Targeted Shielding and Coronavirus Symptoms Among Adults in the UK

Meena Kumari (mkumari@essex.ac.uk)
University of Essex
Tarani Chandola
University of Manchester
Cara L Booker
University of Essex
Michaela J Benzeval
University of Essex

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Abstract

Background: In the UK, in March 2020, those at high risk for adverse outcomes following coronavirus disease (COVID-19), identified as 'clinically extremely vulnerable', were sent a notification to shield themselves for 12 weeks. This study examines the effect of this targeted shielding on reporting of coronavirus symptoms and testing positive, common mental disorder and loneliness.

Methods: Data from 13,750 adult participants (aged 16+), who participated each month from April to July 2020 in the COVID-19 surveys of *Understanding Society* (UKHLS), were used to examine the association of receipt of a shielding communication with coronavirus symptoms reporting or a positive test, common mental disorder, loneliness.

Findings: The prevalence of coronavirus symptom reporting or testing positive was around 4.2% (95% CI: 1.4%-7.2%) lower among individuals living in households that received a shielding letter compared to those in households which did not. This difference was 10.7% (95% CI: 3.1%-18.2%) among individuals in the highest COVID-19 risk group. Poor mental health was associated with the receipt of a shielding letter, but was accounted for by COVID-19 risk level. Similar patterns were apparent for loneliness.

Interpretation: In the context of the lockdown when the general population was staying at home, the shielding policy further reduced the risk of coronavirus symptoms and infections.

Introduction

A number of countries have adopted specific guidance for the elderly and clinically vulnerable as a strategy to protect these groups from the adverse health impacts of the coronavirus. The UK governments adopted policies such that clinically vulnerable groups were targeted and encouraged and supported to stay in their homes and keep away from the rest of the population. In March 2020, in addition to a general government administered 'lockdown' when the population was asked to 'stay at home', an initial list of clinical shielding conditions was signed off by the Chief Medical Officers of the four nations of the UK and 2.2million people were identified as at increased risk and clinically extremely vulnerable (CEV) to COVID-19 [1], who were advised, by letter or text or by their GP, to practice 'shielding' which included not leaving home for 12 weeks [2]. Such people were given priority for online shopping, delivery of medication and other services to enable them to stay at home.

Infectious disease modelling of transmission to susceptible groups suggests that the targeting and isolation of vulnerable sub-populations may be efficient and have lower economic costs than just general population social distancing [3]. However, this is dependent on how practical it is to effectively identify and shield people. For example, COVID-19 infection is a risk for older age groups but shielding older adults may be more difficult in overcrowded households where distancing may be difficult. In younger age groups, shielding has a number of potential negative impacts, for example loss of income where working from home may be difficult.

Further, policies in which subsets of populations are identified as 'vulnerable' and restricted to their homes and out of public spaces, while others are not, have the potential to isolate and stigmatise people. Thus, these policies have the potential to adversely impact the mental health of those targeted.

In initial estimates from the Shielding Behavioural Survey produced by the Office for National Statistics, 62% of CEV people reported completely following shielding advice and 33% reported mostly following the shielding guidance. However, 49% also reported leaving the house at least once since they received shielding guidance and 13% of CEV individuals reported they had received visitors in the last seven days who were not a nurse, support or care worker. Both behaviours are not consistent with shielding and would suggest that less than 62% of people are completely following shielding guidance [1].

An additional set of people with other conditions and pregnant women and those aged 70 year and over were identified as at moderate risk; such groups were advised through public communication messages to stay at home as well but did not receive 'shielding' letters or additional support.

