Research Article

Nudge in the time of coronavirus: Compliance to behavioral messages during crisis

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Abstract: Successful responses to the coronavirus pandemic require those without COVID-19 and asymptomatic individuals to comply with a range of government guidelines. As nudges have been widely found to be effective at stimulating pro-social behaviors, how good are they for the COVID-policy toolkit? In particular, is a reflective device or nudge plus, as an addition to the classic nudge, able to deal with the scale of the problem? To test for the impact of nudges and nudge plus, we implemented an online experiment with 1,481 people during a period of the first national lockdown in the UK in April/May 2020. We show that social norms and the portrayal of the victim do not work on their own at increasing intentions to comply with the guidelines, but when the victim is combined with the more reflective task of writing to a relative there is an impact. After two weeks, however, these intentions do not persist. The implication is that there still much work to do in designing nudges in the context of COVID-19 and other public health pandemics, yet reflection as a behavioral device can encourage individuals to think more responsibly in a world-wide pandemic.

Keywords: nudge, nudge plus, COVID-19, social norms, compliance

Supplements: Preregistered

C ompliance with public health guidelines, such as frequent hand-washing for a minimum of twenty seconds each time, social distancing by standing two meters apart from others, and avoiding going out where possible, remains critical for both reducing transmission of the COVID-19 virus, and avoiding further peaks. As compliance is difficult to observe and enforce, nudge interventions may be effective as a complement to standard policy instruments, leading to sustained behavior change (Gray et al., 2014). Academics and policymakers have argued that there is a great potential for nudge interventions given that, for many, non-compliance may be a function of bounded cognition rather than resistance to government public health messages (Soofi et al., 2020). This makes interventions designed to correct such biases appropriate and potentially efficacious (Lunn et al., 2020). However, there is a need for more research to find out if such interventions work in the context of a pandemic like COVID-19 (West et al., 2020). Testing the effectiveness and persistence of behavioral messages is useful for the development of messaging in current and future pandemics.

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Nudge refers to any aspect of the presentation of choices (choice architecture) that alters individual behavior in predictable ways without reducing autonomy or changing the underlying incentive structure (Leonard, 2008). Nudge is a key tool for today's public administrators, with tests being frequently reported in public administration journals (e.g. John, 2018; Larkin et al., 2019; Vainre et al., 2020). Yet nudges are usually tested for the routine tasks most citizens undertake, such as submitting a tax return, not in crisis situations when both the environment and people's choices are anything but routine. It is a question of external validity whether these tried and tested nudge techniques work in a crisis, when much is demanded from the citizens; when there are already significant limitations on individual freedom; and where there is a huge amount of other information citizens are receiving from governments and media outlets at the same time. Can soft information signals break through these constraints?

Literature Review

Approaches Nudges have been tested during the pandemic in various designs, but given the extent of official interest in this phenomenon, there is still relatively little published experimental work using insights from behavioral public policy, with most interventions focusing on specific public health measures, such as a default for hand washing (e.g. National Library of Medicine, 2020). One study similar to ours, carried out in Japan, tested interventions online, finding that only one treatment was significant and positive in effect (Sasaki et al., 2020). Another study found behaviorally-informed text messages to be effective in São Paulo (Boruchowicz et al., 2020), while a Danish study found that prompts were effective in changing intentions but not actions, as in our study, though this study did not use behaviorally-informed messages (Falco & Zaccagni, 2020). Many studies carried out by government teams and consultancies, such as the Behavioural Insights Team (https://www.bi.team/our-work/covid-19/), only report headline results, with full study designs not available. In this section we review the literature that underpins the three hypotheses tested in the present research.

Nudge: Social Norms and Identifiable Beneficiaries
In this paper, the focus is on two common interventions that use social context to increase a desired behavior: (i) providing normative feedback; and (ii) foregrounding an identifiable beneficiary.

Hypothesis 1: Participants who viewed either the identifiable beneficiary norm or normative social norm message would subsequently report a greater intention to comply with public health guidelines than participants in the control group.

