# Motivating social distancing during the Covid-19 pandemic: An online experiment

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**Abstract**

Social distancing during the COVID-19 pandemic will save lives. We tested communication strategies to promote social distancing via an online experiment (N = 500) commissioned by Ireland's Department of Health. A control group saw a current informational poster. Two treatment groups saw similar posters with messages that highlighted: (i) the risk of transmission to identifiable persons vulnerable to COVID-19; (ii) the exponential nature of transmission. We then measured judgements of behaviours previously identified by focus groups as "marginal" (meaning that people were not sure whether they were advisable, such meeting others outdoors, or visiting parents). We recorded intention to undertake behaviours and stated acceptability of behaviours. Our hypotheses, that both treatments would increase participants' caution about marginal behaviours, were preregistered (i.e. lodged with an international organisation for open science before data collection). Results confirmed the hypotheses. The findings suggest that the thought of infecting vulnerable people or large numbers of people can motivate social distancing. This has implications for communications strategies. The study also demonstrates an effective way to identify outcome variables for rapid behavioural research on the COVID-19 response.

**Introduction**

"Social distancing", reducing social interactions with others, has the potential to save millions of lives during the COVID-19 pandemic (Ferguson et al., 2020; Greenstone & Nigam, 2020). Governments worldwide have already introduced varying levels of social distancing measures, but compliance by individuals is vital (Anderson, 2020). This paper describes a pre-registered[1] experiment to test potential communication strategies to encourage compliance with social distancing. The experiment formed part of a study commissioned by Ireland's Department of Health, in support of the Behaviour Change Subgroup of the National Public Health Emergency Team (NPHET).

This working paper is designed to present initial results that relate to the pre-registered hypotheses at a time when speed is important. There may be lessons in this research from which others can benefit, as work on the behavioural response to COVID-19 quickly progresses (e.g. Everett et al., 2020; Barari et al., 2020; Pfattheicher et al., 2020). The work has been produced much more rapidly than would be standard for work of this type. Consequently, we have focussed on providing robust results in relation to the primary, pre-registered hypotheses, with limited further exploration of the data.

**Background and Hypotheses**

The experiment tested whether behavioural intentions and judgements relevant for compliance with social distancing advice can be improved by psychologically-informed communication strategies. We tested two strategies: (i) highlighting identifiable, vulnerable persons and (ii) highlighting the transmission rate of the coronavirus. In this section we outline the rationale for these hypotheses and the outcome measures we employed.

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[1] The hypotheses and analysis plan were recorded online with the Open Science Framework (https://osf.io/r9hzs/) prior to data collection, in line with best practice in reproducible science.

Previous research has established that people are more likely to make sacrifices to help specific victims who are identified, relative to victims described statistically (Jenni & Loewenstein, 1997; Lee & Feeley, 2016). This effect arises even when a specific individual is identified but remains anonymous, perhaps because the mere act of thinking about a specific individual induces stronger caring emotions (Small & Loewenstein, 2003). Hence, we set out to test a communication strategy that highlights specific persons who are especially vulnerable to the coronavirus: an elderly person, someone with an underlying health condition, a healthcare worker, etc.

People struggle to perceive exponential growth accurately and are inclined to greatly underestimate it (Wagenaar & Sagaria, 1975). This "exponential growth bias" may be important for perceiving risk in relation to the coronavirus, given the exponential nature of network transmission. For instance, people may fail to realise how many others could be affected by one individual's behaviour and, conversely, how many onward infections could be prevented by that one individual acting to protect themselves. Communication that stresses the exponential rate of infection might, in turn, affect the likelihood that people endorse beneficial health behaviours (Witte, 1992). Thus, we also tested whether highlighting the possibility that one individual's behaviour results in multiple onward infections would influence intended compliance with social distancing.

These two streams of literature, on caring for identifiable victims and understanding exponential relationships, formed the basis of two experimental treatments based on exposure to campaign posters. We refer to these as "identifiable person" (IP) and "transmission rate" (TR) treatments. Responses were compared to a control group who saw an informational poster adapted from materials being employed by Ireland's public health authorities.

