Risk perception, illusory superiority, and personal responsibility during COVID-19: An experimental study of attitudes to staying home

Simon T. van Baal[a,b] (https://orcid.org/0000-0001-5351-4361)
Lukasz Walasek[b] (https://orcid.org/0000-0002-7360-0037)
Daniela Karanfilovska[c]
Allen C. Cheng[c,d] (https://orcid.org/0000-0003-3152-116X)
Jakob Hohwy[a] (https://orcid.org/0000-0003-3906-3060)

[a] Cognition & Philosophy Lab
Department of Philosophy
20 Chancellors Walk
Monash University
Melbourne VIC 3800
Australia

[b] Department of Psychology
University of Warwick
CV4 7AL
United Kingdom

[c] Infection Prevention and Healthcare Epidemiology Unit
Alfred Health
55 Commercial Rd
Melbourne VIC 3004
Australia

[d] School of Public Health and Preventive Medicine
Monash University
Melbourne, VIC 3800
Australia

Corresponding author: Simon.vanBaal1@monash.edu

Abstract

Little is known about how different government communication strategies may systematically affect people's attitudes to staying home or going out during the COVID-19 pandemic, nor how people perceive and process the risk of virus transmission in different scenarios. In this study, we report results from two experiments that examine the degree to which participants' attitudes regarding the permissibility of leaving one's home are (1) sensitive to different levels of risk of viral transmission in specific scenarios, (2) sensitive to communication framings that are either imperative or that emphasise personal responsibility, or (3) creating "loopholes" for themselves, enabling a more permissive approach to their own compliance. We find that the level of risk influences attitudes to going out, and that participants report less permissive attitudes to going out when prompted with messages framed in imperative terms, rather than messages emphasising personal responsibility; for self-loopholes, we find no evidence that participants' attitudes towards going out in specific scenarios are more permissive for themselves than for others. However, participants report they are more rigorous in staying home than others, which may cause moral licensing. Additionally, we find that age is negatively associated with permissive attitudes, and that male participants are more permissive to going out. Thus, during phases where it is important to promote staying home for all scenarios, including those perceived to be low-risk, imperative communication may be best suited to increase compliance.

1. Introduction

COVID-19 is a medical condition, but achieving compliance with public health measures is a behavioural, socioeconomic and ethical matter, which severely tests the patience, resources and decision-making of any population. To enable efficient suppression (or mitigation or containment) of the pandemic, future variants, and other disease outbreaks, it is therefore critical to explore the conditions under which the public complies optimally with requests to stay home and to socially distance themselves (Anderson et al., 2020; Bavel et al., 2020; Lunn, Belton, et al., 2020; Zhang et al., 2020).

Governments focus on effective communication to the public to enhance compliance while matching the language to the severity of the situation. This is prudent because message framing impacts physical distancing intentions and attitudes (Everett et al., 2020). For example, in the UK, communication changed from a strong imperative 'Stay Home' to language that invites personal responsibility: 'Stay Alert'. This was mirrored in Australia, where the motto communicated to the public was initially 'if you can stay home, you must stay home', changing to 'stay safe', when the danger to the healthcare system decreased. It is unclear, however, how people's attitudes toward going out change when different communication styles are used to guide compliance. In particular, we are interested in whether imperative-based instrumental language (Renn, 2008) and personal responsibility-based communication that seeks to increase civic engagement (Head, 2011) affect risk perception and attitudes to behaviour for different levels of risk. Further, we are interested in whether such communication styles modulate attitudes to behaviour differentially when people are considering their own case or that of others.

COVID-19 risk perception, and key factors influencing it, has been studied in light of political orientation (Barrios & Hochberg, 2020), personal experience with the virus, individualistic and prosocial values, trust in science (Dryhurst et al., 2020), and perceived probability of getting infected (Wise et al., 2020). However, less is known about the attitudes towards going out for activities with different levels of transmission risk associated with them. There has been some interest in 'marginal' cases where decisions are particularly difficult (Lunn, Timmons, et al., 2020), but what constitutes a

'marginal' case differs for each person and depends on the context. The starting point for this study is therefore whether people's attitudes to going out in specific scenarios correspond to the actual transmission risk (i.e., people ought to be more stringent about going out in high-risk scenarios).

As mentioned, there are prominent examples where communications regarding desired behaviour during the COVID-19 pandemic largely fall into one of two classes: imperative messaging, and communication that invites personal responsibility and reasoning from the public. The communications that invoke personal responsibility are often part of a strategy to create or maintain civic engagement, whereas the imperative simplifies the task at hand, a strategy that appears to follow the (often criticised) deficit model. The deficit model homogenises the audience and communicates information that serves to fill a deficit in knowledge (Meyer, 2016). Such an approach is often not beneficial for civic engagement, but when risks are high and without ambiguity, instrumental discourse can work well (Renn, 2008). In contrast, communication that encourages civic engagement (or community engagement) can enhance the effectiveness of containment measures in public health emergencies (Renn, 2008, 2020), and increase the likelihood of cooperation by the public (Head, 2011). Thus, which mode of communication is most successful at swaying attitudes on going out is yet to be determined and this knowledge could be of assistance for public health responses. This study thus analyses how the different modes of communication (imperative and responsibility-based) influence behavioural attitudes across high, low and minimal risk levels.

People will display responsible decision-making only if they do not create "self-loopholes" for their actions. That is, if they believe an action is impermissible in general (or for others), then they should not believe it is permissible for themselves. In contrast to many of our everyday moral decisions in normal times (e.g., giving to charity or not), a wrong decision during a pandemic can have disastrous consequences (e.g., joining a large gathering or travelling to an unaffected area while infected) (for modelling that highlights this moral aspect, see Donnarumma & Pezzulo, 2020). Loophole reasoning has been evident in some widely publicized cases of politicians and public officials publicly espousing general physical distancing edicts and yet privately finding exceptions for themselves. Here, we therefore investigate if attitudes to scenarios at different risk levels become laxer when they are presented in the first person compared to the third person.

An efficient government communication strategy for managing the COVID-19 crisis thus requires clarity on the role of several psychological factors, which may interact in critical ways, for responsible decision-making about whether to stay home or go out: the perception of different risk levels of everyday scenarios, whether instructions to stay home are imperative or invoke personal responsibility, and how various communication strategies affect beliefs about one's own actions and those of others.

Accordingly, the two experiments reported in the current study measure how permissive participants' attitudes to going out of the house are for a set of everyday scenarios. In the first experiment, scenarios presented to the participants vary in risk level, are presented in the first or third person, and with either imperative-based, personal responsibility-based, or no messaging. We made the following predictions: (1) attitudes to going out will be least permissive for high-risk scenarios, and increasingly permissive for low and minimal-risk scenarios. (2) There will be less permissive attitudes to going out when communication is framed as an imperative and less permissiveness when personal responsibility is emphasised, especially for higher risk levels, compared to the control condition. For loophole reasoning, a more exploratory approach seems appropriate: we are interested in whether permissiveness to going out is higher for cases pertaining to other people than those pertaining to oneself. The second experiment aims to replicate some of the findings in experiment 1 and further explores the possibility of loophole reasoning.

2. Experiment 1

2.1. Methods

2.1.1. Participants

The data collection was completed between 8 and 16 June 2020 via the Prolific online research participant database, sampling residents in the United Kingdom. At this time, the effects of the pandemic in the UK had marginally improved because the country started to get a grip on the first wave of COVID-19 through physical distancing measures, and lockdown restrictions were eased significantly. The importance of pandemic response measures had likely become evident to the population at that time.

Data from 607 participants, using volunteer sampling (through Prolific), was collected, and those who did not report that they resided in the United Kingdom during the survey were excluded, leaving 581 participants. The participants were paid £1.25 for their participation. All participants provided informed consent as approved by the Monash University Human Research Ethics Committee (Project ID: 24774).

The sample consisted of 39.2% males with a mean age of 40.1 (SD = 13.2), and 60.8% females with a mean age of 38.2 (SD = 12.3). Participants were required to be fluent in English (92.4% were native speakers, and 7.1% of the participants indicated that English was their second language). Participants were excluded before completion of the experiment if they were diagnosed with dyslexia, dyspraxia, attention deficit hyperactivity disorder, or if they had trouble reading for any reason (including uncorrected abnormal vision).

2.1.2. Apparatus

Participants were each presented with 30 scenarios, and they were instructed to evaluate these scenarios by indicating to what degree they were certain that it was alright to leave the house under the circumstances described in the scenario (we called this ‘self-isolation’ in the experiment, and it was made clear that this referred to stay-at-home orders). Participants indicated their certainty on a visual analogue scale (VAS) ranging left-to-right from 0-1, without them being able to see this number, with 0 signifying “completely certain it is not alright to go out”, and 1 signifying “completely certain it is alright to go out”. The framing ‘alright to go out’ was chosen for the dependent variable as a succinct, jargon-free, colloquial and normatively neutral indicator of the participant’s attitude to leaving the home in a given hypothetical scenario.

