Supplementary Materials for
"Ambiguous COVID-19 Messaging Increases Unsafe Socializing Intentions"

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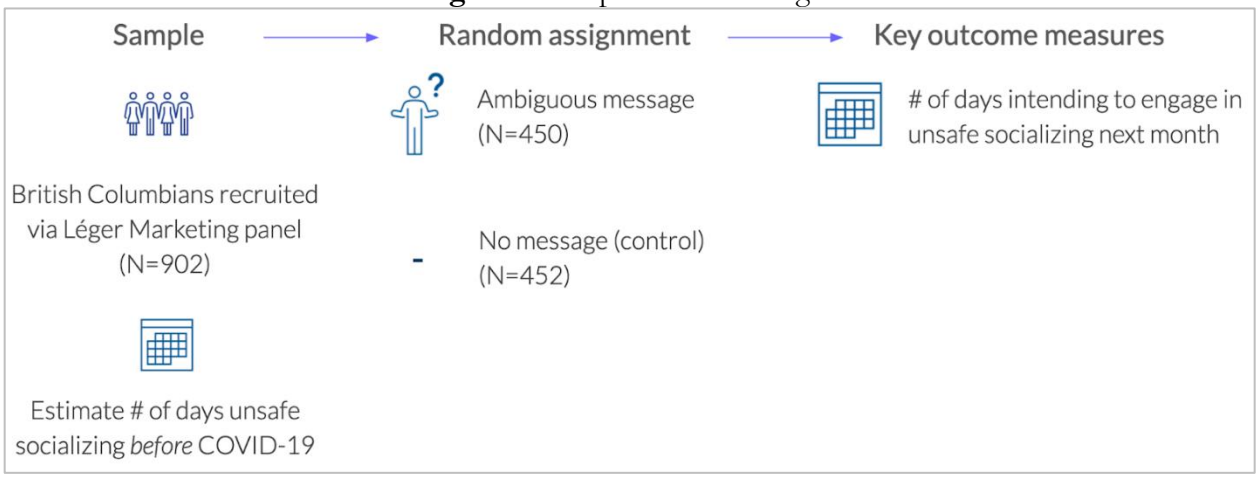
1. Pre-registered trial design

We tested our two hypotheses using a between-subjects, two-arm experimental design. Prior to treatment, we asked all respondents to estimate their social activity before the pandemic. We asked about six behaviours that public health officials had identified as unsafe at the time of the study. These include visiting a bar or a pub, visiting a nightclub, attending house parties, eating at a restaurant, sharing food, drinks or smokes, and attending social gatherings of more than 6 people. Following exposure to treatment (or not for the control group), we then measured the respondent's intentions to engage in these same behaviours over the next 30 days.

Figure S1. Experimental Design.



We designed our messaging treatment with a few considerations in mind. First, we selected some of the most salient aspects of COVID-19 messaging during fall 2020: the need to avoid social gatherings; the risk of serious illness; best practice for physical distancing; and the rationale behind mask wearing. Second, we sought to incorporate the uncertainty in current understanding and guidance about each of these items, such as the benefits and limitations of wearing a mask. This reflects the tension decision-makers face as they attempt to balance message clarity with a desire to be transparent about relevant facts. Third, we recognize public health officials take multiple factors into consideration when designing public communications. For example, the first bullet acknowledges the benefits of 'getting together with others' on our mental wellbeing—something that is not directly related to the transmission of COVID-19.

2. Data description

We recruited participants through Leger Marketing's online panel from November 4-23, 2020. Leger Marketing is headquartered in Montreal and is one of Canada's largest public opinion companies. Our participants comprise a non-probability sample of individuals who opted to participate in our survey. Participants were compensated CAD $2. Leger uses quota sampling based on sex, age, and education. Based on these attributes, we generated post-stratification weights (although we do not use these weights when estimating treatment effects). The survey was in the field from November 4-23, 2020.

Tables S1 and S2 show summary statistics for six variables: duration (in minutes); inferences (ranging from zero to one); retrospective behaviours (ranging from zero to 180); prospective behaviours (ranging from zero to 180); age; and, gender (proportion women). We show these statistics for survey respondents aged 18-39 and 40+.

