

# Student views and experiences of asymptomatic COVID-19 testing at the University of Edinburgh

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# Executive summary

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In November 2020, the University of Edinburgh launched a mass testing programme, using lateral flow devices, to identify pre and asymptomatic cases of COVID-19 among its students with the main goal of minimising transmission when students travelled home for the winter break. To coincide with the rollout of testing, social scientists from the School of Social and Political Science and the Usher Institute at the University of Edinburgh conducted a mixed-methods study to explore student perceptions, experiences, and responses to testing. Of the 8,001 students who booked a test at a University of Edinburgh testing sites, 946 students completed a 10-minute survey that included a combination of closed and open-ended questions. A further 24 students participated in a follow-up interview to share their experiences and perceptions of COVID-19 testing in more depth. The research aimed to understand student views on the value of asymptomatic testing, their motivations for seeking a test, their experiences of the testing process, and any effects of testing on their subsequent protective behaviours with a view to informing and improving testing strategies in the future.

## Key findings

- Students responded positively to the offer of testing and, overall, feedback was positive.
- The decision to participate in the testing programme was motivated by trust in the university's guidance and/or the desire to know they were not infectious and could travel and mix with family safely. A lesser motivation was the contribution that lateral flow device (LFD) testing can reduce the incidence and prevalence of COVID-19 more broadly. Pressures from family and/or friends to participate in a novel, university-wide testing event were also factors.
- For many students, the primary value of the test—to provide reassurance for safe travel—was diminished by the delay between their test result and the end of activities related to their programme of study or scheduled travel.
- Weaknesses in the IT systems for booking tests were experienced as an impediment to programme access. Some students did not receive their test results. These IT issues have the potential to erode student willingness to participate in future programmes.
- While students found the testing programme to be well organised, some did not feel that the information they had received from the university and/or at the testing centre had adequately prepared them for testing. Conflicting or unclear information about how to self-administer the test and the lack of provision for students with impaired hearing were particular concerns.
- Many students were unaware that a negative LFD result did not confirm the absence of infection. Some students did not know what a lateral flow test was and/or were unclear about the differences between antigen-based lateral flow tests and polymerase chain reaction (PCR) tests. Some students referred to the lower accuracy of LFDs as a reason not to trust the accuracy of the results.
- There is some limited evidence from interviews that receiving a negative LFD result diminishes students' adherence to protective behaviours, but this needs exploration in further research.

## Recommendations

Findings from this study inform a number of recommendations for the university that may also be applicable to other presymptomatic and asymptomatic testing programmes.

## Communication

- Consolidate, streamline, and stratify the information provided to students about the testing programme on the university website and booking form to make it easier for students to absorb key messages. Identify priority messages (e.g., that two tests are necessary, that a negative test result does not guarantee an absence of the virus, that these are not PCR tests and cannot be used as a 'fit to travel' certificate) and ensure they are highlighted in all communications.
- Provide guidance on 'what is involved' and 'what is expected' that mirrors the student experience of moving through the testing process (e.g., information about what to bring to the testing centre [mobile phone, student card, face mask], the fact that students will self-administer the test, etc.). Provide a flow diagram that shows students' pathway through the testing process and explains what is expected of students at each stage.
- Provide students with the opportunity to book two tests at once or give a prompt to remind students to book another test separately.
- Improve training for testing centre volunteers to ensure consistency in the on-site instructions given to students. Create on-site provisions, including BSL signers, for students with disabilities. Improve

signage for entrance/exits and access to toilets.

- Improve transparency around the purpose, benefits, and limitations of LFD testing to ensure informed consent and build trust in the programme. Emphasise the public health benefits of asymptomatic testing (i.e., to identify individuals who are positive in the absence of symptoms so that they can self-isolate and reduce the odds of infecting others) and the limited benefits to the individual being tested (i.e., does not confirm absence of infection/cannot provide reassurance of safety to travel). Provide links to reliable sources regarding the sensitivity and specificity of LFDs and information on how they have played a role in identifying cases and reducing community transmission.

## Information systems

Ensure that information systems are fit to support testing programmes.

- Remove the inconvenience of filling in multiple booking forms.
- Address the causes of website access issues/sites not functioning.
- Improve data handling to ensure 100% of test results are returned to students.
- Create 'joined-up' data systems to prevent students needing to manually fill in on-site registration forms.
- Provide a telephone number or email address at the bottom of the page for students who encounter any issues (and/or add an FAQ: 'I didn't get my test result back, what should I do?').

## Logistics

Ensure that the timing and location of testing is convenient for students. This may be particularly important for future regular testing programmes. Barriers to uptake should be minimised, which means students should be able to access testing where they live (for those in halls of residence) or in university venues they routinely attend. If and when face-to-face teaching resumes, testing should not disrupt and should be coordinated with student timetables.

# Introduction

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In November 2020, the University of Edinburgh launched a mass testing programme to identify pre and asymptomatic cases of COVID-19 so as to minimise transmission when students travelled home for the winter break. This was part of a Scotland and UK wide initiative to detect and contain hidden infections in the highly mobile student population. The programme was also an opportunity to explore the future feasibility of mass testing as a strategy to enable UK universities to safely increase the volume of on-campus teaching and research.

With the arrival of new, more transmissible variants of the virus in late 2020, the need to understand the feasibility and potential value of student testing has become more urgent. The UK government's advisory group, SAGE, recently noted that:

“Further quantitative and qualitative data is needed on the feasibility and acceptability of universal, asymptomatic testing of staff and students in universities. This should include broader, more diverse student and staff populations, and focus on student perceptions, experience, and responses (SAGE 2020).”

To address these questions, social scientists from the School of Social and Political Science and the Usher Institute at the University of Edinburgh developed a mixed methods study to coincide with the rollout of the university's testing programme.

Supported by rapid response funding from the university, the study included a short survey immediately following student participation in the testing process in December 2020 followed by in-depth interviews with a smaller cross-section of students in January 2021. The research explored student perceptions and experiences of the university's testing programme and the ways in which their participation influenced their plans for travel and protective behaviours. Topics addressed included students' motivation to participate in asymptomatic testing; challenges that students experienced in accessing or undertaking testing; trust in test results; and how test results influenced adherence to public health guidelines on travel, social distancing, and isolation. The research aimed to understand the value that students attribute to testing and the ways in which this value influences testing practices, with a view to informing and improving government and university testing strategies in the future.

This report begins by outlining the background context within which presymptomatic and asymptomatic testing programmes for students and LFDs were established. It then describes how the Semester 1 (pre-Christmas 2020) University of Edinburgh testing programme was established and what it involved. The methods for the study are then explained, followed by the results, including survey findings (closed and open-ended questions) and some early indications of the key themes emerging from follow-up interviews. Finally, we include a brief discussion of the results as well as conclusions and recommendations. We argue that students experience testing as a social process and that approaching testing programmes from this perspective can help to highlight and address barriers to take-up and improve communications regarding the uses and purposes of testing.

# Background

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The circulation of students through teaching spaces, shared residences, and social venues, combined with their periodic travel to and from permanent residences, puts them at high risk of exposure to the SARS-CoV-2 virus. In September and October 2020, the re-opening of university campuses across the UK was accompanied by outbreaks at over 60 universities, with halls of residence found to be especially prone to outbreaks. University outbreaks contributed to a rise in the prevalence and incidence of COVID-19 in Scotland and elsewhere in the UK during this period. Data from the ONS infection survey in England found that test positivity rates were highest among teenagers and young adults from early August through to mid-November (ONS 2020). University outbreaks in the autumn of 2020 not only posed risks to the wider community in terms of transmission, but also caused harm to students. While the risk of severe disease among students is a fraction of that of older adults, infection in this population resulted in large groups of students being advised to self-isolate, with quarantine being closely monitored in some halls of residence.