Normative feedback as an intervention is based on the notion that although people are influenced by social norms, they are also poor at estimating actual behavior and attitudes (Perkins & Berkowitz, 1986). Social norms guide behavior by representing the "rules and standards that are understood by members of a group, and that guide or constrain social behaviors without the force of law" (Cialdini & Trost, 1998, pg.152). People are often strongly influenced by what others do though conformity (e.g. Goldstein et al., 2008; John et al., 2019; Stok et al., 2016; Wiepking & Heijnen, 2011). Normative misperception can lead to engagement in undesired behaviors due to a false belief that they are commonplace (McAlaney et al., 2011), and therefore providing information about norms can be very influential on behavior. For instance, Hallsworth et al., (2016) found that providing social norm feedback on antibiotic prescribing rates to GP practices prescribing at a rate higher than 80% of practices in their NHS Local Area Team resulted in significantly fewer antibiotic prescriptions than a control. In the early months of the COVID-19 pandemic, the UK media widely reported people flouting the public health guidelines by panic buying and not social distancing (Derbyshire Police, 2020; Ellson, 2020; Jarvis, 2020). Yet, highlighting instances of such behavior creates the perception that this is the norm, causing an increase in these behaviors as people adjust their own behavior in line with the perceived norm (Cialdini et al., 2006; Farrow et al., 2020). Previous interventions suggest that policy-makers could address this by correcting people's perceptions of the norm via communications with the public or by providing normative feedback (e.g. how one's adherence to the guidelines compares to the national average) (Allcott, 2011; Cialdini et al., 2006). However, it is unclear whether this is effective in the case of the current crisis where polls suggest that people are generally aware of, and support, the rules (see Duffy, 2020).

Another form of social norm intervention involves highlighting a specific individual who is affected by another individual's behavior. Research on the identifiable victim (or beneficiary) has long established that people are more willing to make sacrifices for identifiable individuals who are affected by the cause as opposed to those who are represented as groups or statistics (Kogut & Ritov, 2005; Small & Loewenstein, 2003; Small et al., 2007). The mechanism here is the norm of helping others, which works more effectively when people are able to identify a specific person who will be impacted by their actions, either to help or harm. In relation to the COVID-19 outbreak, research suggests that highlighting a person vulnerable to infection can encourage social distancing (Lunn et al., 2020; Pfattheicher et al., 2020). Indeed, it has been found that providing background information on why it was important to social distance does not increase the motivation to adhere to guidelines (Pfattheicher et al., 2020); however, when individuals felt empathy for the most vulnerable, the motivation to distance socially increased.

Nudge plus: Self-reflection

Building on these social norm interventions, the present research also includes a self-reflection intervention that aims to nudge individuals to think about the problem at hand, with the goal of producing more persistent behavioral change.

Hypothesis 2: Participants who are asked to complete a self-persuasion task will subsequently report a greater intention to comply with public health guidelines than those who do not complete a self-persuasion task.

At the peak of the crisis in the UK, the majority of people knew what the guidelines were (Geldsetzer, 2020); however, having such knowledge does not always result in adherence (Pfattheicher et al., 2020). Self-generated arguments are often perceived by individuals as more correct and trustworthy than those from external sources and are less likely to result in defensive reactions (Hoch & Deighton, 1989; Liberman & Chaiken, 1992; Mussweiler & Neumann, 2000). They may also result in a greater degree of internalization of the social norms (Thøgersen, 2006), which in turn creates a sense of pride from following, or shame from not following, the guidelines. Self-persuasion has shown promise at increasing adherence to desirable norms (e.g. Aronson, 1999; Müller et al., 2016a). Incorporation of a reflective or self-persuasive component into a nudge has been termed 'nudge plus' (Banerjee & John, 2021; Kardes et al., 2001a; Müller et al., 2016b; Stoker & John, 2019). Self-persuasion strategies can increase the internalization, and hence persistence, of nudge-style messages. It may be the case that with the large amount of information that people are receiving encouraging them to comply, as with public information messages, an activity that asks people to stop and reflect might be more suitable for the COVID pandemic than standard nudge messages, or at least enhance a nudge message. Also, when so many regulations have been introduced at such great speed and without much deliberation by legislators, by executive action and delegation, the nudge plus does seek to introduce a degree of citizen autonomy and respect into the proceeding through the process of reflection on the argument for these regulations.

