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The impact of "freedom day" on COVID-19 health protective behaviour in England: An observational study of hand hygiene, face covering use and physical distancing in public spaces pre and post the relaxing of restrictions

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Abstract

Objectives: To study the prevalence of COVID-19 health protective behaviours before and after rules eased in England on the 19th July 2021.

Design: Observational study pre (12th-18th July) and post (26th July-1st August) 19th July, and a cross-sectional online survey (26th to 27th July).

Setting: Observations occurred in supermarkets (n = 10), train stations (n = 10), bus stops (n = 10), a coach station (n = 1) and a London Underground station (n = 1). The survey recruited a nationally representative sample.

Participants: All adults entering the observed locations during a one-hour period (n = 3819 pre- and n = 2948 post-19th July). In the online survey, 1472 respondents reported having been shopping for groceries/visited a pharmacy and 566 reported having used public transport or having been in a taxi/minicab in the last week.

Main outcome measures: We observed whether people wore a face covering, maintained distance from others and cleaned their hands. We investigated self-reports of wearing a face covering while in shops or using public transport.

Results: In most locations observed, the proportion of people wearing face coverings, cleaning the hands and maintaining physical distance declined post 19th July. Pre 19th July, 70.2% (95% CI 68.7 to 71.7%) of people were observed to be wearing a face covering versus 55.8% (54.2 to 57.9%) post 19th July. Equivalent rates for physical distancing were 40.9% (39.0 to 42.8%) versus 29.5% (27.4 to 31.7%), and for hand hygiene were 4.4% (3.8 to 5.1%) versus 3.9% (3.2 to 4.6%). Self-reports of "always" wearing face coverings were broadly similar to observed rates.

Conclusions: Adherence to protective behaviours was suboptimal and declined during the relaxation of restrictions, despite appeals to exercise caution. Self-reports of "always" wearing a face covering in specific locations appear valid.

Keywords

infectious diseases, other public health, health promotion

Introduction

In order to reduce the transmission of SARS-CoV-2 during the COVID-19 pandemic, governments around the world have asked people to adopt a range of protective behaviours. Within the UK, a major campaign was launched asking people to remember the importance of "hands, face, space".[1] This campaign recommended that people regularly wash their hands or use hand sanitiser, wear a face covering when in enclosed spaces and remain physically distanced from others who were not in the same household or "bubble" (a support network that links two households),[2] by at least two metres. The strictness with which these measures have been implemented has changed over time. In its "roadmap" out of lockdown,[3] the UK government set out a series of changes that would occur in four steps. Step four, which occurred on 19th July 2021, removed the legal requirement to wear a face covering in shops, on public transport and in other enclosed spaces, and to remain physically distanced from others. In the media, 19th July became known as "freedom day." However, while most aspects of legal compulsion were removed, the UK government nonetheless advised members of the public that caution remained "absolutely vital" in the face of growing case numbers and urged that "we must all take responsibility so we don't undo our progress".[4]

Several studies during the pandemic have attempted to identify factors that are important in helping people adopt protective behaviours. One study suggested that a sense of personal responsibility is important in motivating people to adopt specific hygiene behaviours, with the perceived risk to others, rather than to oneself, being a significant correlate of hand hygiene, use of face coverings, and maintaining physical distance from others.[5] Regulations enforced or lifted by a government can also play a motivating role, by helping to shape how people understand the

current level of risk.[6] The situation in the UK on 19th July, involving rapidly escalating case numbers, appeals to personal responsibility, a large-scale relaxation of restrictions and media rhetoric around "freedom" therefore presented a series of seemingly conflicting messages.

Throughout the pandemic, the assessment of the impact of messages, policies, media narrative and case numbers has largely relied on the use of self-report measures, using large-scale surveys asking participants to report, among other things, how frequently they washed their hands, whether they adhered to rules around self-isolation, whether they wore a mask in the past twenty-four hours and so on. Within the UK, key surveys include those commissioned by the Office for National Statistics (ONS),[7] the Department of Health and Social Care (analysed by our team as part of the "CORSAIR" study),[8] and surveys commissioned by academic groups.[9–11] While self-report may be a reasonably valid technique to measure one-off, memorable behaviours such as being vaccinated, its usefulness in assessing other behaviours that occur frequently over the course of a day or that are particularly socially desirable or legally required is less certain.[12] In a pilot study by our team, a survey of students at our institution (n = 252) found that 90% of participants reported "always" wearing a face covering, 68% reported "always" cleaning their hands, and 49% reported "always" maintaining physical distance from others when entering a campus building.[13] Observation over the course of a day at the sole entrance to the main campus building found the actual rates of these behaviours to be 82%, 16% and 7% respectively. The installation of signage at the entrance reminding people that these behaviours were compulsory significantly improved observed rates.