The VAS anchor was made to be invisible until the participants would press on the bar with their mouse cursor. The VAS was displayed on the same page as the scenario and question prompt, and the length of the VAS is adjusted in proportion to the dimensions of the viewing screen, as determined by Qualtrics programming.

2.1.3. Procedure

After signing consent, participants were required to pass an attention check, in which they received a question asking them to indicate which one of four options was not a city in the U.S., with the instructions reading “Regardless of the right answer, please select Chicago”. If they did not complete this question correctly, the participants were not allowed to complete the survey and no data were recorded. Afterwards, the participants completed basic demographics questions, and they were prompted with instructions:

“This study is about self-isolation decision making during the Covid-19 crisis. Imagine that the country you live in is in lockdown during the first wave of the disease, while the number of daily new cases is starting to come down. Everybody except essential workers is required to self-isolate in order to stop the spread of Covid-19 through the community. We will prompt you with 30 different scenarios concerning self-isolation. Please take your time as you go through these. For each scenario, please indicate to what extent you deem it alright for people to go out of the house. We will start with an example, so you can familiarise with the task.” See Appendix for additional instructions presented in conjunction with a practice trial.

The scenarios were divided into 3 levels, presenting a classification of the risk of transmission of the virus. This within-participants Risk Level factor thus has three levels: minimal-risk, low-risk, and high-risk. The scenarios were categorised into risk levels by consensus of two experts in infectious diseases, with extensive experience in COVID-19 public health (AC, an infectious diseases physician and former Deputy Chief Health Officer to the Australian state of Victoria; and DK, an experienced clinical nurse consultant in infection prevention). We deemed the risk profile of the scenarios used to be fairly generalisable across populations, even though risk and public health messaging may have differed in some respects between the UK and Australia at various points of the pandemic. Participants were not shown the risk levels and were not explicitly asked about them. The order of presentation of the scenarios was randomised (for a complete list of the scenarios, see Table A1). Within each of the 30 trials, the participants were reminded of the overall situation with the words “The country is in lockdown, people are self-isolating” at the top of the screen above the scenario prompt.

As a between-participant manipulation, the scenarios were either presented referring to the participant themselves (i.e., referring to ‘you’), or using an indefinite pronoun (i.e., referring to ‘someone’). For example, “You want to go for a vigorous walk at sunrise...” vs “Someone wants to go for a vigorous walk at sunrise…”. This Perspective factor thus has two levels: Self, Other.

As a further between-participant manipulation, each scenario was followed by communication on how to handle decisions on staying home or going out. After reading the scenario, either they read the sentence “people should stay home, if they can stay home” (Imperative condition), “people should consider whether they will get close to other people before they go out” (Personal Responsibility condition), or no further communication (Control condition). This is then the Communication factor, with three levels. These conditions were presented between participants to help ensure participants stayed naive to the purpose of the experiment.

Participants were randomly assigned to one of the six treatment arms, parsed by the Communication factor, and the Perspective factor. This was done by using the randomised block assignment option with quotas in Qualtrics. In the final sample 192 participants were assigned to the Control Condition (97 in the Self condition, 95 in the Other condition), 197 participants were assigned the Imperative condition (Self, n = 98; Other, n = 99), and 192 participants were assigned the Personal Responsibility condition (Self, n = 96; Other, n = 96). The experiment then has a mixed 3 x 2 x 3 design, with three independent variables (Risk Level, Perspective, Communication), and one dependent variable, permissiveness (i.e., indicating certainty about whether it is alright to go out or not on the VAS). There were two between participant factors, Communication and Perspective, there were thus 6 groups with 95-99 participants in each.

2.1.4. Analysis

Participants’ permissiveness to going out is operationalised as the scores participants reported on the visual analogue scale. The independent variables tested for the main analysis are Risk Level, with three

levels (in ascending order: minimal-risk, low-risk, high-risk), perspective, with two levels (Self and Other), and communication, with three levels (Control, Imperative, Personal Responsibility). See Table 2 for descriptive statistics partitioned by the 3 factors.

Given the non-normal, continuous, ordinal nature of the data, we conducted a continuous ordinal regression (Manuguerra & Heller, 2010; Manuguerra et al., 2020), with permissiveness as the dependent variable, including each of these factors as independent variables together with the participant's age and sex. In addition, the participant was included as a random intercept in the model and an interaction between Communication and Risk Level was included. Given the risk and communication factors consisted of three levels and main effects of factors cannot be judged from model coefficients if factors consist of more than two levels, likelihood ratio tests were used to assess the presence of main effects and interaction effects. The other effects will be assessed through t-tests on the model coefficients.

Any effects were considered significant if they fell below the significance criterion (α = .05). Differences between factor levels were considered significant based on a false discovery rate (FDR) corrected alpha-level of .05. We also obtained a Bayes Factor for inclusion of the Perspective effect to assess the evidence for the null hypothesis using the bayesTestR package (Makowski et al., 2019), based on the approach by Wagenmakers (2007). In addition, an exploratory analysis was conducted by analysing the effects of age and sex on the visual analogue scale responses.

We were unable to get a reasonable a priori estimate of the effect sizes this study would be likely to have. A G*Power (Faul et al., 2009) estimate for 90% power at an effect size of d = .1 produced a sample size of 432 participants with our mixed design. To mitigate the ambiguity of the effect sizes and a priori, the target sample size was set to 140% of this estimate.

Data are available here: https://osf.io/dbqa4/?view_only=65b6efa2b9944b9fbb2d0b46abe95878

2.2. Results

The sample was well balanced across conditions in terms of age and sex, although female participants were-overrepresented in all conditions, see Table 2.

	Communication					
	Imperative		Personal Resp.		Control	
	Mean Age (SD)	N	Mean Age (SD)	N	Mean Age (SD)	N
Self						
Female	37.8 (12.1)	61 (62.24%)	36.59 (11.84)	61 (63.54%)	37.22 (11.46)	59 (60.82%)
Male	39.97 (13.59)	37 (37.76%)	38.63 (12.23)	35 (36.46%)	40.39 (12.22)	38 (39.18%)
Other						
Female	37.9 (12.32)	58 (58.59%)	40.45 (13.4)	60 (62.5%)	39.26 (12.32)	54 (56.84%)
Male	43.98 (13.21)	41 (41.41%)	37.64 (12.4)	36 (37.5%)	39.41 (14.41)	41 (43.16%)

Table 2. The age and sex distribution of participants in the 6 groups, partitioned by the Communication factor (3 levels), and the Perspective factor (2 levels).

There was a main effect of risk $\chi^2(13.53) = 4082.1$, $p < .0001$. Model coefficients show that participants indicated lower permissiveness to going out in the scenarios identified as high-risk scenarios (M = .202, SD = .283) than in the minimal-risk scenarios (M = .509, SD = .362), OR = 8.637, 95% CI [8.045, 9.272], $t(572) = 59.50$, $p < .0001$, and than in the low-risk scenarios (M = .333, SD = 31.9), OR = 2.872, 95% CI [2.693, 3.062], $t(572) = 32.13$, $p < .0001$. Participants also reported significantly lower permissiveness in the low-risk scenarios compared to the minimal-risk scenarios, OR = 3.007, 95% CI [2.784, 3.248], $t(572) = 27.95$, $p < .0001$. The odds ratios refer to the chances of obtaining a lower value

on the VAS scale, so the odds of getting a lower permissiveness value in a high-risk scenario compared to the low-risk scenario is 2.872:1. See Figure 1A.

There was also a main effect of the communication factor (Imperative, Personal Responsibility, Control) on permissiveness, $\chi^2(4.16) = 79.8$, $p < .0001$. The imperative phrasing reduced permissiveness (M = .277, SD = .323), OR = 1.486, 95% CI [1.137, 1.940], $t(572) = 2.90$, $p = 0.01$ compared to the control (M = .324, SD = .348), but there was no evidence that the personal responsibility phrasing did the same (M = .312, SD = .335), OR = 1.117, 95% CI [.833, 1.401], $t(572) = .82$, $p = .41$. After the FDR correction, participants' judgments in the imperative condition were not significantly less permissive than the personal responsibility condition, OR = 1.327, 95% CI [1.016, 1.733], $t(572) = 2.07$, $p = .057$. This means that the imperative framing caused less permissive attitudes toward going out of the house than the control, while we found no evidence that personal responsibility communication had this effect. See Figure 1B.