Ideally, following exposure to the posters based on random allocation, we would measure behaviour over a subsequent period. Given practical restrictions and the need to generate evidence promptly, such a research design was unfeasible. Instead, our outcome variables measure intentions and attitudes. In addition to the possibility of an intention-action gap (Sheeran, 2002), such variables can be prone to ceiling effects, as some rapidly conducted experiments on messaging strategies have already found (e.g. Everett et al., 2020; Barari et al., 2020). To counter this problem, we inserted questions into Department of Health focus groups that asked people to describe activities where they were unsure whether the behaviour was appropriate, given the prevailing social distancing guidelines. We refer to these as "marginal behaviours", i.e. behaviours that some individuals deem acceptable and others not. Some marginal behaviours were relevant for all participants, such as meeting friends and relatives outdoors. We measured participants' intentions to undertake these behaviours "over the next few days". Other marginal behaviours were relevant to only some participants, such as allowing children from different households to play together. For these, we asked participants to judge the acceptability of the behaviour.

Our pre-registered hypotheses were:

H1:  Participants who viewed *either* experimental poster would subsequently (i) report more cautious intentions to engage in marginal social distancing behaviours and (ii) judge the marginal behaviours of others to be less acceptable than participants in the control condition.

H2:  Both the identifiable persons poster and the transmission rate poster would lead to greater caution on both social distancing measures than control communications, respectively.

H3:  There might be differences in how people respond to the identifiable persons poster compared to the transmission rate poster.

*Table 1. Participant Socio-Demographic Characteristics*

|  |  | *n* | *%* |
|---|---|---|---|
| *Gender* | Men | 254 | 51 |
|  | Women | 246 | 49 |
| *Age* | Under 40 years | 166 | 33 |
|  | 40 – 59 years | 154 | 31 |
|  | 60 years + | 180 | 36 |
| *Education* | Degree or above | 167 | 33 |
|  | Below degree | 333 | 67 |
| *Employment* | Employed | 260 | 52 |
|  | Not employed | 240 | 48 |
| *Urban-Rural* | Urban | 317 | 63 |
|  | Rural | 183 | 37 |

**Method**

Participants

Five-hundred participants were recruited by a market research agency to be broadly nationally representative. Socio-demographic characteristics are summarised in Table 1. Participants were paid €5 for undertaking the 15-minute study online, which was programmed using Gorilla (Anwyl-Irvine et al., 2019).

Materials and Design

The experiment was preceded by some survey questions designed to test understanding and compliance with advice in relation to COVID-19, as well as trust in information sources. These variables measured levels of comprehension for the Department of Health in Ireland (to be reported separately). All participants had encountered the same material prior to being randomised to see one of the three posters.
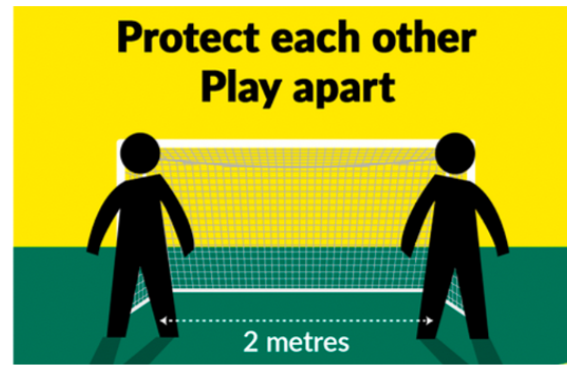
*Posters*

Participants were told that they would be shown a poster and to please give it their attention. Figures 1, 2 and 3 display the Control, IP and TR posters respectively. Each consisted of four panels. The treatment posters contained the same four images of real people from different age groups not maintaining correct social distance, with text-bubbles that foretold a story of a chain of infection.[2] For example, one member of the group "Has COVID-19 but doesn't know it yet" or "Thinks it's just a cough she's had for ages". Another person in the image had a red text-bubble that described an outcome, such as "Will infect her sister" (IP) and "Will infect 3 others" (TR). On each treatment poster, two outcome messages leveraged counterfactuals (e.g. "if they had sat further apart, she would have been okay"), which are established to help people identify causal relationships (Byrne, 2016). The other two left open the outcome in order to leverage the pragmatic implications the participant might infer (e.g. "he's asthmatic"), which are established to facilitate the encoding of information in memory (e.g. Brewer, 1977). The final line at the bottom summarised the overall message.

