somebody who has COVID-19, and that people who have been vaccinated still need to be testing regularly for COVID-19 may also increase uptake.

AUTHOR CONTRIBUTION STATEMENT

All authors conceptualised the study and contributed to survey materials. LS completed analyses with guidance from HWWP and GJR. LS wrote the first draft of the manuscript. All authors contributed to, and approved, the final manuscript. GJR is guarantor. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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COMPETING INTERESTS DECLARATION

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: all authors had financial support from NIHR for the submitted work; RA is an employee of Public Health England; HWWP receives additional salary support from Public Health England and NHS England; HWWP receives consultancy fees to his employer from Ipsos MORI and has a PhD student who works at and has fees paid by Astra Zeneca; no other financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work. NTF is a participant of an independent group advising NHS Digital on the release of patient data. All

authors are participants of the UK's Scientific Advisory Group for Emergencies or its subgroups.

ETHICAL APPROVAL

This work was conducted as part of service evaluation of the marketing and communications run by the Department of Health and Social Care, and so did not require ethical approval.

DATA SHARING STATEMENT

No additional data are available from the authors.

TRANSPARENCY DECLARATION

The authors affirm that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned have been explained.

Surveys were commissioned and funded by DHSC, with the authors providing advice on the question design and selection. DHSC had no role in analysis, decision to publish, or preparation of the manuscript. Preliminary results were made available to DHSC.

DISSEMINATION DECLARATION

Dissemination of survey results to participants is not possible due to the anonymous nature of data collection.

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