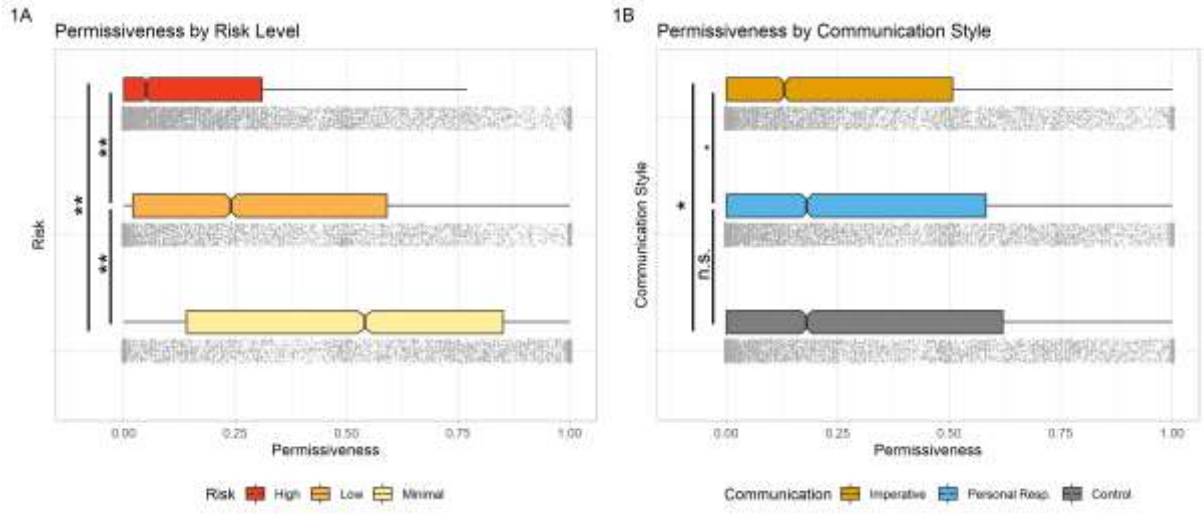

*Fig 1A and 1B. Main effects of Risk Level factor and Communication factor. The left panel (1A) indicates participants' visual analogue scale (VAS) responses to the three Risk levels (respectively: high-risk, low-risk, minimal-risk), while the right panel (1B) pertains to the three Communication conditions (respectively: Imperative, Personal Responsibility, Control). Higher VAS responses correspond to more permissive attitudes to leaving home. **: p<.001; *: p<.05; .: p<.1; n.s.: p>.1.*

There was a significant interaction effect of the communication factor and the risk factor on permissiveness, $\chi^2(4.32) = 78.7$, $p < .0001$. Where the difference between the Imperative condition (M = .456, SD = .356) and the Control condition (M = .555, SD = .364) was greatest in the minimal-risk scenarios, OR = 1.895, 95% CI [1.415, 2.536], $t(572) = 4.29$, $p < .001$. The difference (M = .294, SD = .310 v M = .371, SD = .327) was attenuated (but still present) for the low-risk scenarios, OR = 1.677, 95% CI [1.257, 2.237], $t(572) = 3.52$, $p < .001$, and attenuated further for the high-risk scenarios, where the effect of the imperative condition was not significant (M = .191, SD = .276 v M = .203, SD = .288), OR = 1.032, 95% CI [.079, 1.354], $t(572) = .23$, $p = .92$. The personal responsibility condition displayed the same trend but the effect was not significant in any of the conditions (high-risk: M = .213, SD = .286; low-risk: M = .335, SD = .315; minimal-risk: .518, SD = .359) ORs: .884, 1.250, 1.270; $ps > .1$. See Figure 2 for a depiction of the differences in attitudes for each risk level per communication condition.

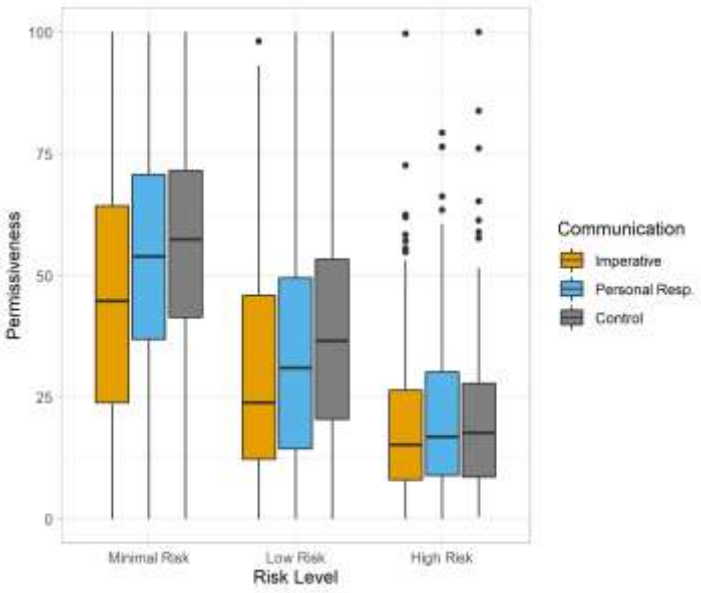

Figure 2. Interaction of the risk level of a scenario and the communication style. The orange boxplot indicates the responses in the Imperative condition, the blue indicates the responses in the Personal Responsibility condition, and the grey indicates the responses in the Control condition. The data are represented on the measurement scale.

Participants' reported permissiveness to going out when scenarios were presented referring to someone (M = .299, SD = .334) as compared to when presented as pertaining to oneself (M = .309, SD = .338), was not significantly higher, OR = 1.021, 95% CI [.910, 1.145], $t(572) = .18$, $p = .85$. To assess support for the null hypothesis, that there was no effect of the perspective factor, we assessed the evidence for excluding the effect from the model, $BF_{01} = .1.62$. This evidence in favour of excluding the effect from the model shows anecdotal support for the absence of a perspective effect.

Subsequent exploratory analysis showed that age and sex affected permissiveness. Younger people were more likely to report permissive attitudes to going out, OR = 1.035, 95% CI [1.026, 1.044], $t(572) = 7.79$, $p < .0001$, and male participants were more likely to report permissive attitudes than females (M = .335, SD = .346; M = .284, SD = .327), OR = 1.481, 95% CI [1.325, 1.657], $t(572) = 3.448$, $p < .0001$. See Figure 3 for a depiction of the relationship between permissiveness, age and sex.

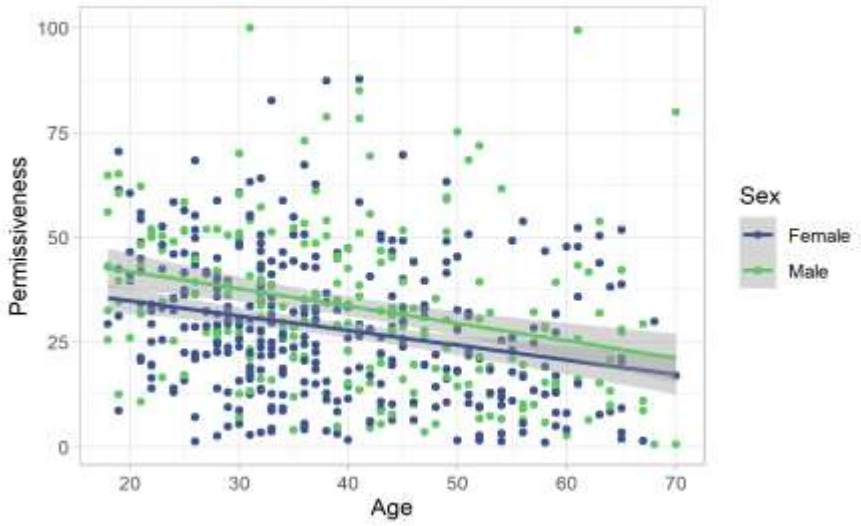

Figure 3. Exploratory visualisation of the relationship between participants' permissiveness attitudes and demographic variables in experiment 1. The blue points are average visual analogue scale responses for females, and the green points are average visual analogue scale responses for males. The blue and green regression lines show the effect of age on permissiveness, partitioned by sex.

2.3. Discussion of Experiment 1

The findings from the first experiment are that (1) participants' attitudes become less permissive to going out with increasing risk level of transmission; (2) imperative communication decreases participants' permissiveness, especially in low and minimal-risk scenarios. There was no self-loophole effect. An exploratory analysis of the demographic variables revealed that younger participants were more permissive to going out than older participants, and males were more permissive than females.

This experiment has some limitations, which provided reasons for conducting a second experiment. First, this experiment used a visual analogue scale (VAS) with no banding or marking beyond the labels for the endpoints. This choice of scale could have had an impact on results; floor and ceiling effects were evident in this experiment, which might conceal further effects of interest. It is possible that a banded VAS design, or giving dynamic feedback upon placing the marker, would modulate the results (Matejka et al., 2016), and there are multiple factors to consider when deciding to employ a midpoint or not (Chyung et al., 2017). Another experiment was needed to examine if the inclusion of a midpoint would lessen the floor/ceiling effects evident in this study (as well as in other studies, such as (Barari et al., 2020). Thus, the second experiment incorporated a between-participants factor assessing the effects of a midpoint marker on the VAS versus no midpoint maker on the VAS (this factor will be referred to as VAS Marker). To not dramatically increase the required *n* to obtain reliable results, it was necessary to drop the communication factor.