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[2] The basic poster design was inspired by a poster campaign by Baltimore City Health Department (https://health.baltimorecity.gov/sites/default/files/COVID-SocialDistancing.jpg).

*Figure 1. Control poster*

*Figure 2. Identifiable Person (IP) poster*

*Figure 3. Transmission Rate (TR) poster*

We did not equalise all aspects of the posters except message content, because the study was designed to improve public health communications, not to make inferences about theory. For instance, while the control poster matched the information-based communications currently in use, thereby providing a meaningful baseline for comparison, its impersonal cartoon characters were not suitable for communicating our treatment messages. Consequently, minor stylistic differences (e.g. photographs of real people) were confounded with our messages. In principle, such differences may have been important, although we judge this to be unlikely. Given current priorities, the trade-off between perfect identification of mechanism and usefulness for public health policy was resolved in favour of the latter.

*Outcome Measures*

After viewing the poster, participants were asked how effective they thought the poster campaign would be at promoting social distancing, and then how memorable they thought it would be (both on 1 to 7 Likert scales, from "not at all" to "extremely"). Participants were also asked to select which of the four panels of the poster might be most persuasive. These questions had two aims: first, to obtain participant intuitions about the effectiveness of the messaging strategies; second, to imply that the aim of this part of the study was to obtain such views.

In fact, our primary outcome measures were obtained after these poster evaluation questions, in what was signalled to be a separate stage of the study about plans for the next few days. First, participants responded to three "Intentions" items regarding marginal behaviours:

Over the next few days, how likely are you to…

Visit a friend or relative in their home

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Meet up with friends or relatives outside in the open air

Go for a walk in your neighbourhood

Each appeared onscreen on its own, with the order randomised across participants. Responses were recorded on numbered Likert scales from 1, "Highly unlikely", to 7, "Highly likely". Next, they responded to three "Acceptability" items about marginal behaviours that others might undertake:

We want to know whether you think it is okay for people to do these things:

Travel by public transport

Allow their children to play outside with friends

Travel to their parent's house for a cup of tea and a chat

Participants responded on a numbered Likert scale from 1, "Definitely not okay", to 7, "Definitely okay". As noted in the pre-registration (footnote 1), we planned to generate two composite scores representing the degree of caution regarding own and others' behaviour, assuming that responses to items within the two groups were sufficiently correlated.

Lastly, we obtained some more general judgements of the coronavirus outbreak, such as whether participants thought others should be taking it more or less seriously and their perceived likelihood of contracting the virus, before recording standard socio-demographic information.

**Results**

Randomisation was effective: there was no statistically significant variation across the three conditions by gender, age, residential location, educational attainment, working status, or nationality. Responses on the Likert scales were typically skewed. We use tertiary splits of responses and conduct inferential analysis using ordinal logistic regression (in one case, where the standard test of the proportional odds assumption fails, generalised ordinal logistic regression). The results are not sensitive to the number of categories used and closely similar findings can be obtained via OLS regression. Here, we report descriptive data and associated p-values. Full models are provided in the Appendices.

