Supplementary methods

Definitions

- **Primary case**: A confirmed case with laboratory evidence of infection as determined by detection of SARS-CoV-2 RNA by nucleic acid amplification, who nominated the contacts recruited in this study.

- **Study participant (primary contact)**: A primary contact is defined as a person who was identified as a contact of a primary confirmed case of COVID-19 during their infectious period and met the contact definition. These are the participants recruited to this study.

- **Household contact**: Anyone living in the same household or household-like setting (for example, a boarding school or hostel) as a confirmed case of COVID-19 and met the contact definition.

- **Non-household contact**: A person NOT living in the same household or household-like setting (for example, a boarding school or hostel) as a confirmed case of COVID-19 and met the contact definition.

- **Secondary case**: A study participant (primary contact) recruited to this study with evidence of COVID-19 infection as determined by detection of SARS-CoV-2 RNA by nucleic acid amplification within the period 2 days before and 14 days after recruitment.

- **Secondary contact**: A secondary contact is defined as a person who had close contact with a COVID-19 positive participant (secondary case) during their infectious period. These are contacts exposed to COVID-19 positive participants recruited into this study.

- **Tertiary case**: The contact of a COVID-19 positive participant with laboratory evidence of COVID-19 infection as determined by detection of SARS-CoV-2 RNA by nucleic acid amplification. These are COVID-19 cases identified via rules-based matching and selection who were potentially infected by a COVID-19 positive participant recruited into this study.

Study design

A two-arm non-inferiority randomised control trial study design was used (**Supplementary Figure 1**). Participants were radomised into either a self-isolation with PCR arm, which was the standard approach for contacts of COVID-19 cases in England during the study period. Study participants were requested to have a single PCR test on kit reciept and to isolate for 10 days from last contact with a case, unless testing PCR is positive whereby they were required to isolate for 10 days from the swab collection date or the date of developing symptoms if they develop symptoms in the subsequent days. In the Daily contact testing (DCT) arm, participants were required to take 7 self-administered self-processed, daily serial LFD tests carried out at home with 2 self-collected PCR swabs for LFD validation (one on receipt of kit and one at end of testing period/on receipt of positive LFD result). Asymptomatic participants were granted freedom from self-isolation for a 24-hour period on receipt of a negative LFD result. Those who test positive by LFD or who became symptomatic, were asked to take a study PCR swab on the same day. Participants who tested positive by PCR were instructed to self-isolate for 10 days from the date of the sample.

Study population and sampling

The study population comprised adult contacts of confirmed COVID-19 cases aged over 18 years of age notified to NHS Test and Trace.

Contacts were eligible for inclusion if they were asymptomatic close contacts of confirmed COVID-19 cases reported to NHS T&T, aged over 18 years at the point of recruitment, had an email address and were resident in England. Contacts were excluded from the study if they were aged under 18 years, stated they were symptomatic at the point of recruitment, were under quarantine after arriving in England from a red or amber list country, resident in a prison or care home setting, already participating in a workplace, school or other daily contact testing programme, or did not agree to further follow-up in their NHS Test and Trace contact tracing questionnaire.

From 29 April 2021 to 7 June 2021, if people who were a contact of a person with a variant of concern (VOC), excluding alpha or variant under investigation (VUI) or working in a workplace where a variant was circulating. This exclusion criteria was removed on 8 June 2021 based on the expansion of the delta variant to ensure that this was generalisable to the population.

Eligibility was based on self-reported information with the exception of being a contact of a case with a VOC or VUI or a person returning from an amber or red-list country which were identified from the NHS Test and Trace contact tracing and advice system (NHSTT). Individuals reporting a date of birth under 18 years of age and those with a postcode outside England were also identified as ineligible using NHSTT records. Ineligible participants were not actively invited to participate. However, any ineligible participant who subsequently registered was notified by text and/or email that they were unable to take part. Individuals were selected sequentially to account for the capacity of the trial with no sampling frame used. As a public facing web portal was used for recruitment, it was technically possible for contacts notified by the NHS T&T contact tracing app to self-register for the study without being invited.

Recruitment

Eligible close contacts of confirmed COVID-19 cases registered in NHSTT were invited to take part on completion of routine contact tracing via four routes (**Suppplementary Figure 1**). From 11 May 2021, NHS T&T contact tracing call agents introduced the study to eligible contacts and then transferred the individual to a 119-call agent who completed the recruitment questionnaire on behalf of individual after the individual listened to a pre-recorded consent statement. Household contacts were not captured via this route (Call agent route - inbound). From 18 May 2021, a link to self-register using an online recruitment questionnaire was sent to all eligible contacts

in first isolation notice text/email sent on completion of the NHST&T contact questionnaire. This link was at the end of a message detailing self-isolation advice. Household and non-household contacts were invited by this route (Digital route (NHS T&T)). From 25 May 2020, a link to self-register using an online recruitment questionnaire was sent to all eligible contacts by text/email using a dedicated message sent from Notify. Contacts had been reported to NHS T&T in the previous 24 hours. Household and non-household contacts were invited by this route (Digital route (dedicated SMS/email)). From 29 April 2021 to 11 May 2021, participants were recruited at the end of the routine contact tracing interview by a dedicated team of call handlers (Agile Lighthouse team). From 10 June 2021 to 28 July 2021, up to 160 119 call agents were provided with an extract of eligible participants and outbound recruitment calls were made. Call agents completed the recruitment questionnaire on behalf of the individual. Household and non-household contacts were invited by this route (Call agent route (outbound)).

Recruitment was performed Monday to Sunday from 29 April to 28 July 2021. Dedicated study texts were sent out each morning to all eligible contacts with a mobile number and/or email address. 119 call agents received inbound calls daily between 08.00 and 20.00 from NHS T&T call handlers and made outbound calls using a dedicated list of eligible contacts between 08.00 and 20.00 Monday to Saturday. There was no limit on the daily number of participants recruited; however, due to intermittent limitations in the number of kits available, the number of individuals invited was restricted on certain dates. Recruitment was stopped after the desired number of contacts was reached.

Separate electronic recruitment questionnaires developed in Snap Survey were used for digital and call agent routes to reflect questions written in the first person (digital route) and second person (call agent route). Data collected at recruitment was identical for both recruitment routes, with personal details including name, date of birth, sex and home address; sociodemographic factors including ethnicity and ability to work from home, and vaccination status.

Individuals contacted by outbound call agents who declined the offer of participation were asked to optionally and anonymously provide details of why they declined from a multiple-choice list of common themes with a free text option available. Declining individuals were also asked to consent to a follow-up call with a behavioural scientist.