Second, the initial experiment used an indefinite pronoun (i.e. 'someone') when describing scenarios in the Other condition. This could have weakened our perspective manipulation because 'someone' can be used to describe oneself. Thus, the second experiment was designed to address this issue by referring to 'a person in your neighbourhood'.

In addition, we investigated another possible way that people may arrive at loophole reasoning. People have a general tendency to view their own actions more favourably, which is called self-serving bias (Mezulis et al., 2004), and to view themselves as better than average, illusory superiority (Zell et al., 2020). This could also be the case for pandemic response behaviour, such that people will falsely believe their physical distancing behaviour is more rigorous than that of others. This is potentially harmful because if people believe that they have acted morally (because they think they are comparatively rigorously physical distancing), they will be more likely to behave immorally later (Blanken et al., 2015), which could be a reason for suboptimal compliance. This counterintuitive behaviour pattern is called moral licensing. Exploring this other form of self-loopholes is important because the hypothetical scenarios in this study are unlikely to capture such effects, given that these scenarios are supposed to be viewed in isolation, and not in context of one's past actions. The second experiment investigates that question by asking participants to rank their compliance as compared to others in their community, and uses the results of that to infer whether they exhibit illusory superiority.

The effects of sex and age were discovered due to exploratory analysis. Therefore, we deemed it necessary to replicate these results and strengthen our confidence in the evidence that these effects exist. Given these three limitations, we decided to conduct another experiment.

3. Experiment 2

The second experiment was conducted to replicate the effects of the first experiment holding fixed the communication messaging, to validate the methodology of our VAS design, to verify the sex and age effects, and to further investigate self-loopholes and beliefs about one's own physical distancing behaviour compared to that of others.

Thus, we made the following predictions for the second experiment: (1) participants are sensitive to levels of risk of viral transmission, and as such display decreasing permissiveness to going out over increasing levels of risk. (2)(a) Younger people and (b) males are more permissive to going out. (3) Introducing a midpoint marker on the VAS will alleviate the ceiling and floor effects that were evident in the first experiment. (4) Participants make self-loopholes when the phrasing of a scenario is explicitly allocentric. (5) Participants display illusory superiority when they compare their compliance to that of others in their community.

It is noteworthy that the second experiment was conducted two months after the first, in which the situation was marginally different. For instance, restrictions were in place, but lockdowns had long been lifted at that point because the UK was seemingly able to keep infection rates low. Schools were planned to reopen in the next month, and the R number was said to be above 1 only in three relatively densely populated areas of England (London, the North-West, the South-West, see e.g. https://www.itv.com/news/2020-08-07/coronavirus-r-number-could-be-above-one-in-london-south-west-and-north-west).

3.1. Methods

3.1.1. Participants

The data collection was completed on 7 August 2020 via the Prolific online research participant database. Data from 412 participants was collected, and 3 participants whose responses were all at either bound of the scale were excluded from analysis, as well as one participant who answered "Other" on the sex question was excluded from analysis due to the low number of observations in this category, leaving 408 participants. Participants were paid £1.25 for their participation. All participants provided informed consent as approved by the Monash University Human Research Ethics Committee (Project ID: 24774).

The sample consisted of 33.1% males with a mean age of 37.2 (SD = 11.7), and 66.9% females with a mean age of 33.1 (SD = 10.6). Participants were required to be fluent in English (89.0% were native speakers, and 10.8% of the participants indicated that English was their second language). Participants were excluded before completion of the experiment if they had participated in the initial experiment, were diagnosed with dyslexia, dyspraxia, attention deficit hyperactivity disorder, or if they had trouble reading for any reason (including uncorrected abnormal vision).

3.1.2. Apparatus

The VAS was largely the same as in Experiment 1, but as a between-participant manipulation, the VAS was either identical to the one in the initial study (No Marker condition), or it contained a visible midpoint on the scale at "uncertain whether it is alright or not" (Midpoint condition). In both conditions, we also included a label underneath the midpoint: "Uncertain if it is alright or not", see Figure A2.

After the 30 scenarios were presented, all participants were prompted with a question in which they were instructed to indicate where they ranked in the population in terms of compliance. The scale ranged

from 0 signifying “I self-isolated the least”, 50 signifying “50% isolated more, and 50% isolated less than me”, and 100 signifying “I self-isolated the most”. The VAS for this question showed a number as the participants hovered over the slider with their cursor, so they could provide a more precise ranking. The question was phrased as:

“We want you to think about when the country was in lockdown. Consider how much you were self-isolating, and how much others were self-isolating. Where would you rank yourself in terms of self-isolation compared to others in your community?”

3.1.3. Procedure

While in Experiment 1 participants were presented with self or other-framings of scenarios, this experiment also referred to the participant themselves (i.e., identical to the self-framing), but referred more explicitly to another person (i.e., referring to ‘a person in your neighbourhood’). Further, given the prevalence of imperative framing in government communication during the response to COVID-19 in various nations, all scenarios were framed with imperative messaging, phrased identically to the manipulation that was administered in Experiment 1.

Participants were randomly assigned to the 4 treatment arms for the two between-participant factors, perspective and VAS marker. There were 202 participants in the Midpoint condition (Self, n = 100; Other, n = 102), and 206 in the No Marker condition (Self, n = 103; Other, n = 103). This experiment had a mixed 3 x 2 x 2 design, with three independent variables (Risk Level, Perspective, VAS marker), and two dependent variables, permissiveness (i.e. indicating certainty about whether it is alright to go out or not on the VAS), and self-adherence ranking. There were two between participant factors, VAS Marker and Perspective.

3.1.4. Analysis

The main analysis for this experiment was analogous to the analysis in experiment 1; we conducted a continuous ordinal regression (Manuguerra & Heller, 2010; Manuguerra et al., 2020), with permissiveness as the dependent variable, including each of the three factors as independent variables, together with demographic variables age and sex, and the participant as a random intercept. Considering the risk factor consisted of three levels and main effects of factors with more than two levels cannot be judged from model coefficients, likelihood ratio tests were used to assess the presence of main effects and interaction effects involving the risk factor. The other effects were assessed through t-tests on the model coefficients. Any effects were considered significant if they fell below the significance criterion (α = .05). Differences between factor levels were considered significant based on a false discovery rate (FDR) corrected alpha-level.

We also obtained a Bayes Factor for inclusion of the VAS marker and the perspective effect to assess the evidence for the null hypothesis using the bayesTestR package (Makowski et al., 2019), based on the approach by Wagenmakers (2007).

To assess the support for the null hypothesis that VAS Marker does not affect permissiveness, we obtained the Bayes Factor for inclusion of the Perspective and VAS Marker factors to assess the evidence for the null hypotheses using approach mentioned before.

In addition, we tested whether floor and ceiling effects were alleviated by transforming the VAS responses: the dependent variable was a dichotomous variable representing whether the response fell between [0, .1] or [.9, 1] (i.e., at the bottom or top 10% of the scale). Then, a likelihood ratio test of binomial generalised linear mixed models was used to identify whether a model including the VAS Marker factor fit the data significantly better than a model without that factor.

We then conducted a Wilcoxon Rank Sum test to assess whether the median of participants' self-reported self-adherence rankings was greater than 50. We also assessed the evidence on whether sampling at different timepoints affected participants' permissiveness by collating the data from both experiments, and running a continuous ordinal regression including the communication, perspective, risk, VAS marker, age and sex variables, as well as a variable for the timepoint at which data was collected. The coefficient for the timepoint was used to infer whether participants attitudes were different in Experiment 1 than in Experiment 2.

Data are available here: https://osf.io/dbqa4/?view_only=65b6efa2b9944b9fbb2d0b46abe95878

3.2. Results

The age and sex distribution per group was less well-balanced in this experiment compared to the first (See Table 3), but given that participants' characteristics were included in the model, this modest imbalance should not negatively impact the results.

	VAS Marker			
	Midpoint Marker		No Midpoint Marker	
	Mean Age (SD)	N	Mean Age (SD)	N
Self				
Female	31.97 (9.84)	61 (59.8%)	36.74 (10.72)	68 (66.02%)
Male	39.03 (10.72)	39 (38.24%)	36.94 (11.77)	35 (33.98%)
Other				
Female	32.83 (11.12)	71 (71%)	30.93 (9.51)	73 (70.87%)
Male	35.03 (11.46)	31 (31%)	37.5 (12.47)	30 (29.13%)

Table 3. Descriptive statistics of age and sex distribution in the 4 conditions that consist of the VAS Marker factor (2 levels), and the Perspective factor (2 levels). The N column indicates the number of participants in each cell, as a percentage of the number of participants in that group.