To understand the impact of relaxing restrictions at a time of increasing case incidence, in this study we observed the use of face coverings, physical distancing and hand hygiene at 32 locations in England pre and post 19th July 2021. We compared data about behaviour obtained via our direct observation with data obtained via self-report measures from a nationally representative on-line survey that was conducted at the same time as our "post 19th July" measures.

Methods

Design

We observed behaviour at 32 locations during two data collection periods: 12th to 18th July 2021 and 26th July to 1st August 2021.

We assessed self-reported behaviour using a cross-sectional survey of a nationally-representative sample (data collected 26th to 27th July 2021). The survey was wave 54 of the UK Department of Health and Social Care's panel of surveys assessing behaviour over the course of the pandemic, analysed by our team as part of the "CORSAIR" study. Details of the methods have been published elsewhere.[8] Quota sampling (based on age and gender combined) was used to recruit 2008 participants. For this study, we included only people living in England (n = 1732).

Ethics

This study was approved by the King's College London BDM Research Ethics Subcommittee (reference: HR-20/21-21752).

Observation locations

We chose 32 locations across England, while preserving ease of access for our team. Locations were predominantly in London and the South East of England, but also included Sheffield, Manchester and Birmingham. Locations included ten supermarkets (chosen to represent those with the highest market share),[14] ten train stations (including four in large cities, two in smaller cities and four in towns), ten bus stops (with a similar spread between towns and cities), a large coach terminus in London and a London Underground station.

Members of our team spent approximately one hour at each location before the easing of restrictions and returned for another hour's observation after the easing. Observations took place on weekends and weekdays, between 9am and 5pm. Observations after the change in restrictions for a given location occurred on the same day and time as the previous observation and were conducted by the same observer as previously. In five locations it was not possible to repeat observations. Four were due to staff absences. In three of these instances, we added a new location as an alternative (matching two supermarkets in North London to one supermarket in Berkshire and one supermarket in South London, matching a bus stop in Manchester to a bus stop in Sheffield). The fourth location was not replaced (a bus stop in Birmingham). For another location, the London Underground station, it was not possible to repeat the observation as the station was shut for maintenance work over the second observational period. Because this was only apparent to us after our researcher arrived at the location and because other stations on the same underground route were also shut, we were unable to find a suitable replacement location in time to complete data collection.

Observation procedure

Before commencing observations, an observational protocol was agreed, to ensure standardised data collection across the observers.

Observers positioned themselves in a public area where they could see people entering the location or, in the case

of bus stops, boarding the bus. They were instructed to record, for each person: whether a face covering was worn on or immediately upon entry/boarding (yes fully, yes partially (e.g. not covering both the nose and mouth), no, cannot tell, or person was obviously exempt (e.g. wearing a lanyard displaying an exemption); whether hand hygiene was performed before or immediately upon entry/boarding at the first opportunity (yes, no, cannot tell); and whether a two-metre gap was maintained from other people (yes, no, cannot tell / does not apply). For analyses, we coded participants who were wearing a face covering that partially covered their nose and mouth as non-adherent. For physical distancing, observers discounted distance from people who appeared to be in the same party. This was assumed to be the case if multiple individuals approached the location in a group. In this instance distancing of the group relative to other individuals was assessed. In instances where observation was difficult due to large group sizes, the first and last person in the group were coded first, before moving to other members of the group to code their data. In these instances, we recorded the people we were unable to observe as missing data. We estimated the number of people for whom observations were impossible to be 162, 94% of whom were from the London Underground station location. These people were coded as having missing data for all variables and were excluded from analyses.

Observers were asked to remain discreet and not to actively engage with members of the public, but to provide full information about the study if questioned and to provide an information sheet to anyone who approached them and asked about the study. In practice we were approached three times; once at a bus stop and twice at the coach station by members of the public who asked about the observer taking notes. All three were offered participant information sheets but declined.