Sample size

Taking into account expected participant drop out and compliance with testing, approximately 20,000 individuals needed to be recruited in each arm to generate the required 3,170 secondary contacts needed based on a non-inferiority sample size calculation, using a significance level of 0.05, power of 80%, ratio of group sizes 1:1, design effect of 1.2, and a difference in the Percentage of contacts of contacts who become cases of 6.25% in the LFD arm and 8.15% in the self-isolation arm, based on findings from the previous study by Love et al (14). Sample size calculations were performed using ART, version 1.0.0 in STATA, version 16.1. The prevalence of COVID-19 in contacts was lower than seen in the previous studies, as determined in an interim analysis carried out at mid-point in the recuitment (after more than 20,000 participants were recuited). This lower prevalence may potentially have been due to increasing Percentages of participants being vaccinated over the study period. To reflect this, there was an inflation of the sample size to 50,000 participants.

Randomisation

Participants were randomly assigned to one of two study arms, with randomisation performed at the point of consent before any personal information was given. On clicking the recruitment questionnaire link a timestamp was generated by the system for each participant. If the number of seconds in the timestamp was less than 30 participants were routed into the PCR arm and if more than 30 participants were routed into the DCT arm. If

multiple contacts were reported from a single household (concatination of door number and postcode), then all individuals in the household were assigned to the same arm of the study after recruitment, with all individuals assigned to the arm assigned to the first member of the household recruited. Individuals were only informed of their final arm allocation after accounting for household clustering.

Daily study process

Recruitment data were downloaded from the Snap Survey online database at approximately 11.00 and 17.00 daily and processed in R to produce lists for kit postage and messaging. Messaging was semi-automated, requiring the manual upload of telephone numbers/email addresses and NHSTT IDs to Notify to send out the messages and the upload of NHSTT IDs into Snap Survey to create unique accounts for participants in the DCT arm.

Participants were sent either a self-swab kit containing 7 LFDs and a 2 self-sample PCR-swabs (DCT arm) or a single PCR swab (PCR arm) together with appropriate information leaflets, using the standard NHS T&T Home Delivery Channel with bulk uploads performed twice daily in to the NHS T&T system.

A text message or email was sent to all participants with a valid mobile number and/or email address using the Notify messaging service (https://www.notifications.service.gov.uk) following submission of postage orders. This was to inform the participant of their assigned study arm and to send a link to a short online baseline behavioural survey. Initial reminder messages were sent to all participants to prompt the completion of the short online survey 48 hours after initial recruitment. Participants in the LFD arm also received an email with their unique link to access the results portal within 24 hours of recruitment. No further communication was had with participants in the self-isolation arm until day 7, when an email or text message was sent with a link to the short end of study online survey. A further reminder message was sent at day 9 to encourage completion of this survey. Individuals in the DCT arm received an automated daily reminder message to prompt the reporting of results into the LFD results portal. In addition, this group received an email or text message with a link to the short end of study online survey at day 7, and a further reminder message at day 9.

Specimen collection and result reporting for study participants

Participants in the PCR arm were asked to collect a PCR self-swab on the same day the swab kit arrived, as described in their study letter.

Study participants in the DCT arm were asked to self-collect a PCR swab the same day they received a test kit in addition to performing their first LFD test, as described in their study letter. Lateral flow tests were performed by the participant at home on the first day of kit receipt plus the following 6 sequential days. The second PCR swab was to be submitted by individuals in the LFD arm on receipt of a positive LFD result or on the same day as a last LFD (if all previous LFD tests were negative).

PCR swabs from participants in both arms were returned to NHS T&T laboratories using the standard postal, laboratory and reporting processes.

Study participants in the DCT arm were asked to self-report daily LFD results to PHE each day using a secure results portal developed in Snap Survey using unique url links based on the individual's NHSTT ID allowed for the linkage of all daily LFD results to recruitment data while removing the requirement for the entry of personal identifiable information with each result, shortening the reporting questionnaire. Participants were required to submit daily LFD results, an image of the test, and symptoms. Conditional questions were used to allow the participant to record the date their test kit arrived (day 1 only) and their PCR barcode (day 1, day 7 (if negative) or on recording a positive result), which improved data linkage. Automated, unique links were sent to the participant to allow access to the results portal on receipt of test kit, with participants also able to access by the

entry of their NHSTT ID without requiring a password. From the date of recruitment, reminder email messages were sent every 24 hours for 7 days to improve completion of LFD submissions.

All LFD results were uploaded to the central point of care result portal to ensure notification was compliant with amendments to The Health Protection (Notification) Regulations 2010.

On reporting their first negative LFD, participants in the LFD arm were assigned a 'Daily Contact Testing' status flag in the NHS Test and Trace contact tracing system. This prevented participants from being contacted by call agents undertaking isolation checks and removed access to self-isolation support payments. Participants in the LFD arm were provided with a letter to exempt them from self-isolation.

Data sources and data linkage

Linkage of all study datasets was deterministic based on the inclusion of a combination of NHSTT ID, name, date of birth, telephone number, postcode and NHS number in all data sets.

Demographic data from the NHS Test and Trace Contact Tracing (NHSTT) webtool (name, date of birth, email address, mobile number, sex and NHS number) was deterministically linked to questionnaire data obtained during participant recruitment (address including postcode, ethnicity, consent, reason for accepting/declining, vaccination status, homeworking status) using the participants unique NHSTT ID. Missing NHS numbers were obtained from the NHS demographic batch tracing service (DBS).

PCR results for participants were identified from PHE's laboratory surveillance system, SGSS and from NHSTT. To limit the range of data being compared, the dataset was restricted to tests with specimen dates in the range of the 90 days before earliest interview date (29 January 2021). The 90 day period was selected to allow identification of PCR positive results from participants in the 90 days prior to participation in the study, as current policy is not to test these people again using PCR due to the potential for extended PCR positivity. Data were extracted as of 8 September 2021. Study PCR swabs had a unique prefix to their barcode (ALH) to allow easy identification from national datasets.

Vaccination records were obtained for study participants via linkage to National Immunisation Management Service (NIMS) data. For linkage to NIMS, the fields NHS number, sex, forename, surname, date of birth and postcode were used from the dataset and NIMS patient-level records. Fields were cleaned: forename and surname cleaned to the initial alphabetical segment and postcode stripped of spaces and reduced to lowercase.

The linkage to NIMS was conducted sequentially using rules developed through inspection of the data and an impact assessment to minimise false positive matches. If a record from the dataset was linked in an earlier step it would be excluded from later steps. The first step was linkage on NHS number, forename, surname and date of birth, or linkage on forename, surname and date of birth where the dataset record had missing NHS number. The second was nhsnumber and forename, nhsnumber and date of birth or nhsnumber, surname and sex. The third was postcode, surname, date of birth, sex and first initial. Any dataset records which matched to multiple NIMS identifiers had matches restricted to only the identifiers with matching postcode, which resolved all ambiguities except that two dataset records appeared to have duplicate records in NIMS which appeared to be valid, and were retained.