Permissiveness in the Midpoint condition (M = .315, SD = .317) was not significantly different from the No Marker condition (M = .302, SD = .310), OR = 1.162, 95% CI [.891, 1.516], $t(408) = 1.11$, p = .27. There was also no significant difference in permissiveness between the Self condition (M = .306, SD = .319) and Other condition (M = .311, SD = .307), OR = 1.008, 95% CI [.763, 1.332], $t(408) = .06$, p = .95. We obtained Bayes Factors to assess support for the null hypotheses (i.e., no main effect of perspective or the VAS marker), resulting in BF_{01} = 1.57 for perspective and BF_{01} = 1.36 for the VAS marker. This indicates anecdotal evidence for the absence of an effect for both factors. For density plots of the responses partitioned by risk level, see Figure A3. The binomial GLMM showed that the VAS Marker was not a significant predictor for the likelihood of responding at the extremes of the scale [0 - .1; .9 - 10], $\chi^2(8) = .00$, p = .98.

Like in the previous experiment, there was a main effect of risk on permissiveness, $\chi^2(6.08) = 2214.9$, p<.0001. Participants reported less permissiveness of going out in high-risk scenarios (M = .223, SD = .334) than in the low-risk scenarios (M = .333, SD = .301), OR = 2.402, 95% CI [2.226, 2.592], $t(408) = 22.60$, $p < .0001$, and than in the minimal-risk scenarios (M = .480, SD = .334), OR = 6.628, 95% CI [6.100, 7.204], $t(408)$, $p < .0001$. They also reported less permissiveness in the low-risk scenarios compared to the minimal-risk scenarios, OR = 2.759, 95% CI [2.518, 3.024], $t(408) = 21.71$, $p < .0001$. This replicates the effect of experiment 1, which showed that participants reported less permissive attitudes (by reporting a lower score on the VAS) to going out for increasing risk levels. See Figure 3.

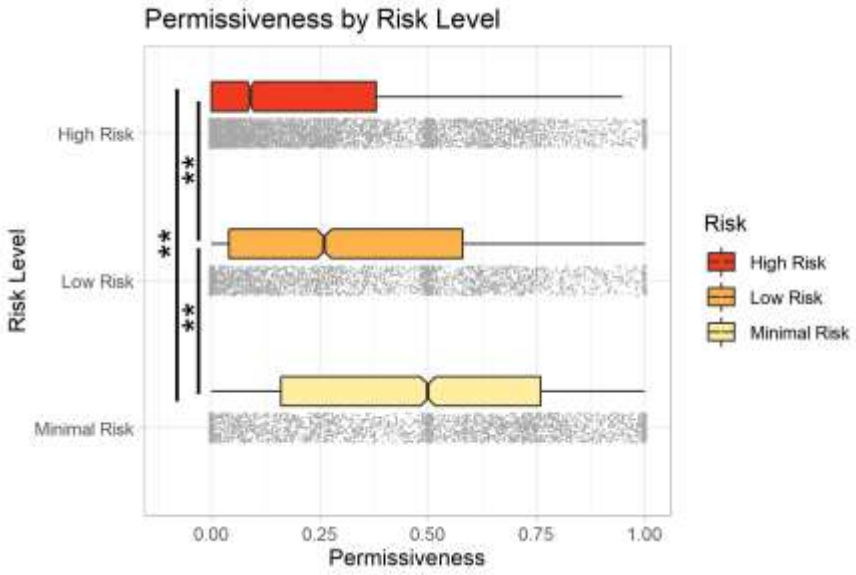

*Figure 3. Main effects of risk; the dots represent participants' responses indicating permissiveness to going out (as indicated on a visual analogue scale) to the three risk levels (respectively: high-risk, low-risk, minimal-risk). Higher VAS responses correspond to more permissive attitudes to going out. **: p<.001; *: p<.05; .: p<.1.*

Older people reported less permissive attitudes to going out than younger people, OR = 1.042, 95% CI [1.029, 1.055], $t(408) = 6.63$ $p < .0001$ and female participants ($M = .300$, $SD = .310$) reported less permissive attitudes than males ($M = .325$, $SD = .320$), OR = 1.249, 95% CI [1.083, 1.441], $t(408) = 3.05$, $p < .01$. This replicates the effects from experiment 1. See Figure 4.

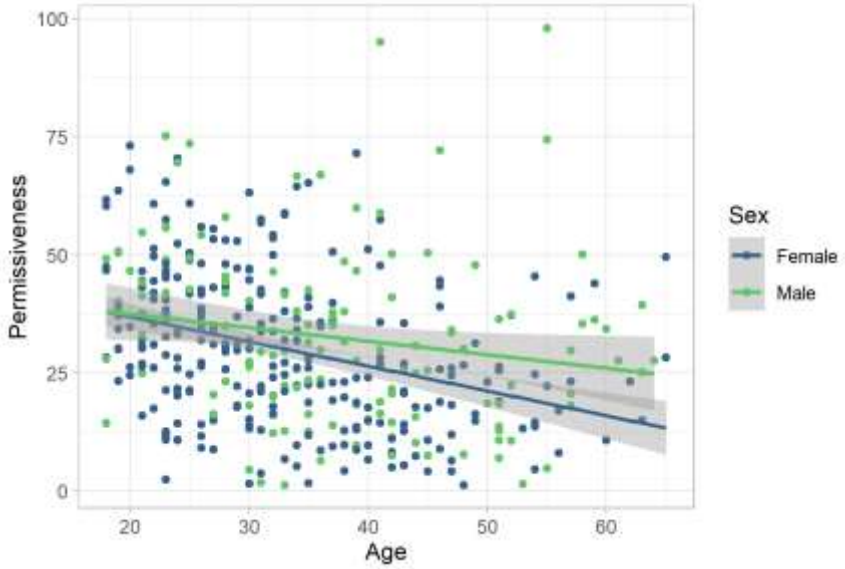

Figure 4. Visualisation of the relationship between participants' permissiveness attitudes and demographic variables in the second experiment. The blue points are average visual analogue scale responses for females, and the green points are average visual analogue scale responses for males. The blue and green curves are regression lines, showing the effect of age on permissiveness, partitioned by sex.

The median self- adherence ranking was significantly higher than 50, 95% CI [.795, .825], $z = 16.13$, $p < .0001$.

To see whether collecting data at the different timepoints had an effect on our dependent variable, we compared the VAS responses from June (M = .304, SD = .314) to August (M = .309, SD = .336), OR = 1.297, 95% CI [1.258, 1.339], $t(28) = 8.171$, $p < .0001$. This means that, all else being equal, participants in the first experiment were more likely to report less permissive attitudes. We found no other meaningful differences in participants' judgments between experiments.

3.3. Discussion of Experiment 2

The findings from the second experiment are that (1) like in the first experiment, participants' attitudes report lower permissiveness to going out in scenarios with increasing risk level. (2a) Sex is a significant factor in attitudes to staying home, with males reporting more permissive attitudes to going out than females; (2b) age is a significant factor in attitudes to staying home, with younger participants reporting more permissive attitudes to going out than older participants. (3a) There was no effect of VAS Marker, (3b) nor was there support for lesser floor and ceiling effects. However, there was a larger concentration of responses around the midpoint in the Midpoint condition. This shows that the midpoint marker encouraged fence sitting, rather than meaningfully relieving floor or ceiling effects. (4) There was no evidence to support an effect of Perspective. (5) Participants report illusory superiority, as they significantly overstate their stay-at-home order compliance in comparison to others in their community. We also found that participants in the second experiment were slightly more permissive than those in the first experiment, which may be due to the data collection happening in different stages during the pandemic. We did not find any other differences that could affect the interpretation of results.

4. General Discussion

This study manipulated framing for a set of scenarios at three different risk levels, to investigate the association with people's attitudes to staying home or going out for specific activities. We studied the effects of imperative and personal responsibility-based framings of government advice ("people should stay home, if they can stay home" vs "people should consider whether they will get close to other people before they go out", and a control condition without additional framing), as well as self and other ("You" vs "Someone" or "A person in your neighbourhood") framings for the selected scenarios. Imperative framings were found to be effective at reducing permissiveness to going out, and participants show sensitivity to risk of disease transmission, but suffer from illusory superiority. We found no evidence that they judge scenarios from someone else's viewpoint more strictly than when they judge what to do themselves. Older people were less permissive of going out, as were female participants compared to males.

The imperative framing was more effective than the framing invoking personal responsibility at encouraging stringent attitudes to staying home in general, and particularly in low and minimal-risk scenarios. This interaction may be due in part to floor effects for the high-risk scenarios, where participants were already very impermissive of going out. Imperatives are simple and apply equally to all scenarios where the imperative can plausibly be followed, making them useful for cutting through uncertainty in decisions about going out, which can be effective in situations with high risk (Renn, 2008). However, even when faced with an imperative, people seem to reason about the risks of each condition, as revealed in the different levels of permissiveness per risk level. Thus, these results suggest that it may be prudent to use imperative framing when high compliance is necessary, even in minimal-risk scenarios, when presented with a virus or variant of concern with unknown transmission characteristics or an 'escape variant' that evades vaccines. A shift to communication that emphasises personal responsibility about weighing the risk of contact with others against the need for going out

may be warranted if the objective is to be more permissive overall, but in particular for outings perceived as minimal-risk.