To avoid community transmission rising again when students returned home for the winter break, in November 2020 the UK government announced that it would make rapid lateral flow device (LFD) tests available free of charge to any university that volunteered to run a mass testing programme prior to the end of Semester 1.

LFDs are swab antigen tests that identify the presence of SARS-CoV-2 viral proteins via throat and nasal swabs. Unlike the polymerase chain reaction (PCR) test that is currently the gold standard in diagnostic procedures for detecting SARS-CoV-2, LFDs do not require laboratory processing, are more affordable than PCR tests, and can generate results in around 30 minutes. While mass presymptomatic and asymptomatic testing of university communities using current PCR tests was considered logistically and economic impractical at the time (although some universities do offer PCR testing to students), LFDs could be rolled out at scale and were thus selected for the pre-Christmas University testing programme.

The primary test deployed in UK-wide university testing programme was the SARS-CoV-2 Antigen Rapid Qualitative Test manufactured by the Innova Medical Group Inc., a subsidiary of Xiamen Biotime Biotechnology Company. These tests were included in a validation study carried out by Public Health England (PHE) in collaboration with Oxford University. Study results showed the test had a sensitivity of 73% (95% confidence interval 64% to 85%) when administered by NIHR research nurses and 79% (73% to 85%) when tested by laboratory scientists, falling to 58% (52% to 63%) when administered by Boots test centre employees following written instructions (University of Oxford 2020).

Based on these results, the Department for Health and Social Care announced that the LFDs were 'accurate and sensitive enough to be used in the community, including for asymptomatic people'. Most importantly, it stated, the tests could, 'catch all those with high viral loads, meaning they are effective in identifying the cases who are infectious and are most likely to transmit the disease'.

Later results from a pilot community testing programme in Liverpool that used the same devices

found that test specificity was 94.4% and that the test detected 48.89% of COVID-19 infections in asymptomatic people when compared to a PCR test (Wise 2020a). Unpublished results, which have not yet been peer-reviewed and so should be treated with caution, from an evaluation of LFDs used in the asymptomatic testing programme run by the University of Birmingham suggested a sensitivity closer to 3.2% (95% CI 0.60% to 15.59%) when tests were self-administered by students (Ferguson 2021).

The rollout of the LFDs has been highly controversial (Kmietowicz 2021). A major concern is that the high percentage of false negatives associated with LFDs risks giving false assurance to individuals who are infected and reduces public adherence to protective behaviours such as hand-washing, social distancing, and the wearing of a face covering (Raffle 2020; Deeks 2020; Armstrong 2020). Others have pointed out that the impact of even a small number of false positives is amplified when testing a large low-prevalence population, meaning that many people are asked to self-isolate unnecessarily, a problem which can come at a substantial economic and social cost to those affected (Gill and Gray 2020: 1). Concerns have also been raised that the use of LFTs in screening asymptomatic populations has not been subject to appraisal by the UK's National Screening Committee for viability, effectiveness, and appropriateness (Abassi 2020; Gill and Gray 2020: 1; Raffle 2020; Wise 2020b).

Despite these potential shortcomings, SAGE has stated that their modelling indicates that asymptomatic testing is likely to 'have some impact' on transmission and the prevention of university-associated outbreaks in the UK (SAGE 2021). This follows modelling from the USA that has shown that the use of LFDs for asymptomatic screening can contribute to reducing overall transmission, even in cases of low sensitivity (high numbers of false negatives) so long as the true positive rate is high (Paltiel et al. 2020).

In a public health emergency, authorities must frequently act before scientific evidence has provided certainty about the net gain of an intervention. In terms of identifying hidden cases of infection that would not otherwise be picked up, there are potential benefits to deploying LFDs in a university context (Peto 2021). But the low sensitivity of currently available devices limits the benefits of testing (in terms of providing confirmation of the absence of infection) for the individuals who would be enrolled in such mass testing programmes. This raises challenges for institutions running asymptomatic testing programmes: how they should manage uncertainties in the evidence for LFD use? How should they communicate the costs and benefits of asymptomatic testing to participants?

There are several key questions that must be answered regarding the management of these uncertainties:

- What motivates students to participate in testing?
- To what extent does awareness of the uncertainty accompanying a negative result impact motivation?
- What is the impact of a negative test on subsequent protective behaviour?

Lastly, given that asymptomatic testing continues to be used (including at the University of Edinburgh,

where the pre-Christmas programme was offered again in January and February to returning students), it is important to understand how the logistics of accessing and undergoing testing can be improved. Insights from students' experience of the pre-Christmas mass testing programme can inform the design and delivery of similar testing programmes in the future.

## The University of Edinburgh testing programme

The University of Edinburgh student asymptomatic testing programme made LFD tests available to all students attending the University of Edinburgh, Edinburgh Napier University, Queen Margaret University, MGA Academy of Performing Arts, and SRUC Scotland's Rural College, and was carried out in two University of Edinburgh campus locations in Edinburgh city centre. The programme ran from 30 November until 9 December, and was subsequently extended until 18 December 2020. At the time of writing, the programme is offered to students returning from the winter break.

In late November, all students at the University of Edinburgh received an email inviting them to take part in the programme and book their 10 minute test slot through an **online booking system**. In line with Scottish Government advice, students were offered two tests, spaced three to five days apart. Students were encouraged to book their second test as close as possible to their date of departure.

**Information about the testing programme was provided via a webpage hosted** on the University of Edinburgh website. Students without COVID-19 symptoms were eligible for testing, including those who had tested positive for COVID-19 more than 90 days previously and completed their self-isolation at least 10 days prior. The webpage also included links to government guidance regarding positive and negative results.

On arrival, students were directed to a registration desk where they each showed their student identification card and were handed a registration card with a QR code. Students filled in their details on the UK government's website either using their mobile phones or the iPads available on site. Once completed, students were directed to the testing hall, where they each queued for an individual booth. At the testing booth, each student was greeted by a student supervisor behind a screen who asked whether they had undergone LFD testing before and issued instructions for sampling. Students were invited to consult the self-test diagram on the booth wall and to locate their tonsils with the help of a mirror. The supervisor helped the student count to ten seconds while administering the throat and nasal swab. The swab was then collected by the supervisor and analysed on site. The supervisor informed the student they would receive their test result within an hour, and the student exited via the one-way system.

The student received their test result by text message and by email from the NHS (**nhs.covid19.notification@notifications.service.gov.uk**). Students with negative test results were informed 'It's likely you were not infectious when the test was done' and instructed to 'keep following coronavirus advice including: regular handwashing, social distancing, and wearing a face covering where recommended'. If either of the LFD tests returned a positive result, the student was asked to self-isolate and arrange for a confirmatory polymerase chain reaction (PCR) test through the NHS Test and Trace system.

Overall, 8,001 individuals participated in the pre-Christmas testing programme offered at University of Edinburgh sites. In total, 15,730 tests were carried out, meaning that the vast majority of those participating took two tests. Eleven out of the 15,730 tests were positive.

In late January 2021, Public Health Scotland included national data on asymptomatic testing of students in their weekly COVID-19 statistical report (Public Health Scotland 2021). Dundee University ran the same programme but its data was excluded from the PHS figures as there was some evidence of a flawed LFD batch, which was still under review at the time of writing. The PHS analysis showed that approximately 28,000 students took part in the pre-Christmas testing programme across Scotland. Around 90% of students took two tests and 52,533 tests were administered in total. Of these tests, 35 (0.1%) had a positive test result. All of the positive LFD tests were subject to subsequent PCR confirmatory testing. Of these, 25 (71.4%) were confirmed as positive and 10 (28.5%) as negative. The report did not indicate which university testing sites had returned the 10 false positive LFD results.