Secondary cases were linked to their NHSTT case records via combinations of specimen number, specimen date, NHS number, forename, surname and date of birth to enable secondary attack rate analysis. Secondary contacts were all named close contacts listed by these secondary case in NHSTT. These were categorised as household contacts or non-houshold contacts as reported to NHSTT by the secondary case.

To identify tertiary cases, all NHSTT contact records were matched to NHSTT case records via the following rules, to identify where a case and contact record refer to the same person.

- Name* + NHS number
- Name* + DOB + postcode/current postcode
- Name* + DOB + email
- Name* + DOB + phone
- Alphabetically ordered full name + phone
- Alphabetically ordered full name + email

*A name (e.g. Charles/Darwin-Smith) can have the forename and surname exchanged (Darwin-Smith/Charles) and either one of the parts can be changed so long as the initial is retained (so Colin/Darwin-Smith and D/Charles would be matches) or the split between forename and surname could be changed (so Charles Darwin/Smith would also match).

A NHSTT contact was defined as a potential transmission event where it was matched to a subsequent case record whose onset of symptoms (or test date, if no symptom onset) were between 2 and 14 days inclusive after the date of contact (or onset date of exposing case for household contacts). Where multiple contact episodes were identified as a potential transmission event for a particular case (i.e. if somebody was exposed by two different cases within a short period of time), rules-based selection was performed so that each case had up to one potential transmission event identified. This rules-based selection prioritised household contacts over non-household contacts, and later contact events within the window (i.e. closer to symptom onset or test in the ensuing case). A secondary contact was considered to have become a tertiary case if it was selected as the potential transmission event leading to a case.

Descriptive data analysis

All data submitted to the study LFD results portal and recruitment portal were analysed as of 14 August 2021, with PCR data analysed as of 8 September 2021. Following linkage as described previously, the dataset was analysed in Stata version 15 and R Studio version 4.0.0.

Contact records were excluded from the analysis if no address or contact information was provided or if the contact was ineligble based on the study exclusion critiera. Duplicate registrations from the same participant (based on NHS number or concatenation of available name, date of birth and postcode) registering with more than one contact tracing ID within a 3-day period were deduplicated. Participants registering more than once after more than 3 days remained in the study as two separate participants.

LFD results submitted from participants in the PCR arm and LFD resuts submitted from participants in the LFD arm to the NHS T&T portal were not included in LFD analysis as it could not be established if these participants had taken part in DCT and had daily freedoms or if they had reported results not intended for inclusion in the study.

Vaccination status was derived from the National Immunisation Management System (NIMS) with fully vaccinated and one dose vaccinated individuals defined as those with a vaccination date more than 14 days prior to recruitment. Where NIMS vaccination status was unknown, self-reported vaccination status was used a proxy.

Associations were determined by chi-squared and rank sum tests, with a p value of <0.001 used to show significant observed differences between groups due to large numbers in each group.

Attack rates in contacts of participants

Attack rates were calculated amongst contacts ("secondary contacts") of study participants who developed COVID-19 as determined by confirmatory PCR between 2 days before and 14 days after recruitment ("secondary cases") excluding those in the PCR arm who did submit results to the LFD portal. Analysis was carried out based on these secondary cases identified in NHSTT, their contacts ("secondary contacts") and specific transmission links identified in the NHSTT data to identify tertiary cases. For the main analysis, study participants in the LFD arm who did not report a LFD to the study portal were excluded; these were included in a sensitivity analysis. A separate sensitivity analysis was performed including only the first participant recruited within each household, and excluding study participants in the LFD arm who did not report a LFD to the study portal.

Attack rate estimators among secondary contacts were derived from Bernoulli regression models with a binary outcome (positive/negative) using household clustering to obtain cluster-robust standard errors from miceadds package 3.11-6 in R version 4.0.5. In each case the denominator was all secondary contacts and numerator was tertiary cases amongst those secondary contacts. The simplest model used arm as the only covariate and the identity link. All other models used the logit link. The second model added household exposure and its interaction with arm to that in the simplest model, while the third model instead added vaccine status (0 or 1; 2 doses) and its interaction. These three models are referred to 'unadjusted'. 'Adjusted' versions of these were obtained by adding household exposure, vaccine status and ability to work from home to the simplest model, vaccine status and ability to work from home to the second model, and household exposure and ability to work from home to the third model. Interactions were tested for significance by means of the Wald test.

A masked, independent analysis by an individual outside the study team was performed for the unadjusted models with no interaction and that including the interaction between household contact and arm.

Behavioural questionnaires

A link to a short, non-mandatory, anonymous questionnaire developed in Snap Survey was sent by Notify text messaging/email messaging to all consenting participants with a valid mobile number and/or email address at the beginning and end of the study. Separate questionnaires were used for the PCR and DCT arms to avoid misclassification of study participants, with questionnaires covering the same core questions. Baseline questionnaires were sent within 24 hours of recruitment with a completion reminder sent 48 hours after recruitment. Baseline and final questionnaires were unlinked. Final questionnaires were sent at day 7 with a reminder sent on day 9.

Baseline questionnaires included reasons for participation, activities in the 7 days prior to enrolment, amount of close contact (indoors and for more than 15 minutes) with non-household members in the last 7 days compared with the previous week and demographics (educational status, sex, age and ethnicity). Final questionnaires covered questions relating to activities carried out in the last 24 hours, amount of close contact (indoors and for more than 15 minutes) with non-household members in the last 7 days compared with the previous week, activities undertaken outside the home while the participant should have been isolating, reasons for leaving the home during any isolation period, the participant's confidence in any test results, and demographics (educational status, sex, age and ethnicity). Full copies of the questionnaires are available in Appendicies H and I.

For the baseline survey, participants were analysed according to the two study arms: PCR and daily testing. For the end of study survey, participants were analysed according to three groups: PCR (self-isolating); DCT – positive test (isolating); and DCT– no positive test (participants with no positive LFD or PCR results). Participants in the DCT arm who did not report any LFD results should have self-isolated as required outside the study as there is a legal duty to do so. We therefore took an intention to treat approach and analysed 109 DCT

participants (14.5% of respondents in DCT arm) who did not report any LFT results as part of the 'DCT – tested positive' group'; on the basis that these participants should have been isolating if they were not undertaking daily testing. The 'DCT – tested positive' group' thus comprises all participants who should have been self-isolating. There is some potential for misclassification – for example, if people were using LFTs but not reporting them. Percentages were calculated among participants who provided a least one response to a question and were compared using Chi squared tests.

Data management and Information Governance

Questionnaire and results portal data was stored on an electronic Snap Survey database hosted on a secure PHE server. Data were downloaded twice daily and processed, with all data extracts appropriately handled and securely stored in accordance with the Data Protection Act (2018) and GDPR.

Patient identifiable information was handled by the study team where essential only, with all staff handling patient identifiable information completing information governance training. Participants were recruited by call handlers with data security training. All permissions for data use were agreed in advance, data was only transferred via secured systems &/or with encryption.

