Viral social media videos can raise pro-social behaviours when an epidemic arises

Yiting Guo[a], Jason Shachat[b], Matthew J. Walker[c], and Lijia Wei[d]

[a] Economics and Management School, Wuhan University, Wuhan, HUB 430072, China.
[b] Corresponding author: jason.shachat@durham.ac.uk. Department of Economics and Finance, Durham University Business School, Durham, DH1 3LB, United Kingdom; and Economics and Management School, Wuhan University, Wuhan, HUB 430072, China. https://orcid.org/0000-0002-9719-4555.
[c] Department of Economics and Finance, Durham University Business School, Durham, DH1 3LB, United Kingdom. https://orcid.org/0000-0002-3863-0564.
[d] Economics and Management School, Wuhan University, Wuhan, HUB 430072, China.

Abstract: Access to information via social media is one of the biggest differentiators of public health crises today. During the early stages of the Covid-19 outbreak in January 2020, we conducted an experiment in Wuhan, China to assess the impact of viral social media content on pro-social and trust behaviours and preferences towards risk and ambiguity. Prior to the experiment, participants viewed one of two videos that had been widely and anonymously shared on Chinese social media: a central government leader visiting a local hospital and supermarket, or health care volunteers transiting to Wuhan. In a control condition, participants watched a neutral video, unrelated to the crisis. Viewing one of the leadership or volunteer videos leads to higher levels of pro-sociality and increased ambiguity aversion relative to the control condition. The leadership video, however, induces lower levels of trust. We provide evidence from two post-experiment surveys that the video's impact on pro-sociality is modulated by influencing the viewer's affective emotional state.

Keywords: Social media, pro-sociality, risk preference, experiment, induced emotions, Covid-19

JEL codes: C93, H12, I12

Declarations

Conflicts of interest/Competing interests: We declare that we have no competing interests.

Availability of data, code, and materials: All data needed to evaluate the conclusions in the paper are present in the paper and/or the Supplementary Materials. Data files and computing scripts are available from the authors on request.

Institutional Review Board: This research was approved by the Academy of Humanities and Social Sciences of Wuhan University.

1. Introduction

On January 23, 2020, local authorities in China imposed a full lockdown of Wuhan city in response to the emergence of a novel coronavirus and associated disease, Covid-19. This event was followed shortly after by the lockdown of other cities across Hubei province. With the movements of over 50 million people in the centre of China being closely monitored, this represented one of the largest forced quarantines in human history.[1] The lockdown of Wuhan city was the first, and one of the most stringent, to be implemented globally. During those early days of uncertainty, with scant reporting in official media outlets, social media became a key source of information about the virus for ordinary Chinese citizens. The currency of social media are viral videos and associated messages; during this time, many videos were circulated in private chat groups, showing evocative scenes of containment and relief efforts.[2]

Access to information via social media is one of the biggest differentiators of pandemics today from the past (Balinska and Rizzo, 2009). Social media has become an important medium that individuals turn to for information in public emergencies (Reuter and Kaufhold, 2018). Since information systems, rather than personal experience, are the most likely source of information during a crisis, social media is an important agent of risk amplification (Kasperson and Kasperson, 1996; Pidgeon et al., 2003). Recent research recognises the potential of viral social media content to promote collective action in moments of crisis, alongside possible negative effects for trust and risk perception (Taylor et al., 2012; Alexander, 2014; Haushofer and Metcalf, 2020). During a public health crisis, the coordination of individual efforts towards collective demands underpins the success of mitigating measures (Bavel et al., 2020). Trust and risk attitudes are associated with the adoption of health behaviours and so indirectly for controlling the rate of disease transmission

---

[1] See, for example, https://apnews.com/7f7336d2ed099936bd59bf8cb7f43756.
[2] See, for example, https://www.nytimes.com/2020/01/24/world/asia/china-social-media-coronavirus.html.

(Chuang et al., 2015). It is therefore important to understand how social media content influences pro-social, trust and risk-related preferences.

This study examines the influences of social media content on such preferences via the modulation of a viewer's affective emotional state. A long literature in psychology emphasises that affective states influence normative judgements and decision-making processes (Forgas, 1995; Loewenstein and Lerner, 2003; Pham, 2007).[3] Online media content that arouses emotions is more likely to go "viral" in the first place (for an example of this in the Chinese social media context, see Fan et al., 2014). Thus, we conjecture that social media videos of the type used in this study may act as an incidental (that is, not normatively relevant for the judgement at hand) influence on individuals' emotions and mood, which in turn affects their decisions.[4]

An extensive experimental economics literature explores the ability of induced emotions to affect strategic behaviour and individual preferences. Capra (2004) finds that induced good mood leads to more altruistic giving. Drouvelis and Grosskopf (2016) and Bartke et al. (2019) observe that induced positive (negative) affective states increase (diminish) pro-social behaviour in a public goods game, while findings for cooperation are mixed (Hertel and Fiedler, 1994; Hertel et al., 2000). Dunn and Schweitzer (2005) suggest that incidental anger reduces trust. In a gift-exchange game, Kirchsteiger et al. (2006) observe that those individuals who watched a funny movie clip are more generous, while those who watched a sad clip are more reciprocal. Kugler et al. (2012) show that induced mood can have a systematic impact on individual risk preferences: in their study, fearful participants make more risk-averse lottery choices than angry participants.

---

[3] Various experimental economics studies also find a correlation between emotions and behaviour (Charness and Grosskopf, 2001; Sanfey et al., 2003; Xiao and Houser, 2005; Hopfensitz and Reuben, 2009; Meshulam et al. 2012; Bolle et al., 2014; Joffily et al., 2014; Schniter and Sheremeta 2014).
[4] Psychologists distinguish between emotions (intense and short-lived feelings) and mood (diffuse feelings that tend to persist). For a discussion, see Lerner et al. (2015). We do not pursue this distinction further here.