Judgements of poster effectiveness

Participants judged all three posters to be effective and memorable. Figure 4 shows responses. The Control poster was perceived to be more likely to be effective and more memorable than the two treatment posters. The difference in perceived effectiveness between Control and treatment posters (pooled) was marginally statistically significant (p=0.06, Model 1, Table A1), while that between the Control and IP was significant (p<0.05, Model 2, Table A1; Control versus Transmission Rate, p>0.20). The differences in perceived memorability between the control and treatment posters were all significant (pooled, p<0.01, Model 3, Table A1; Control versus IP, p<0.01, Control versus TR, p<0.05, Model 4, Table A1).
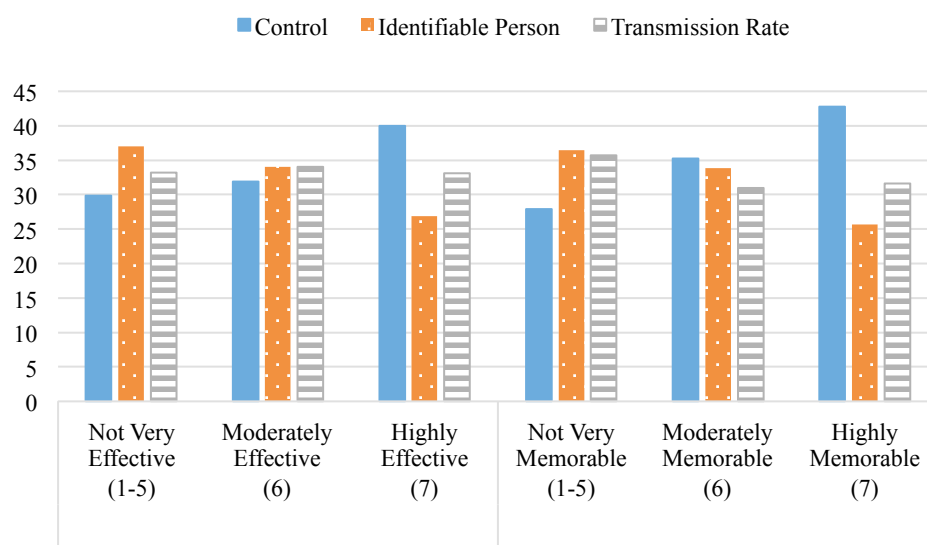


*Figure 4. Participant evaluations of posters. Responses on the 1-7 Likert scales in parentheses.*

Marginal Behaviours

In line with the pre-registration, we examined consistency between items before generating composite scores and prior to any analysis by condition. Regarding the three Intentions items, the meeting and visiting responses had a modest and highly significant correlation (r=0.35,

p<0.001), but the walking response was less correlated with the other two. Indeed, more than 100 participants responded with a 1 to the meeting and visiting items and a 7 to the walking item. We therefore did not include this item in the composite score for Intentions. The score was constructed by standardising and averaging responses to the meeting and visiting items only. This score had a skewed distribution and was split into three categories representing Low, Medium and High caution with regard to behavioural intentions. Correlations among Acceptability items were more consistent: public transport and children playing together, r=0.45; public transport and tea with parent, r=0.20; children playing together and tea with parent, r=0.34; p<0.001 in each case. The score was constructed by standardising and averaging responses to these three items, then split into Low, Medium and High caution with regard to Acceptability.

The distributions of caution by condition are shown in Figure 5. Both treatment conditions resulted in increased proportions of individuals expressing high caution. Our primary hypotheses (H1 and H2) are directional and so significance tests are single-tailed. The overall increase in caution in the treatment conditions (pooled) versus the Control condition is borderline statistically significant for Intentions (p=0.05, Model 5, Table A2) and significant for Acceptability (p<0.05, Model 6, Table A2). With regard to Intentions, the effects for Control versus IP and TR treatments are more marginal (IP, p=0.10; TR, p<0.05 for High versus Medium caution, p>0.50 for Medium versus Low caution, via a generalised ordinal logistic regression, Model 7, Table A2). With regard to Acceptability the effects are somewhat clearer (Control versus IP, P<0.05; versus TR, p<0.10, Model 8, Table A2).

No differences between the two treatment conditions (H3) are statistically significant. All effects are robust to the inclusion of control variables for gender, age, residential location, educational attainment, working status, and nationality. Interactions between the main effects, gender and age are short of statistical significance.