As people who are not CEV are excluded from the Shielding Behavioural Survey, it cannot establish whether the shielding policy was effective in reducing the risk of COVID-19 symptoms and infections in the general population. Further, as public health advice to the whole population during the lockdown was to 'stay at home', it is unclear whether it was necessary to additionally target shielding for a particular group. Moreover, it is unclear whether there were inadvertent side effects of the policy with respect to mental health and loneliness. It is of high importance to understand the utility of this policy, particularly in relation to its possible re-introduction in the future. We examine whether shielding worked in a large representative sample of the UK, by investigating the impact of the receipt of a shielding letter (or text) from the NHS on symptom reporting. We also examine whether there were adverse effects of shielding by examining associations with mental health and loneliness. We hypothesize that receipt of a shielding letter or text leads to reduced symptom reporting but higher levels of poor mental health.

Methods

Data source and participants

Data are from a substudy of *Understanding Society* (UKHLS), a longitudinal, nationally representative study of UK households, with everyone in the household interviewed annually. It is based on a two-stage stratified random sample of the household population in 2009, with two boost samples of immigrant and ethnic minorities [4]. During the months of April, May, June and July 2020, participants who had taken part in waves 8 or 9 of UKHLS were approached to complete a short web-survey that focused on the experience of COVID-19 symptoms, testing and hospitalisation and other aspects of life under the lockdown including health conditions and shielding [5]. This paper uses data from interviews conducted before the pandemic in 2019 (from waves 10 or 11 of the Study) and four months of the COVID-19 survey, April to July. All participants in our survey gave oral consent at each wave of data collection. Participants

were enrolled only after consent was provided. Understanding Society has been approved by the University of Essex Ethics Committee. All methods were carried out in accordance with the approved guidelines and regulations. Further information can be found at https://www.understandingsociety.ac.uk/documentation/covid-19

Procedures

Respondents were asked in the COVID-19 survey to report whether they had any symptoms that could be coronavirus and whether they had been tested for coronavirus (and their test results). Participants were considered positive if they responded positively to any coronavirus symptoms or a positive test result in any of the survey months.

Respondents were also asked if they had received a letter or text from the NHS or Chief Medical Officer saying that they had been identified as someone at risk of severe illness if they caught coronavirus (hereafter referred to as "shielding letter"). As the UKHLS is a household survey with multiple respondents per household, we could identify whether someone was living in household in which either themselves or a co-resident had received a shielding letter. In addition specific to the June survey, an explicit question was asked on whether anyone in the household was shielding. We incorporated this information into our overall measure of anyone in the household shielding from April to July.

Outcomes

Common Mental Disorder (CMD) was measured using the 12-item General Health Questionnaire (GHQ-12) designed to capture depressive and anxiety symptoms and is a widely used measure of non-psychotic psychological distress [6]. Each item has four response categories on a Likert scale ranging from 'not at all' to 'much more than usual'. Respondents who score three or more on the GHQ-12 have probable CMD.

Loneliness was assessed with the question' In the last four weeks, how often have you felt lonely?' with responses of 'hardly ever'/'not at all' and 'some of the time' grouped together and compared with 'often'.

Co-variates

A range of questions on health conditions and treatments were asked, which allowed us to approximate the group of respondents who were at moderate and high risk of adverse outcomes following COVID-19 drawing on the criteria as used for the NHS shielding policy (https://digital.nhs.uk/coronavirus/shielded-patient-list). Two mutually exclusive groups were created . Medium risk was defined using the following criteria: aged 70 or older, having chronic (long-term) respiratory diseases, such as asthma, chronic obstructive pulmonary disease (COPD), emphysema or bronchitis; chronic heart disease, such as heart failure and coronary heart disease; chronic kidney disease, liver disease; chronic neurological conditions, such as Parkinson's disease, motor neurone disease, multiple sclerosis, a learning disability or cerebral palsy, diabetes; being seriously overweight (a BMI of 40 or above) or being pregnant. High risk was defined using the following variables: on medication following organ transplant; people with bone or blood cancers or being treated with chemotherapy or targeted cancer treatments, all those with lung cancer being treated by radiotherapy ; people with severe respiratory conditions including cystic fibrosis, severe asthma and COPD; being treated with steroids; those reporting sickle cell anaemia or splenectomy; people on immunosuppression therapies; women who are pregnant with significant heart disease [7].