Our study consists of an economic experiment that measures the behavioural impact of watching viral social media videos, and two follow-up surveys that assess the emotional states induced by the content of those same videos. In the experiment, Wuhan-based students complete a panel of decision tasks to measure the effects of crisis-related social media video stimuli on their pro-social, cooperative, and trusting behaviour, as well as their preferences towards risk and ambiguity. The experiment was implemented in late January 2020, the time of greatest uncertainty about the coronavirus in China. All experimental tasks are incentive compatible: all choices have monetary rewards proportional to the good outcomes of the tasks.[5]

The experiment comprises two treatment conditions and a control condition, using a between-subjects design. In the treatment conditions, participants are primed with one of two videos, each of which shows evocative content related to the Covid-19 crisis. The first of these videos shows a senior central government official's visit to a local hospital and a supermarket (henceforth "Leadership video"). The second of these videos shows health care volunteers from other provinces in transit to Wuhan (henceforth "Volunteer video"). Both videos were circulating widely and anonymously among chat groups on the Chinese social media application WeChat at the time of the experiment. In the control condition, participants watch a neutral product advertisement video, unrelated to the crisis (henceforth "Neutral video").

We find that priming participants with either the Leadership or Volunteer video results in significantly more pro-social behaviour relative to the Neutral video, as measured by participants' levels of altruism and expectations of reciprocity in the decision tasks. Participants' also display comparatively higher levels of ambiguity aversion in the treatment conditions, although there is no

---

[5] This contrasts with psychometric-style questionnaires conducted during previous public health emergencies (Leung et al., 2005; Jones and Salathé, 2009; Bults et al., 2011; van der Weerd et al., 2011; Prati et al., 2011).

systematic effect of the viral videos on risk preferences. The Leadership video alone induces a significant fall in trust, although we caution on drawing generalized conclusions from this result, because we test only one video which involves just one (prominent) government figure.

In the two follow-up surveys, we find evidence to support the argument that the videos impact behaviour through the manipulation of affective emotional states. In the first survey, we ask respondents to select five events, from a list of fifteen, which acted as psychologically positive motivating factors during the early stages of the Covid-19 crisis. The two most selected events are health care teams volunteering to assist in Hubei province and national leaders countering the epidemic. In the second survey, we evaluate the impact of viewing the videos in our experiment through a set of questionnaires that assess an inventory of emotional measurements. We find that the Leadership and Volunteer videos each induce a significant rise in positive affect relative to the Neutral video, with underlying increases in joviality and self-assuredness. Those subjects who watch the Volunteer video also report greater attentiveness. There is some evidence that viewers of the Leadership and Volunteer videos feel a comparatively greater sense of guilt.

The paper continues in Section 2 with a description of the experimental design and procedures. In Section 3, we present the results of the economic experiment. In Section 4, we describe the two post-experiment surveys we undertook to assess the video-induced changes in emotional states. In Section 5, we conclude with a discussion of how to interpret the results and outline some limitations of our study.

2. Experimental Design

A timeline of our economic experiment in context of the Covid-19 outbreak in Hubei province is displayed in Fig. 1. We recruited 240 participants at random from an online database of over 9,000

Wuhan University students. Our study has three experimental conditions based upon the nature of a priming social media video. We randomly assigned 80 participants to each condition. The experiment consisted of twelve sessions designed for twenty participants each. Three sessions, one for each experimental condition, were run concurrently in the morning and afternoon on January 28 and 30, 2020. Morning and afternoon sessions differed by which subset of tasks we administered. The final day of data collection coincided with the World Health Organization's declaration of the virus as a Public Health Emergency of International Concern (WHO, 2020).

Invitations to participate in a session were sent directly to participants' WeChat accounts, which is the most popular instant messaging app and the largest social media platform in China. At the time of the experiment, participants had already left the university for the semester break, which coincides with the annual spring festival holiday. Thus, participants were in twenty-nine different provinces. Forty participants were from Hubei province, including seventeen from Wuhan. On average, each session lasted forty-five minutes, and participants earned 63.79 RMB (about 9.5 US dollars), including a participation fee of 10 RMB. Participation in the experiment was completed using a mobile device and we transferred payment to their WeChat account immediately after completion of their experimental session.

Four canonical games, multi-persons decision problems, are considered: a dictator game (DG), an ultimatum game (UG), a trust game (TG), and a prisoner's dilemma game (PD). In the DG, players are matched into pairs and assigned to the role of player 1 or player 2. Player 1 is allotted a real sum of money (the stake) and decides how to allocate the stake between the two. Higher amounts offered to player 2 reflect greater pro-sociality on the part of player 1. The UG is the same as the DG, except that player 2 can choose to accept or reject - which results in both receiving zero - the proposed allocation. In the UG, higher amounts offered by player 1 may reflect a combination of

pro-sociality and expectations of reciprocity norms; player 2's decision reflects actual reciprocity norms. The stake used in the DG is 5 RMB, and in the UG is 8 RMB. We use different stakes for these games to reduce the likelihood that participants would anchor on their first response when making their second.

In the TG, players are again matched into pairs, player 1 is allotted a stake and decides how much of that stake to transfer to player 2. The amount transferred is tripled, which player 1 is aware of, before reaching player 2. After player 2 receives the multiplied transfer, he or she decides how much of it to return to player 1. In the TG, the amount that player 1 sends is a measure of trust and the amount that player 2 returns reflects trustworthiness. The stake used for this game is 8 RMB.

The PD is a normal-form game in which each player chooses to either Cooperate or Defect. Choosing Defect yields a player a higher payoff than choosing Cooperate against each of the opponent's possible choices. However, the pair's total payoff is highest when both choose to Cooperate. The payoff to mutual cooperation was 6 RMB, to mutual defection 3 RMB, to unilateral cooperation 0 RMB and to unilateral defection 9 RMB.