Behavioral Intentions
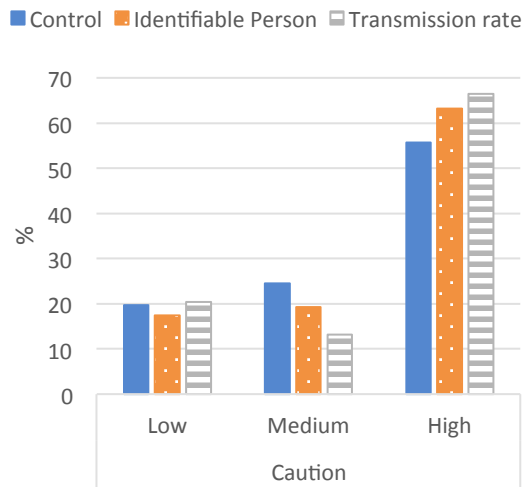


Acceptability of Behaviours
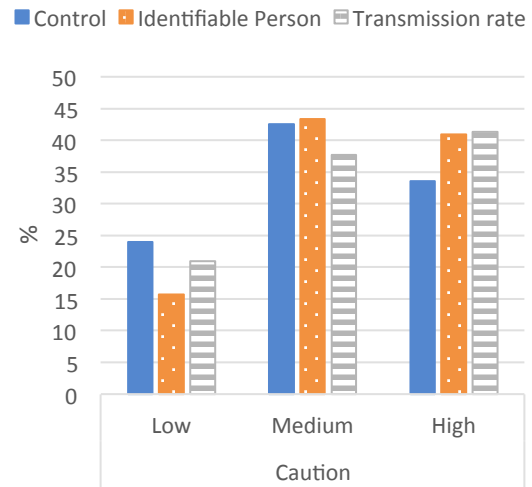


*Figure 5. Caution with respect to intended marginal social distancing behaviours and acceptability of behaviours by condition*

**Discussion**

This experiment tested whether two psychologically-informed communication strategies promote greater caution about compliance with social distancing. The findings suggest that they do. Posters that emphasised the likelihood that an individual who contracts the virus infects an identifiable, vulnerable person, or substantial numbers of other people, both increased caution. Our outcome measures were stated intentions for behaviours in coming days and assessments of the acceptability of behaviours. Other recent experimental evidence suggests that highlighting vulnerable persons can encourage physical distancing (Pfattheicher et al., 2020). We conclude that the study generates supportive evidence for communications that not only inform people about recommended behaviour, but that emphasise the impact of noncompliance on identifiable people and the potential number of infections.

The study was undertaken rapidly and has limitations. Most obviously, we measured intentions and attitudes, not behaviour. Given the truncated distributions of our outcome

variables, it is also difficult to obtain clear measures of effect size, although some of the changes in proportions within categories are substantial. Overall, the treatment conditions moved more than 1-in-5 participants from the Medium and Low caution categories to the High caution category for behavioural intentions.

We also found that participants' judgements about the effectiveness of the posters were the opposite of the effects we recorded. This mismatch between participants' intuitions and empirical observations replicates other research on appeals to moral values (Everett et al., 2020). The finding has two implications. First, it suggests that the main effects we report were not due to the superficial attractiveness of the treatment posters; participants did not like them. Second, it indicates that there are circumstances where testing campaigns via focus groups may backfire, perhaps especially where a message makes people feel uncomfortable or guilty. Generally, individuals may want to believe that their behaviour is based on rational information processing, not emotional responses, despite evidence to the contrary (Lerner et al., 2015).

Conducting rapid behavioural research during an unprecedented crisis is challenging, particularly with respect to the reliability and validity of outcome variables. Our strategy was to identify marginal behaviours and to create a "caution" score from intentions and judgements of these behaviours. As the situation evolves and recommended measures change, behaviours that might be considered marginal will change too. However, we hope that other researchers may be able to build on our approach, which mitigated ceiling effects and generated workable variation in the outcomes of interest.

Much more research is needed. Communication strategies will benefit from not only rapid experiments but also rapid replication of experiments. However, despite the rapidly evolving

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nature of the COVID-19 pandemic, it is possible to use the techniques of behavioural science to support policy (Lunn et al., 2020), including via the pre-testing of interventions.

**References**

Anderson, R. M., Heesterbeek, H., Klinkenberg, D., & Hollingsworth, T. D. (2020). How will country-based mitigation measures influence the course of the COVID-19 epidemic? *The Lancet*, Published online. https://doi.org/10.1016/S0140-6736(20)30567-5

Anwyl-Irvine, A. L., Massonnié, J., Flitton, A., Kirkham, N., & Evershed, J. K. (2020). Gorilla in our midst: An online behavioral experiment builder. *Behavior Research Methods*, 52(1), 388-407.

Barari, S., Caria, S., Davola, A., Falco, P., Fiorin, S., Hensel, L., ... & Ledda, A. *Evaluating COVID-19 Public Health Messaging in Italy: Self-Reported Compliance and Growing Mental Health Concerns.* Working Paper.