Only people over the age of 18 were included in the observations. Where observers were uncertain about the age of participants, they excluded the individual.

Online surveys

Survey participants were asked how many times in the past seven days they had been to the shops for groceries/pharmacy and had used public transport or been in a taxi/ minicab. People who indicated they had been shopping and/or used public transport/taxi/ minicabs were asked whether they wore a face covering while doing so. Response options were "yes, on all occasions", "yes, on some occasions", and "no, not at all".

Analysis

We coded outcomes where data could not be observed or recorded as missing data. We categorised data relating to face coverings where a person was visibly exempt as adherent (n = 22), given that the individual could choose whether or not to use one.

We presented adherence for each outcome in each of the five location types (supermarket, train station, bus stop, coach station, London Underground station) by time (pre vs post 19th July). We used chi square tests to assess whether rates of each outcome changed over time for each location type. To adjust for conducting 12 tests we applied a Bonferroni correction and set our critical *p*-value at.004.

Some areas, notably London, attempted to maintain mask wearing on local public transport even after 19 July. We therefore used a sensitivity analysis to test whether a different pattern of mask wearing was observed in London and outside London transport locations (i.e. train stations and bus stops) before and after 19 July. In addition, not all locations were identical for both the pre and post observation. Therefore, we performed a second sensitivity analysis by restricting comparisons only to those locations which were identical before and after 19 July.

For self-reported data, we describe rates of wearing a face covering narratively.

Results

We observed 3819 people pre and 2948 people post 19th July. We excluded 162 people for whom observations were impossible, giving a final sample of 6605 for analysis. Of these, 3513 were female (53.2%), 3090 were male (46.8%) and 2 (<0.1%) had missing data for gender. Individual locations contributed between 4 (a bus stop) and 835 (a London train terminal) observations, with a median of 152 observations per location. Supermarkets accounted for 1793 observations, train stations 2,831, bus stops 757, the coach station 832, and the London Underground station 554.

Most participants had valid observations to determine face covering behaviour (n = 6,591, 99.8%) and hand hygiene (n = 6,562, 99.3%). For observation of adequate physical distancing, we obtained valid data for 4333 (65.6%) participants. Consensus among observers was that assessing physical distance was often difficult. Observers reported particular difficulties discerning whether people were members of groups that approached together, and that distancing was impossible to assess when areas were quiet and there were no other individuals to assess distancing against. It was also noted that physical distancing was sometimes compromised while attempting to practice hand hygiene, as individuals sometimes congregated around hand hygiene stations.

Table 1 and Figures 1 to 3 show the percentage of participants observed according to whether they displayed each of our three outcomes overall and broken down by location type. At both time points, wearing a face covering was the most common behaviour with 70.2% (95% CI 68.7 to 71.7%) of people pre 19th July versus 56.0% (95% CI 54.2 to 57.9%) post wearing a covering, followed by

Table 1. Rates of observed behaviour at each location, pre and post 19th July 2021 (bold p-values meet Bonferroni correction of $p < .004$).

		Pre 19th July					Post 19th July						
Observed behaviour	Location	N (yes)	% (yes)	95% CI of %	N(no)	N (missing)	N (yes)	% (yes)	95% CI of %	N (no)	N (missing)	χ^2	p
Face masks	Supermarket	757	80.8%	78.1, 83.3%	180	1	557	65.2%	62.9, 68.4%	297	1	55.4	**<.001**
	Train station	1011	68.6%	66.2, 71.0%	463	10	684	50.9%	48.1, 53.6%	661	2	92.3	**<.001**
	Bus Stop	263	65.4%	60.5, 70.1%	139	0	219	61.7%	56.4, 66.8%	136	0	1.1	.287
	Coach station	299	67.8%	63.2, 72.1%	142	0	185	48.6%	43.4, 53.7%	196	10	31.3	**<.001**
	London underground station	238	59.2%	54.2, 64.0%	164	152	-	-	-	-	-	-	-
Hand hygiene	Supermarket	123	13.1%	11.0, 15.5%	814	1	113	13.2%	11.0, 15.7%	741	1	0.0	.948
	Train station	22	1.5%	0.9, 2.3%	1426	36	0	0.0%	0.0, 0.2%	1338	9	20.5	**<.001**
	Bus Stop	13	3.3%	1.8, 5.5%	383	6	1	0.3%	0.0, 1.5%	354	0	9.2	**.002**
	Coach station	2	0.5%	0.0, 1.6%	439	0	0	0.0%	0.0, 0.9%	391	0	1.8	.183
	London underground station	0	0.0%	0.0, 0.9%	402	152	-	-	-	-	-	-	-
Social distance	Supermarket	250	46.6%	42.4, 51.0%	286	402	208	48.3%	43.5, 53.1%	223	424	0.3	.617
	Train station	461	41.9%	38.9, 44.9%	639	384	188	22.7%	19.9, 25.7%	639	520	77.7	**<.001**
	Bus Stop	154	41.1%	36.0, 46.2%	221	27	91	31.5%	26.2, 37.2%	198	66	6.4	.011
	Coach station	149	67.4%	60.8, 73.6%	72	220	29	14.3%	9.8, 19.9%	174	188	122.6	**<.001**
	London underground station	43	12.3%	9.0, 16.1%	308	203	-	-	-	-	-	-	-