People adjust their responses according to the risk associated with specific activities, indicating more certainty that it is not alright to go out for risky scenarios, middle levels of certainty for low-risk scenarios, and higher levels of certainty that it is alright to go out for minimal-risk scenarios (where attitudes are approximately uniformly distributed). The issue of risk perception of different scenarios is critical to understanding individual decision-making and actual risk-taking behaviour (Bran & Vaidis, 2020). Our findings are encouraging because they show that, in broad strokes, the public is aware of the riskiness of certain scenarios and takes this into account in their decision-making. Lunn, Timmons, et al. (2020) identify 'marginal' scenarios, defined as scenarios where people were not sure whether the activities presented were advisable, but when inspecting the responses in the current study Figures A1 and A3, it appears there is considerable disagreement on the acceptability of going out across all risk levels, but most notably in minimal-risk scenarios. This wide range of uncertainty about specific scenarios could be partially due to individual differences in abilities to accommodate loss (Osmundsen & Petersen, 2020). The disagreement in whether going out is acceptable for specific scenarios is an important issue to address in communications to the public during infectious disease outbreaks.

The self vs. other framings of the scenarios did not lead to differences in responses, nor display any significant interaction with the other factors. However, the second experiment revealed that people display illusory superiority about their compliance. Understanding loophole reasoning is critical for COVID-19 because even a low number of people finding loopholes for themselves can have devastating effects (Donnarumma & Pezzulo, 2020). Illusory superiority may lead to moral licensing, and thus a self-loophole. That is, people may not *a priori* believe they are more justified in going out, but if they believe they have been morally 'good' by self-isolating rigorously, then they may be more likely to behave immorally and transgress (through moral licensing).

Several studies may pertain to our considerations about loophole reasonings. Jordan et al. (2020) investigated self-interested vs prosocial framings, a distinction that may create openings for loophole reasoning. Bilancini et al. (2020) investigated different norm-based potential communications, which may be relevant to loophole reasoning because norms can be personal or injunctive (i.e., what a person thinks other people believe is correct); they find that norm-based interventions have little impact on actual engagement. Various personality traits may also be relevant; Wolff et al. (2020) discuss impulsivity, which may relate to succumbing to temptations for loophole reasoning, and Swami and Barron (2020) discuss analytical thinking, which may relate to self-loopholes via its role in reasoning about scenarios.

Concerning risk perception, we also found that age and sex are relevant for attitudes to these scenarios. It is perhaps unsurprising that males are more permissive, less risk-averse, than females. Similarly, it may be unsurprising that younger people are more permissive to going out than older people, given the age differences in how different groups are affected by COVID-19.

This study had some limitations that should be noted. First, the participants tested all reside in the United Kingdom. This may have had a distinct influence on the results due to the different trajectories of the COVID-19 pandemic in different countries, and might limit the extent to which these results apply to different populations. Second, the study does not have information about actual behaviour, but rather an indication of participants' attitude or intention for (hypothetical) behaviour (cf., Sheeran & Webb, 2016). Third, even though there was reasonable spread in demographic variables, the samples were not representative of the population, which may affect the generalisability of findings, and in particular affect the effect sizes of age and sex. There is also a risk that self-reported attitudes to behaviours suffer

from a social desirability bias. However, there is mixed evidence on social desirability bias around COVID-19 public health guideline compliance (for absence of an effect, see Larsen et al., 2020; for evidence of an effect, see Timmons et al., 2021). GPS data suggests that self-reported physical distancing during COVID-19 does predict actual physical distancing (Gollwitzer et al., 2020).

We chose to elicit judgments from our sample by asking them to what extent it was 'alright' to go out. This wording was chosen because it is colloquial and because it lacks significant normative meaning or jargon. And while this wording was intended to elicit comprehensive judgments that subsume moral, legal, and public health considerations, participants may have interpreted this wording in various ways. For example, it is possible that our communication manipulation affected permissiveness by changing the way people interpreted the appropriate inputs to the judgment; perhaps some participants interpreted the imperative framing as emphasising that breaching the stay-at-home orders was a fineable offence, effectively increasing the salience of legal considerations. We made efforts to clarify in the instructions that the experiments concerned individual decision making (i.e., not solely legal or moral judgments), but we cannot rule out this mechanism for the effect of the imperative phrasing. Either way, we suggest that this mechanism would be interesting in itself, for example, if we could make people think about stay-at-home orders as a moral issue, then that could increase compliance (Frias-Navarro et al., 2021), and doing so indirectly - rather than by emphasising morality directly - might be preferable in some situations. Shedding light on how imperatives from public health officials influence behaviour could be an interesting direction for future research.

The lack of accurate a priori effect size estimates for experiment 1 and the elaborate experimental design led to low power for detecting interactions, and it could explain why we did not find an effect for the personal responsibility framing (but this may also be due to ineffective wording). Future studies will be able to use effect sizes from these experiments as a baseline to power experiments more efficiently and use more focused designs to eliminate the need for larger sample sizes. This would enable a more accurate assessment of the various effects found in this study with economical use of resources.

Our findings may be relevant for public policy makers and citizens alike. The communication-style used when requesting compliance from the public may meaningfully shape people's attitudes towards the policy. In particular, we might expect that using imperatives instils a sense of urgency that is appropriate for a future dangerous infectious disease outbreak. Further, it seems that, on aggregate, people display a relatively high degree of agreement in risk perception when a scenario is very risky, but in minimal risk scenarios attitudes differ widely – this may be useful information for policy makers and public health officials to incorporate in their models and predictions. Lastly, given we all tend to believe we self-isolate more than most others, it may be conducive to compliance, as well as potentially social cohesion, if communications seek to redress such conceptions.

References

Anderson, R. M., Heesterbeek, H., Klinkenberg, D., & Hollingsworth, T. D. (2020, 2020/03/21/). How will country-based mitigation measures influence the course of the COVID-19 epidemic? *The Lancet, 395*(10228), 931-934. https://doi.org/https://doi.org/10.1016/S0140-6736(20)30567-5

Barari, S., Caria, S., Davola, A., Falco, P., Fetzer, T., Fiorin, S., Hensel, L., Ivchenko, A., Jachimowicz, J., King, G., Kraft-Todd, G., Ledda, A., MacLennan, M., Mutoi, L., Pagani, C., Reutskaja, E., & Slepoi, F. R. (2020). Evaluating COVID-19 Public Health Messaging in Italy: Self-Reported Compliance and Growing Mental Health Concerns. *medRxiv*, 2020.2003.2027.20042820. https://doi.org/10.1101/2020.03.27.20042820

Barrios, J. M., & Hochberg, Y. (2020). *Risk perception through the lens of politics in the time of the covid-19 pandemic* (0898-2937).

Bavel, J. J. V., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., Kitayama, S., Mobbs, D., Napper, L. E., Packer, D. J., Pennycook, G., Peters, E., Petty, R. E., Rand, D. G., Reicher, S. D., Schnall, S., Shariff, A., Skitka, L. J., Smith, S. S., Sunstein, C. R., Tabri, N., Tucker, J. A., Linden, S. v. d., Lange, P. v., Weeden, K. A., Wohl, M. J. A., Zaki, J., Zion, S. R., & Willer, R. (2020, 2020/05/01). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour, 4*(5), 460-471. https://doi.org/10.1038/s41562-020-0884-z

Bilancini, E., Boncinelli, L., Capraro, V., Celadin, T., & Di Paolo, R. (2020). The effect of norm-based messages on reading and understanding COVID-19 pandemic response governmental rules.

Blanken, I., van de Ven, N., & Zeelenberg, M. (2015). A meta-analytic review of moral licensing. *Personality and Social Psychology Bulletin, 41*(4), 540-558.

Bran, A., & Vaidis, D. C. (2020). Assessing risk-taking: What to measure and how to measure it. *Journal of Risk Research, 23*(4), 490-503.

Chyung, S. Y., Roberts, K., Swanson, I., & Hankinson, A. (2017, 2017/11/01). Evidence-Based Survey Design: The Use of a Midpoint on the Likert Scale. *Performance Improvement, 56*(10), 15-23. https://doi.org/10.1002/pfi.21727

Donnarumma, F., & Pezzulo, G. (2020). Moral decisions in the age of COVID-19: your choices really matter. *arXiv preprint arXiv:2004.07081*.

Dryhurst, S., Schneider, C. R., Kerr, J., Freeman, A. L. J., Recchia, G., van der Bles, A. M., Spiegelhalter, D., & van der Linden, S. (2020). Risk perceptions of COVID-19 around the world. *Journal of Risk Research*, 1-13. https://doi.org/10.1080/13669877.2020.1758193

Everett, J. A. C., 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. https://doi.org/https://doi.org/10.31234/osf.io/9yqs8

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009, 2009/11/01). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Frias-Navarro, D., Pascual-Soler, M., Berrios-Riquelme, J., Gomez-Frias, R., & Caamaño-Rocha, L. (2021). COVID–19. Effect of Moral Messages to Persuade the Population to Stay at Home in Spain, Chile, and Colombia. *The Spanish journal of psychology, 24*.