In addition, a broad range of social and demographic factors were measured before the pandemic from the 2019 interview [7]: Age (16–24, 25–34, 35–44, 45–54, 55–64, 65-74, ≥75 years), sex (women and men), ethnicity (White British, other White, Indian, Pakistani/Bangladeshi, Black Caribbean, African, Chinese/Other), cohabitation (living with a partner or not),number of children under 5 years old in household, housing tenure (house ownership or rent), employment status (employee, self employed, both employee and self employed or not in work). In the COVID-19 survey respondents in paid employment were asked whether they had been furloughed and how often they were able to work from home. We also included region in the UK and if their location was classified as urban or rural.

Statistical Analyses: The distribution of the dependent variables (coronavirus symptoms and tests, CMD and loneliness) by receipt of the shielding letter, COVID-19 risk status and social and demographic factors was examined (Table 1). In addition, we examined logistic regression models (Tables 2-5) to predict the dependent variables, examining the associations with the shielding letter (Model 1), adding in COVID-19 risk status (Model 2) and the interaction between the shielding letter and COVID-19 risk status (Model 3), controlling for a range of social and demographic factors. The interaction effect in Model 3 allows us to examine whether receipt of the shielding letter had a greater effect in those who were at higher risk of COVID-19.

All the standard errors in the regression model analyses were adjusted to take account of the clustered and stratified sample using the *svy* command in STATA. Models included inverse probability weights to take account of unequal selection probabilities into the study and differential nonresponse at each wave, including to the COVID-19 Survey. These longitudinal weights were constructed from the wave 9 weights and ensure the results are reliable estimates representative of the UK adult population living in private households [7].

Role of funding Source:

The study funders had no role in the study design, data collection, data analysis, data interpretation, or writing of the report. All authors had full access to the data reported in the study and the final responsibility to submit for publication.

Results

There were 19,763 adults who responded to at least one of the surveys from April to July. This paper is based on those who took part in all four months and a preceding wave, and have a valid weight, which gives a sample size of 13,754 adults. Table 1 describes how symptom reporting or testing positive, CMD and

loneliness vary by key characteristics and covariates in the population. Adults who reported receiving a 'shielding' letter or those who lived in a household where someone received such a letter were less likely to report symptoms or a positive test for coronavirus. Participants at high risk of adverse outcomes of COVID-19 were also slightly less likely to report symptoms or a positive test for coronavirus. Figure 1 shows that higher COVID-19 risk was associated with increasing likelihood of receiving a letter. However among those in paid employment, receipt of a letter was not different for those who were and were not working from home, or those who were or were not furloughed.

Reporting symptoms or a positive test for COVID-19 was greater in younger age-groups. Black Caribbean/African and Other ethnic groups were the most likely to report symptoms or a positive test for COVID-19. People who were working both as employee and self-employed, living in London, in urban settings or had CMD in 2019 also reported the highest levels of coronavirus symptoms or positive tests.

The prevalence of CMD was higher in those that either received a letter or lived in a household where someone received a letter compared to those that didn't receive a letter. Higher levels of CMD were also apparent in those classified as high risk of adverse outcomes from COVID-19. Younger age-groups, women, adults not living with a partner, Pakistani/Bangladeshi and mixed ethnic groups and renters had higher levels of CMD than their counterparts. Unsurprisingly, pre-pandemic CMD was strongly associated with common mental disorder during the pandemic. Similar patterns were apparent for loneliness.

Individuals or those in households that received a shielding letter had marginally lower odds of reporting symptoms or testing positive for COVID-19 (Tables 2a and 2b, Models 1 and 2). In Figure 2, we see the estimated probability of reporting coronavirus symptoms/positive test was 4.2% less in those who lived in households that received the letter compared to those that did not. The interaction term for the shielded and high risk group (Table 2a Model 3) was significantly different from zero. This translates into an estimated difference of 10.7% in reporting symptoms or testing positive for COVID-19 among adults in the high risk group between those that did and did not receive the letter (Figure 3).