Interaction Effects: Nudge and Nudge Plus

It is not unreasonable to assume that self-persuasion will be more effective at increasing intention to adhere to guidelines after seeing certain types of social messages than others, or than self-persuasion alone. This is core to the nudge plus idea that the plus (the think) is presented alongside a classic nudge, so enhancing the nudge with the plus (see Banerjee and John 2021). This is similar to the argument in the boost literature (Hertwig & Grüne-Yanoff, 2017) that the individual needs extra capacity and resources conveyed by the boost to respond to an information signal effectively.

Hypothesis 3: There may also be a complementary effect of the nudge messages and the self-persuasion/nudge plus task.

The Experiment

Although promising, much of the research on self-persuasion and nudge plus, has been conducted in the lab environment (for exceptions see, for example, Damen et al., 2015; Kardes et al., 2001b; Müller et al., 2016b) making generalizability to the current context hard to ascertain. Further, most existing nudge research to date

is not conducted in crisis contexts, and there is reason to be cautious about extrapolating effects. In the present situation, fear and panic can dominate (Association, 2020; McKeever, 2020) making behavior more difficult to anticipate and influence.

The present study tested whether intentions of compliance with public health guidelines related to COVID-19 (including, but not limited to, hand washing, social distancing, and self-isolating) can be improved using behavioral communication strategies. The research was carried out in the UK the middle of the first national lockdown designed to suppress the spread of the virus. From March 23 the UK government confined everyone (bar essential workers) to their homes, only with permission to exercise outside one hour per day, rules that gradually eased from 16 May[1]. The first wave of the main experiment ran from 23 April 2020 at 2pm to 24 April 2020 at 8am; the second wave took place from 7 May 2020 at 11am to 9 May 2020 at 4pm. These dates show that the experiment occurred right in the middle of the period when citizens were required to follow the most stringent set of rules from government. However, owing to reports in the media around 7 May, wave 2 participants may have been expecting that some of the restrictions might be about to be lifted - this announcement occurred on 10 May[2]. We provide a full timeline of announcements in the months surrounding the trial in Appendix D.

There is always a challenge, especially with behavioral interventions, as to whether people who are mobilized with good intentions turn them into action (Brandon et al., 2017; Gaudeul & Kaczmarek, 2017). If the good intentions are not accompanied by a plan to put them into action or are triggered at a point when they cannot be acted on, they can be forgotten. Pro-social behavioral intentions can also fade as the message becomes more temporally distant (Västfjäll et al., 2014). On the basis that good intentions do not help anyone, we wished to test whether these intentions translated to reported changes in behavior, at a two-week follow up.

Method

Design and Materials

After consenting and answering introductory questions, participants were randomly allocated to see one of three scenarios: a control, a normative ('classic') social norm, or the identifiable beneficiary of an elderly person. The text of all three interventions is given below. The interventions were mocked-up to look like online news articles and were identical in content - bar the title and opening paragraphs outlined below - with each having three further paragraphs detailing factually correct information about the lockdown announced by the prime minister, Boris Johnson, on 23 March.

Control
What are the public health guidelines in the UK?

When staying at home in order to social distance or self-isolate for an extended period of time it is important to maintain your wellbeing by eating a balanced diet, keeping mobile and staying in contact with family online or via mobile. You should also keep your mind busy with activities such as cooking, sewing or painting and creating a routine can also help maintain a sense of normality.

Classic Social Norm
Continue to adhere to the public health guidelines

Recent surveys suggest that, in the UK, 94% of people are complying with a minimum of one public health guideline. Overall:
More than 80% of people are avoiding public places.
82% of people are washing or sanitizing their hands more frequently than usual.
61% of people are avoiding all travel by car, train or bus
In London, movement around the city has dropped 91% compared to usual.

Identifiable Beneficiary
Follow the public health guidelines to protect the elderly

"We feel completely powerless with this situation. We actually have less freedom than the younger generation because we're faced with this virus while in the last chapter of our life." By adhering to the guidelines,

you protect Sam, a 72-year-old retiree with three grandchildren from developing COVID-19, but also from the loneliness and uncertainty of being isolated indefinitely[3]

Following the article, participants were randomized to see a nudge plus self-reflection intervention or not. If they did not receive the nudge plus, they moved straight to the next stage of the survey; if they received the intervention, they saw a message which read:

The chances are that everyone knows someone who is a key worker - helping keep the country running - or is either elderly, or has an underlying health condition, and so would be substantially more impacted by the virus if they caught it.