NIMS history was used to validate self-reported status and to use as an accurate source of data. The centrally held data was protected by appropriate information governance controls and administered via a single application process, with access restricted to a limited set of analysts.

Ethical considerations

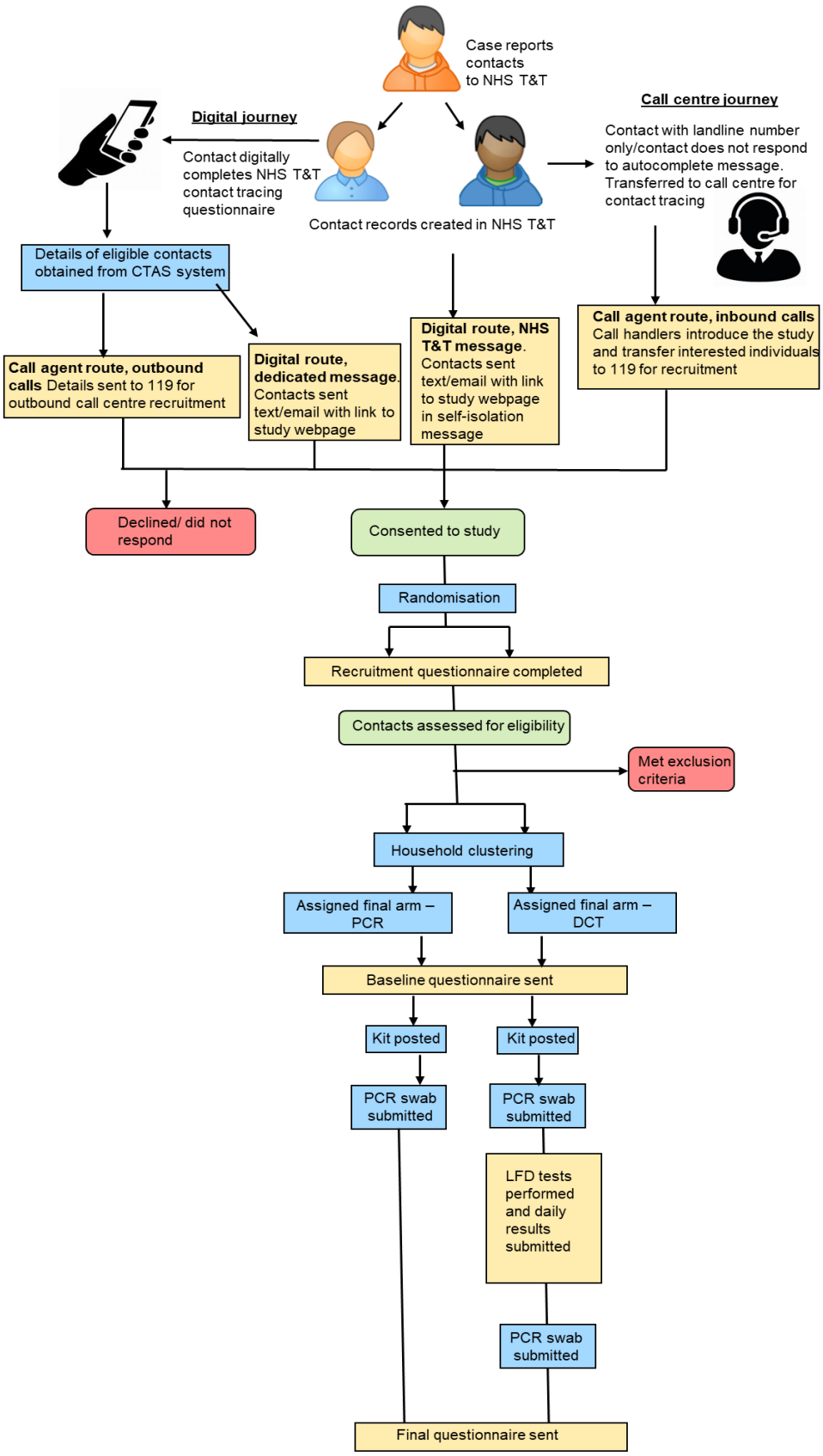
Research governance approval for this study was granted by PHE Research Ethics and Governance Group (REGG) - reference NR0235 (appendix M). All data were handled and stored in accordance with the Data Protection Act (2018) and GDPR in line with PHE information governance and securities policies. The study protocol was registered with the Research Registry (ID: 6809) (17).

Informed consent for both serial testing and evaluation interviews with academic partners was obtained during recruitment. Implied consent of participants was assumed by their return of the self-test results, self-test PCR swab and laboratory request form. Individuals who did not provided consent, either actively or because they lacked capacity were not included in the study.

To support participants in the study a dedicated email in-box was set-up to allow potential, or recruited, participants to raise queries directly with the study team. This email address was included on all study documentation and was available on the study webpage. Any issues related to kit failures or discrepant results were notified to MHRA using the yellow card system and were recorded in a separate report.

Notification to Public Health colleagues occurred on 28 April 2021, via a PHE briefing note (Reference 2021/022), Appendix N.

Supplementary Figure 1 - Flow diagram of recruitment, study participant flow and reporting processes.



Supplementary Table 1 - Self-reported reasons for withdrawing from the study by self-reported study arm

	PCR arm		DCT arm		All withdrawing*	
	N	%	N	%	N	%
I did not want to be in the DCT group	16	0.6%	83	3.5%	100	1.9%
I did not want to be in the PCR group	1,327	47.1%	27	1.1%	1,367	25.5%
I do not trust my test results	8	0.3%	39	1.6%	48	0.9%
I have had a previous PCR test and do not want to do another	444	15.8%	124	5.2%	579	10.8%
I have not received my kit	33	1.2%	148	6.2%	186	3.5%
I have symptoms	19	0.7%	76	3.2%	99	1.8%
I have tested positive	107	3.8%	346	14.6%	467	8.7%
I'm at the end of my isolation period	268	9.5%	502	21.1%	799	14.9%
Other reason	540	19.2%	989	41.6%	1,608	30.0%
No reason given	57	2.0%	43	1.8%	106	2.0%
Total	2,819		2,377		5,359	

* All withdrawing participants including those who did not self-report an arm. Withdrawing participants deduplicated by contact tracing ID where available. Participants not reporting ID or reporting inaccurate ID may have responded multiple times. Reasons were given as multiple-choice options (options as displayed in table). No free text option for expansion of other reason field.