We also include tasks designed to elicit preferences towards risk and ambiguity. The risk preference elicitation task involves a series of nine pairwise choices between a lottery (option A) and a sure amount of money (option B). The lottery remains fixed across all choices: a 50% chance of receiving 9 RMB, and a 50% chance of receiving 3 RMB. The sure amount increases evenly with each choice from 3 RMB up to 9 RMB. The task to elicit preferences over ambiguity is identical except that the lottery is unknown. Participants are informed that if they choose option A, a ball is randomly drawn from an opaque urn. The urn contains both red and blue balls, but the number of

each colour is unknown. If the draw is red, they earn 9 RMB. If the draw is blue, they earn 3 RMB. One choice from each risk/ambiguity elicitation task is randomly drawn for payment.

Before completing the decision tasks, participants watch a once repeated video of approximately two minutes in length.[6] To mitigate the possibility of experimenter demand effects, we did not provide any cover story or description to accompany the videos. In the control condition, participants are shown a product advertisement for the sculpting of a plastic bottle, unrelated to the Covid-19 crisis (the Neutral video). By contrast, the two treatment conditions each feature a video that had been circulating widely and anonymously on Chinese social media around the time of the experiment.

In the Leadership video treatment, participants are shown excerpts from the visit of Chinese Premier Li Keqiang to Wuhan Jinyintan Hospital – the first hospital designated to treat patients with Covid-19 – and to a local supermarket, on January 27, 2020. In this video, Premier Li uses morale-boosting words and phrases such as "protect", "save lives" and "empowered", to which the doctors and customers alike respond enthusiastically. In the Volunteer video treatment, participants are shown a video of health care volunteers from other provinces in transit to Wuhan. The video pans to teams from various hospitals and acknowledges their place of origin and number, in almost regimental style. Exclamations are heard over the public tannoy such as "go Wuhan!" and "we will carry the burden with you".

We summarize our economic experiment and the data collection process in Table 1. The decision-making tasks were completed sequentially. In the morning sessions we excluded the UG task, and

---

[6] Specifically, the Leadership video lasts 2 minutes and 3 seconds, the Volunteer video lasts 1 minute and 47 seconds, and the Neutral video lasts 1 minute and 54 seconds. The videos used in this study (subtitled in English) and corresponding transcripts can be found in the project repository at Open Science Framework: https://tinyurl.com/sl28dg6.

in the afternoon sessions we excluded the TG task. We did this to rule out the possibility of a behavioural spillover effect; specifically, the second-movers conditioning their actions on the first movers' actions in both the UG and TG games. We only informed participants of their respective task outcomes and earnings after all decision tasks were completed. No individual participated in more than one session and all sessions consisted of 20 participants, except one session in which there was only 16 participants due to participant no-shows. To ensure consistency of the interface, four participants are excluded from the sample for using a computer rather than mobile device to complete the experiment.

3. Experimental Results

The aggregate outcomes of the lab experiment are presented in Table 2. The Leadership (L) and Volunteer (V) videos have marginally significant positive effects on pro-sociality in the experiment relative to the Neutral (N) video. In the DG, both videos increase the average amount sent by player 1s (p-value = 0.08 and p-value = 0.07 respectively, $n_L = n_V = 38$ and $n_N = 39$). There is also evidence that participants offer higher amounts in the UG. While this increase is not significant at conventional thresholds for the Leadership video versus the Neutral video, it is for the Volunteer video (p-value = 0.12 and p-value = 0.03 respectively, $n_L = 20$, $n_V = 20$ and $n_N = 19$). As expected UG acceptance rates are lower in the Neutral video condition in response to the reduced offers, although higher variability means that the pairwise differences are not significant (p-value = 0.15 and p-value = 0.15 respectively, $n_L = 20$, $n_V = 20$ and $n_N = 19$).

Interestingly, the Leadership video appears to undermine trust. Amounts sent by player 1s in the TG are significantly lower in the Leadership video treatment than in the Neutral video control (p-value = 0.09, $n_L = 18$ and $n_N = 20$). We find no such significant negative effect of the Volunteer video on trust (p-value = 0.82, $n_V = 18$ and $n_N = 20$). Reciprocity, in terms of amounts returned,

adjusts proportionally in each experimental condition. Consistent with earlier TG experiments, a trustor's decision to transfer money is on average a breakeven strategy (Berg et al., 1995). There are no statistically significant pairwise differences in average PD cooperation rates in the respective treatment conditions relative to the control condition (p-value $= 0.52$ and p-value $= 0.64$ respectively, $n_L = n_N = 78$ and $n_V = 76$).

An ancillary question is how the treatment condition videos influence participants' preferences towards risk and ambiguity. While neither the Leadership nor Volunteer video significantly influences risk aversion (p-value $= 0.70$ and p-value $= 0.85$ respectively, $n_L = 77$ $n_V = 75$ and $n_N = 78$), both videos do reduce participants' willingness to seek out ambiguity (p-value $= 0.03$ and p-value $= 0.02$ respectively, $n_L = 74$, $n_V = 75$ and $n_N = 78$). We advise against reading into the absolute levels recorded in the ambiguity preference elicitation task, because our implementation did not permit participants to choose the payoff-relevant colour and so this task may also pick up trust in the experimenter. Nevertheless, this potential confound should influence behaviour similarly across treatments and leave the relative comparisons unaffected.

That participants' reactions to the treatment condition videos differ across risk and ambiguity domains is not unusual (see also Cavatorta and Groom, 2020). Whereas risk involves known probabilities, ambiguity describes situations in which probabilities are vague. If the treatment videos heightened feelings of uncertainty about the situation in Wuhan in those early days of the Covid-19 outbreak, individuals may have been prone to act more cautiously when the likelihoods of outcomes associated with their actions are unknown. It does not necessarily follow that they would also prefer to take fewer risks. The probabilities of bad outcomes in an emerging public health crisis are far from well-defined.

Due in part to features of our design (e.g. no role uncertainty, alternation of UG and TG tasks across sessions to preclude second-mover learning), our non-parametric analyses above rest on small sample sizes per condition and so lack statistical power to detect effects. To address this issue, we conduct an individual-level regression analysis of our key outcome measures on indicator variables for the two treatment condition videos, while controlling for other demographic and local factors that might be influencing behaviour. We include as covariates the aggregate number of diagnosed virus cases at provincial level, participant gender, cell phone operating system and screen size.