Reflecting on this person you know, how would you explain what steps you are taking to reduce the spread of coronavirus, and why you consider that this is important? Please use the box below.

The median response length for those who saw the self-reflection prompt was 36.5 words; the first quartile was 21 words. Only 5 respondents (out of 736) in the plus condition provided no text in response.

All participants then indicated their intention to adhere with public health guidelines on a 7-point scale from (1) 'never' to (7) 'always' with an option to select 'I don't know / not applicable'. Items on this scale were based on Weinberg (2020) and were amended to cover official and unofficial guidelines in place in the UK at the time of the study, and to include seven response levels rather than five. Items included 'Working from home unless essential to do otherwise' and 'Social distancing from others apart from those in your household'. Participants were also asked to indicate their intention to leave their home in the next five days: 'Yes', 'No', 'I'm not sure'. If they answered 'Yes' or 'not sure' they were then asked how frequently they intended to leave their house across a range of different activities. This was originally used by Barari et al. (2020), who found 62 percent of respondents stated a need to leave the house. Larsen et al (2020) show that these survey measures do not suffer from social desirability bias. Appendix A gives the full set of activities for both outcomes.

Sample

After obtaining ethical approval[4], we recruited a total sample of 1,481 participants on Prolific with an average age of 46.1 and a standard deviation of 15.4 years. The sample was recruited to be representative of the UK population with regards to age, gender, and ethnicity. Sample size was mainly determined by financial constraints, but we calculated that a sample of 250 participants per cell was powered to detect effects greater than Cohen's *d* of 0.25, a fairly modest effect. This achieved cell size is in keeping with the guidance of Simmons et al (2018).

Respondents were re-sampled two weeks later. 1,211 (79%) participants completed the follow-up survey. There was no imbalance in retention by intended compliance, but some variation in retention on ethnicity, and those seeing the beneficiary plus interventions had higher rates (5 percentage points, $p = 0.1$) of responding to wave 2.

Analysis

The analysis proceeded using an Ordinary Least Squares (OLS) regression with 'HC2' robust standard errors (Hayes & Cai, 2007).

The analysis specified the treatment indicator as a factor with six levels, corresponding to the six combinations of the nudge and plus interventions, with those allocated to control in both randomizations as the reference category. This specification was chosen as it is the most straightforward to interpret and has the most meaning from a policy standpoint. Our pre-registration used a 3 x 2 factorial design, which is provided in Appendix B. In addition, we have analyzed wave 1 and wave 2 separately, again for reasons of interpretability. However, we present a panel specification, with standard errors clustered at the level of the individual respondent, in the Appendix. Our pre-registration plan included the use of a baseline measure of the outcome, but in the end we did not collect this as we did not think it sensible to administer the same instrument twice within a seven-minute survey[5]. Instead, we included gender, age, and ethnicity as covariates, and present specifications with and without these covariates in the Appendix. Our outcome measures were the proportion of activities where a respondent indicated an affirmative intention to comply with regulations, and how often they intended to leave their house over the coming week. Our pre-registration assumed we would be able to code this outcome as the average of the responses, from 1 ('never') to 7 ('always'), but did not pre-specify an imputation strategy for 'don't know' responses. However, likelihood of answering 'don't know' was close-to-significantly affected

by treatment assignment ($p = 0.1$), so we determined that the most parsimonious way to code this would be to treat the outcome as the proportion of instances where participants indicated a strong intention to comply with the guidelines (i.e. if they answered 'almost always'/'always' - or 'almost never'/'never' in some cases). We considered this the approach that assigned 'don't know' most appropriately. The outcome measure was therefore a continuous variable from 0 to 1, representing the proportion of the activities presented where the respondent intended to comply with the regulations (see Appendix A for list of activities). We present the analysis as pre-registered, with 'don't know' responses conservatively imputed with the item sample mean, in Appendix B.

This outcome was re-collected in the follow-up survey two weeks later. As there was a close-to- significant imbalance on response to the follow-up, there was a risk of bias in complete case analysis, or when using last observation carried forward to impute wave 2 outcomes for these respondents. As such, we opted to impute the sample mean for each item in analyzing the follow-up[6]. We also conducted complete case analysis, but the results change very little, so we present only the analysis with imputed values in the paper.