## Study methods

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All students who booked a test through the University of Edinburgh online booking form were given the option of electing to receive information about how to participate in a follow-up survey. Students who ticked this box were subsequently sent an email with information about the project, including a participant information form, data privacy information, and a link to an online survey. Once students accessed the survey, they were asked to complete an informed consent form prior to accessing the questions. Upon completion of the survey, participants were invited to opt in to a follow-up interview with a member of the research team. The study was approved for ethics by the School of Social and Political Sciences Research Governance Committee and the College of Arts, Humanities, and Social Sciences ACCORD Committee (REF Lee CAHSS200605).

### Survey design

The survey involved a questionnaire with closed and open-ended questions. The questionnaire was initially developed in written format before the questions were entered into Qualtrics online survey platform, version 5.10, and prepared for distribution.

There were several reasons for choosing an online survey. It would enable the researchers to gather the responses of a potentially large sample of the student population being tested; encapsulate both quantitative and qualitative data; be developed in a timely and low-cost manner; and allow for the comparison of responses between various subgroups. An online survey is also highly accessible and reduces the burden on students in terms of completion time.

### Survey questions

Questions were ordered to mirror the student pathway through the testing process, starting in terms of topic with the information the student received prior to booking a test, through to their booking a

test, navigating the testing centre, administering the test, receiving results, and any action they took following the result. Demographic questions (gender, date of birth, degree programme, disability, ethnic group, accommodation, and travel destination) were included at the end of the survey.

Nearly all questions relating to students' perceptions and attitudes towards the testing process had five-point response options. These included both uni- and bi-polar response scales depending on the nature of the construct. However, one question had four-point response options as the 'did not receive instructions' response option was deemed unnecessary, while another had a binary response option ('yes'/'no') with an added 'unsure' option. The five-point scale was generally preferred as it was deemed to offer sufficient granularity without becoming too burdensome for respondents. For bipolar response scales, the inclusion of a midpoint response option was deemed appropriate given that the constructs in question were related to events the students had been directly involved in.

Independent of the type of scale used, emphasis was put on balancing response options between the negative/positive poles to avoid forcing the direction of responses.

Verbal labels were attached to each response point to provide clarity—these were not considered too burdensome for the respondent to read given the relatively modest number of response options. The questions related to the students' experience of the testing process were open-ended to allow respondents to provide more detail.

## **Piloting**

The survey was piloted with two postgraduate students before being finalised. No immediate issues arose regarding clarity, comprehensibility, relevance of the questions, the response options offered, or the flow of the questionnaire.

## **Interview design**

A two-stage sampling strategy was developed to capture the wide range of experiences and potential challenges experienced by students. In the first stage we prioritised students who had tested positive to COVID-19, those who had not received test results, those who had taken only one test, students with disabilities, students identifying as Black, Asian, Ethnic Minority (BAME), and students who identified as male. After 15 interviews were completed, we reviewed the demographic characteristics of the sample and identified target groups for subsequent recruitment to achieve gender parity and ensure that a range of age groups, programmes of study, living situations, and travel destinations were represented in the study.

Students were contacted by email at the addresses provided on their registration forms. Due to COVID-19 restrictions, recruitment and interviews took place remotely. Interviews took place with one interviewer on Microsoft Teams or by phone call, and lasted between 30–60 minutes. Interviews were audio recorded, transcribed by a third party, and then checked by a University of Edinburgh researcher.

Interviews followed a topic guide that covered the personal experiences and opinions of the

university's asymptomatic testing programme, understandings and expectations of lateral flow device (LFD) tests, interpretations of test results, subsequent behaviours, and experiences of self-isolation. Owing to the semi-structured and participant-led nature of the interviews (i.e., the interviewer followed the interests and experiences put forward by the participants), not all participants were asked all the questions on the topic guide.

## **Quantitative data analysis**

Only respondents who submitted the questionnaire were included in the analysis. Therefore, respondents who had only partially answered the questionnaire but not submitted it were excluded. However, respondents who submitted the questionnaire but had not answered all the questions in full were included.

Descriptive statistics, including frequency distributions and summary statistics, were conducted using Microsoft Excel version 16.43. Inferential statistics, including tests of independence between categorical variables using the chi-squared test, was conducted using SPSS Statistics version 26.0. Missing data responses to individual questions were removed from all analyses.

## **Qualitative survey data analysis**

Qualitative data from the online survey (collected using open questions and free text boxes) were analysed using NVivo version 1.3. This section of the research focused on two questions in the online survey: 'Please describe any challenges you experienced in accessing tests and/or test results as part of the asymptomatic testing programme' and 'Is there anything else you would like to tell us about your testing experience?' These questions invited students to share more about their experiences of the asymptomatic testing programme and gave them an opportunity to disclose any issues or thoughts they had pertaining to their experiences which may have been missed by the closed survey questions.

Responses to these questions were analysed through thematic coding using NVivo. Initially, codes were created that covered a wide range of the comments left by participants linked to different stages of the testing programme, such as the booking process and experiences at the test centre. Within each of these broad coding categories, key themes emerged: students reported common experiences or opinions relating to specific issues. The most frequently occurring key themes emerging from this analysis are included in this report.

Quotations presented in this section were chosen to represent the thoughts and experiences of a diverse mix of the students who took part in the testing programme (in terms of degree programme and where they were travelling to after the end of the semester). The quotations used to illustrate some of the key themes were also selected as they were thought to best demonstrate some of the most commonly cited comments left by participants and provide wider context about why particular issues or challenges were important.

Data analysis for qualitative interviews (which finished on 12 February) will follow the same process as

that described above. Preliminary analysis for this report has been based on the rapid mapping of key themes immediately following each interview and a keyword search of the available transcripts for themes identified by the analysis of the survey.

## Results

The responses to the demographic survey questions (participant characteristics) are presented first. Following these are the responses relating to student experiences of the testing programme and their knowledge, attitudes, and behaviour.

### Participant characteristics

A total of 8,001 individuals accessed the programme via the two University of Edinburgh testing sites. Of these, 946 responded to our invitation to complete the survey (a response rate of 11.8%).

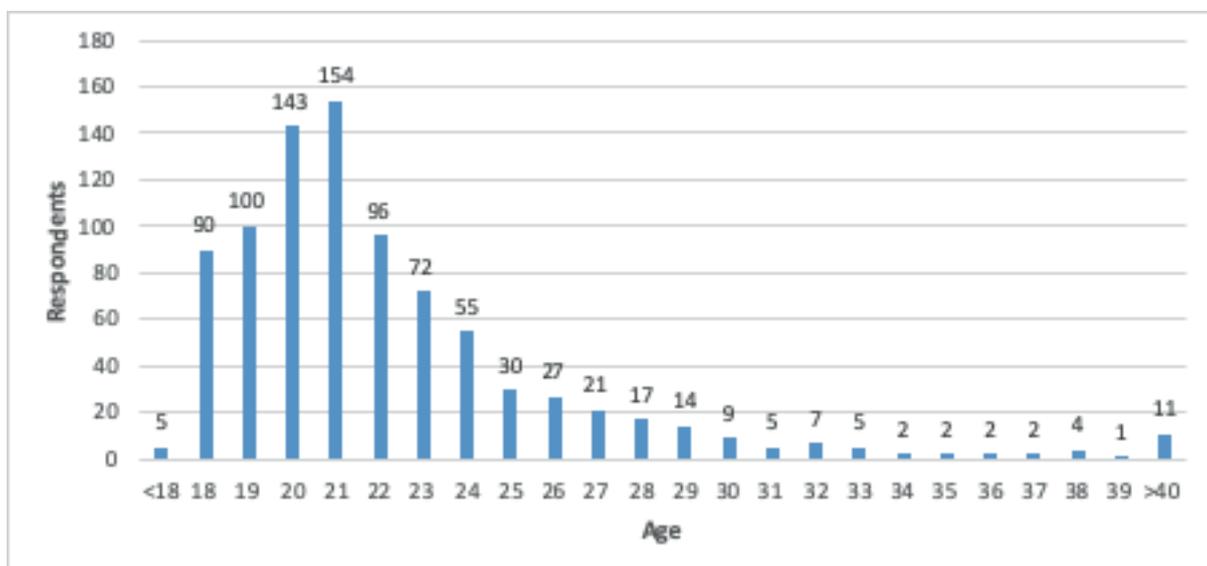
The majority of survey participants were female (73%), with 85% indicating that they were of white ethnicity.