Figure 1. Percentage with 95% confidence intervals of people wearing a face covering properly [no data were collected post 19th July for London underground location].

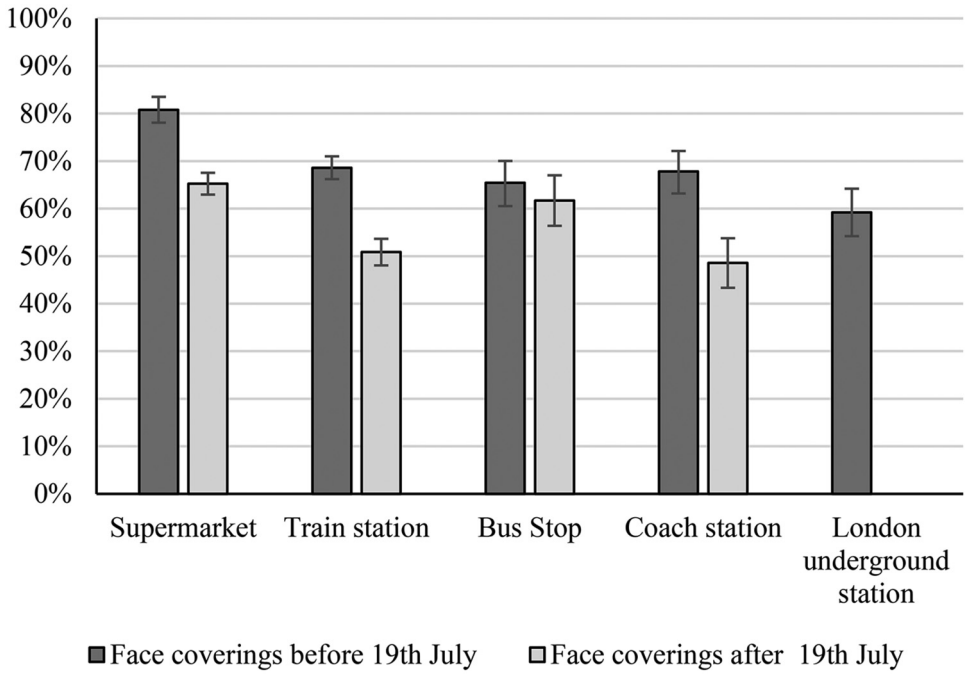


Figure 2. Percentage with 95% confidence intervals of people engaging in hand hygiene [no data were collected post 19th July for London underground location].