The second outcome related to respondents' intentions to leave the house. Respondents were first asked whether they needed to leave the house in the next week. Respondents who answered 'no' to this initial question were assigned an outcome value of 1. Respondents who answered 'yes' or 'I'm not sure' were then shown a list of reasons for leaving the house and asked for each how frequently they would leave for that reason. Each item was coded from 1 ('never') to 6 ('2-3 times a day') and averaged across the 13 activities. There was no imbalance on 'don't know' item responses by treatment, which were imputed with the item sample mean.

Results

This section presents a summary of the results of the experiment. Full regression tables, including alternative specifications, may be found in Appendix B.
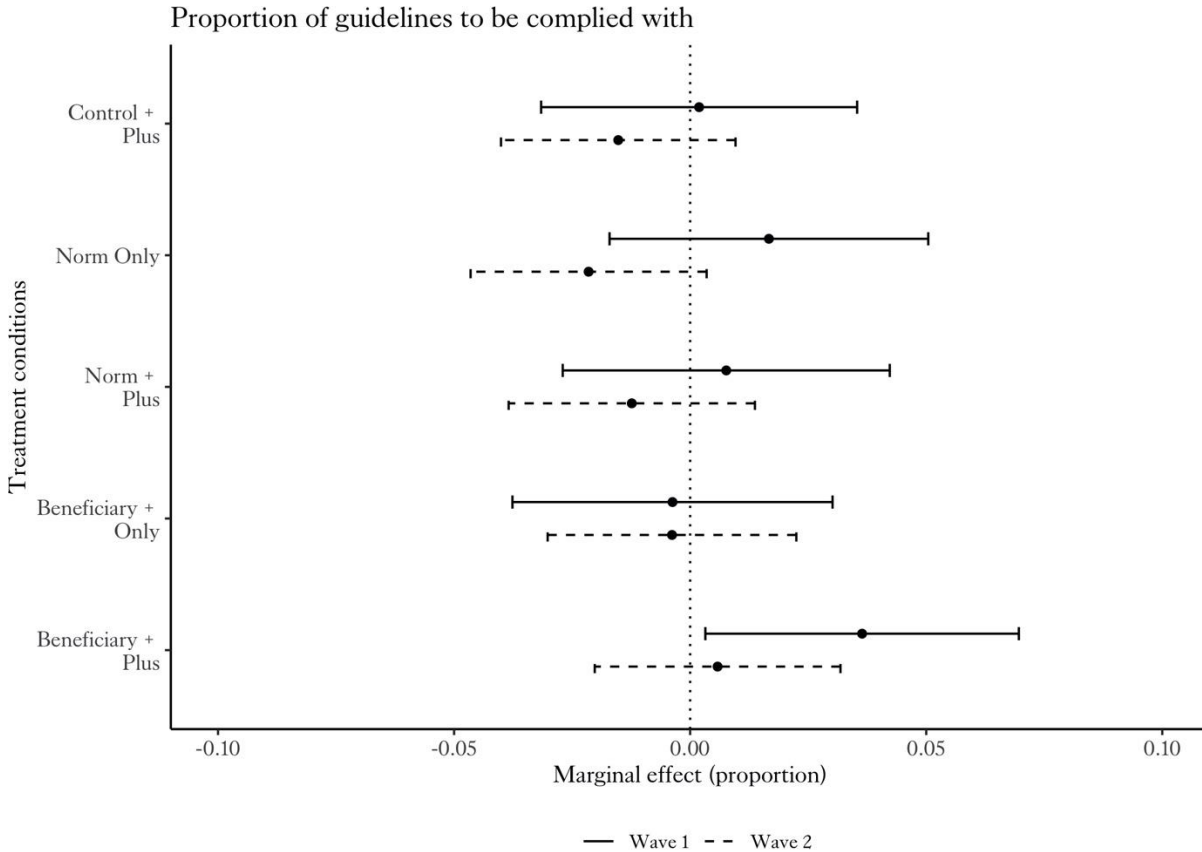
Compliance with guidelines

Figure 1 gives the proportion of the guidelines shown to respondents that they intended to comply with either 'always' or 'almost always', broken down by treatment condition (coded as a six-level factor, with those who were in the control for both the 'nudge' and 'plus' components as the reference group), at both wave 1 (directly post-treatment) and wave 2 (two weeks later).