**Table 1: Ethnicity**

Answers	Respondents	Percent
Asian/Asian British	50	5.5%
Black African/Caribbean/British	12	1.3%
Mixed/multiple ethnic groups	58	6.4%
Other ethnic group	8	0.9%
White	780	85.9%
Total	908	100.0%

\*Missing respondents: 38

As Figure 1 shows, most participants were aged between 18 and 22. Of the 946 students who took part in the survey, 72 did not provide their age.



Most survey participants were undergraduates (71%). Just under one in three (29%) were postgraduates, with slightly more PhD students than master’s students participating.

**Table 2: Programme of Study**

Programme	Respondents	Percent
Undergraduate	666	70.9%
Master’s	131	13.9%
PhD	143	15.2%
Total	940	100%

Missing respondents: 6

295 survey participants agreed to be contacted for an interview. A total of 58 students were contacted, and 27 (13 men, 14 women) took part in an interview. Seventeen participants were enrolled in undergraduate programmes and 10 were in postgraduate programmes. Seven participants identified as Black, Asian, or mixed/multiple ethnic background, three participants lived with a disability, and two participants preferred not to say. In terms of living situation, nine participants lived in university accommodation at the time of testing, 13 lived in privately rented shared accommodation, four lived in privately rented sole-occupant accommodation, and one student lived in privately owned property. In terms of travel, eight participants planned to remain in Scotland, 11 aimed to travel elsewhere in the UK, five planned to go to Mainland Europe, two to North America, and one to Africa. One student interviewed had tested positive; all other students had received negative test results.

## Pre-testing experiences

Survey participants were asked where they had heard about the programme. The vast majority of people (96%, n=904) had been alerted to the opportunity by an email from the university. A smaller group (17.9%, n=169) heard about it through word of mouth (i.e., friends/flatmates). Fewer respondents still reported that they’d learned about it through social media.

Interview participants were asked about their motivation for taking part in the programme. Most students responded that they had wanted the reassurance (afforded by a negative result) that they would not transmit the virus to family members over the Christmas period. Some participants also saw the testing programme as a way to contribute to the pandemic response more broadly, for example by contributing to the collection of public health data. Others opted to get tested after hearing that several other people in their close social networks were getting tested, out of ‘curiosity’, or because their parents wanted them to get tested.

Survey respondents were asked how easy or difficult it was to find information about the programme prior to taking part. Only 26 people (2.8%) said this was ‘difficult’, with 86.8% indicating that it was ‘very easy’ or ‘easy’ and just 10.4% (n=98) responding neutrally (i.e., claiming it was neither easy nor difficult).

Participants exhibited mixed views regarding the information provided by the university about the testing programme. Participants were asked, ‘Prior to booking your rapid COVID-19 test, how informed did you feel about what the process would involve?’ Results are shown in Table 3. Just under one in five participants (18.4%) felt only ‘slightly informed’ or ‘not at all informed’.

**Table 3: Extent to which students felt informed about the testing process**

Answers	Respondents	Percent
Extremely informed	83	8.8%
Very informed	297	31.5%
Moderately informed	389	41.3%
Slightly informed	145	15.4%
Not at all informed	28	3.0%
Total	942	100%

\*Missing respondents: 4

Several interview respondents indicated that they’d been unaware prior to being tested that they would self-administer the test. This was especially surprising to those international students who had previously had tests administered by trained personnel in their home countries. In the open survey questions, several students responded that it could have been made clearer what they needed to bring to the test centre to complete registration (e.g., a charged mobile phone).

It is notable that several interview participants indicated that they were not aware there were differences between lateral flow device (LFD) and polymerase chain reaction (PCR) tests. This was not necessarily a basis for dissatisfaction with the information provided; indeed, many students indicated that they were happy to follow the university’s guidance on testing, and neither expected nor desired in-depth information about the tests themselves. Several participants said they had not read all of the information they had been provided with about the tests. However, other students felt they should have received more information about the performance of the tests and the broader aims of testing prior to booking a test.

Almost three in four survey participants found it either ‘very easy’ or ‘easy’ (74.6%) to book an LFD test at a convenient time and place. However, as seen in Table 4, more than 15% reported it being either ‘difficult’ or ‘very difficult’ to book a test at a place and time that was convenient for them.

**Table 4: Level of difficulty booking a test that was convenient**

Answers	Respondents	Percent
Very easy	428	45.5%
Easy	274	29.1%
Neutral	97	10.3%
Difficult	111	11.8%
Very difficult	31	3.3%
Total	941	100.0%

Difficulty booking a test was one of the most common problems raised in responses to the open-ended survey questions. Issues with the booking system in the first days of the launch led to a number of students unintentionally booking multiple tests which they then found they could not cancel. Some students attempting to book a test were left anxious that they would not be able to book a test before travelling, while others were confused by the confirmation emails for testing slots they were not aware they had booked.

“Tests and facility itself were run very well but the booking site was a nightmare. Didn’t work properly, constantly crashing, no way to see all your appointments at once. I ended up with three appointments by accident and I have a friend who had 20 because when we would book or reschedule the site wouldn’t work properly. She called to try and cancel 18 of them and was told that IT had no way of going into the system and doing this for her. Site seemed to be thrown up at the last minute and not very well thought out.”

- Master’s student travelling to North America

“The system not working properly on the day it was released was stressful especially as no information was being given to us. It felt like all the slots were getting booked up and I wasn’t going to be able to get a test. It would have been nice to just receive a simple announcement to say that it would be fixed.”

- Undergraduate student travelling to England/Wales/Northern Ireland

Some students also felt communication from the university about booking a second test could have been clearer, with some students reporting that they’d been unaware that two tests required two separate bookings.

“I had only one test towards the end of the programme. I was aware I needed two tests, however, I was assuming I would book the second test in person at the test site or receive instructions at the test site. I only noticed too late that actually I was supposed to book two tests initially at the same time, via small print in the email I received to confirm my one test. Perhaps make this clearer—if two tests need to be booked online simultaneously, please can the online booking

process automatically lead from the first test booking to the second booking. Otherwise the experience, though unprecedented, was so well organised.”

- PhD student travelling within Scotland

Apart from issues with the booking system, the most frequent criticism of the testing programme was the timescale, with a large portion of the comments made in the survey relating to the testing programme ending too early (it was subsequently extended to just before Christmas, so students were referring to the original end date). These findings were reinforced in follow-up interviews, during which several participants complained about the length of time they were expected to self-isolate or minimise contact for after receiving their test and before travelling home. Students reported difficulty adhering to advice to reduce social contact between the time of their test result and travel because activities involving mixing were necessary either for their programme of study or for everyday errands (e.g., the need to shop for food). Some students also reported that they were unaware of the advice to minimise social contact. Some interview participants reported changing the dates of their travel to accommodate the dates of the testing programme.

The timing of the testing programme appears to have been a particular problem for postgraduate students and students on placements, who were due to travel home later in the semester. These students felt that the initial end date of 9 December was too early—many of them reported that they had plans to return home around 20 December, at the end of the exam period and/or the postgraduate term. Even when the programme was extended, many respondents claimed the announcement had been made too late and at too short notice; such students had to change their travel plans, which had been organised around the original testing dates. Others did not benefit from the extension as they had already booked or received both of their tests and were instructed by the university not to book or re-book these additional slots.