Tables 3a and 3b show that receipt of a letter was associated with higher odds of Common Mental Disorder both for the individual and also for those living in a household that received a letter. However, after adjustment for COVID-19 risk status (Tables 3a and 3b Model 2), receipt of a letter by an individual or within the household was no longer associated with increased risk of CMD. Instead, the risk of CMD was higher in adults at higher risk of the COVID-19. Similar patterns were observed when loneliness was examined (Tables 4a and 4b)- receipt of the shielding letter was not as important as COVID-19 risk status in predicting loneliness.

Discussion

Receipt of the shielding letter and accompanying support to enable this shielding within the household was effective in reducing the probability of coronavirus by 4.2% in symptoms/positive coronavirus test in the UK general adult population. This protection was most effective in the highest risk groups as there was a difference of 10.7% between those that received a letter compared to those that didn't. The association between receiving letters and poorer mental health was explained by increased COVID-19 risk. In contrast, the receipt of a letter at individual or household level was not associated with loneliness.

What our study adds

The UK is the only country that attempted to identify and safeguard people with additional support at potential risk of particularly poor outcomes following infection. Our findings have implications for decision making related to such policies should there be a need for targeted shielding internationally or in the future. A number of studies using modelling and forecasting suggest that shielding should be successful [3][8][9], and our data suggest that shielding did reduce symptom reporting, both at an individual and at a household level. This accords with a recent study that compared mortality rates in CEV groups with those in the general population before and after lockdown and described a decrease the COVID-19 mortality differences between the general population and the shielded group during lockdown [10]. However, receiving a letter was associated with poorer mental health. Impacts of a shielding letter on mental health were largely accounted for by COVID-19 risk, which suggests it may be the underlying health conditions that led to poor mental health rather than the shielding letter *per se*. Our analyses suggest that mental health declined in the whole population in the initial lockdown period [11], and these data indicate that clinical management of mental health should be a focus for those with a raised COVID-19 risk.

Implications for clinicians and policymakers

Identification of groups at increased risk following infection has not remained static as understanding of the pandemic has developed. The number of conditions and people considered at risk has evolved over time. Thus men, those with underlying conditions such as obesity [12], hypertension and diabetes [13], socially disadvantaged groups and ethnic minority groups [14][15] are reportedly at increased risk of adverse outcomes but are not currently shielded or formally included as at moderate risk. Risk advice for moderate groups was given through general public health messages. It is unclear, should shielding be required in the future, whether these broader groups should be targeted to receive the letters in addition to those sent shielding letters in April 2020. This is because it has been suggested that shielding would need to be constrained to 15% of the population [16] to remain effective and with high rates of obesity and hypertension at 29% and 26% [17][18] respectively, it may be impractical to shield all at risk groups.

Strengths And Limitations

The strength of this study is that it is the first population representative study in the UK that analyses the effect of receipt of the NHS shielding letter on reporting coronavirus symptoms or a positive test. It covers the entire adult age range and is based on data collected early in lockdown, and included detailed recent pre-pandemic measures of social and demographic factors. The analyses were conducted at the whole household level, which is important as having a family member shielding may change the behaviour of the whole household. The limitations of the study are that this is a web survey and hence will have excluded those with no access to the internet or for whom English is not a first language. However, once weights have been applied it has been shown to be