From this, we can see that overall, most of the treatment conditions had no effect, with the exception of those who saw the beneficiary nudge, followed by the plus prompt. This group intended to comply with a significantly higher proportion of the guidelines applicable in the UK at the time of the experiment. However, by the two-week follow up, there were no significant differences in compliance intentions, for any condition. Note there are differences in baselines across wave 1 and 2 with the intercepts in the regression decreasing from .77 to .32. This indicates a change in population behavior between the waves, possibly in response to reports about easing of lockdown.

Figure 1
Proportion of the guidelines that respondents indented to comply with always or almost always, by treatment allocation.


Intended frequency of leaving the house

Figure 2 below gives the effect of treatment condition on participants' intention to leave the house coded two ways: (1) as a binary set to 0 if they stated they did not intend to leave the house at all in the coming week, and 1 if they said they did intend to leave the house or weren't sure; and (1) as a continuous variable representing the average frequency with which they stated they intended to leave the house for a range of purposes, with 0 representing no intention to leave the house and 1 representing the intention to leave the house 2-3 times a day across all the listed purposes.

Again, we see limited effectiveness of all conditions, with the beneficiary nudge condition overall as the most promising, and - consistent with our other outcome - the beneficiary condition with the self-reflection 'plus' prompt being the only condition to have a significant impact on intention to leave the house, compared to the control[7].

Figure 2
Intended frequency of leaving the house, by treatment allocation.

Intention to leave the house
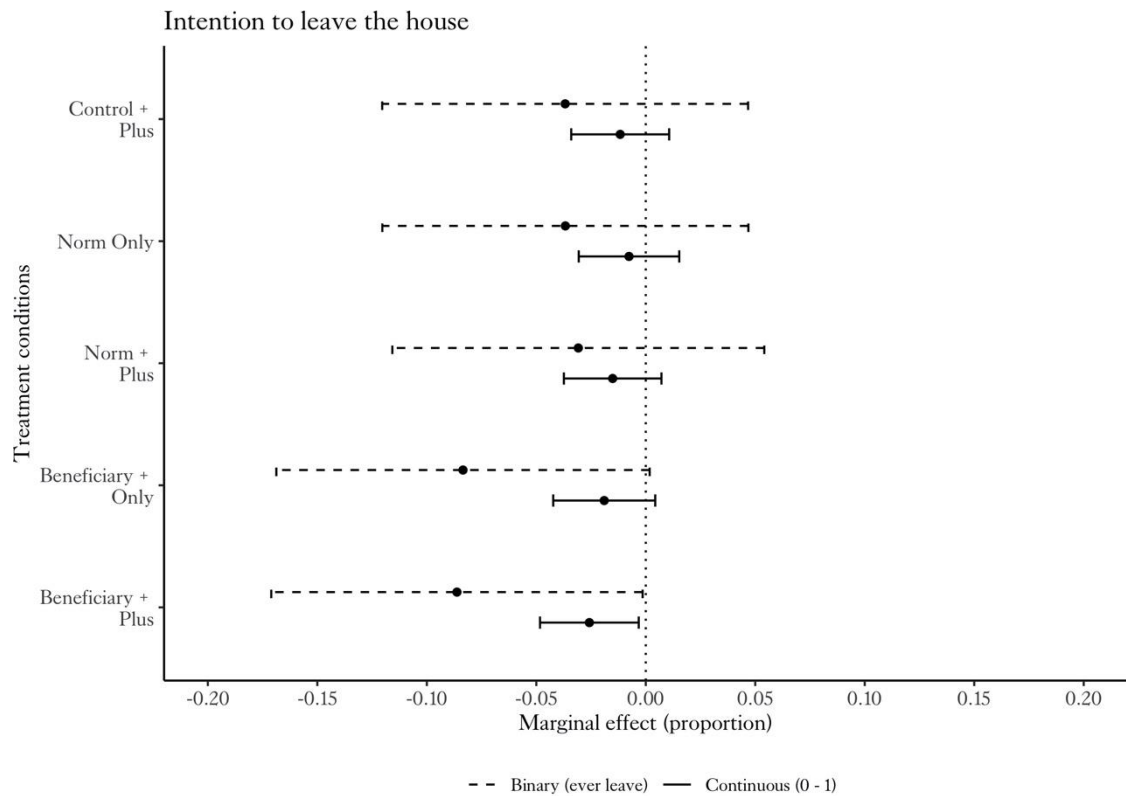
Bars represent the 95% confidence interval. N = 1476

Discussion

Our study tested the efficacy of nudge treatments to attract the attention of respondents in an information-heavy environment of COVID-19. We find that the addition of nudge plus increased intentions to comply directly following treatment. But when followed up two weeks later, participants reported no changed intentions going forward. The importance of these findings is the lack of impact of classic nudges, except when combined with nudge plus, and the lack of any persistence in changed intentions.