“The last day of testing was way too early for me. It’s suitable for undergraduate students to go home early but it’s not for postgraduate research students. I understand that the university extended the testing dates to the 18th but the announcement was too last-minute and all the later slots were booked up already.”

- PhD student travelling to England/Wales/Northern Ireland

“It would have been good to be able to access tests after 9 December. This is because my exams run up to the 19th. Therefore I had to move all of my things home between exams which definitely disturbed by revision. By the time the scheme was extended, I had already committed to going home early. I would have preferred to have the option to book later on, accepting the risk that I might have to self isolate over Christmas.”

- Undergraduate student travelling within Scotland

“I was very annoyed that the university first said they [would] only offer testing until 9 December,

then extended the testing until the 16th. I booked my second test for the 9th, however that was not optimal because I was only able to return home on 13 December (not my choice; there were only very few tests available). When the uni emailed us to say the testing had been extended, it said in the email that anyone who had a test on 8 or 9 December should NOT change their test date or book a third test.”

- Master's student travelling to EU/Mainland Europe

Of the survey participants, 18.6% did not go for a second test. Six interview respondents reported that they had only booked one test. Reasons given for this were that all the slots were full, they needed a PCR test result to travel, they hadn't seen the instructions, they didn't have time, or they were not planning to travel.

Preliminary analysis of interview data suggests that many students were unaware that testing was also available to all students returning from the winter break at the start of Semester 2. Some interview participants also stated that they did not feel that testing was as necessary for returning to campus, either because they had had less contact over the break, they were returning to empty accommodation, or simply because they had not received clear instructions from the university.

## Experiences of testing

Once students arrived at the testing site, they were asked to register their details using either their own phone or an iPad supplied at the site. Many survey respondents reported that they found completing the registration forms on site difficult, with several students explaining that the process necessitated spending more time in the testing centre than they thought necessary. Others felt they were rushed while filling in the forms. Some students also felt that the completion of forms at the test centre was too reliant on students having access to smartphones and internet access; this was a particular issue as many students felt it had not been made adequately clear that they would need to bring or use their smartphones.

“More help could be put in place for people who are neurodivergent/disabled? From my experience as a person with dyslexia, filling in the long form, trying to follow multiple instructions from the person administering the test, and trying to quickly read the sign in the test cubicle on how to administer the test all amounted to a more stressful, embarrassing experience than I think others will experience. Being able to fill in the form and having information in emails concerning testing on how to conduct the test before would be great improvement. “

- Undergraduate student travelling within Scotland

Once they had registered, students were provided with instructions on how to self-administer the LFD test. The survey asked them how clear/unclear they found these instructions. Just under two thirds (64.2%) reported that these instructions were 'very clear', while 32.3% stated that they were 'clear', 3%

'unclear', and just three people (0.3%) indicated they were 'very unclear'. Two people said they did not receive instructions at the testing site.

Responses to open-ended survey questions provided more details on a few of the difficulties participants faced. One challenge reported by respondents was hearing the instructions given at the test centre. In many cases, students found it difficult to hear the instructions given by staff due to both the ambient noise in the venues and the mask-muffled of the staff. Some students also expressed concerns that this would make the testing process particularly difficult for individuals with hearing difficulties.

"It was very, very difficult to hear the person giving the instructions, due to how loud the hall was, the masks, plastic screens, etc. I really struggled to understand what they were telling me to do."

- Undergraduate student travelling to England/Wales/Northern Ireland

Several participants expressed concern that the instructions given at the test centre were inconsistent. In some cases, respondents described how the guidance they were given on how to self-administer the test differed between their first and second tests, while others reported that the instructions they received from staff at the university testing programme differed from instructions they had received elsewhere.

"First test was done with more explanation, while the second was trying to rush and contradicted how the test was performed the first time. This difference was due to the volunteers helping."

- PhD student travelling to EU/Mainland Europe

While some of the survey respondents experienced some negative interactions with staff working at the testing centre, of those who left comments regarding the staff a majority were positive. In general, students found that those working at the test centres were very helpful and friendly. Several students left comments describing how this helped them feel less nervous and more reassured.

"Despite what must have been stressful and hard work, everyone I encountered at the testing site was not only extremely helpful and knowledgeable, but also friendly, which went a long way!"

- Undergraduate student travelling to North America

A few interview participants were concerned that the testing site itself could be a site of transmission. Some were apprehensive about the lack of vetting prior to entry to the site and the several bottlenecks in the movement of students through the site.

## Experiences of results

Of the 946 respondents, 22 reported they had not received at least one of their results. Students who enquired about missing results received conflicting information, with some told to assume their tests were negative while others were told to re-book.

“I didn’t actually receive any of my test results, so when I responded ‘negative’ on the previous question that is just based on the assumption that I would have been informed if it was positive. Obviously I would want to be informed either way, that is the whole point of this test, so this is of course hugely problematic. I inquired about the results from the first test when I went to get the second, and they told me several people had not received results but as long as I heard from the second one I need not worry. I never heard anything about it, but since I knew I could get tested at home too and had no symptoms, and I assumed I would be told if it was positive, I decided it was safe to travel home regardless. But again, I would have preferred to know the results, given the time it takes for me to get the tests but also, and perhaps more importantly, given all the resources spent on this programme.”

- PhD student travelling to the EU/Mainland Europe

The survey also asked whether students had tested positive or negative for COVID-19 with an LFD test. Sixteen people ticked ‘positive’ to this question, but answers to subsequent questions in the survey for those indicating ‘positive’ were inconsistent, suggesting that a number of students had not completed this section accurately.

A confirmatory NHS PCR test was advised for any student who tested positive on an LFD test. Of the 16 participants who initially responded that they had tested positive, four subsequently stated that all their test results were in fact negative. Of the 12 remaining participants, one gave no further information about their test results, six stated they did not plan to book a PCR test, two stated that they planned to book a test but had not yet done so, one stated that they had booked a test, and two stated they had received a PCR test (one of whom confirmed this through interview). The inconsistency of responses means we cannot depend on them or on subsequent questions regarding adherence to guidelines on self-isolation in the case of positive results.

**Thus, our survey results should not be used as a measure of the proportion of students who tested positive or negative from the pre-Christmas 2020 asymptomatic testing programme.**

We know there were only 11 positive LFT results from the University of Edinburgh testing sites out of the 15,730 tests administered in December 2020. The PHS report (Public Health Scotland 2021) is the main reference that provides a reliable measure of positive cases and test positivity.

When asked whether the guidance provided upon receiving the test result had been clear/unclear, four in five students responded either ‘very clear’ or ‘clear’ (77.7%).

**Table 6: Clarity of guidance received post-test result**

Answers	Respondents	Percent
Very clear	367	39.0%
Clear	365	38.7%
Neutral	160	17.0%
Unclear	41	4.4%
Very unclear	9	1.0%
Total	942	100.0%

Missing respondents: 4

No issues were raised regarding the clarity of the guidance received alongside the test result in the open-ended survey responses. In interview responses, the one student we interviewed who had received a positive result to her PCR suggested the guidance to book a confirmatory PCR test was not clear.

“Like, ‘You’ve tested positive. Please isolate for a certain amount of days’, and then it was probably somewhere down the bottom where it said, ‘You have to go get another test’. I missed it when I first got the message, because obviously I was then like phoning everyone and cancelling work and sorting stuff out, and then when I actually went to the message and stopped being a drama queen and read the full text, that’s when I saw it saying, ‘You need to go get another test today.’”

- Undergraduate student travelling within Scotland

As students were informed that undergoing LFD testing would help reduce the risk of transmission to their family and community, participants were asked about the extent to which they felt that they could travel home safely after taking part in the asymptomatic testing programme. Of the respondents, 60.4% felt either ‘very reassured’ or ‘extremely reassured’ after receiving their test results, as shown in Table 5. However, the response options can be construed as biased in favour of ‘reassured’.