Table S1. Summary Statistics: Respondents aged 18-39 (unweighted)

	Minimum	**Median**	**Mean**	**Maximum**	**Std. Dev.**
Duration (in minutes)	3.2	11.20	33.85	3296.92	176.20
Inferences (out of 1)	0	1	0.82	1	0.28
Retrospective behaviours (out of 180)	0	8	14.51	154	18.99
Prospective behaviours (out of 180)	0	0	4.65	161	18.15
Age	18	29	29.36	39	6.03
Gender (proportion women)	-	-	0.54	-	-

Table S2. Summary Statistics: Respondents aged 40+ (unweighted)

	Minimum	**Median**	**Mean**	**Maximum**	**Std. Dev.**
Duration (in minutes)	3.5	14.35	51.07	5805.17	326.73
Inferences (out of 1)	0	1	0.85	1	0.26
Retrospective behaviours (out of 180)	0	5	10.04	143	17.62
Prospective behaviours (out of 180)	0	0	3.88	180	17.70
Age	40	60	59.62	97	12.12
Gender (proportion women)	-	-	0.53	-	-

3. Balance Test

We do not rely on balance tests for evidence of successful randomization (Mutz, Pemantle and Pham 2019). However, we recognize such tests are commonplace in published work. For the benefit of the reader, we present the results of a balance test in Table S3.

We conduct two linear models, regressing several pretreatment variables—including retrospective behaviours, age, sex, and citizenship status—on treatment assignment (coded 0 or 1). Model 1 shows the results for survey respondents aged 18-39. Model 2 shows the results for respondents aged 40 and above. In no case is there evidence of imbalance—that is, none of the variables show a statistically significant difference in the probability of treatment assignment. A joint orthogonality test for Model 1 yields $F(6, 491) = 1.03$ with P-value = 0.40. For Model 2, the joint orthogonality test yields $F(6, 390) = 1.36$ with P-value = 0.23.

Table S3. OLS Regression Results (balance test)

	Dependent variable: Treatment Assignment	
	Model #1 18-39	**Model #2 40+**
Retrospective behaviours	0.0018	0.0004
	(0.00)	(0.00)
Age	-0.0034	0.0026
	(0.00)	(0.00)
Women (compared to men)	0.0691	0.0673
	(0.05)	(0.05)
"Other" gender (e.g. Trans, non-binary, two-spirit, gender-queer)	0.182	-0.155
	(0.29)	(0.29)
Non-Canadian Citizenship (compared to Canadian)	0.0324	-0.523
	(0.11)	(0.50)
Permanent Resident (compared to Canadian citizenship)	-0.0288	0.258
	(0.09)	(0.14)
Constant	0.521*	0.321*
	(0.12)	(0.13)
Observations	498	397
R^2	0.012	0.021

Unstandardized OLS coefficients with standard error in parentheses. * $p < 0.05$

4. Descriptive Results

Here, we descriptively look at respondents' inferences and intentions. We begin with inferences. This measures the proportion of respondents that correctly identified each activity as one that the BC CDC expected them to avoid: high-fiving a good friend; getting within two meters of other people; hosting several friends; eating indoors with a large group of friends; and sharing snacks, drinks, etc. with someone you have just met.

In Figure S2, we show that 80 to 90 percent (depending on the issue) of respondents in the control group correctly identified these activities as things they were expected to avoid. Two of the behaviours that the CDC did not expect British Columbians to avoid (getting takeout and sending mail) were incorrectly identified as such by a small percentage of respondents in the control group. At the same time, there appears to have been more confusion about the appropriateness of engaging in sexual activity, leaving home without a mask, and travelling outside the respondent's local area. At the time, the CDC declared that these were acceptable activities, but a majority thought they were expected to avoid them. Overall, inferences regarding the CDC's expectations were relatively accurate. A large proportion of respondents in the control group were able to identify the activities they were expected to avoid, even if they thought they were expected to avoid some activities that were, in fact, permissible. This would seem consistent with the fact that press conferences held by the Provincial Health Officer were reported in the media 4 to 5 days a week and the provincial government was making substantial use of social and traditional media to inform citizens about expected behaviours.