The results of the regression analysis are presented in Table 3.[7] We find support for the positive impact of the Leadership and Volunteer videos on first-mover offers in the UG, suggesting that the content of these videos increased expectations of reciprocity norms relative to the Neutral video. We also find some support for our observation that the Volunteer video induces a significant increase in giving by Player 1s in the DG. While the coefficient estimate on the Leadership video indicator is positive, it is not significant at conventional levels. Since we are primarily interested in the effect of the Leadership and Volunteer videos on "pro-sociality" broadly defined, rather than behaviour in a specific task, we pool standardized first-mover data from the DG and UG and run a separate random effects regression that accounts for the panel structure.[8] There is strong statistical evidence that both treatment condition videos cause an increase in pro-sociality relative to the Neutral video.

We also find support in Table 3 for our aggregate finding that the Leadership video results in a significant fall in amounts sent by player 1s in the TG. Only the Volunteer video, however, has the robust statistical effect of increasing ambiguity aversion. Scholars in the experimental economics

---

[7] In Tables S2 and S3 of the Supplementary Material, we also present regression analyses for risk preferences, PD cooperation rates and second-mover behaviour in the UG and TG. The findings are consistent with the aggregate analysis.
[8] We are grateful to an editor for this suggestion.

literature have long debated whether risk preferences are associated with trusting behaviour (e.g. Eckel and Wilson, 2004; Ben-Ner and Halldorsson, 2010). The decision to take a "social risk" on the trustworthiness of a stranger in the one-shot TG might be viewed as conceptually closer to a preference over ambiguity. In view of this, we pool standardized data from first-movers in the TG and on their preferences towards risk and ambiguity and run an additional panel regression of trust-related behaviours on our treatment condition indicators. The results are consistent with the interpretation of the Leadership video – but *not* the Volunteer video – undermining participants' propensity to trust.

4. Two survey studies on the emotional states induced by the social media videos

To gain further insight into the channels mediating the differential effects observed in our economic experiment, we provide two post-experiment assessments on how the content of the social media videos are perceived. The first assessment is a follow-up survey we administered from March 12 to 20, 2020 to 5,686 non-student individuals around China. Among other questions, we asked respondents to select five events, from a list of fifteen, which acted as psychologically positive motivating factors in the early stages of the Covid-19 crisis (see Fig. 2).[9] The two most selected events were health care teams volunteer to assist in Hubei province and national leaders countering the epidemic (77.67% and 66.43%, respectively).

In the second assessment, we evaluate the impact of video viewing on a more extensive inventory of emotional measurements.[10] We recruited 241 new participants between September 11 and 18, 2020, from the same population of Wuhan-based student subjects. As before, we randomly assigned 80 participants to each experimental condition (81 to the Leadership video condition) and used WeChat for the experimental implementation. On arrival, each participant watched their randomly

---

[9] Full details of the survey administration are included in the Supplementary Material.
[10] We thank an anonymous referee for this suggestion.

assigned video twice. Participants were told only that the video they were about to watch was recorded and edited within a week of Wuhan's January lockdown.

After watching their randomly assigned video, participants were asked to complete three psychological questionnaires. These were the Positive and Negative Affect Schedule (PANAS, Watson et al., 1988), Interpersonal Reactivity Index (IRI, Davis, 1983) and Sense of Control (SOC, Lachman and Weaver, 1998).[11] The PANAS contains two higher-order scales measuring positive and negative affect, which can be decomposed into sub-scales measuring specific positive emotions (e.g. fear, hostility, guilt) and negative emotions (e.g. joviality, self-assurance, attentiveness). The IRI is often used in the social sciences to measure pro-social behaviours along four dimensions: empathy, perspective taking, personal distress and fantasy (e.g. Carlo et al., 1999; Büchner et al., 2007). The SOC provides a generalized measure of competence and contingency along two dimensions: personal mastery and perceived constraints. All responses are measured on Likert scales, with a higher number on the scale indicating greater agreement with the described feeling or emotion at the present moment. The sequence in which the three questionnaires were presented to subjects in the experiment was randomized, to control for possible order effects. On completion of the psychological questionnaires, participants were asked to fill in demographic information.[12] They received a show-up fee of 5 RMB, and a payment of 8 RMB for each questionnaire completed. The total completion time was less than 30 minutes.

We find significant increases in positive affect induced by the Leadership and Volunteer videos relative to the Neutral video (Table 4). Participants in both treatment conditions describe feeling more self-assured and jovial than those in the control condition (all pairwise comparison *p*-values

---

[11] The complete questionnaires are contained in the Supplementary Material.
[12] Demographic characteristics of this follow-up sample are comparable to the main experiment (see Tables S1 and S4 in the Supplementary Material).

< 0.01). There is some evidence that those participants who watched the Volunteer video also feel comparatively more attentive (p-value = 0.08), which is not the case for the Leadership video (p-value = 0.22). By contrast, we find no significant difference in negative affect for either the Leadership video (p-value = 0.42) or Volunteer video (p-value = 0.35), and little underlying variability in the negative emotions of fear or hostility. An interesting exception is that participants in both the Leadership and Volunteer video conditions describe feeling a greater sense of guilt than their counterparts in the Neutral video condition (respectively, p-value = 0.07 and p-value = 0.08). We observe no systematic differences in responses to the IRI or SOC questionnaires.[13]

That the observed increase in positive affect manifested itself in a rise in pro-sociality in the economic experiment is consistent with prior studies (Capra, 2004; Drouvelis and Grosskopf, 2016; Bartke et al., 2019). The relative effect sizes also support this interpretation. Compared to the Neutral video, the Volunteer video induced a larger emotional response across all four positive emotion sub-scales than the Leadership video (see second panel of Table 4), which translated into consistently larger behavioural estimates of the video's impact on pro-sociality (see Table 2 and columns 1 to 3 of Table 3).