Supplementary Table 2 - Socio-demographic characteristics of first study participant in a household in the DCT arm (n=19,268) and those in the PCR arm (n=18,567)

		DCT arm (n=19,268)			PCR arm (n=18,567)			p-value
		Percentage	[95% CI]	(Number)	Percentage	[95% CI]	(Number)	
Sex	Female	54.5%	[53.8 - 55.2%]	(10496)	55.4%	[54.6 - 56.1%]	(10274)	0.09
	Male	45.5%	[44.8 - 46.2%]	(8766)	44.6%	[43.9 - 45.4%]	(8286)	
Age	Mean	41.6			41.7			0.58
	95% CI	[41.4 – 41.8]			[41.5 – 41.9]			
	Range	18-87			18-89			
Geography	East Midlands	6.9%	[6.6 - 7.3%]	(1337)	7.0%	[6.6 - 7.3%]	(1293)	0.66
	East of England	8.3%	[7.9 - 8.7%]	(1605)	8.7%	[8.3 - 9.1%]	(1618)	
	London	11.7%	[11.2 - 12.2%]	(2254)	11.3%	[10.9 - 11.8%]	(2103)	
	North East	8.7%	[8.3 - 9.1%]	(1672)	8.5%	[8.1 - 8.9%]	(1578)	
	North West	18.7%	[18.1 - 19.2%]	(3595)	19.2%	[18.6 - 19.7%]	(3559)	
	South East	14.4%	[13.9 - 14.9%]	(2781)	14.0%	[13.5 - 14.5%]	(2596)	
	South West	1.6%	[10.2 - 11%]	(2041)	10.6%	[10.2 - 11.1%]	(1973)	
	West Midlands	8.6%	[8.2 - 9%]	(1649)	8.5%	[8.1 - 8.9%]	(1578)	
	Yorkshire & Humber	12.1%	[11.6 - 12.6%]	(2331)	12.2%	[11.7 - 12.7%]	(2261)	
Index of multiple deprivation	1 - Most deprived	6.3%	[5.9 - 6.6%]	(1206)	6.5%	[6.2 - 6.9%]	(1202)	0.13
	2	6.9%	[6.5 - 7.2%]	(1319)	7.3%	[6.9 - 7.7%]	(1345)	
	3	7.9%	[7.5 - 8.3%]	(1517)	7.9%	[7.5 - 8.3%]	(1457)	
	4	8.9%	[8.5 - 9.3%]	(1705)	8.8%	[8.4 - 9.2%]	(1630)	
	5	9.7%	[9.3 - 10.1%]	(1860)	9.5%	[9.1 - 9.9%]	(1752)	
	6	10.2%	[9.8 - 10.6%]	(1956)	10.5%	[10 - 10.9%]	(1931)	
	7	11.5%	[11.1 - 12%]	(2212)	11.6%	[11.1 - 12%]	(2135)	
	8	11.8%	[11.4 - 12.3%]	(2270)	12.1%	[11.7 - 12.6%]	(2237)	
	9	12.4%	[12 - 12.9%]	(2383)	12.2%	[11.7 - 12.7%]	(2249)	
	10 - Least deprived	14.3%	[13.8 - 14.8%]	(2749)	13.6%	[13.1 - 14.1%]	(2506)	
Ethnicity	Asian	3.3%	[3.1 - 3.6%]	(637)	3.5%	[3.2 - 3.7%]	(637)	0.27
	Black	1.2%	[1 - 1.3%]	(226)	1.1%	[1 - 1.3%]	(207)	
	Mixed	2.9%	[2.6 - 3.1%]	(547)	2.5%	[2.3 - 2.8%]	(466)	
	White	91.4%	[91 - 91.8%]	(235)	91.7%	[1 - 1.3%]	(210)	
	Other	1.2%	[1.1 - 1.4%]	(17432)	1.1%	[91.3 - 92.1%]	(16824)	
Self-reported vaccination*	Unvaccinated	13.5%	[13 - 14%]	(2581)	13.1%	[12.6 - 13.6%]	(2409)	0.01
	1 dose	25.0%	[24.3 - 25.6%]	(4762)	26.3%	[25.7 - 26.9%]	(4839)	
	2 doses	61.5%	[60.8 - 62.2%]	(11739)	60.6%	[59.9 - 61.3%]	(11155)	
Case in household**	No	43.9%	[43.2 - 44.6%]	(8367)	44.0%	[43.3 - 44.7%]	(8078)	0.89
	Yes	56.1%	[55.4 - 56.8%]	(10692)	56.0%	[55.3 - 56.7%]	(10294)	
Homeworker***	No	40.5%	[39.8 - 41.2%]	(7708)	43.6%	[42.8 - 44.3%]	(7988)	<0.001
	Yes	59.5%	[58.8 - 60.2%]	(11307)	56.4%	[55.7 - 57.2%]	(10351)	

* Self-reported vaccination status. Question: 'Have you received a vaccination for COVID-19'. Options; Yes – 2 doses, Yes – 1 dose, No.

** Self-reported. Question: ‘Does the person with COVID-19 that you were exposed to live in your household?’. Options; Yes, No.
*** Self-reported. Question: ‘Are you able to work from home?’. Single choice options; Yes, No.

Supplementary Table 3 - Number of participants reporting results by method of result reported (days 0 to 14)

		DCT arm		PCR arm	
		Study portal		Study portal	
		Result reported	No result reported	Result reported	No result reported
NHS T&T portal	Result reported	5,027	1,300	13	5,810
	No result reported	15,768	4,028	30	17,647
	Total	**20,795**	**5,328**	**43**	**23,457**

Supplementary Table 4 - Socio-demographic characteristics of contacts in the DCT arm who consented and reported a result (n=20,795) and those consenting who did not report a result (n=5,328)