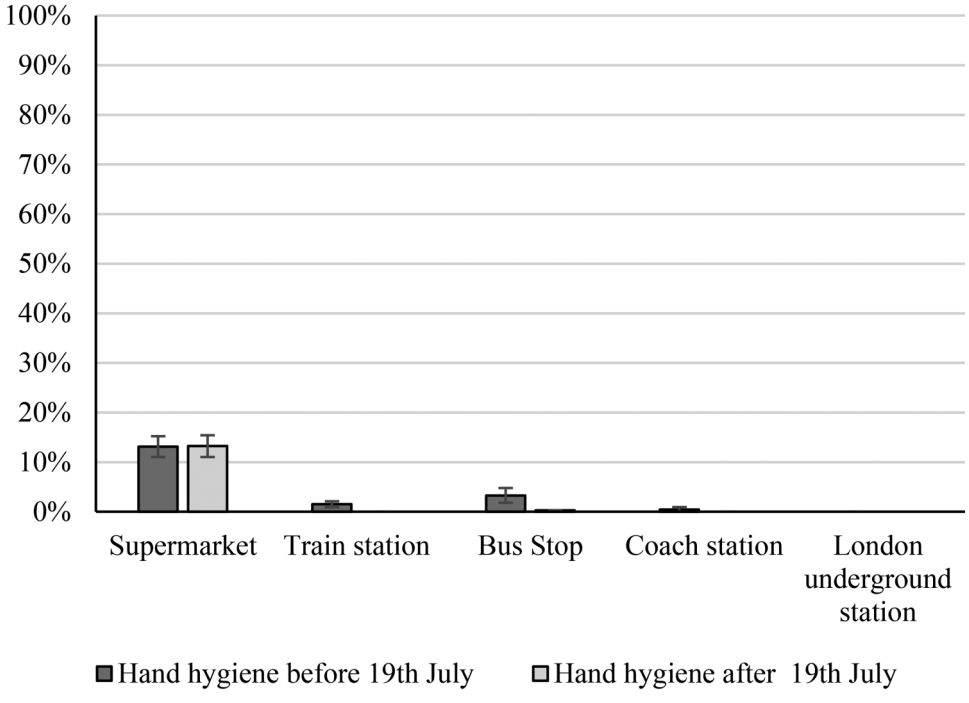
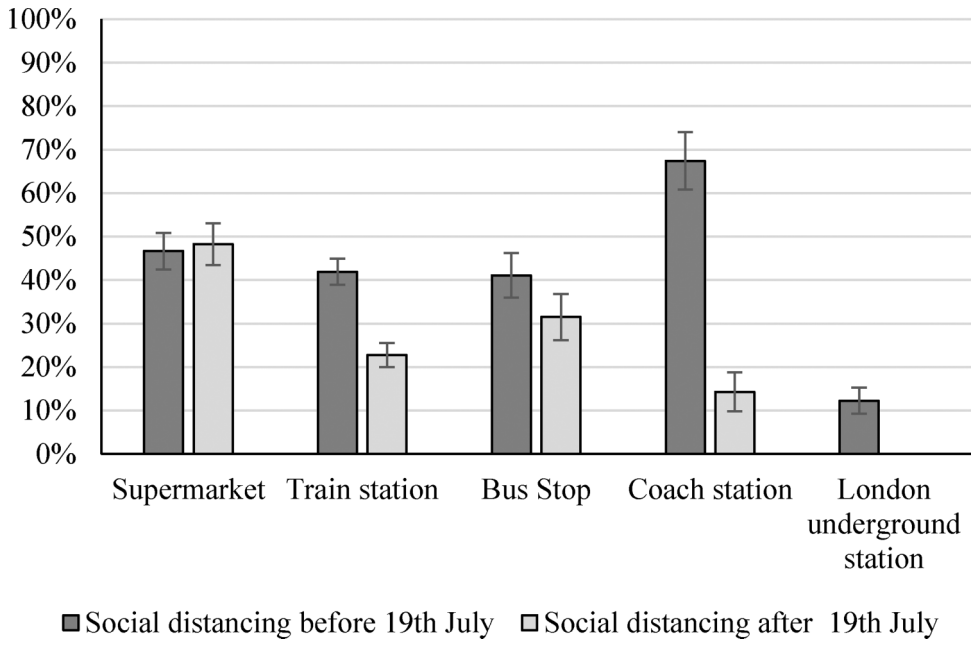


Figure 3. Percentage with 95% confidence intervals of people maintaining physical distance where required [no data were collected post 19th July for London underground location].



physical distancing (40.9% [95% CI 39.0 to 42.8%] versus 29.5% [95% CI 27.4 to 31.7%]) and hand hygiene (4.4% [95% CI, 3.8 to 5.1%] versus 3.9% [95% CI, 3.2 to 4.6%]). Although hand hygiene was low in every location, it was notably higher in supermarkets than elsewhere. The proportion of people wearing face coverings declined in every location post 19th July, although the decrease was not significant at bus stops. Rates of hand hygiene decreased at train stations and bus stops, but not supermarkets or coach stations. Rates of distancing declined at train stations, coach stations, and bus stops, although the reduction was not significant at bus stops. Rates of distancing remained very similar at supermarkets.