Neither treatment condition video significantly affected fear, which Kugler et al. (2012) observed to increase risk aversion, and we find no significant difference in risk preferences versus the control condition. While it is plausible that heightened feelings of guilt are behind the rise in ambiguity aversion, we do not know of a precedent for this channel and cannot disentangle it from the corresponding increase in positive affect. The elicited emotions are also unable to explain the fall in trust induced by the Leadership video alone, more on this below.

---

[13] Results of the IRI and SOC can be found in the Supplementary Material (Table S5).

5. Discussion and Conclusion

The results of our economic experiment suggest that viral social media videos, a distinctive feature of modern crises, can influence behaviour and preferences. We find that, in the early days of the Covid-19 outbreak in China, videos showing either a prominent government leader's visit to Wuhan or the inward transit of health care volunteers induce greater pro-sociality, relative to a neutral video unrelated to the crisis. In the real-world, this could translate to a rise in donations, assistance, and willingness to comply with mandated health behaviours. On the other hand, the Leadership video used in our study had the unintended consequence of decreasing individuals' levels of trust. This may undermine the authorities' effectiveness in crisis response efforts.

It is important to keep in mind that these videos are context-specific and not representative of the macrocosm of social media videos circulating on Chinese social media platforms during January 2020. We cannot rule out that participants' perceptions of the Leadership video are biased by their preconceptions about the particular leader involved. One should remain wary of extrapolating our findings as to the effect of viral media content on behaviour to other populations.

We also uncover evidence that the social media videos used in our study had an incidental influence on individuals' emotions. Specifically, the Leadership and Volunteer videos induced significant increases in positive affect and mood, which may plausibly have driven the increase in pro-social behaviours. This complements evidence from hypothetical survey response data that emotional responses to a pandemic correlate with intended compliant behaviours (Sadique et al., 2007; Rubin et al., 2010). Two *caveats* should be noted here.

First, our measurements of emotional responses to the video stimuli were elicited nearly eight months after the behavioural measures obtained in the economic experiment. Thus, it is possible

that the videos would have induced different emotional responses between the two time periods. In this regard, we take re-assurance from the consistency of our psychological response data with the representative follow-up survey conducted in early March 2020, which indicate that the events broadcast in the two social media videos were perceived among ordinary Chinese citizens as positive motivating factors.

Second, we observe few systematic differences in emotional responses between the Leadership and Volunteer videos themselves, and so emotions cannot well explain the differential impact of the Leadership video on trust. An alternative explanation for this finding is that the source, rather than the content, of the video influences behaviour. The direction of communication in the Leadership video is from leader to citizen, whereas the direction of communication in the Volunteer video is citizen to citizen. Leadership studies have traditionally suggested a top-down communication style is most effective in establishing trust and conformity (the *centralization thesis*, e.g. 't Hart et al., 1993; McEntire and Dawson, 2007). Other literature has challenged the veracity of the *centralization thesis* in times of crisis, postulating that bottom-up communication styles are more effective (Boin and 't Hart, 2003; Demiroz and Kapucu, 2012). On this interpretation, our experimental findings on trust would come out in favour of the critics.

Appendix: Further details on the methods and videos used in this study can be found in the Supplementary Materials (separate file).

References

Alexander, D. E. (2014). Social media in disaster risk reduction and crisis management. *Science and Engineering Ethics, 20*(3), 717-733.

Balinska, M., & Rizzo, C. (2009). Behavioural responses to influenza pandemics: what do we know? *PLoS Currents Influenza, 1*, RRN1037.

Bartke, S., Bosworth, S. J., Snower, D. J., & Chierchia, G. (2019). Motives and comprehension in a public goods game with induced emotions. *Theory and Decision, 86*(2), 205-238. doi:10.1007/s11238-018-9677-5

Bavel, J. J. V., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., . . . Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour, 4*(5), 460-471. doi:10.1038/s41562-020-0884-z

Ben-Ner, A., & Halldorsson, F. (2010). Trusting and trustworthiness: What are they, how to measure them, and what affects them. *Journal of Economic Psychology, 31*(1), 64-79. doi:https://doi.org/10.1016/j.joep.2009.10.001

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior, 10*(1), 122-142.

Boin, A., & 't Hart, P. (2003). Public Leadership in Times of Crisis: Mission Impossible? *Public Administration Review, 63*(5), 544-553.

Bolle, F., Tan, J. H. W., & Zizzo, D. J. (2014). Vendettas. *American Economic Journal: Microeconomics, 6*(2), 93-130. doi:10.1257/mic.6.2.93

Büchner, S., Coricelli, G., & Greiner, B. (2007). Self-centered and other-regarding behavior in the solidarity game. *Journal of Economic Behavior & Organization, 62*(2), 293-303. doi:https://doi.org/10.1016/j.jebo.2004.12.006

Bults, M., Beaujean, D. J., de Zwart, O., Kok, G., van Empelen, P., van Steenbergen, J. E., . . . Voeten, H. A. (2011). Perceived risk, anxiety, and behavioural responses of the general public during the early phase of the Influenza A (H1N1) pandemic in the Netherlands: results of three consecutive online surveys. *BMC Public Health, 11*(1), 2.

Capra, M. C. (2004). Mood-Driven Behavior in Strategic Interactions. *American Economic Review, 94*(2), 367-372. doi:10.1257/0002828041301885

Carlo, G., Allen, J. B., & Buhman, D. C. (1999). Facilitating and Disinhibiting Prosocial Behaviors: The Nonlinear Interaction of Trait Perspective Taking and Trait Personal Distress on Volunteering. *Basic and Applied Social Psychology, 21*(3), 189-197. doi:10.1207/S15324834BASP2103_3

Cavatorta, E., & Groom, B. (2020). Does deterrence change preferences? Evidence from a natural experiment. *European Economic Review, 127*, 103456. doi:https://doi.org/10.1016/j.euroecorev.2020.103456

Charness, G., & Grosskopf, B. (2001). Relative payoffs and happiness: an experimental study. *Journal of Economic Behavior & Organization, 45*(3), 301-328. doi:https://doi.org/10.1016/S0167-2681(01)00148-2

Chuang, Y.-C., Huang, Y.-L., Tseng, K.-C., Yen, C.-H., & Yang, L.-h. (2015). Social capital and health-protective behavior intentions in an influenza pandemic. *PLOS ONE, 10*(4).