		DCT - no LFD results reported (n=5,328) Percentage [95% CI] (Number)			DCT - results reported (n=20,795) Percentage [95% CI] (Number)			p-value
Sex	Female	52.6%	[51.3 - 53.9%]	(2799)	53.9%	[53.1 - 54.5%]	(11201)	0.10
	Male	47.4%	[46.1 - 48.7%]	(2522)	46.1%	[45.5 - 46.8%]	(9591)	
Age	Mean	40			42			<0.001
	95% CI	[39.4 - 40.2]			[41.8 - 42.2]			
	Range	18 - 87			18 - 87			
Geography	East Midlands	6.8%	[6.1 - 7.4%]	(361)	7.0%	[6.7 - 7.4%]	(1461)	0.01
	East of England	8.1%	[7.4 - 8.8%]	(432)	8.3%	[7.9 - 8.7%]	(1726)	
	London	10.4%	[9.6 - 11.2%]	(551)	11.5%	[11.1 - 12%]	(2396)	
	North East	9.5%	[8.7 - 10.3%]	(506)	8.5%	[8.1 - 8.9%]	(1776)	
	North West	20.0%	[18.9 - 21.1%]	(1061)	18.6%	[18 - 19.1%]	(3856)	
	South East	13.9%	[13 - 14.8%]	(738)	14.8%	[14.3 - 15.3%]	(3075)	
	South West	10.4%	[9.5 - 11.2%]	(550)	10.7%	[10.3 - 11.2%]	(2232)	
	West Midlands	9.1%	[8.3 - 9.9%]	(483)	8.3%	[7.9 - 8.6%]	(1716)	
	Yorkshire & Humber	11.8%	[10.9 - 12.6%]	(625)	12.3%	[11.8 - 12.7%]	(2551)	
Index of multiple deprivation	1 - Most deprived	8.3%	[7.6 - 9.1%]	(438)	5.1%	[4.8 - 5.4%]	(1055)	<0.001
	2	7.7%	[7 - 8.4%]	(404)	5.9%	[5.6 - 6.2%]	(1226)	
	3	8.1%	[7.4 - 8.9%]	(427)	7.2%	[6.8 - 7.5%]	(1485)	
	4	8.5%	[7.7 - 9.2%]	(446)	8.4%	[8.1 - 8.8%]	(1748)	
	5	9.7%	[8.9 - 10.5%]	(512)	9.7%	[9.3 - 10.1%]	(2009)	
	6	10.2%	[9.4 - 11%]	(536)	10.3%	[9.9 - 10.7%]	(2136)	
	7	10.8%	[9.9 - 11.6%]	(566)	11.9%	[11.5 - 12.3%]	(2466)	
	8	11.9%	[11.1 - 12.8%]	(628)	12.3%	[11.9 - 12.8%]	(2554)	
	9	11.8%	[10.9 - 12.6%]	(619)	13.2%	[12.7 - 13.7%]	(2738)	
	10 - Least deprived	13.0%	[12.1 - 13.9%]	(684)	16.0%	[15.5 - 16.5%]	(3309)	
Ethnicity	Asian	4.1%	[3.5 - 4.6%]	(213)	3.2%	[2.9 - 3.4%]	(643)	<0.001
	Black	1.9%	[1.5 - 2.3%]	(100)	0.8%	[0.7 - 0.9%]	(164)	
	Mixed	2.9%	[2.5 - 3.4%]	(153)	2.7%	[2.5 - 2.9%]	(554)	
	White	89.5%	[88.7 - 90.3%]	(83)	92.3%	[0.9 - 1.2%]	(221)	
	Other	1.6%	[1.2 - 1.9%]	(4678)	1.1%	[92 - 92.7%]	(19040)	
Self-reported vaccination*	Unvaccinated	18.8%	[17.8 - 19.9%]	(978)	11.7%	[11.2 - 12.1%]	(2412)	<0.001
	1 dose	25.4%	[24.3 - 26.6%]	(1321)	24.3%	[23.7 - 24.9%]	(5022)	
	2 doses	55.7%	[54.4 - 57.1%]	(2894)	64.0%	[63.3 - 64.6%]	(13209)	
Case in household**	No	41.4%	[40 - 42.7%]	(2145)	38.8%	[57.3 - 60%]	(7989)	<0.001
	Yes	58.6%	[33.7 - 35%]	(3041)	61.2%	[53.7 - 54.9%]	(12625)	
Homeworker***	No	48.7%	[47.3 - 50.1%]	(2526)	37.9%	[37.3 - 38.6%]	(7798)	<0.001
	Yes	51.3%	[49.9 - 52.7%]	(2661)	62.1%	[61.4 - 62.7%]	(12763)	
Household multiple ****	No	60.6%	[59.3 - 61.9%]	(3228)	57.8%	[57.1 - 58.4%]	(12011)	<0.001
	Yes	39.4%	[38.1 - 40.7%]	(2100)	42.2%	[41.6 - 42.9%]	(8784)	

* Self-reported vaccination status. Question: 'Have you received a vaccination for COVID-19'. Options; Yes – 2 doses, Yes – 1 dose, No.

** Self-reported. Question: 'Does the person with COVID-19 that you were exposed to live in your household?'. Single options; Yes, No.

*** Self-reported. Question: 'Are you able to work from home?'. Single choice options; Yes, No.

****Derived from house number and postcode given at recruitment. Participants with same postcode and house number grouped as household members. Includes individuals registered more than once if more than 3 days from first registration.

[1] Data completeness for sex n=5,321 not reporting (99.9%) and 20,792 reporting (100%). Pearson Chi^2 =2.74

Data completeness for age n=5,219 not reporting (98.5%) and 20,230 reporting (7.3%). Mann-Whitney

Data completeness for geography (PHE region) n=5,307 not reporting (99.7 %) and 20,789 reporting (99.9%). Pearson Chi^2 =22.03

Data completeness for index of multiple deprivation (IMD) n=5,260 in not reporting (98.7%) and 20,726 reporting (99.7%). Pearson Chi^2 =138.45

Data completeness for ethnicity n=5,227 not reporting (98.1%) and 20,622 reporting (99.2%). Pearson Chi^2 =76.53

Data completeness for self-reported vaccination status n=5,193 not reporting (97.5%) and 20,643 reporting (99.3%). Pearson Chi^2 =209.09

Data completeness for index case being in household n=5,186 not reporting (97.3%) and 20,614 reporting (99.1%). Pearson Chi^2 =11.80

Data completeness for self-reported ability to work from home n=5,187 in PCR (97.4%) and 20,561 reporting (98.9%). Pearson Chi^2 =200.12

Data completeness for having more than one household member/an individual being registered more than once in the study n=5,328 not reporting (100%) and 20,795 reporting (100%). Pearson Chi^2 =13.94

Supplementary Table 5 – Number of COVID-19 PCR positive participants (secondary cases), their contacts (secondary contacts) and the number of tertiary cases identified in NHSTT records, excluding those in DCT arm who did not report a LFD result to the study portal

	DCT	SI	Total
Number of PCR positive cases among study participants (secondary cases)	1,647	2,359	4,006
Number of PCR positive cases among participants (secondary cases) identified in NHSTT*	1,671	2,385	4,056
Number of secondary cases with NHSTT secondary contacts	1,323	1,948	3,271
Number of secondary cases with NHSTT household secondary contacts	1,298	1,922	3,220
Number of secondary cases with NHSTT non-household secondary contacts	147	214	361
Number of secondary contacts	3,697	5,206	8,903
Number of household secondary contacts	3,244	4,638	7,882
Number of non-household secondary contacts	453	568	1,021
Number of tertiary cases	222	390	612
Number of tertiary cases from household contacts	208	370	578
Number of tertiary cases from non-household contacts	14	20	34
Number of secondary contacts per participant case (all cases)	2.2	2.2	2.2
Number of secondary contacts per participant case (cases with contacts)	2.8	2.7	2.7
Number of household secondary contacts per participant case (all cases)	1.9	1.9	1.9
Number of household secondary contacts per participant case (cases with household contacts)	2.5	2.4	2.5
Number of non-household secondary contacts per participant case (all cases)	0.3	0.2	0.3
Number of non-household secondary contacts per participant case (cases with non-household secondary contacts)	3.1	2.7	2.8
Number of tertiary cases per NHSTT secondary case	0.1	0.2	0.2
Number of tertiary cases per secondary case via household secondary contact	0.1	0.2	0.1
Number of tertiary cases per secondary case via non-household secondary contact	0.01	0.01	0.01