Sensitivity analysis reported in Supplementary Table 1 demonstrated lower mask wearing in London locations for public transport prior to 19 July, which fell post 19 July. The size of the fall was roughly equivalent in London (13 percentage points) and outside-London (16 percentage points) locations. Our second sensitivity analysis reported in Supplementary Table 2 restricting comparisons only to those locations where observations were made both before and after 19 July made no difference to the results, except that for social distancing rates in the subsample where repeated observations were made were significantly higher prior to 19 July (46.7% rather than 40.9%) and lower after 19 July (24.1% rather than 29.5%).

Self-reported rates of "always" wearing of a face covering post 19th July were similar to rates of observed behaviour, with 62.6% (60.2 to 65.1%) and 62.2% (58.2 to 66.2%) of respondents reporting wearing a face covering on all occasions while shopping for groceries/pharmacy and while on public transport or in a taxi/minicab (Table 2). An additional 22.8% and 25.3% of people reported "sometimes" wearing a face covering in shops and on transport, respectively.

Discussion

The change from mandated to voluntary COVID-19 restrictions with regards to face covering and physical distancing that occurred in the UK on 19th July 2021 saw overall falls in the number of people who engaged in three key protective measures recommended by the government, namely wearing a face covering, maintaining physical distance from others and a small difference seen in levels of hand hygiene. At the time of the change, case numbers were rising rapidly and the government were urging the public "to think about the risk of transmission," "exercise common sense" and not take the end of restrictions as an invitation "simply to have a great jubilee".[15] However, the signal sent by removing legal restrictions may have had a stronger behavioural impact than these messages. Our data suggest that government actions spoke louder than words in this specific instance, in line with previous findings.[16]

Table 2. Self-reported wearing of a face covering post 19th July 2021.

	In shops, for groceries/pharmacy, (total n = 1472)					On public transport or in a taxi/minicab (total n = 566)				
	N (yes)	% (yes)	95% CI of %	N (no)	N (missing)	N (yes)	% (yes)	95% CI of %	N (no)	N (missing)
Yes, on all occasions	922	62.6%	60.2, 65.1%	550	0	352	62.2%	58.2, 66.2%	214	0
Yes, on some occasions	335	22.8%	20.6, 24.9%	1137	0	143	25.3%	21.7, 28.9%	423	0
No, not at all	215	14.6%	12.8, 16.4%	1257	0	71	12.5%	9.8, 15.3%	495	0

The pattern of changes that we observed is of interest. Use of face coverings declined in every location type apart from when entering buses. Buses in England are usually boarded at the front, with all passengers interacting with the driver or systems near to the driver in order to purchase or validate a ticket. We suspect that the social pressure of this in-person interaction with a member of staff may have acted to maintain the existing norm of wearing a face covering. Hand hygiene behaviours were very low even prior to 19th July, but notably higher in supermarkets than elsewhere. The impression of our observers was that this may have been partly driven by the use of shopping trolleys. Some supermarkets provided "sanitising stations" that were used by customers to clean the handle of their trolley. When shoppers used a trolley and sanitised the handle, they sometimes also cleaned their own hands at the same time, leading to an increased rate of hand hygiene in these locations. This would be in line with theories proposing that behaviours are more likely to occur when the effort needed to enact them reduces.[17] Train stations and bus stations also provided similar hand hygiene stations, however at bus stops these were not provided and participants would need to have their own supply of hand gel to maintain hand hygiene. Levels of physical distancing were largely maintained at supermarket entrances and at bus stops after rule changes, but showed declines at train stations and the coach station. Particularly at the coach station, this change appeared to be the result of environmental changes in between our first and second observation periods, including the removal of a one-way system that had been enforced by staff.