Gollwitzer, A., Martel, C., Marshall, J., Höhs, J. M., & Bargh, J. A. (2020). Connecting Self-Reported Social Distancing to Real-World Behavior at the Individual and U.S. State Level. https://doi.org/https://doi.org/10.31234/osf.io/kvnwp

Head, B. W. (2011). Australian experience: Civic engagement as symbol and substance. *Public Administration and Development, 31*(2), 102-112.

Jordan, J., Yoeli, E., & Rand, D. G. (2020). Don't get it or don't spread it? Comparing self-interested versus prosocially framed COVID-19 prevention messaging.

Larsen, M., Nyrup, J., & Petersen, M. B. (2020). Do survey estimates of the public's compliance with COVID-19 regulations suffer from social desirability bias? *Journal of Behavioral Public Administration, 3*(2). https://doi.org/https://doi.org/10.30636/jbpa.32.164

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).

Lunn, P. D., Timmons, S., Belton, C. A., Barjaková, M., Julienne, H., & Lavin, C. (2020). Motivating social distancing during the Covid-19 pandemic: An online experiment. *Social Science & Medicine, 265*, 113478.

Makowski, D., Ben-Shachar, M. S., & Lüdecke, D. (2019). bayestestR: Describing effects and their uncertainty, existence and significance within the Bayesian framework. *Journal of Open Source Software, 4*(40), 1541.

Manuguerra, M., & Heller, G. Z. (2010). Ordinal regression models for continuous scales. *The International Journal of Biostatistics, 6*(1).

Manuguerra, M., Heller, G. Z., & Ma, J. (2020). Continuous ordinal regression for analysis of visual analogue scales: the R Package ordinalCont. *Journal of Statistical Software, 96*(1), 1-25.

Matejka, J., Glueck, M., Grossman, T., & Fitzmaurice, G. (2016). *The Effect of Visual Appearance on the Performance of Continuous Sliders and Visual Analogue Scales* Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems, San Jose, California, USA. https://doi-org.ezproxy.lib.monash.edu.au/10.1145/2858036.2858063

Meyer, G. (2016). In science communication, why does the idea of a public deficit always return? *Public Understanding of Science, 25*(4), 433-446.

Mezulis, A. H., Abramson, L. Y., Hyde, J. S., & Hankin, B. L. (2004). Is there a universal positivity bias in attributions? A meta-analytic review of individual, developmental, and cultural differences in the self-serving attributional bias. *Psychological bulletin, 130*(5), 711.

Osmundsen, M., & Petersen, M. B. (2020, 2020/02/01). Framing Political Risks: Individual Differences and Loss Aversion in Personal and Political Situations. *Political Psychology, 41*(1), 53-70. https://doi.org/10.1111/pops.12587

Renn, O. (2008). *Risk governance: coping with uncertainty in a complex world*. Earthscan.

Renn, O. (2020). Risk communication: Insights and requirements for designing successful communication programs on health and environmental hazards. In *Handbook of risk and crisis communication* (pp. 80-98). Routledge.

Sheeran, P., & Webb, T. L. (2016, 2016/09/01). The Intention–Behavior Gap. *Social and Personality Psychology Compass, 10*(9), 503-518. https://doi.org/10.1111/spc3.12265

Swami, V., & Barron, D. (2020). Analytic Thinking, Rejection of Coronavirus (COVID-19) Conspiracy Theories, and Compliance with Mandated Social-Distancing: Direct and Indirect Relationships in a Nationally Representative Sample of Adults in the United Kingdom. https://doi.org/https://doi.org/10.31219/osf.io/nmx9w

Timmons, S., McGinnity, F., Belton, C., Barjaková, M., & Lunn, P. (2021). It depends on how you ask: measuring bias in population surveys of compliance with COVID-19 public health guidance. *J Epidemiol Community Health, 75*(4), 387-389.

Wagenmakers, E.-J. (2007). A practical solution to the pervasive problems ofp values. *Psychonomic bulletin & review, 14*(5), 779-804.

Wise, T., Zbozinek, T. D., Michelini, G., & Hagan, C. C. (2020). Changes in risk perception and protective behavior during the first week of the COVID-19 pandemic in the United States.

Wolff, W., Martarelli, C. S., Schüler, J., & Bieleke, M. (2020). High boredom proneness and low trait self-control impair adherence to social distancing guidelines during the COVID-19 pandemic. *International journal of environmental research and public health, 17*(15), 5420.

Zell, E., Strickhouser, J. E., Sedikides, C., & Alicke, M. D. (2020). The better-than-average effect in comparative self-evaluation: A comprehensive review and meta-analysis. *Psychological bulletin, 146*(2), 118.

Zhang, Y., Jiang, B., Yuan, J., & Tao, Y. (2020). The impact of social distancing and epicenter lockdown on the COVID-19 epidemic in mainland China: A data-driven SEIQR model study. https://doi.org/https://doi.org/10.1101/2020.03.04.20031187

Appendices

Appendix A

Instructions experiment 1

This study is about self-isolation decision making during the Covid-19 crisis.

Imagine that the country you live in is on lockdown during the first wave of the disease, while the number of daily new cases is starting to come down.

Everybody except essential workers is required to self-isolate in order to stop the spread of Covid-19 through the community.

We will prompt you with 30 different scenarios concerning self-isolation. Please take your time as you go through these.

For each scenario, please indicate to what extent you deem it alright for people to go out of the house. We will start with an example, so you can familiarise with the task.

You are asked to indicate how certain you are that it is acceptable for you to go out of the house.

You indicate your answer by clicking on the grey line where you decide. A slider will then appear, which you can drag if you change your mind.

For example:

You want to get the mail from the mailbox outside. How certain are you that it is alright to go out of the house?

Instructions experiment 2

This study is about self-isolation decision making during the Covid-19 crisis.

Imagine that the country you live in is on lockdown during the first wave of the disease, while the number of daily new cases is starting to come down.

Everybody except essential workers is required to self-isolate in order to stop the spread of Covid-19 through the community.

We will prompt you with 30 different scenarios concerning self-isolation. Please take your time as you go through these.

For each scenario, please indicate to what extent you deem it alright for you[1] to go out of the house. We will start with an example, so you can familiarise with the task.

[1] In the Other condition, the word ‘you’ was replaced with ‘a person in your neighbourhood’.

Appendix B

Risk Level	Personal scenario prompt
High	You want to play basketball because a few of your friends asked you to join them today. You really enjoy playing basketball.
High	You want to go see your partner because you do not live together. Your only option is to go by public transport.
High	You want to give care to a family member who is having a difficult time. You could leave it to one of your siblings, who does not need to use public transport to get there.
High	You want to see your friend who has recently returned from abroad, as their quarantine just finished. You haven't seen them in a very long time and they have invited you over for a drink.
High	You want to return to the supermarket to pick up one item you forgot to buy. This means that you will have to go back into the busy supermarket.
High	You want to go to a birthday party for one of your friends. Their apartment is not big, and there are quite a few people coming.
High	You want to see your friend who lives close by and has invited you over for dinner. Your friend has been diligently self-isolating for 4 weeks.
High	You want to have dinner with your friends. The six of you have not seen each other for a long time. Some are more serious about social distancing than others.
High	You want to go to the shops because you change your mind about what to make for dinner, but need some other ingredients to do it. You have already gone to the shops twice today.
High	You want to go deliver a meal to an elderly person in your close family. You worry that they are lonely.
High	You want to go for a barbecue in the park with your friends. There will be four of you and you have not discussed social distancing with them.
High	You want to go see your partner, but you do not live together. You will go by car, and you can park in front of their house.
High	You want to do some minor repairs around your home. You plan to go to the hardware store on a weekday morning to ask for advice and to buy some materials.
High	You want to help your friend move house because it's hard to find help when everybody is self-isolating. It will be the two of you and their partner.
High	You want to go see your close friend who lives close by. They tell you that they don't take social distancing very seriously.
High	You want to go for a swim at the beach with three of your friends. To get to the beach you will need to go together in one car.
Low	You want to get a new piece of furniture, because you have been spending a lot of time inside. It has been busy at the big furniture stores lately.
Low	You want to get a coffee. You can pay contactless at the popular cafe where you will have to wait outside on the busy footpath.
Low	You want to play tennis with your tennis partner. You will go early in the morning. You will arrive separately and stay at opposite sides of the court.
Low	You want to spend some time on an outdoor site for your work to finish an overdue job. There will be other people on the site, but there is lots of space.
Low	You want to meet and go for a walk in a forest with three old friends. You have discussed social distancing with them.
Low	You want to spend some time in the office at your workplace to concentrate on an important task. Most other colleagues on your floor are working from home. You will need to use the lift to get to your floor.
Low	You want to go running on a track by the beach during working hours. It is a popular, quite narrow and winding track.
Minimal	You want to go for a walk in the park at 5pm. It is a popular neighbourhood park with narrow footpaths near your house.