very reflective of the general population [19]. Participants receiving a letter are slightly over-represented in the survey compared to expected and it is difficult to explain the cause. People may have mis understood the question, for example, those in the moderate at risk group, such as over 70s, who were advised to stay home may have felt it applied to them although they did not actually receive a letter. It should also be noted that the definition of high risk changed over time and the variables we employed to capture risk were imprecise. There were also early operational difficulties, such as letters and texts that were sent incorrectly [20], which may have confused respondents. In addition, the study used self-reported coronavirus symptoms and coronavirus test results. Some people may have had symptoms and not reported them. Others who had coronavirus may not have had symptoms and/or a test. However, whether this would bias the 10.7% difference upwards or downwards is unknown. The study may also be subject to some bias associated with remaining in the survey between April and July as we restricted analyses to participation in all waves. The study did not measure adherence to isolation, however it is likely adherence was high, particularly in the light of the practical support which increases adherence more generally [21]. We attempted to deal with some measurement error, for example overlap of symptoms such as fatigue with psychological distress, by adjusting for CMD before the pandemic. While it is a strength of the study that it was conducted at an early stage of the lockdown, this meant that a relatively high proportion of the population was working from home or adhering to social distancing in addition to people that were asked to shield. Indeed in this study, during the first UK national lockdown, receipt of a shielding letter did not result in marked difference in rates of staying at home for adults in work. Given this context, our observations are likely to describe the lower bounds of the impact of letter on the outcomes examined. Advice given to people shielding in the UK changed in subsequent national lockdowns, and when further data are available, the impact of different shielding restrictions on both infections and mental health can be examined.

Conclusions

We conclude that targeting patients with communication to shield for 12 weeks worked in reducing the level of reporting of coronavirus symptoms. This reduction was observed for the individual but was also apparent more broadly at the household level. This targeting should be considered should there be a future requirement.

Declarations

Acknowledgments

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Contributors

MK, TC, CB and MB drafted all versions of the manuscript, TC and CB carried out the data analysis.

Declaration of Interests

All authors declare no conflicts of interest.

Data sharing

Understanding Society data are available to researchers through the UK Data Service (https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=8644).

References

1. ONS. ONS bulletin. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/coronavirusandshieldingofclinicallyextre
2. Public Health England. Guidance on shielding and protecting people who are clinically extremely vulnerable from COVID-19. [Online] 2020. https://obr.uk/download/coronavirus-reference-scenario-the-obrs-coronavirus-analysis/
3. Neufeld, Z., Khataee, H., Czirok, A. Targeted adaptive isolation strategy for COVID-19 pandemic. *Infect Dis Model.***5**, 357-361 (2020)
4. *University of Essex, Institute for Social and Economic Research, NatCen Social Research, Kantar Public. (2019). Understanding Society: Waves 1-9, 2009-2018 and Harmonised BHPS: Waves 1-18, 1991-2009. [data collection]. 12th Edition. UK Data Service. SN: 6.*
5. University of Essex, Institute for Social and Economic Research. *Understanding Society: COVID-19 Study, 2020. [data collection]. 4th Edition.* Colchester : UK Data Service. 2020. SN: 8644, 10.5255/UKDA-SN-8644-4**.**
6. 6**.** Goldberg, DP. *User's guide to the General Health Questionnaire.* Windsor : NFER-Nelson, 1988.
7. *Understanding Society COVID-19 User Guide. Version 3.0, July 2020.* Colchester : Institute for Social and Economic Research, University of Essex., 2020.
8. Bunnik van, B.A., Morgan, A.L., Bessell, P.R., et al. Segmentation and shielding of the most vulnerable members of the population as elements of an exit strategy from COVID-19 lockdown. MedXiv. [preprint]**.**