We compared our observational data on face coverings in supermarkets and on public transport post 19th July with data from a nationally representative survey which asked about face covering use in people who reported having been to supermarkets or having used public transport in the past week. Self-reports of "always" wearing a face-covering in these situations were remarkably close to our observational data for supermarkets (63% vs 65%, respectively) and were reasonably close for public transport (62% vs 49% to 62% depending on location type). This finding that self-reported use of face coverings matches observed use of face coverings is similar to the results of a previous pilot study conducted by our team at a university campus in march 2021, in which 90% of respondents to a survey reported always wearing a face covering when entering a university building, while 82% of people were observed to actually wear a face covering when entering the main campus building.[13] In the present study, survey participants were given the option to report wearing a face covering "on some occasions", something which an additional 23% to 25% of participants reported. Further work to confirm and extend this finding is needed, but for now we suggest that self-reports of wearing face coverings "on some occasions" or words to that effect should be treated with a degree of caution.

We were unable to test directly whether self-reports of hand hygiene or physical distancing are valid. Data collected by the Office for National Statistics for 14th to 18th July 2021 found that 82% of respondents reported always or often washing their hands straight away after returning home from a public place, while 63% reported always or often social distancing when meeting up with people from outside their household or "support bubble".[7] While the situations in which we observed behaviour were different, the different rates for hand hygiene in particular are striking. In line with this, our previous pilot study noted a particular discrepancy between self-reports of always cleaning hands (68%) and observed behaviour (16%).[13] It is reasonable to assume that infrequent behaviours that are still relatively novel in the UK (such as wearing a face covering) are better recalled and easier to measure using self-report than more everyday behaviours such as washing hands.[12]

Several limitations of this study should be considered. First, while we made efforts to sample widely, the representativeness of the observational sample is uncertain, with locations dictated partly by the ease of access for our team. A nationally representative sample would require a more detailed assessment of shopping and transportation use across the country than we were able to conduct. Similarly, our sample representativeness may be affected by the observations occurring between 9am-5pm, and a different population may be seen outside of these times. Different populations may also exist between 9am and 5pm each day, for example public transport users at 9am and 5pm are more likely

to be commuters than passengers at 11am. We did not have the observer capacity to study all hours, but observations were spaced out between 9am and 5pm to account for this. Second, the behavioural representativeness of the online survey sample is also uncertain. While we employed standard market research techniques to derive a demographically representative sample of the adult UK population, from which we extracted respondents who lived in England, whether COVID-19 related behaviours of people who sign up to market research panels is representative of behaviour nationally is untested. Third, we obtained only a snapshot of behaviour at the entrance to locations. Behaviour on the approach to the location or once inside was not assessed. Fourth, observation of behaviour was often difficult. Observers did not always have unobscured views of behaviour. Hand hygiene stations were sometimes located inside shops or transport hubs and were therefore not directly observable potentially contributing to underestimation of hand cleansing behaviour. Where areas were crowded, observation became particularly problematic. This accounts for the high level of missing data in the London Underground station – readers should be cautious in interpreting data for this location in particular. Fifth, while national rules regarding face coverings eased on 19th July, some local areas maintained them (notably including transport within London), although enforcement was relatively limited. The reductions we observed would probably have been greater in the absence of these local rules. Sixth, in our self-report survey, we asked participants about their behaviour the preceding week. Therefore, rates are for the week commencing 19th July 2021. Lastly, weather conditions were different during the pre- and post-19th July collection periods, with the former being warm and dry, and the latter encountering heavy rain in many locations. This may have affected behaviour as participants were often rushing to get out of the rain and holding umbrellas leaving hands occupied and potentially making it more difficult to engage in protective behaviours. However, we note that a reduction in self-reported protective behaviours has been a continuing trend in more recent data.[7]

Overall, our study demonstrated that the relaxation of restrictions on the 19th July 2021 was accompanied by reductions in key protective behaviours, despite rising case numbers and recommendations to exercise caution. Wearing a face covering declined from 70.2% to 56.0%, physical distancing declined from 40.9% to 29.5% and hand hygiene from 4.4% versus 3.8%. The levels of face covering wearing that we observed broadly matched rates of people who said they "always" wore face coverings. In future infectious disease outbreaks, policy makers should be aware that exhortations to exercise caution are unlikely to fully mitigate changes in behaviour caused by the removal of legal restrictions.

Declarations

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Declaration of conflicting interests: GJR, RA and LS participate in the UK's Scientific Advisory Group for Emergencies, or its subgroups. RA is an employee of the UK Health Security Agency.

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