***** where a case had multiple records, all were included

Supplementary Table 6 – Attack rates in secondary contacts and difference in percentages amongst secondary contacts, excluding those in DCT arm who did not report a LFD result to the study portal

Attack rates in secondary contacts		Percent positive	95% Confidence interval	Percent positive	95% Confidence interval
		Unadjusted (n = 8,903)		**Adjusted (n = 8,777)**	
DCT arm		6.0%	(5.2%, 6.8%)	6.1%	(5.2%, 6.9%)
SI arm		7.5%	(6.7%, 8.3%)	7.4%	(6.7%, 8.2%)
Difference in percentage	DCT vs SI arms	-1.5%	(-2.6%, -0.3%)	-1.4%	(-2.5%, -0.2%)
		Unadjusted (n = 8,903)		**Adjusted (n = 8,777)**	
DCT arm: household secondary contacts		6.4%	(5.5%, 7.3%)	6.4%	(5.5%, 7.4%)
SI arm: household secondary contacts		8.0%	(7.1%, 8.8%)	7.9%	(7.1%, 8.8%)
DCT arm: non-household secondary contacts		3.1%	(1.3%, 4.9%)	3.0%	(1.3%, 4.8%)
SI arm: non-household secondary contacts		3.5%	(1.9%, 5.1%)	3.54%	(1.9%, 5.2%)
Difference in percentage	DCT vs SI: household secondary contacts	-1.6%	(-2.8%, -0.3%)	-1.50%	(-2.8%, -0.3%)
	DCT vs SI: non-household secondary contacts	-0.4%	(-2.8%, 2.0%)	-0.50%	(-2.9%, 1.9%)
		Unadjusted (n = 8,871)		**Adjusted (n = 8,777)**	
DCT arm: 0 or 1 dose vaccine		6.8%	(5.5%, 8.0%)	6.97%	(5.7%, 8.2%)
SI arm: 0 or 1 dose vaccine		7.8%	(6.7%, 8.9%)	7.82%	(6.8%, 8.9%)
DCT arm: 2 doses vaccine		5.2%	(4.1%, 6.3%)	5.07%	(4.0%, 6.2%)
SI arm: 2 doses vaccine		7.1%	(5.9%, 8.2%)	7.02%	(5.9%, 8.1%)
Difference in percentage	DCT vs SI: 0 or 1 dose vaccine	-1.0%	(-2.7%, 0.6%)	-0.85%	(-2.5%, 0.8%)
	DCT vs SI: 2 doses vaccine	-1.9%	(-3.4%, -0.3%)	-2.0%	(-3.5%, -0.4%)

'Unadjusted' models include named variables (arm, arm and household exposure, and arm and vaccination status) as covariates. 'Adjusted' versions of these models were obtained by adding all others from household exposure, vaccine status and ability to work from home. SI was used as a baseline against which DCT was compared. Model testing for significance of arm and household exposure interaction and arm and vaccination status interaction were not significant (Unadjusted model arm and household exposure: p=0.80, adjusted model arm and household

exposure: p=0.86, unadjusted model arm and vaccination status: p=0.36, adjusted model arm and vaccination status: p=0.25).

Supplementary Table 7 – Number of COVID-19 PCR positive participants (secondary cases), their contacts (secondary contacts) and the number of tertiary cases identified in NHSTT records for first study participant in household, including those in DCT arm who did not report a LFD result to the study portal

	DCT	SI	Total
Number of PCR positive cases among study participants (secondary cases)	1,652	1,882	3,534
Number of PCR positive cases among participants (secondary cases) identified in NHSTT*	1,669	1,904	3,573
Number of secondary cases with NHSTT secondary contacts	1,329	1,542	2,871
Number of secondary cases with NHSTT household secondary contacts	1299	1517	2816
Number of secondary cases with NHSTT non-household secondary contacts	169	176	345
Number of secondary contacts	3,536	3,946	7,482
Number of household secondary contacts	3066	3513	6579
Number of non-household secondary contacts	470	433	903
Number of tertiary cases	228	282	510
Number of tertiary cases from household contacts	215	266	481
Number of tertiary cases from non-household contacts	13	16	29
Number of secondary contacts per participant case (all cases)	2.1	2.1	2.1
Number of secondary contacts per participant case (cases with contacts)	2.7	2.6	2.6
Number of household secondary contacts per participant case (all cases)	1.8	1.9	1.8
Number of household secondary contacts per participant case (cases with household contacts)	2.4	2.3	2.3
Number of non-household secondary contacts per participant case (all cases)	0.3	0.2	0.3
Number of non-household secondary contacts per participant case (cases with non-household secondary contacts)	2.8	2.5	2.6
Number of tertiary cases per NHSTT secondary case	0.1	0.2	0.1
Number of tertiary cases per secondary case via household secondary contact	0.1	0.1	0.1
Number of tertiary cases per secondary case via non-household secondary contact	0.01	0.01	0.01

***** where a case had multiple records, all were included

Supplementary Table 8 – Attack rates in secondary contacts and difference in percentages amongst secondary contacts, for first study participant in household, including those in DCT arm who did not report a LFD result to the study portal

Attack rates in secondary contacts		Percent positive	95% Confidence interval	Percent positive	95% Confidence interval
		Unadjusted (n = 7,482)		**Adjusted (n = 7,365)**	
DCT arm		6.5%	(5.6%, 7.3%)	6.45%	(5.58%, 7.32%)
SI arm		7.2%	(6.3%, 8.0%)	7.07%	(6.2%, 7.93%)
Difference in percentage	DCT vs SI arms	-0.7%	(-1.9%, 0.5%)	-0.62%	(-1.85%, 0.61%)
		Unadjusted (n = 7,482)		**Adjusted (n = 7,365)**	
DCT arm: household secondary contacts		7.0%	(6.1%, 8.0%)	7.0%	(6.0%, 8.0%)
SI arm: household secondary contacts		7.6%	(6.6%, 8.5%)	7.54%	(6.6%, 8.5%)
DCT arm: non-household secondary contacts		2.8%	(1.2%, 4.3%)	2.70%	(1.2%, 4.2%)
SI arm: non-household secondary contacts		3.7%	(1.8%, 5.6%)	3.71%	(1.8%, 5.6%)
Difference in percentage	DCT vs SI: household secondary contacts	-0.6%	(-1.9%, 0.8%)	-0.56%	(-1.9%, 0.8%)
	DCT vs SI: non-household secondary contacts	-0.9%	(-3.4%, 1.5%)	-1.0%	(-3.5%, 1.4%)
		Unadjusted (n = 7,444)		**Adjusted (n = 7,365)**	
DCT arm: 0 or 1 dose vaccine		7.1%	(5.8%, 8.4%)	7.2%	(6.0 %, 8.5%)
SI arm: 0 or 1 dose vaccine		7.5%	(6.2%, 8.7%)	7.5%	(6.3%, 8.7%)
DCT arm: 2 doses vaccine		5.7%	(4.5%, 6.9%)	5.6%	(4.4%, 6.7%)
SI arm: 2 doses vaccine		6.7%	(5.4%, 7.9%)	6.6%	(5.4%, 7.8%)
Difference in percentage	DCT vs SI: 0 or 1 dose vaccine	-0.4%	(-2.1%, 1.4%)	-0.3%	(-2.0%, 1.5%)
	DCT vs SI: 2 doses vaccine	-1.0%	(-2.7%, 0.7%)	-1.1%	(-2.8%, 0.7%)