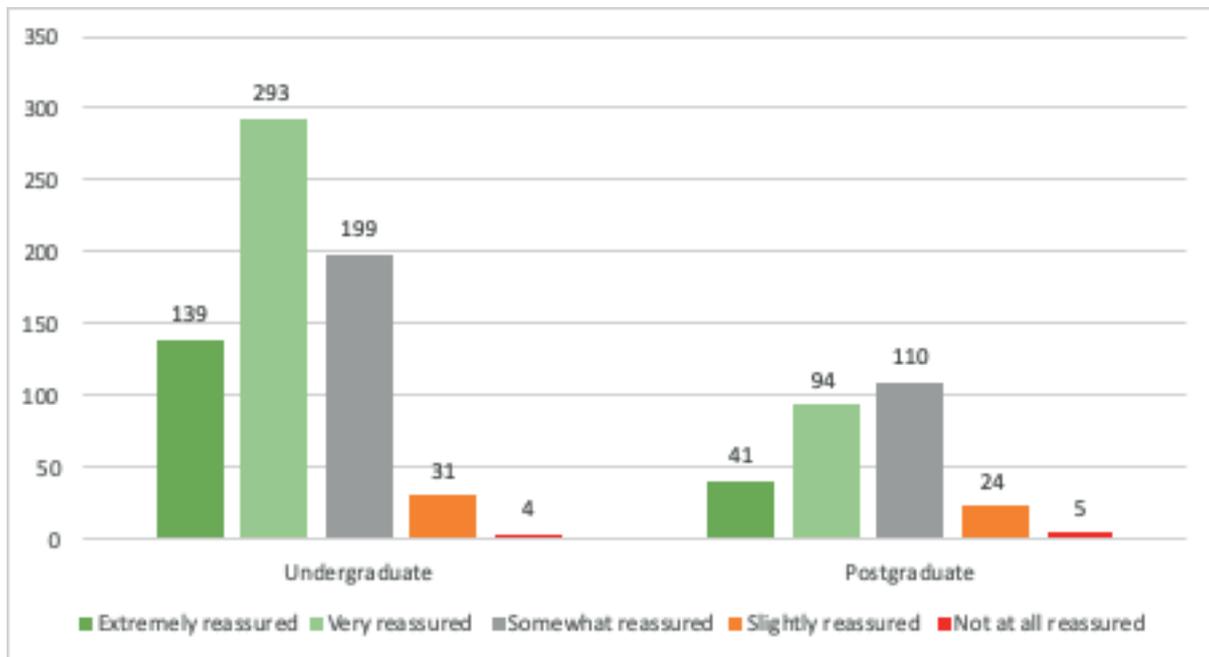
**Table 5: Reassurance from the testing programme**

Answers	Respondents	Percent
Extremely reassured	180	19.1%
Very reassured	389	41.3%
Somewhat reassured	309	32.8%
Slightly reassured	55	5.8%
Not at all reassured	9	1.0%
Total	942	100%

Missing respondents: 4

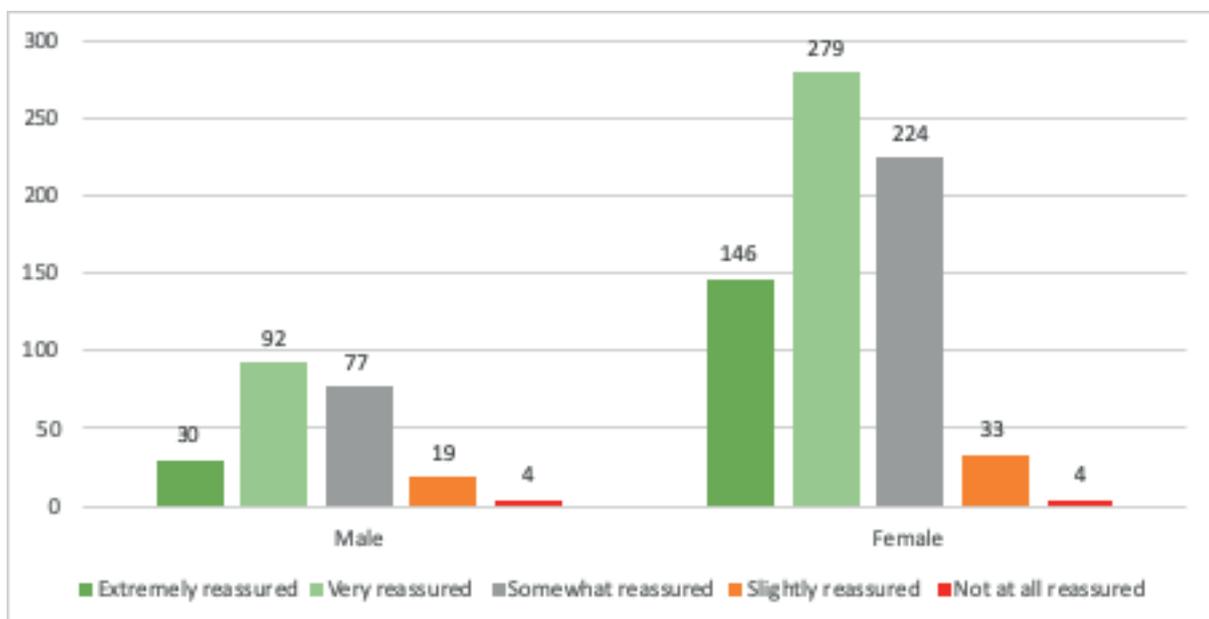
There were slightly lower levels of reassurance among postgraduates than undergraduates, as illustrated in Figure 2 ( $\chi^2$ :  $p=0.001$ ).

**Figure 2: Reassurance: Undergraduates and postgraduates**



There were also slightly lower levels of reassurance among males than females, as illustrated in figure 3 ( $\chi^2$ :  $p=0.015$ ).

**Figure 3: Reassurance: Male and female**



Participants were asked if they trusted the test results they'd received—did they feel it was accurate? Almost four in five (79%) students reported that they did trust the test result, with 18% stating that they were unsure and just 2.5% (24 people) reporting that they did not trust the test result. Postgraduates were less likely to trust their result than undergraduates, as indicated by the chi-squared test ( $\chi^2$ :

$p=0.001$ ), which provided strong evidence to reject the  $H_0$  of independence.

In the qualitative responses, many students expressed concern that the tests were self-administered and referred to this as a reason to question the result. Many were not confident that they had administered the test correctly, and would have trusted the results more if the swabs had been taken by trained staff. Some students felt that additional guidance using images and videos would have helped reassure them that they were administering the test correctly.

“As we are self-administrating the test, it could be great to add more information about how to do it, more images or videos.”

- PhD student travelling to EU/Mainland Europe

“I had difficulty locating my tonsils and feel like I was a little unsure about whether I had done the test properly. I don’t know how this would work in practice, but if the people on duty had appropriate PPE, could the option to have the tests administered by one of the team be available? I came out of the test unsure if I had swabbed my tonsils properly and whether I had put the swab up my nose far enough.”

- Undergraduate student travelling within Scotland

Several students also expressed doubts about the reliability of the LFD tests.

“The university did not provide adequate information on the reliability of the tests. News reports and articles in the British Medical Journal have made it clear that the rates of false negatives in asymptomatic rapid testing, especially for tests administered by non-medical staff, is worryingly high, and there is therefore great potential for the tests to give false confidence when making the decision to return home. For me personally, in light of the reports mentioned, the results of the test had no effect whatsoever on my decisions.”

- PhD student, travel information withheld

“[Being asked to book a confirmatory PCR test following a positive LFD] did make me think, ‘Do they not fully trust their student testing? Is it not always 100% accurate or could your test get mixed up more easily than it would with the test and trace ones?’”