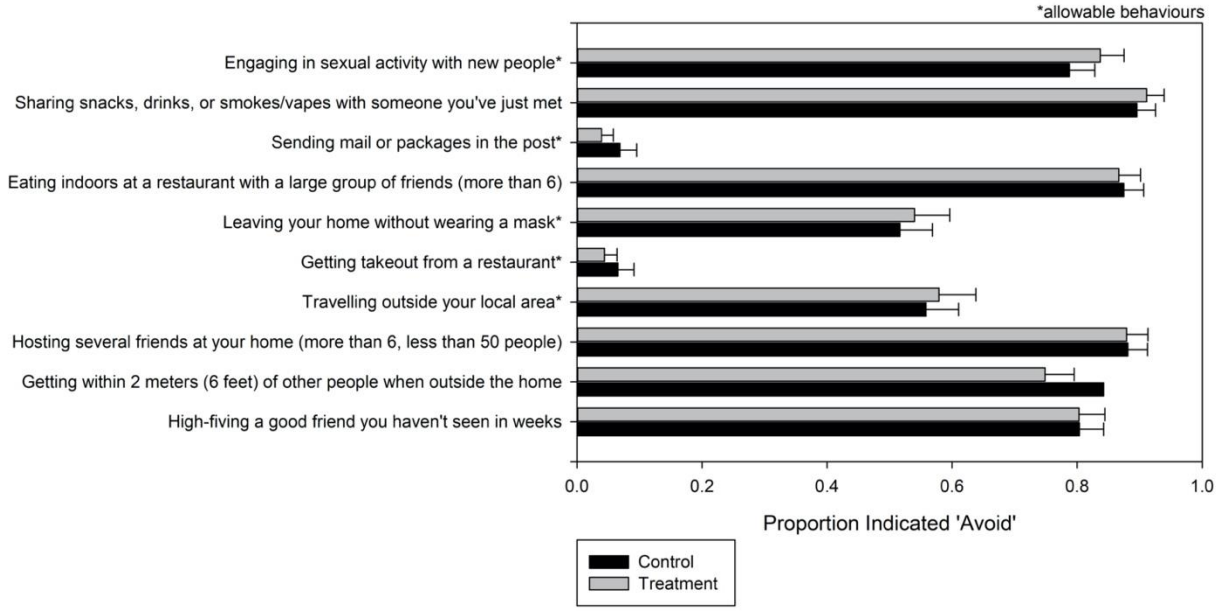


Figure S2. *Proportion of respondents identifying each activity as one that the BC CDC expected them to avoid. Asterisk denotes allowable behaviours—i.e. those that were compliant with the guidelines at the time of study.*

Figure S3 plots the number of activities per month respondents planned to engage in such activities during COVID-19 against the number of activities per month they engaged one year prior, before

COVID-19. The figure separates those in the treatment group from those in the control group. Two things are evident. The first is that, on average, individuals planned to engage in these activities far less during COVID-19 (control group average = 4.20), compared to before the pandemic (control group average = 11.09). The second is that there is a correlation between how often individuals planned to participate in these activities during COVID-19 and how often they did a year before (control group correlation = 0.55). The overall picture is consistent with what public health officers were describing at the time: engagement in unsafe activities was limited to a relatively small proportion of the population who regularly ignored the public health orders and participated in 'super spreader' events.

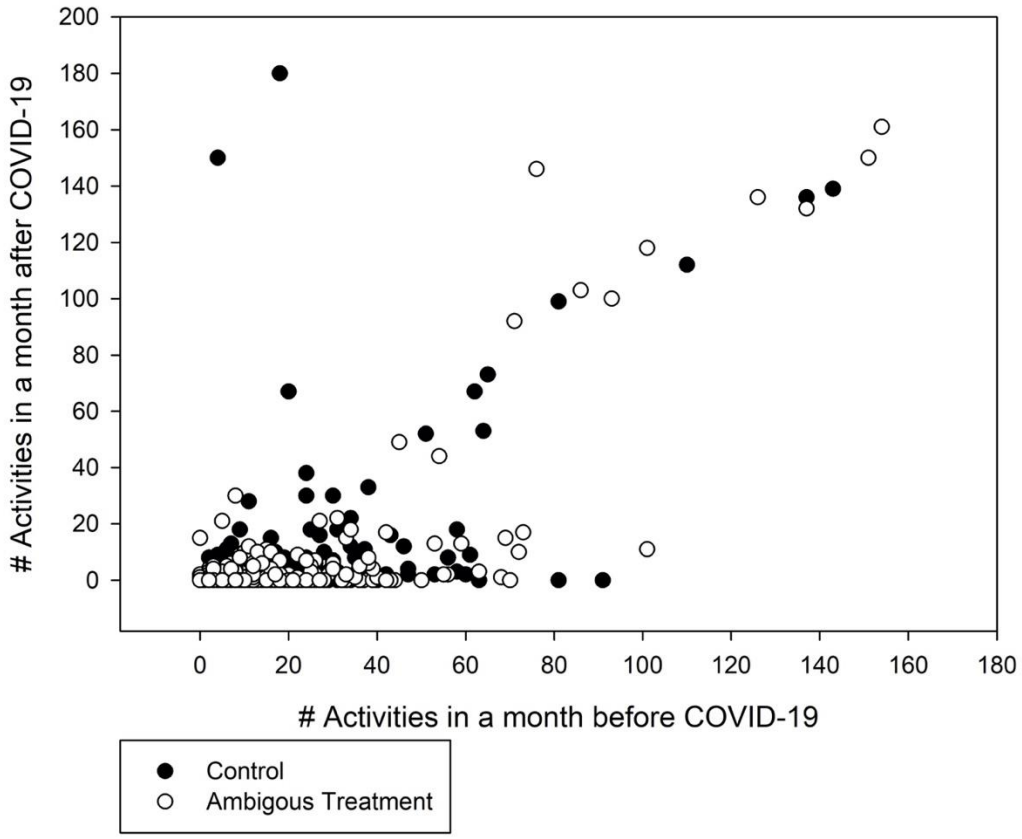


Figure S3. *Number of activities per month respondents planned to engage in noncompliant ('unsafe') activities, by treatment group and before/during COVID-19.*

4. Regression Results

In Table S4, we present the regression results for the full sample (i.e. ages 18 and up). Column 1 shows the results for inferences. Column 2 shows the results for prospective behaviours.