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology, 44*(1), 113–126.

Demiroz, F., & Kapucu, N. (2012). The Role of Leadership in Managing Emergencies and Disasters. *European Journal of Economic & Political Studies, 5*(1).

Drouvelis, M., & Grosskopf, B. (2016). The effects of induced emotions on pro-social behaviour. *Journal of Public Economics, 134*, 1-8. doi:https://doi.org/10.1016/j.jpubeco.2015.12.012

Dunn, J. R., & Schweitzer, M. E. (2005). Feeling and believing: the influence of emotion on trust. *Journal of Personality and Social Psychology, 88*(5), 736-748.

Eckel, C. C., & Wilson, R. K. (2004). Is trust a risky decision? *Journal of Economic Behavior & Organization, 55*(4), 447-465. doi:https://doi.org/10.1016/j.jebo.2003.11.003

Fan, R., Zhao, J., Chen, Y., & Xu, K. (2014). Anger Is More Influential than Joy: Sentiment Correlation in Weibo. *PLOS ONE, 9*(10), e110184. doi:10.1371/journal.pone.0110184

Forgas, J. P. (1995). Mood and judgment: the affect infusion model (AIM). *Psychological Bulletin, 117*(1), 39-66.

Haushofer J, & CJ., M. (2020). *Combining behavioral economics and infectious disease epidemiology to mitigate the COVID-19 outbreak. Available from: https://www.princeton.edu/haushofer/publications/Haushofer_Metcalf_Corona_2020-03-06.pdf.*

Hertel, G., & Fiedler, K. (1994). Affective and cognitive influences in social dilemma game. *European Journal of Social Psychology, 24*(1), 131-145. doi:10.1002/ejsp.2420240110

Hertel, G., Neuhof, J., Theuer, T., & Kerr, N. L. (2000). Mood effects on cooperation in small groups: Does positive mood simply lead to more cooperation? *Cognition and Emotion, 14*(4), 441-472. doi:10.1080/026999300402754

Hopfensitz, A., & Reuben, E. (2009). The Importance of Emotions for the Effectiveness of Social Punishment. *Economic Journal, 119*(540), 1534-1559. doi:10.1111/j.1468-0297.2009.02288.x

Joffily, M., Masclet, D., Noussair, C. N., & Villeval, M. C. (2014). Emotions, Sanctions, and Cooperation. *Southern Economic Journal, 80*(4), 1002-1027. doi:10.4284/0038-4038-2012.067

Jones, J. H., & Salathé, M. (2009). Early assessment of anxiety and behavioral response to novel swine-origin influenza A (H1N1). *PLOS ONE, 4*(12).

Kasperson, R. E., & Kasperson, J. X. (1996). The social amplification and attenuation of risk. *The Annals of the American Academy of Political and Social Science, 545*(1), 95-105.

Kirchsteiger, G., Rigotti, L., & Rustichini, A. (2006). Your morals might be your moods. *Journal of Economic Behavior & Organization, 59*(2), 155-172. doi:https://doi.org/10.1016/j.jebo.2004.07.004

Kugler, T., Connolly, T., & Ordóñez, L. D. (2012). Emotion, Decision, and Risk: Betting on Gambles versus Betting on People. *Journal of Behavioral Decision Making, 25*(2), 123-134. doi:10.1002/bdm.724

Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social class differences in health and well-being. *Journal of Personality and Social Psychology, 74*(3), 763-773.

Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and Decision Making. *Annual Review of Psychology, 66*(1), 799-823. doi:10.1146/annurev-psych-010213-115043

Leung, G. M., Ho, L.-M., Chan, S. K., Ho, S.-Y., Bacon-Shone, J., Choy, R. Y., . . . Fielding, R. (2005). Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. *Clinical Infectious Diseases, 40*(12), 1713-1720.

Loewenstein, G., & Lerner, J. S. (2003). The role of affect in decision making. In Davidson RJ, Scherer KR, & Goldsmith KR (Eds.), *Handbook of Affective Science* (pp. 619-642). New York: Oxford University Press.

McEntire, D., & Dawson, G. (2007). The Intergovernmental Context. In W. L. J. Waugh & K. Tierney (Eds.), *Emergency Management: Principles and Practice for Local Government* (2nd ed., pp. 57-70). Washington DC: ICMA.

Meshulam, M., Winter, E., Ben-Shakhar, G., & Aharon, I. (2012). Rational emotions. *Social Neuroscience, 7*(1), 11-17. doi:10.1080/17470919.2011.559124

Pham, M. T. (2007). Emotion and Rationality: A Critical Review and Interpretation of Empirical Evidence. *Review of General Psychology, 11*(2), 155-178. doi:10.1037/1089-2680.11.2.155

Pidgeon, N., Kasperson, R. E., & Slovic, P. (2003). *The social amplification of risk*: Cambridge University Press.

Prati, G., Pietrantoni, L., & Zani, B. (2011). Compliance with recommendations for pandemic influenza H1N1 2009: the role of trust and personal beliefs. *Health Education Research, 26*(5), 761-769. doi:10.1093/her/cyr035

Reuter, C., & Kaufhold, M. A. (2018). Fifteen years of social media in emergencies: a retrospective review and future directions for crisis informatics. *Journal of Contingencies and Crisis Management, 26*(1), 41-57.

Rubin, G. J., Amlôt, R., Rogers, M. B., Hall, I., Leach, S., Simpson, J., & Wessely, S. (2010). Perceptions and reactions with regard to pneumonic plague. *Emerging Infectious Diseases, 16*(1), 120.