'Unadjusted' models include named variables (arm, arm and household exposure, and arm and vaccination status) as covariates. 'Adjusted' versions of these models were obtained by adding all others from household exposure, vaccine status and ability to work from home. SI was used as a baseline against which DCT was compared. Model testing for significance of arm and household exposure interaction and arm and vaccination status interaction were not significant (Unadjusted model arm and household exposure: p=0.60, adjusted model arm and household

exposure: p=0.55 and unadjusted model arm and vaccination status: p=0.56, adjusted model arm and vaccination status: p=0.47 respectively).

Supplementary Table 9 – Number of COVID-19 PCR positive participants (secondary cases), their contacts (secondary contacts) and the number of tertiary cases identified in NHSTT records for first study participant in household, excluding those in DCT arm who did not report a LFD result to the study portal

	DCT	SI	Total
Number of PCR positive cases among study participants (secondary cases)	1,267	1,882	3,149
Number of PCR positive cases among participants (secondary cases) identified in NHSTT*	1,284	1,904	3,188
Number of secondary cases with NHSTT secondary contacts	1,027	1,542	2,569
Number of secondary cases with NHSTT household secondary contacts	1,005	1,517	2,522
Number of secondary cases with NHSTT non-household secondary contacts	120	176	296
Number of secondary contacts	2,760	3,946	6,706
Number of household secondary contacts	2,397	3,513	5,910
Number of non-household secondary contacts	363	433	796
Number of tertiary cases	169	282	451
Number of tertiary cases from household contacts	158	266	424
Number of tertiary cases from non-household contacts	11	16	27
Number of secondary contacts per participant case (all cases)	2.2	2.1	2.1
Number of secondary contacts per participant case (cases with contacts)	2.7	2.6	2.6
Number of household secondary contacts per participant case (all cases)	1.9	1.9	1.9
Number of household secondary contacts per participant case (cases with household contacts)	2.4	2.3	2.3
Number of non-household secondary contacts per participant case (all cases)	0.3	0.2	0.3
Number of non-household secondary contacts per participant case (cases with non-household secondary contacts)	3.0	2.5	2.7
Number of tertiary cases per NHSTT secondary case	0.1	0.2	0.1
Number of tertiary cases per secondary case via household secondary contact	0.1	0.1	0.1
Number of tertiary cases per secondary case via non-household secondary contact	0.01	0.01	0.01

***** where a case had multiple records, all were included

Supplementary Table 10 – Attack rates in secondary contacts and difference in percentages amongst secondary contacts, for first study participant in household, excluding those in DCT arm who did not report a LFD result to the study portal

Attack rates in secondary contacts		Percent positive	95% Confidence interval	Percent positive	95% Confidence interval
		Unadjusted (n= 6,706)		**Adjusted (n = 6,608)**	
DCT arm		6.1%	(5.1%, 7.1%)	6.2%	(5.2%, 7.1%)
SI arm		7.2%	(6.3%, 8.0%)	7.1%	(6.2%, 7.9%)
Difference in percentage	DCT vs SI arms	-1.0%	(-2.3%, 0.3%)	-1.0%	(-2.2%, 0.4%)
		Unadjusted (n= 6706)		**Adjusted (n = 6608)**	
DCT arm: household secondary contacts		6.6%	(5.5%, 7.7%)	6.6%	(5.5%, 7.7%)
SI arm: household secondary contacts		7.6%	(6.6%, 8.5%)	7.5%	(6.6%, 8.5%)
DCT arm: non-household secondary contacts		3.0%	(1.2%, 4.9%)	3.0%	(1.1%, 4.8%)
SI arm: non-household secondary contacts		3.7%	(1.8%, 5.6%)	3.7%	(1.8%, 5.6%)
Difference in percentage	DCT vs SI: household secondary contacts	-1.0%	(-2.4%, 0.5%)	-0.9%	(-2.4%, 0.5%)
	DCT vs SI: non-household secondary contacts	-0.7%	(-3.3%, 2.0%)	-0.8%	(-3.5%, 1.9%)
		Unadjusted (n= 6,674)		**Adjusted (n = 6608)**	
DCT arm: 0 or 1 dose vaccine		6.89%	(5.4%, 8.4%)	7.1%	(5.6%, 8.5%)
SI arm: 0 or 1 dose vaccine		7.45%	(6.2%, 8.7%)	7.5%	(6.3%, 8.7%)
DCT arm: 2 doses vaccine		5.30%	(4.0%, 6.6%)	5.2%	(3.9%, 6.5%)
SI arm: 2 doses vaccine		6.66%	(5.4%, 8.0%)	6.6%	(5.4%, 7.8%)
Difference in percentage	DCT vs SI: 0 or 1 dose vaccine	-0.56%	(-2.5%, 1.4%)	-0.4%	(-2.3%, 1.5%)
	DCT vs SI: 2 doses vaccine	-1.36%	(-3.2%, 0.5%)	-1.5%	(-3.3%, 0.4%)

'Unadjusted' models include named variables (arm, arm and household exposure, and arm and vaccination status) as covariates. 'Adjusted' versions of these models were obtained by adding all others from household exposure, vaccine status and ability to work from home. SI was used as a baseline against which DCT was compared. Model testing for significance of arm and household exposure interaction and arm and vaccination status interaction were

not significant (Unadjusted model arm and household exposure: p=0.90, adjusted model arm and household exposure: p=0.84, unadjusted model arm and vaccination status: p=0.48, adjusted model arm and vaccination status: p=0.37).

Supplementary Table 11 - Baseline survey - self-reported reasons for consenting to take part in the study

Reason for participating	Number of participants (n=31,597)	Percentage of participants
I wanted to avoid having to self-isolate if possible	21,700	69%
I needed to go to work, school, college or university if possible	9,526	30%
I needed to go out for other reasons if possible	8,578	27%
Taking part could help my family or employer	11,723	37%
I wanted to know if I have the virus so I can protect others	15,117	48%
I wanted to help with the study	23,872	76%
None of these reasons	194	1%