Brewer, M. B. (1977). An information-processing approach to attribution of responsibility. *Journal of Experimental Social Psychology*, 13(1), 58-69.

Byrne, R. M. (2016). Counterfactual thought. *Annual Review of Psychology*, 67, 135-157.

Everett, J. A., Colombatto, C., Chituc, V., Brady, W. J., & Crockett, M. (2020). The effectiveness of moral messages on public health behavioral intentions during the COVID-19 pandemic. *Working Paper.*

Ferguson, N., Laydon, D., Nedjati Gilani, G., Imai, N., Ainslie, K., Baguelin, M., Bhatia, S., Boonyasiri, A., Cucunuba Perez, Z.U.L.M.A., Cuomo-Dannenburg, G., & Dighe, A. (2020). *Report 9: Impact of non-pharmaceutical interventions (NPIs) to reduce COVID19 mortality and healthcare demand.*

Greenstone, M., & Nigam, V. (2020). *Does Social Distancing Matter?* University of Chicago, Becker Friedman Institute for Economics Working Paper, (2020-26).

Lee, S., & Feeley, T. H. (2016). The identifiable victim effect: A meta-analytic review. *Social Influence*, *11*(3), 199-215.

Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and decision making. *Annual Review of Psychology*, 66, 799-823.

Lunn, P. D., Belton, C. A., Lavin, C., McGowan, F. P., Timmons, S., & Robertson, D. A. (2020). Using Behavioral Science to help fight the Coronavirus. *Journal of Behavioral Public Administration*, 3(1). https://doi.org/10.30636/jbpa.31.147

Jenni, K., & Loewenstein, G. (1997). Explaining the identifiable victim effect. *Journal of Risk and uncertainty*, *14*(3), 235-257.

Pfattheicher, S., Nockur, L., Böhm, R., Sassenrath, C., & Petersen, M. B. (2020). *The emotional path to action: Empathy promotes physical distancing during the COVID-19 pandemic.* Working Paper.

Sheeran P. (2002). Intention–behaviour relations: A conceptual and empirical review. *European Review of Social Psychology*, 12, 1–36.

Small, D. A., & Loewenstein, G. (2003). Helping a victim or helping the victim: Altruism and identifiability. *Journal of Risk and Uncertainty*, 26(1), 5-16.

Wagenaar, W. A., & Sagaria, S. D. (1975). Misperception of exponential growth. *Attention, Perception, & Psychophysics*, 18(6), 416-422.

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communications Monographs*, 59(4), 329-349.

**Appendix**

*Table A1: Ordinal logistic regressions for perceived effectiveness (Models 1 and 2) and memorability (Models 7 and 8) of posters (Low-Medium-High).*

| *Poster* | (1) Effectiveness (OLR) | (2) Effectiveness (OLR) | (3) Memorability (OLR) | (4) Memorability (OLR) |
|---|---|---|---|---|
| Treatment | -.336* (.176) | | -.504** (.178) | |
| Identifiable Person | | -.450** (.217) | | -.561*** (.204) |
| Transmission Rate | | -.223 (.203) | | -.447** (.205) |
| N | 500 | 500 | 500 | 500 |

* p<0.1; ** p<0.05; ***p<0.01

*Table A2: Ordinal logistic regressions for caution (Low-Medium-High) with respect to behavioural intentions (Models 5 and 6) and acceptability of behaviours (Models 7 and 8).*

| *Poster* | (5) Intentions (OLR) | (6) Intentions (GOLR)[1] Low v Med | Med v High | (7) Acceptability (OLR) | (8) Acceptability (OLR) |
|---|---|---|---|---|---|
| Treatment | .301* (.186) | | | .331** (.177) | |
| Identifiable Person | | .276 (.217) | .276 (.217) | | .380** (.204) |
| Transmission Rate | | .019 (.258) | .435** (.224) | | .281* (.205) |
| N | 500 | 500 | | 500 | 500 |

[1] Generalised OLR fitted, because independent variable TR fails test of proportional odds assumption.

* p<0.1; ** p<0.05; ***p<0.01