9. Weitz. J.S., Beckett, S.J., Coenen, A.R., et al. Intervention Serology and Interaction Substitution: Modeling the Role of 'Shield 462 Immunity' in Reducing COVID-19 Epidemic Spread. MedXiv. 2020. 04.01.2004976 [preprint]
10. NHS Digital. *Tracking Healthcare Activity and Outcomes for Shielded Patients, England.* s.l. : Government Statistical Service, 2020. https://files.digital.nhs.uk/44/D9BF93/Tracking%20Healthcare%20Activity%20and%20Outcomes%20for%20Shielded%20Patients%2C%20England%2C%2
11. Chandola, T., Kumari, M., Booker, C., Benzeval, M. The mental health impact of COVID-19 and pandemic related stressors among adults in the UK . *Psychological Medicine* :1-10.
12. Hamer, M., Gale, C.R., Kivimaki, M., et al. Overweight, obesity, and risk of hospitalization for COVID-19: A community-based cohort study of adults in the United Kingdom. *Proc Natl Acad Sci U S A.* 2020; Vol: 202011086
13. Holman, N., Knighton, P., Kar, P., et al. Risk factors for COVID-19-related mortality in people with type 1 and type 2 diabetes in England: a population-based cohort study. *Lancet Diabetes Endocrinol.* 2020; S2213-8587: 30271-0.
14. Niedzwiedz CL, O' Donnell, Jani BD, et al. Ethnic and socioeconomic differences in SARS-CoV-2 infection: prospective cohort study using UK Biobank *BMC Med* 2020;**18**: 160.
15. Williamson E, Walker AJ, Bhaskaran KJ, et al. OpenSAFELY: factors associated with covid-19-related hospital death in the linked electronic health records of 17 million adult NHS patients. MedRxiv 2020. [Preprint.]
16. McKeigue PM, Colhoun HM. *Evaluation of "stratify and shield" as a policy option for ending the COVID-19 lockdown in the UK.*MedRxiv 2020. [preprint].
17. Lifestyles Team, NHS Digital. *Statistics on Obesity, Physical Activity and Diet, England*: NHS Digital, part of the Government Statistical Service, 2019
18. National Cardiovascular Intelligence Network. *Adult hypertension prevalence estimates, 2017.* Public Health England, 2020.
19. Benzeval, M., Burton, J., Crossley, T.F., Fisher, P., Gardiner, C., Jäckle, A., Moore, J. High frequency online data collection in an annual household panel study: some evidence on bias prevention and bias adjustment. *under review*
20. Torjesen I. Covid-19: Charities call for clear advice after "utter mess" of shielding texts. BMJ. 2020 **29;**369:m2173.
21. Smith, L.E., Potts, H.W., Amlot, R., Fear, N.T., Michie, S., Rubin, J. Adherence to the test, trace and isolate system: results from a time series of 21 nationally representative surveys in the UK (the COVID-19 Rapid Survey of Adherence to Interventions and Responses [CORSAIR] study). MedRxiv 2020. [preprint]