Table S4. OLS Regression Results (prospective behaviours)

	(1) Dependent variable: Inferences	**(2) Dependent variable: Prospective Behaviours**
	Ages 18+	**Ages 18+**
Treatment (control)	0.004 (0.02)	-2.562* (1.08)
Retrospective behaviours	-0.005* (0.00)	0.570* (0.04)
Treatment (ambiguity) x Retrospective behaviours	0.0007 (0.00)	0.136* (0.05)
Constant	0.892* (0.01)	-2.441* (0.77)
N	896	895
R^2	0.11	0.45

Unstandardized OLS coefficients with standard error in parentheses. * $p < 0.05$

5. Examples of messaging from BC at the time of our study

BC Centre for Disease Control
@CDCofBC

Attention all mummies and daddies: if you're taking your child out trick-or-treating this #Halloween, remember to stay bright, clean hands frequently, check candy and don't crowd: ow.ly/wplN50C58Al

1:20 PM · Oct 28, 2020 · Hootsuite Inc.

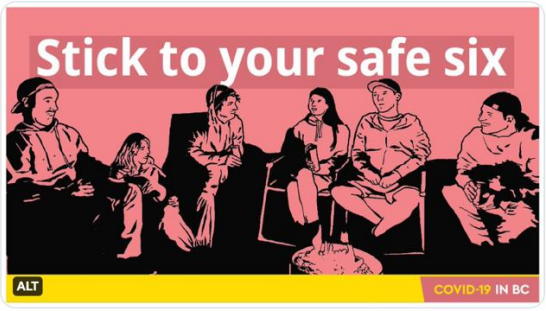
28 Retweets **9** Quote Tweets **36** Likes

BC Government News
@BCGovNews

Gatherings inside homes and backyards have caused COVID-19 to spread in our communities.

When you're home, limit visitors to your "safe six" — the same six friends or extended family members. You should be in their "safe six" and they should be in yours.

gov.bc.ca/phase3#safe-six



11:19 AM · Nov 4, 2020 · Twitter Web App

117 Retweets **8** Quote Tweets **155** Likes

BC Government News
@BCGovNews

Many miss our friends & family. Show you care & find other ways to connect. Remember:
👥 Stick with the same 6 outside your household. You should be in their 6 and they should be in yours.
📏 Keep your distance
🤗 No handshakes, air hugs only!
#CovidBC #SafeSix

11:25 AM · Nov 5, 2020 · Twitter Web App

24 Retweets **11** Quote Tweets **45** Likes

BC Government News
@BCGovNews

New orders are in place to help everyone in BC significantly reduce their social interactions and to stop #Covid19 from spreading in our province.

The following orders and direction are in effect: (1/3)

2:11 PM · Nov 23, 2020 · Twitter Web App

94 Retweets **14** Quote Tweets **139** Likes

BC Centre for Disease Control
@CDCofBC

If I live alone, can I see anyone? Yes - you can socialize with 1-2 people such as a partner, relative or close friend. Think of them as your immediate household that you do social activities with like eating a meal, watching a movie or going for a walk. ow.ly/Vy4l50CqPya

6:00 PM · Nov 21, 2020 · Hootsuite Inc.

62 Retweets **5** Quote Tweets **95** Likes

BC Government News
@BCGovNews

New provincewide public safety orders require people in BC to wear masks in most indoor public settings. People who do not comply with BC's new indoor mask mandate can now be fined up to $230. Learn more: news.gov.bc.ca/23315 #CovidBC

7:34 PM · Nov 24, 2020 · Hootsuite Inc.

82 Retweets **15** Quote Tweets **194** Likes

BC Centre for Disease Control
@CDCofBC

Limit social activities to the people you live with or one or two people in your core bubble if you live alone. This is not the time to invite friends or family over to your home and do not go to someone else's home for a social visit. ow.ly/Po8h50CwS2v

5:00 PM · Nov 28, 2020 · Hootsuite Inc.

27 Retweets **9** Quote Tweets **39** Likes

6. Replication

All data and source code (in Stata) are available on the Harvard Dataverse. The survey and pre-analysis plans are available through the Open Science Framework: https://osf.io/w8d97

References

Mutz, D. C., Pemantle, R., & Pham, P. (2019). The perils of balance testing in experimental design: Messy analyses of clean data. The American Statistician, 73(1), 32-42.