Sadique, M. Z., Edmunds, W. J., Smith, R. D., Meerding, W. J., De Zwart, O., Brug, J., & Beutels, P. (2007). Precautionary behavior in response to perceived threat of pandemic influenza. *Emerging Infectious Diseases, 13*(9), 1307.

Sanfey, A. G., Rilling, J. K., Aronson, J. A., Nystrom, L. E., & Cohen, J. D. (2003). The Neural Basis of Economic Decision-Making in the Ultimatum Game. *Science, 300*(5626), 1755. doi:10.1126/science.1082976

Schniter, E., & Sheremeta, R. M. (2014). Predictable and predictive emotions: explaining cheap signals and trust re-extension. *Frontiers in Behavioral Neuroscience, 8*(401). doi:10.3389/fnbeh.2014.00401

't Hart, P., Rosenthal, U., & Kouzmin, A. (1993). Crisis Decision making: The Centralization Thesis Revisited. *Administration & Society, 25*(1), 12-45.

Taylor, M., Wells, G., Howell, G., & Raphael, B. (2012). The role of social media as psychological first aid as a support to community resilience building. *Australian Journal of Emergency Management, 27*(1), 20.

van der Weerd, W., Timmermans, D. R., Beaujean, D. J., Oudhoff, J., & van Steenbergen, J. E. (2011). Monitoring the level of government trust, risk perception and intention of the general public to adopt protective measures during the influenza A (H1N1) pandemic in the Netherlands. *BMC Public Health, 11*(1), 575.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

WHO. (2020). *Coronavirus disease 2019 (COVID-19) Situation Report – 11. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/.* Retrieved from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/.

Xiao, E., & Houser, D. (2005). Emotion expression in human punishment behavior. *Proceedings of the National Academy of Sciences of the United States of America, 102*(20), 7398. doi:10.1073/pnas.0502399102
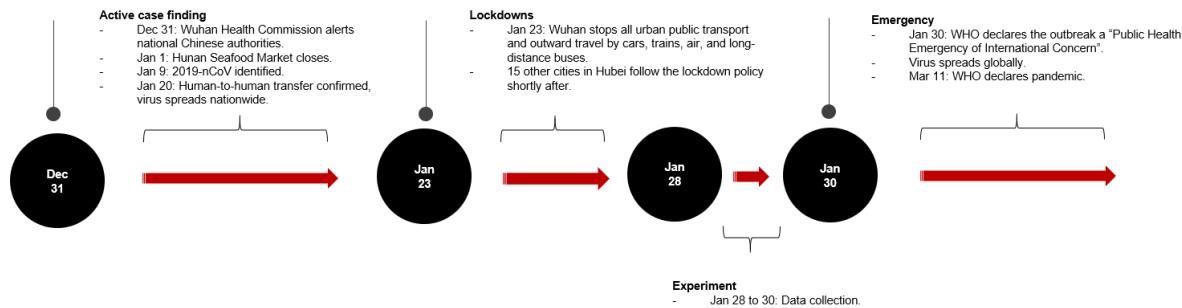
Tables and Figures

Fig. 1. Timeline of Covid-19 events in Hubei province, 2019 to 2020. Figure shows the dates of experiment data collection in context of wider events relating to the public emergency.
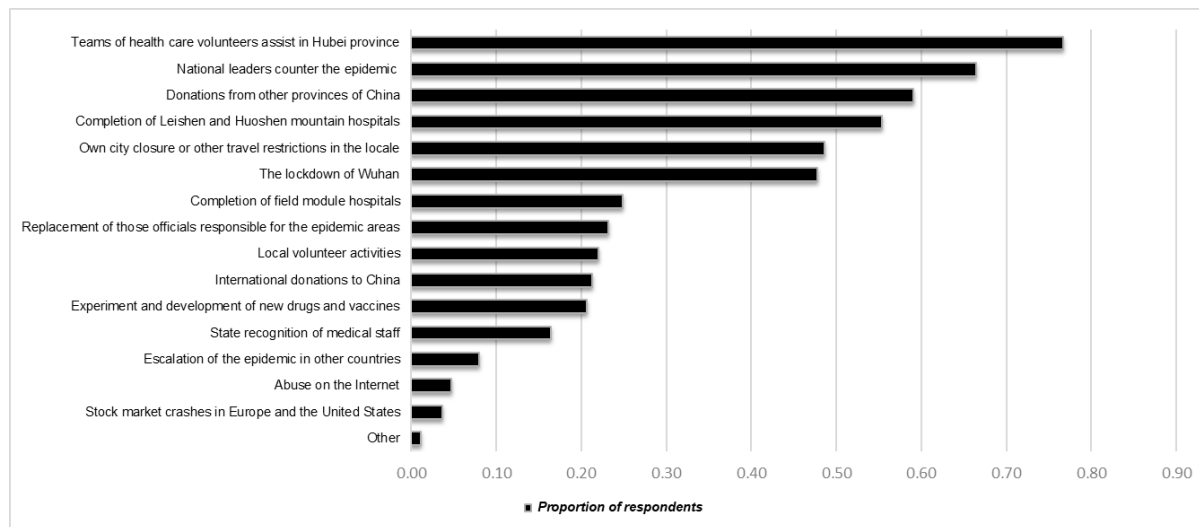

Fig. 2. Positive motivating factors during the Covid-19 outbreak. Figure presents the results of a survey question administered from March 12 – 20, 2020 to 5,686 non-student individuals around China. The survey question asked respondents to consider the development of the epidemic and select five factors that had provided them with positive psychological motivation.

Table 1. Experimental design and session information.

Treatment	Jan 28 morning	Jan 28 afternoon	Jan 30 morning	Jan 30 afternoon
Neutral video	20 participants	20 participants[a]	20 participants	20 participants
Volunteer video	16 participants	20 participants	20 participants	20 participants
Leadership video	20 participants[b]	20 participants	20 participants	20 participants
Excluded task	Ultimatum Game	Trust Game	Ultimatum Game	Trust Game

Notes:

[a] ID 5 & 20 used a computer and are excluded from the analysis.