- Undergraduate student, travelling within Scotland

Interview participants were asked what they did in the hours and days following their tests and were then asked to reflect on whether their behaviour had changed in any way because of their negative LFD test results. Most students said that they did not change their behaviour post-test results, but several students thought that ‘false reassurance’ was something to be cautious about, particularly ‘for others’. Some students reported being ‘a little less careful’ than usual in the few hours immediately

following their test results. Other students reported being very careful in the hours and days following their tests, but became more relaxed once they had reached their destinations. One participant mentioned that they agreed to help out at a food bank over Christmas because they'd received the negative test, while another mentioned visiting a vulnerable friend at Christmas, which they would not have done if they had not been tested.

One participant had been experiencing flu-like symptoms (headache, cough, running nose), self-isolating, and considering finding out how to book a test. This participant saw the asymptomatic testing programme as an appropriate venue for testing, and was adequately reassured upon receiving a negative result to stop self-isolating. While this may be an isolated incident, it shows the necessity for clear instructions on the part of universities on the role of LFDs, particularly for students for whom English may not be a first language.

## Overall views of the testing programme

Despite some of the challenges described above, many students said that they'd had positive experiences of the testing programme and that they thought the process ran smoothly, particularly at the test centre. Many of these students appreciated the efforts of the university in providing this programme and wanted to extend their thanks.

“Great idea and very impressive implementation overall. Despite some troubles with the booking and flow of information, it was to be expected with such a large operation organised in such short time. I am very grateful I was given a chance to test completely for free which along with two week isolation made me assured that I can see my family at Christmas without greater risk to their and public health.”

- PhD student, travel information withheld

Interview participants were asked whether, based on their experience of the Semester 1 testing programme, they would be willing to take part in more routine asymptomatic testing in the future. Some participants expressed enthusiasm at having a routine testing service available, particularly if this enabled in-person teaching or the reopening of the library and gym facilities. Many participants saw the value of the testing programme to be linked to specific events, such as returning home to see family, and several people stated that they would probably not take part in more routine testing.

“If I was going home to see my family again, I'd consider using it then. But as for day-to-day life just in the flat, seeing just my flatmates, I probably wouldn't use it.”

- Undergraduate student travelling home to Scotland

“I don’t think I would have gone [for a test] because I haven’t had a test in Edinburgh, I didn’t have symptoms or anything [...] I didn’t go because I thought I had, it was literally to travel.”

- Undergraduate student travelling internationally

Finally, survey participants were asked, ‘Overall, how would you rate your experience of the University of Edinburgh asymptomatic testing programme?’ Survey participants were positive about their experience, as Table 7 shows, and found the testing process easy to navigate. The vast majority (91%) rated it ‘excellent’ or ‘good’, with just 1% indicating their experience was ‘poor’ or ‘very poor’.

**Table 7: Overall views of the testing programme**

Answers	Respondents	Percent
Excellent	475	50.6%
Good	382	40.7%
Fair	72	7.7%
Poor	7	0.7%
Very poor	3	0.3%
Total	939	100%

Missing respondents: 7

## DISCUSSION

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Establishing asymptomatic testing programmes for COVID-19 is a substantial task for universities and other organisations to undertake, involving considerable time and resources. Prior to November 2020, the University of Edinburgh had no ‘in-house’ testing programme for students or staff and so had to rapidly set one up, using lateral flow devices, to facilitate students returning home for the Christmas break. The large turnout of students and the high ratio of number of tests to students are a testament to a successful communications strategy and the efforts of many in the university community and beyond. Overall, students who participated in the programme were satisfied with their experiences of testing and reported that the programme had been well organised.

There were, however, some instances where students encountered obstacles to accessing and undergoing testing and acting on results. We think it is important to understand COVID-19 testing as a social process that extends well beyond the test site itself. This social process includes students’ prior experiences of testing for COVID-19; trust in the university and government; previous experiences of quarantine, self-isolation, and contact-tracing; relationships with family and peers; interactions with messages about the asymptomatic testing programme; and experiences of the booking system, among others. These diverse factors all affect students’ willingness to get tested, perceptions of test results, and subsequent behaviour. Experiences at the testing centre also build (or harm) students’

trust in the programme, the university, and the test itself, especially if these clash with expectations.

In addition, the guidance that students receive following a test can inform their perceptions of the purpose and value of testing.

Students' experiences prior to arriving at the test site are important, both in terms of their motivation to attend the tests and their behaviour after receiving test results. Experiencing problems with the online booking system was one of the main complaints reported in the survey. While students will be willing to overlook these issues for a rapidly established one-off testing programme, they may be less tolerant of an established routine system that doesn't work smoothly. Removing any barriers to access will be important in the future.

The high uptake of lateral flow device testing raises questions around what motivates students to get tested and what kinds of value they attribute to the tests. For the most part, students reported that they were motivated to access testing out of a desire to keep family and friends safe when they returned home for Christmas. This motivation was premised on the assumption that a negative test indicated the absence of infection. Students were, for the most part, aware that the test result was only applicable to the time at which they were tested. Many demonstrated a willingness to go to some lengths to keep their 'negative status' between the time of their test and time of travel or contact with family (e.g., by minimising social contact or changing the date of travel). However, students were less aware that LFDs are not always accurate. This may in part be because of the communications they received from the university that indicated that getting tested would reduce the risk of transmission to family members (early information on the university website, which was later corrected, stated that a negative test meant it was 'safe to travel'). Information that students received with their negative test results also reinforced this perception.

Such misconceptions create a potential challenge for the organisers of asymptomatic testing programmes in the future. On the one hand, students were arguably insufficiently informed of the purpose and value of the LFD tests prior to getting tested (Mahase 2020). On the other hand, these misperceptions about the purpose and value of LFD tests may have been an important factor in testing uptake. Thus, while acceptability of the test may be high, the ethical basis for rolling it out may be 'shaky' (Gill and Gray 2020: 1). Careful communications strategies will need to be developed for future programmes to ensure that students are fully informed of issues to do with the sensitivity and specificity of any tests used. Communication should also make clear the purpose of the testing (e.g., a programme might aim to provide results that allow students to travel or to reduce the chance of any outbreaks on campus occurring, making teaching and work spaces more 'COVID-secure').

Our study identified some other reasons students engaged with the programme: some students took part simply because the university was offering it, even though they were not planning to travel. Others took up the offer of testing because friends were doing it, because it was something novel, or because parents had encouraged them to attend. One interviewee suggested they had gone out of curiosity and because they wanted a legitimate reason to leave the house. If testing becomes routine (as is the case in some other universities), these reasons for uptake won't necessarily apply. Some students also indicated that they sought testing out of a desire to 'do their bit' and 'help' the response,

a sentiment that could be built on in communications for future programmes. Monitoring uptake within an established programme (including the LFD programme the university provided to returning students in January) will be important.

A few issues arose during and following the testing process. Most students reported that they'd received adequate information at the testing centre and that they'd known before attending what they had to bring and what was expected of them. However, some didn't realise they would need to fill in additional forms at the testing site and stated that this should have been made clearer to them before they arrived. Others didn't realise they would need to self-administer the test, and not everyone found this straightforward. Additional guidance using images or videos was suggested. There was also some indication that students would have trusted the results more if the swabs had been taken by trained staff.

The vast majority of students reported receiving rapid results from their tests, although there were some instances of results being delayed or not received. Following up lost test results was experienced by students as a challenge. Information about what to do following receipt of their results was also positively received. We were only able to interview one student who tested positive. This individual did not immediately notice instructions about the need to arrange a confirmatory test via NHS Test and Protect, which is concerning. This element of the post-test information may need to be more prominently displayed.

Preliminary analysis of the follow-up interviews suggests that a small number of students who received a negative LFD test result may have changed their behaviour because of it. They indicated that they were a 'little less careful' once they knew their test was negative. One student felt reassured enough to volunteer at a food bank over Christmas. Another felt more comfortable going to visit a vulnerable person's home. However, these are just examples and more research is needed before suggesting that testing encourages unsafe behaviour.