The key question from this research is why is there no treatment effect on intention to change and actual behaviors when stimulating people to wish to change their behavior for the classic nudges. It seems that classic nudges are not well adjusted for the COVID environment. There is much more promise for when a nudge is combined with a reflective device, the nudge plus. Yet even this did not transfer to compliance. This is a familiar problem with COVID interventions (e.g., Favero & Pedersen, 2020).

Information effects need to be considered. Our sample was recruited via Prolific. Conducting the study online allowed for the research to be conducted where face-to-face contact was not possible and as such was an appropriate method. However, it is possible that participants may have been involved in other COVID-19 related studies available on the platform around the time of our research. They may therefore have been exposed to greater levels of information on COVID-19 and interventions which may have inadvertently countered the aims of the messages in the present study.

Although this may have influenced the ability of the messages in our study to cut through, this is also precisely the challenge faced by policy-makers hoping to nudge people's compliance. At the beginning of the pandemic, the government relied heavily on nudge strategies (Sibony, 2020; Yates, 2020), amidst a multitude of messages being directed at the public. Our study suggests, with all the other pressures on people's behavior during a crisis, nudges may just be crowded out. The invocation to reflect might be a way a government can break through this information overload. Agencies might be able to use reflection devices in the roll out of messaging and in encouragements for citizens to think more slowly.

Notes

1. There were variations in these rules across the four nations of the UK, though these were generally not large at this period of time.
2. Note that the most important event that changed people's response to government during the lockdown was the furore over the breach of guidelines by the Prime Minister's Chief of Staff, Dominic Cummings. This occurred after our experiment, from 22 May.
3. This beneficiary was chosen via a pilot study (N=300, on 6 April in the afternoon, followed by a booster sample on 11 April also in the afternoon), which aimed to identify which of three potential beneficiaries of participants' good behaviour (or victims of poor behaviour) participants found the most relatable, based on scores on measures of emotional valence. The vignettes featured a medical professional, an elderly person, and a younger immunocompromised person. After reading the vignettes, participants were asked a series of questions about how much they related to the character described as well as some factual questions about the government guidance. The elderly vignette provided the highest relatability/emotional valence scores (p=0.254, Cohen's d =0.2), as well as a higher proportion of correct answers on the factual questions.
4. King's College Research Ethics Committee, reference: LRS-19/20-19268, 19 April 2020, amended 26 May 2020.
5. Pre-registered at the Open Science Foundation (OSF): Stockdale, E., Hume, S., John, P., & Sanders, M. (2021, June 24). COVID-19: Testing the effectiveness of social norm messages in affecting adherence to public health guidelines. Retrieved from osf.io/mzyj9
6. This imputation approach carries two risks. Compared to multiple imputation, it tends to under-estimate the variance in the data, and lead to spurious rejection of the null hypothesis. By contrast, by imputing the sample mean, rather than the within-treatment mean, risks attenuating the treatment effect, leading to spurious acceptance of the null hypothesis. Given our findings, and the scarcity of our data, multiple imputation would not change the interpretation of our findings, while these findings are also robust to the use of alternative imputation strategies.
7. Note that the beneficiary plus result is significantly different (p <0.05, t >1.96), from the beneficiary only result in two out of the four specifications in Table 1, with a third yielding a result close to significance (<0.1, t >1.69), and three out of the four specifications in Appendix B, Table 2.

Acknowledgement

Author Contributions

Each author contributed equally.

Statement of Pre-registration

The study was pre-registered with the Center for Open Science: (https://osf.io/mzyj9/?view_only=f85f707c010e4002bb3f0d27625d2cb7). Neither the data nor the materials

have been made available on a permanent third-party archive; requests for the data or materials may be sent via email to the lead author.

Competing Interests Statement and Ethical Consideration

There are no competing interests. All studies were approved by King's College London Research Ethics Committee.

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