[b] ID 12 & 18 used a computer and are excluded from the analysis.

Table 2. Key outcome measures in the experimental treatments.

Task (response range)	N[c]	Definitions: Higher value implies	Neutral video	Leadership video	Volunteer video
DG amount sent[a] (0 – 5)	39/38/38	greater pro-sociality	1.37 (1.01)	1.76* (0.99)	1.84* (1.03)
UG offer[b] (0 – 8)	19/20/20	greater pro-sociality and/or expectations of reciprocity norms	2.58 (1.43)	3.23 (1.24)	3.55** (0.83)
UG acceptance rate[b] (Accept=1, Reject=0)	19/20/20	lesser actual reciprocity norms	0.79 (0.42)	0.95 (0.22)	0.95 (0.22)
TG amount sent[a] (0 – 8)	20/18/18	greater trust	3.20 (2.28)	2.06* (1.98)	3.11 (2.78)
TG return[a] (0 – 24)	20/18/18	greater trustworthiness	3.05 (3.78)	2.1 (3.38)	3.21 (4.38)
PD cooperation rate[b] (Cooperate=1, Defect=0)	78/78/76	greater cooperation	0.40 (0.49)	0.46 (0.50)	0.45 (0.50)
Risk preference[a,d] (0 – 9)	78/77/75	greater willingness to seek out risks	4.78 (1.54)	4.75 (1.46)	4.79 (1.48)
Ambiguity preference[a] (0 – 9)	78/74/75	greater willingness to seek out ambiguity	4.53 (1.51)	4.14** (1.44)	3.96** (1.33)

Notes: *p<0.1; **p<0.05; ***p<0.01. Mean (SD) values are presented in the table.

[a] Two-tailed Wilcoxon rank-sum test.

[b] Two-proportions z-test.

[c] The convention is number of observations by Neutral/Leadership/Volunteer video treatment.

[d] We excluded responses from participants exhibiting inconsistent preference by switching from the certain amount to the lottery more than once. For the Leadership video, this required excluding 4 responses for risk and 1 for ambiguity; for the Volunteer video, this required excluding 1 response for risk and 1 for ambiguity; and for the Neutral video, this required excluding no responses for risk but 1 for ambiguity.

Table 3. Regression analysis of covariance.

	DG amount sent	UG offer	Pro-sociality[d]	TG amount sent	Ambiguity preference	Trust-related[e]
			Dependent Variable			
	OLS	OLS	Panel	OLS	OLS	Panel
	(1)	(2)	(3)	(4)	(5)	(6)
Diagnosed cases[a]	0.031	-0.125	-0.013	-0.363*	0.023	-0.026*
	(0.062)	(0.098)	(0.013)[d]	(0.209)	(0.054)	(0.015)
Volunteer video[b]	0.414*	1.200***	0.149***	-0.503	-0.578**	-0.035
	(0.242)	(0.387)	(0.053)	(0.813)	(0.225)	(0.042)
Leadership video	0.334	0.857**	0.111**	-1.496**	-0.334	-0.103**
	(0.237)	(0.435)	(0.052)	(0.716)	(0.239)	(0.041)
Panel indicators[c]						
DG			-0.035			
			(0.024)			
Risk						0.096**
						(0.037)
Ambiguity						0.046
						(0.037)
Constant	2.522*	3.804	0.654	6.646	3.185**	0.612*
	(1.042)	(3.736)	(0.423)	(6.461)	(1.564)	(0.325)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Random effects	No	No	Yes	No	No	Yes
Observations	114	59	118	55	224	162
R-squared	0.043	0.158	0.098	0.153	0.052	0.12

Notes: *p<0.1; **p<0.05; ***p<0.01. Robust standard errors are shown in the parentheses, calculated using the Huber/White sandwich estimator of variance. Control variables include gender, cell phone operating system and screen size.

[a] Log transformation of the aggregate number of diagnosed virus cases at the provincial level by the midnight of the previous day, based on data from CDC china.

[b] The reference video category is the Neutral video.

[c] Task data in the panel.

[d] Includes standardized data on DG amount sent and UG offer.

[e] Includes standardized data on TG amount sent, ambiguity preference and risk preference.

Table 4. Positive and Negative Affect Schedule (PANAS) outcomes.

Item	Emotions	Neutral video (N=80)	Leadership video (N=81)	Volunteer video (N=80)
Higher-order scales				
Positive affect (10 – 50)	active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, strong	29.01 (8.48)	32.15*** (7.38)	33.48*** (7.53)
Negative affect (10 – 50)	afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, distressed	19.69 (7.99)	21.01 (7.45)	21.47 (8.62)
Positive emotion scales				
Self-assurance	proud, strong	5.38 (2.05)	6.58*** (1.87)	7.01*** (1.95)
Attentiveness	alert, attentive, determined	8.78 (2.67)	9.37 (2.09)	9.55* (2.38)
Joviality	enthusiastic, excited	5.95 (1.94)	6.69*** (1.73)	6.73*** (1.86)
Other	active, inspired, interested	8.91 (2.87)	9.74* (2.47)	10.53*** (2.39)
Negative emotion scales				
Fear	afraid, scared, nervous, jittery	7.99 (3.77)	8.37 (3.74)	8.63 (3.70)
Hostility	hostile, irritable	3.38 (1.54)	3.14 (1.39)	3.19 (1.50)
Guilt	guilty, ashamed	3.82 (1.79)	4.28* (1.97)	4.34* (1.77)
Other	upset, distressed	4.51 (2.19)	4.89 (2.01)	4.73 (2.28)

Notes: *p<0.1; **p<0.05; ***p<0.01, based on two-tailed Wilcoxon rank-sum test versus the Neutral video. Mean (SD) values are presented in the table.