Minimal	You want to go for a run on a popular running track by a park. People will be breathing heavily and running both ways.
Minimal	You want to go for a vigorous walk at sunrise. The walking path is off the beaten track.
Minimal	You want to go play basketball on your own on a Sunday morning. The basketball court is located outside, on the grounds of your quiet neighbourhood school.
Minimal	You want to play a round of golf alone. You have packed drinks and food, so you will not have to buy anything unnecessarily.
Minimal	You want to go sit in the park and read your book. It is a weekday, and the park is quite large.
Minimal	You want to go for a walk in the park close to your house. You plan to go at 7am.

Table A1. List of the 30 scenarios used in this study, with indication of their a priori assigned Risk Level. Shown here with the Self formulation (the Other formulation is in terms of "Someone" rather than "You"). Presentation of the scenario was followed by a Communication framing (either Imperative "people should stay home, if they can stay home", or Personal Responsibility "people should consider whether they will get close to other people before they go out", or a Control with no framing). Participants were then asked to indicate on a visual analogue scale how certain they were that it is alright to go out.

Appendix C

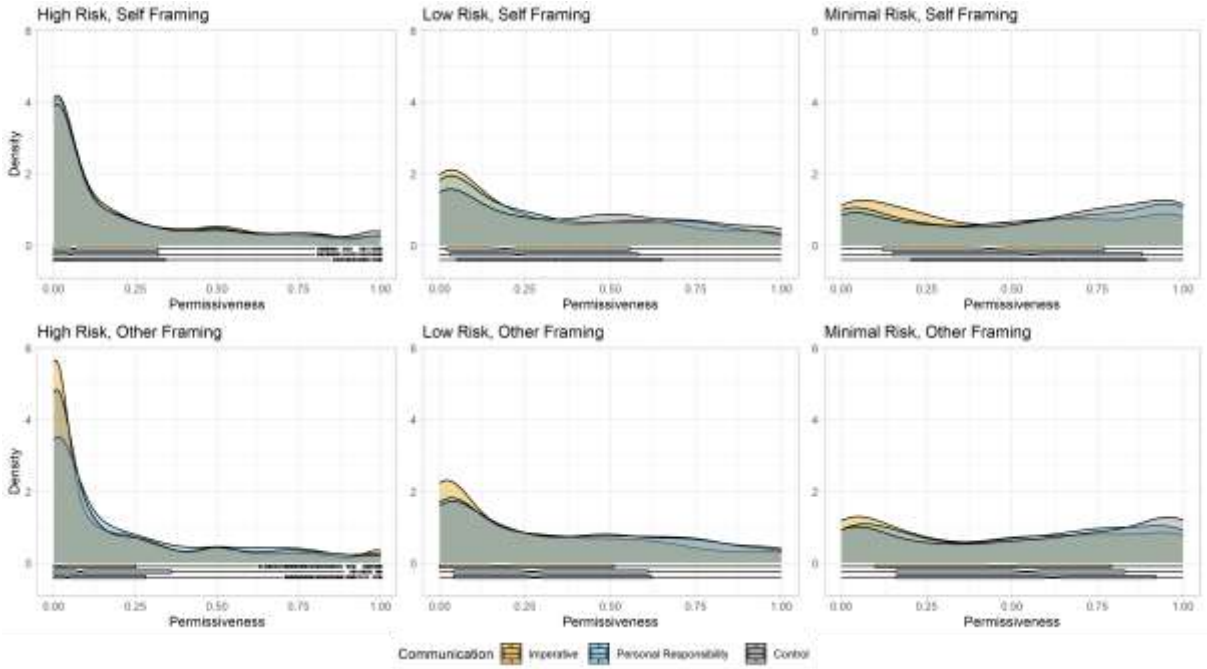

Figure A1. Density plots indicating each participants' 30 visual analogue scale responses in experiment 1 parsed by Communication and Risk levels. The yellow area under the curve indicates response in the Imperative condition, the blue area indicates responses in the Personal Responsibility condition, and the grey area indicates responses in the Control condition. Lower visual analogue scale responses indicate a less permissive attitude to going out. The top plots pertain to the Self framing condition, in high-risk, low-risk, and minimal-risk scenarios respectively. The bottom plots pertain to the Other framing condition with the same Risk partitioning.

Appendix D

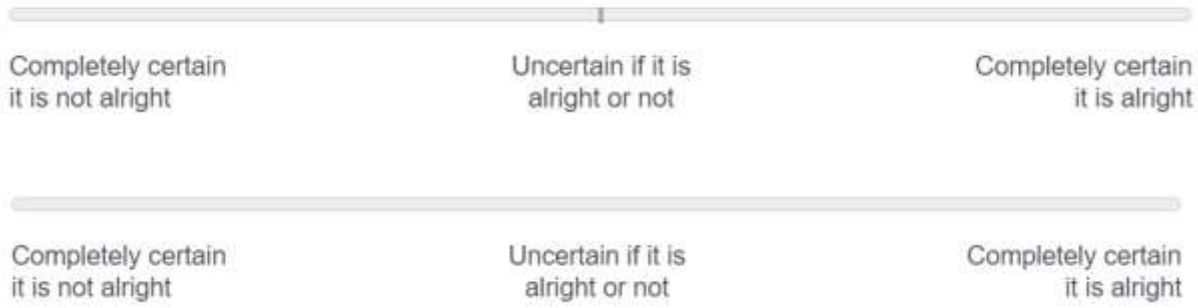

Figure A2. Illustrating the VAS Marker manipulation in experiment 2. The midpoint marker is visible on the bar in the top panel, and the control bar without a marker is visible on the bottom panel.

Appendix E

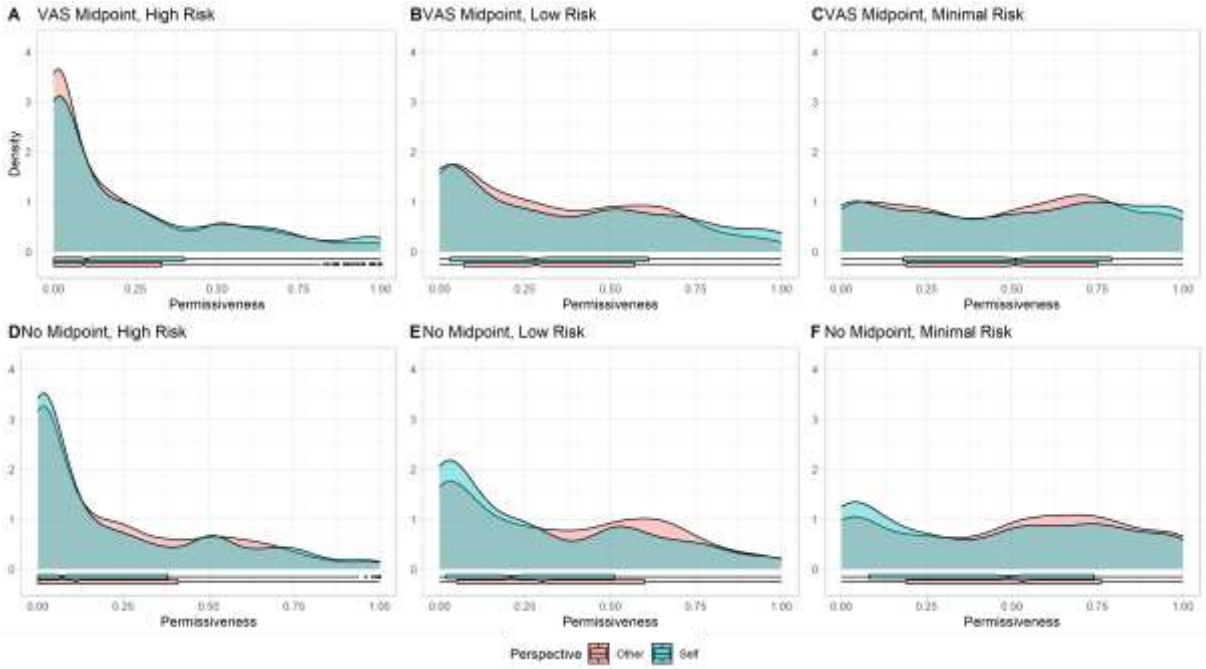

Figure A3. Density plots of participants' responses in experiment 2, partitioned by the Vas Marker and Risk factors. The top panels represent trials with a midpoint marker, while the bottom panels represent control trials without one (see Figure A2). The panels on the left represent high-risk scenario questions, the middle panels represent low-risk scenarios, and the panels on the right represent minimal-risk scenarios. The curve with the blue area underneath pertains to scenarios about one's own decisions, while the curve with the red area underneath pertains to scenarios about someone in the participant's neighbourhood's decisions.