Figures

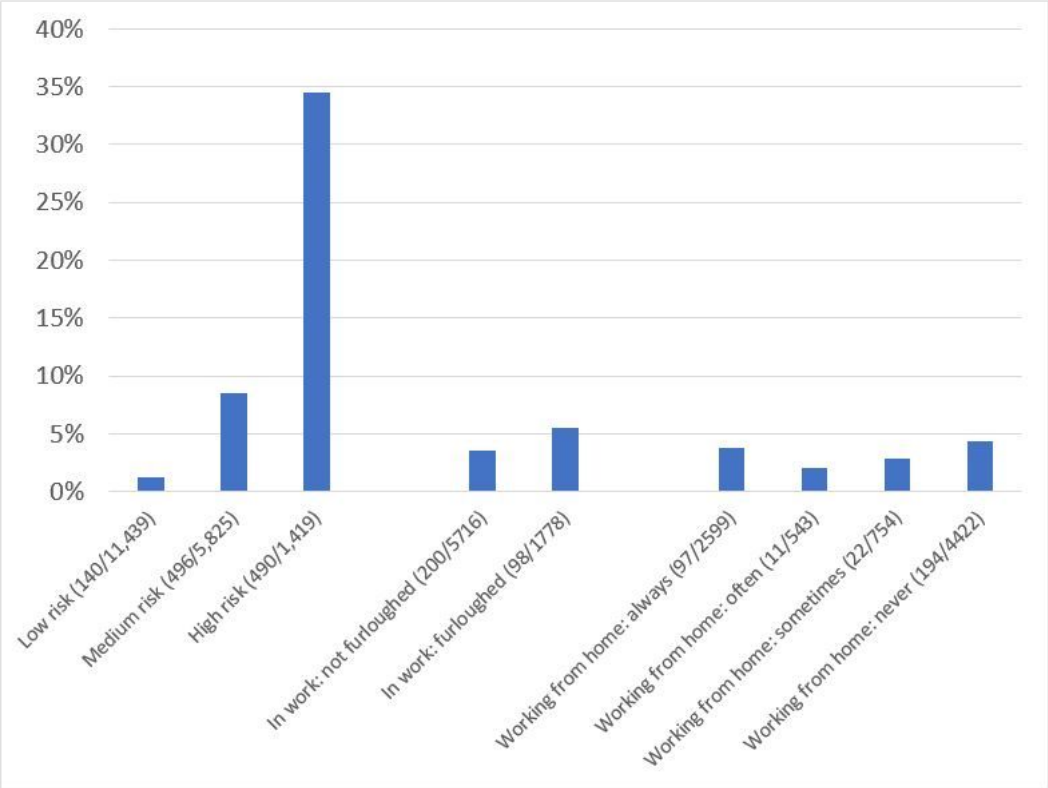
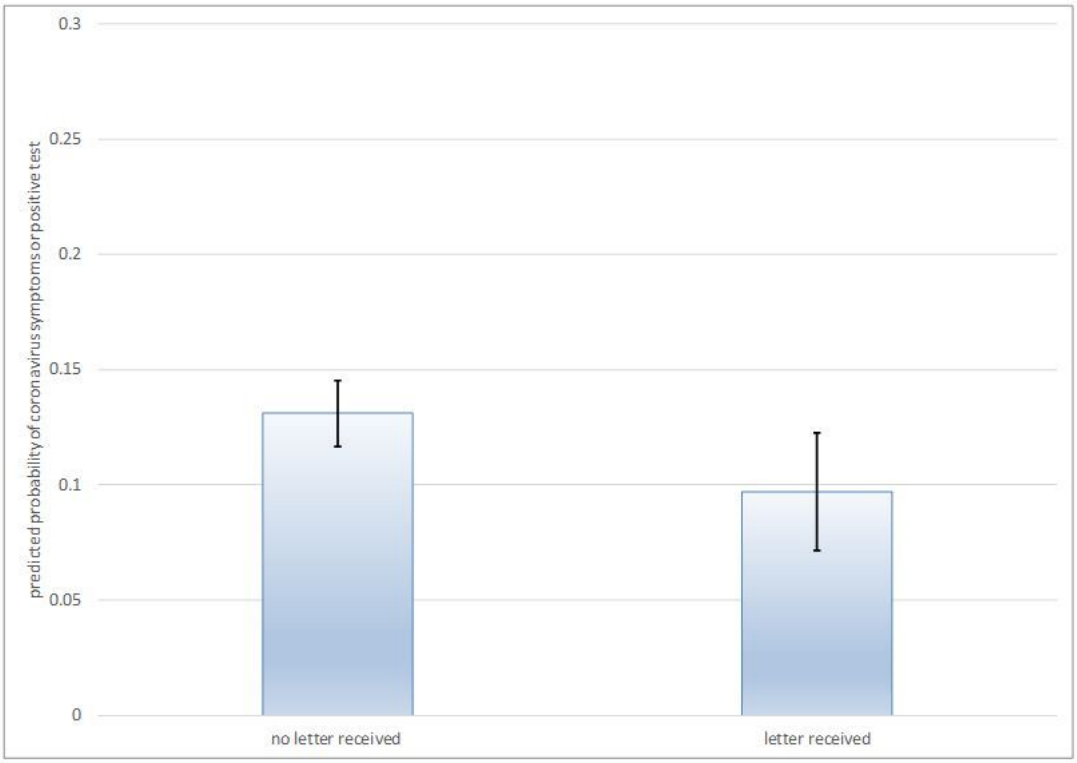