## Conclusion

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Data from the Office of National Statistics (ONS) indicate that student intentions to engage with university COVID-19 testing programmes appears high in the UK (ONS 2020). Certainly the uptake of asymptomatic testing in the pre-Christmas 2020 period was high in Scotland, including at the two University of Edinburgh testing sites (Public Health Scotland 2021). Results from this study suggest that the programme was successfully delivered and well received by students. There are some areas for improvement and we have drawn on our findings to develop several recommendations, which we include below. Findings from this study may also inform future COVID-19 testing programmes at the University of Edinburgh and possibly elsewhere, particularly if regular testing for students is introduced on campus, as is already the case in a number of other universities across the country.

## Limitations

This study had a number of limitations. Invitations to complete the online survey were sent in two batches based on the initial date the university intended to finish pre-Christmas testing, but the date for this was extended. As a result, some students accessed their second test after filling in the survey. In addition, the survey did not provide any option for students to correct a response made in error, which led to several instances in which students falsely reported a positive result. It was therefore impossible to draw conclusions from the responses to wrongly assigned follow-up questions about self-isolation experiences. Additionally, some of the five-point response options may have been biased, limiting our ability to draw firm conclusions from questions about reassurance and trust. The questionnaire for the survey was intended to be brief and, as a result, a number of questions that we could have included were not.

We are in the process of analysing data from the interviews with the 27 students who completed the survey and agreed to follow-up discussions with a member of the research team. Some preliminary results have been included in this report but more will be available in due course.

## Recommendations

Findings from this study suggest a number of recommendations for the University of Edinburgh that may also be applicable to other presymptomatic and asymptomatic testing programmes. These relate to communication, information systems, and logistics.

### Communication

- Consolidate, streamline, and stratify the information provided to students about the testing programme on the university website and booking form to make it easier for students to absorb key messages. Identify priority messages (e.g., that test results are not 'fit to travel' certificates) and ensure they are highlighted in all communications. Ideally provide a flow diagram that makes clear the student pathway through the testing process and explains what is expected of students at each stage.
- Provide guidance on 'what is involved' and 'what is expected' that mirrors the student experience of moving through the testing process (e.g., information about what to bring to the testing centre and about how to self-administer the test).
- Provide students with the opportunity to book two tests at once or provide a prompt to remind students to book another test separately.
- Improve training for testing centre volunteers to ensure consistency in the on-site instructions given to students. Create on-site provisions, including BSL signers, for students with disabilities. Improve signage for entrance/exits and access to toilets.
- Improve transparency around the purpose, benefits, and limitations of LFD testing to ensure informed consent and build trust in the programme. Emphasise the public health benefits of asymptomatic testing (i.e., to identify individuals who are positive in the absence of symptoms so that they can self-isolate and reduce the odds of infecting others) and the limited benefits to the individual being tested (i.e., does not confirm absence of infection/cannot provide reassurance of safety to travel). Provide links to reliable sources regarding the sensitivity and specificity of LFDs

and information on how they have played a role in identifying cases and reducing community transmission.

- For students who test positive, clearly communicate that a confirmatory polymerase chain reaction (PCR) test must be arranged through NHS Test and Protect. Ensure this information is immediately apparent to the recipient.

## Information systems

Ensure that information systems are fit for purpose to support testing programmes.

- Remove the inconvenience of filling in multiple booking forms.
- Address the causes of website access issues/sites not functioning.
- Improve data handling to ensure test results are returned to all students.
- Create 'joined up' data systems to prevent students needing to manually fill in on-site registration forms.
- Provide a telephone number or email address at the bottom of the page in case students encounter any issues (or add an FAQ: I didn't get my test result back, what should I do?).

## Logistics

Ensure that the timing and location of testing is convenient for students. This may be particularly important for future regular testing programmes. Barriers to uptake should be minimised, which means students should be able to access testing where they live (for those in halls of residence) or in university venues they routinely attend. If and when face-to-face teaching resumes, testing should not disrupt and should be coordinated with student timetables.

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## Appendix A: survey questions

Construct	Question	Options
Perceptions of the testing process	How easy/difficult was it for you to find information about the testing programme prior to taking part?	5-point scale (Very difficult to Very easy)
	Prior to booking your rapid COVID- 19 test, how informed did you feel about what the process would involve?	5-point scale (Not at all informed to Extremely informed)
	How easy/difficult was it for you to book a test at a time and place convenient to you?	5-point scale (Very difficult to Very easy)
	How clear/unclear did you find the instructions you received at the testing centre for self-administering the test?	4-point scale (Very unclear to Very clear) + 'did not receive instructions' option.
Test results	Was your most recent rapid LFT test positive or negative?	<ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>
	(If 'yes' to the above) After your positive LFT test you should have been advised to get a different type of test to confirm the result. This is called a PCR test and is available via Test and Protect. Did you receive this confirmatory PCR test?	<ul style="list-style-type: none"> <li>No, I will not take a PCR test</li> <li>No, I have not yet booked a PCR test but intend to do so</li> <li>No, but I have booked a PCR test</li> <li>Yes</li> </ul>
	(If 'yes' to the above) Was your confirmatory PCR test through Test and Protect positive/negative?	<ul style="list-style-type: none"> <li>Have not yet received a result</li> <li>Negative</li> <li>Positive</li> </ul>
Experiences of the testing process	Please describe any challenges you experienced in accessing tests and/or test results as part of the asymptomatic testing programme? (optional)	(Open text)
Attitudes towards the test results	Did you trust the result you received for your rapid asymptomatic LFT test and believe it was accurate?	<ul style="list-style-type: none"> <li>Unsure</li> <li>No</li> <li>Yes</li> </ul>
	Did you feel reassured that you could travel home safely after taking part in the asymptomatic testing programme?	5-point scale (Not at all reassured to Extremely reassured)
Perceptions of the testing process	How clear/unclear was the guidance you received on what to do following your rapid LFT test result?	5-point scale (Very unclear to Very clear)
Behaviour following test	(if positive LFT) How well do you feel you have followed Scottish government guidelines on self-isolation following your positive rapid LFT test?	<ul style="list-style-type: none"> <li>Not self-isolating</li> <li>Followed very few guidelines</li> <li>Followed some guidelines</li> <li>Followed most but not all guidelines</li> <li>Followed all guidelines</li> </ul>
Perceptions of the testing process	How satisfied are you with the support you received from the university following your positive test result?	5-point scale (Very unsatisfied to Very satisfied)

Construct	Question	Options
Experiences of the testing process	Please describe any challenges you have experienced to following guidelines on self-isolation (optional)	(Open text)
Perceptions of the testing process	Overall, how would you rate your experience of the University of Edinburgh asymptomatic student testing programme?	5-point scale (Very poor to Very Excellent)
Experiences of the testing process	Is there anything else you would like to tell us about your testing experience? (optional)	(Open text)
Demographic questions	What is your gender?	<ul style="list-style-type: none"> <li>• Male</li> <li>• Female</li> <li>• Non-binary</li> <li>• Other</li> <li>• Prefer not to say</li> </ul>
	What is your date of birth? (DD/MM/YYYY)	(Open-text)
	What is your degree programme?	<ul style="list-style-type: none"> <li>• Undergraduate</li> <li>• Master's</li> <li>• PhD</li> </ul>
	Do you consider yourself disabled?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Prefer not to say</li> </ul>
	What is your ethnic group?	Drop-down menu
	Which of the following best describes your current accommodation?	<ul style="list-style-type: none"> <li>• University accommodation</li> <li>• Privately rented shared accommodation</li> <li>• Privately rented sole occupant accommodation</li> <li>• Other (please state below)</li> <li>• Prefer not to say</li> </ul>
	Where will you be travelling to during the holidays?	Drop-down menu