Figure 1

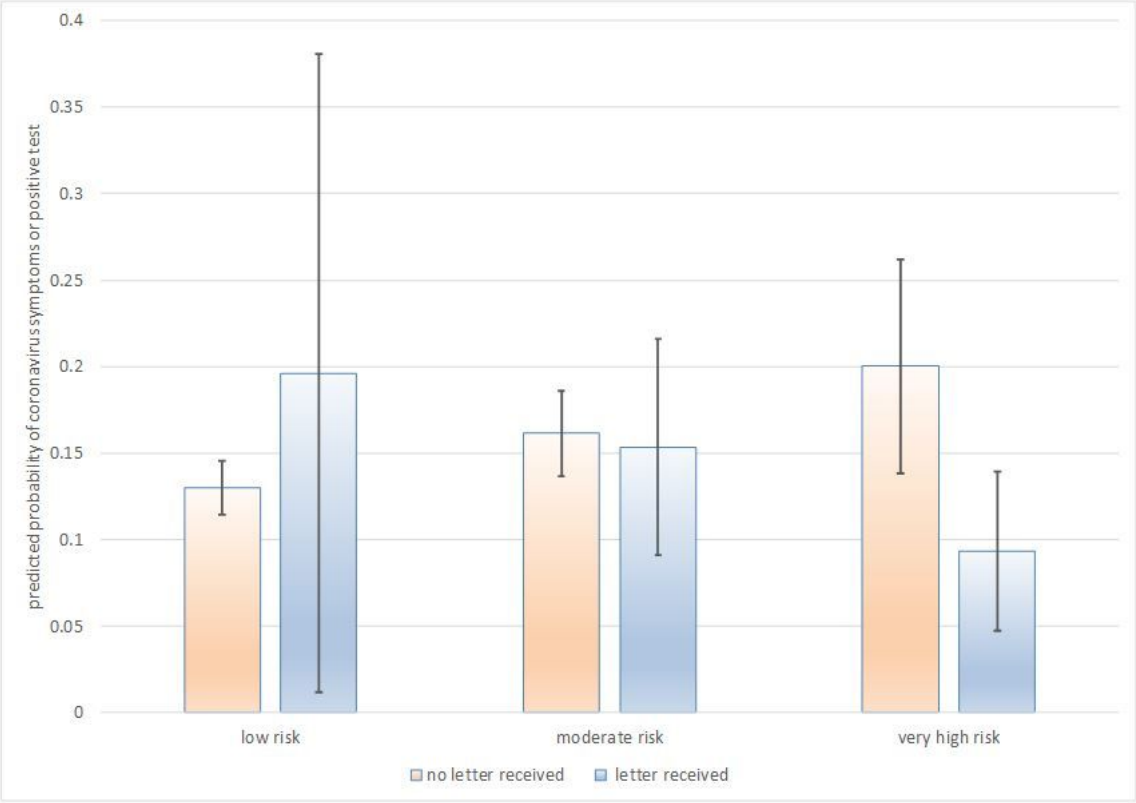
Percent of participants shielding by COVID-19 risk status, furloughing status and working from home among UKHLS respondents who received an NHS shielding notification, April to July 2020



Difference between letter vs no letter= 4.2% (95%CI=1.4%-7.2%)

Figure 2

Estimated probability of reporting coronavirus symptoms/positive test April to July 2020 by NHS shielding notification (household) and COVID-19 risk: estimated from Table 2a Model 2



Difference between letter vs no letter for very high risk= 10.7% (95% CI=3.1%-18.2%)

Figure 3

Estimated probability of reporting coronavirus symptoms/positive test April to July 2020 by NHS shielding notification (individual) and COVID-19 risk: estimated from Table 2a Model 3

Supplementary Files

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- Tables.docx