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Viral Social Media Videos Can Raise Pro-Social Behaviours When an Epidemic Arises

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Comments

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

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Abstract: At the onset of an epidemic, can viral social media videos induce the high levels of trust and pro-sociality required for a successful community response? Shortly after the outbreak of the COVID-19 virus in Wuhan, China, we conducted an experiment assessing the impact of viral videos on individual preferences and pro-social behaviour. Prior to the experiment, participants viewed one of three videos culled from Chinese social media: a central government leader visiting a local hospital and supermarket, health care volunteers transiting to Wuhan, or an emotionally neutral video unrelated to the emergency. Viewing one of the first two videos leads to higher levels of pro-sociality and increased ambiguity aversion relative to the third video. The leadership video, however, induces lower levels of trust. Our results suggest ways to craft more effective crisis response efforts and provide insights into how the direction of information in hierarchies influences trust in community members.

Keywords: Viral social media, pro-sociality, risk attitude, health communication, experiment, epidemic

JEL codes: C93, H12, I12

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Introduction

In December 2019, a novel coronavirus resembling severe acute respiratory syndrome coronavirus (SARS-COV) emerged in the Chinese city of Wuhan, the capital of Hubei province and a major international and domestic transportation hub. On 23 January 2020, local authorities imposed a full lockdown in Wuhan. One week later, the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (*1*). Locally within Wuhan, ensuing measures to mitigate contagion and manage strained health services required radical coordination of individual efforts toward collective demands. The success of such measures depends crucially on the propensity of community members to follow pro-social norms. Identifying inexpensive and quick to deploy interventions that increase, even temporarily, various kinds of pro-social behaviour are desirable.

One such intervention is the use of public media communications. These messages can reflect the delivery of information regarding the details of the crisis and the required actions of citizens. Alternatively, these messages can provide moral suasion to influence the public's willingness to comply with mandated behaviours. Effective communication is critical for managing behavioural responses in an epidemic. Health risk communication must motivate cooperation with self-protective measures without causing undue alarm (*2*). Within the frantic atmosphere of an outbreak, successful leadership strategies for building trust and cooperation are often counter-intuitive (*3, 4*). The leadership literature has traditionally suggested centralized, i.e. top-down, communications are the most effective in establishing trust and conformity (*5, 6*). More recent literature has challenged the veracity of this position in times of crisis, postulating that decentralized, i.e. bottom-up, communications are more effective (*7, 8*).

Social media has become an important channel that individuals turn to for information during public emergencies (*9*). As information systems, rather than personal experience, are the most likely source of information during an outbreak, media is an important agent of risk amplification (*10, 11*). Access to information via social media is one of the biggest differentiators of pandemics today (*12*). Recent research has recognised the actual and potential of social media to promote community cohesion during a crisis, alongside its negative effects (*13, 14, 15*).

The currency of social media are viral videos and text messages. Message content during episodes of heightened uncertainty influences trust, cooperation and pro-sociality (*16*). Trust is important for the adoption of health behaviours and therefore, indirectly, for controlling the rate of disease transmission (*17*). A long literature emphasizes that a message's effectiveness depends on its social and cultural context (*18-20*). In the social context of a systemic high anxiety event people process information differently (*21*). In the cultural context of social media, a social transformation of risk takes place (*22*). Evidence from hypothetical survey responses suggests that emotional responses to risk perception correlate with compliant behaviours (*23, 24*). Survey data collected during actual influenza pandemics reinforces the importance of psycho-social factors in health-related risk events (*25-29*).

To provide insight into how viral exchanges of information shape individual perceptions and reactions to emerging public health events, we conducted an experiment in which Wuhan University students completed a panel of decision tasks to measure the effects of social media videos on their pro-social, cooperative, and trusting behaviour, as well as their preferences towards risk and uncertainty. Our study has three experimental treatments based upon the nature of a priming social media video. All experimental tasks are incentive compatible, all choices have

monetary rewards proportional to the good outcomes of the tasks. To our knowledge, this contrasts with previous psychometric-style questionnaires conducted during public health emergencies.

A timeline of our 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. We randomly assigned 80 participants to each video treatment. The experiments consisted of twelve sessions designed for twenty participants each. Three sessions, one for each video treatment, 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. Invitations to participate 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 exclusively completed using one's mobile phone 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 this case, higher amounts offered by player 1 reflects a composition of pro-sociality and expectations of reciprocity norms, and player 2's decision reflects actual reciprocity norms. The stake used in the DG is 5 RMB, and in the UG is 8 RMB.

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 player 1 sends is a measure of trust and the amount 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 included 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 are primed by watching a once repeated two-minute video. The non-benchmark videos had been circulating widely and anonymously on social media. One video shows a senior central government official's visit to a local hospital and a supermarket (henceforth "Leadership video"). Another video shows health care volunteers from other provinces in transit to Wuhan (henceforth "Volunteer video"). The third video is emotionally neutral and unrelated to the crisis (henceforth "Neutral video"). Existing laboratory studies from the psychology (*30, 31*) and experimental economics (*32*) literatures suggest that video-induced mood influences pro-social behaviour.

We summarize our experiments and the data collection process in Table 1. In the morning sessions we excluded the UG task, and in the afternoon sessions we excluded the TG task. We did this because of the similarity between the tasks and to reduce the probability of human error in conducting sessions. 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. Four participants are excluded from the sample for using a computer rather than mobile phone to complete the experiment.

Results

As Table 2 presents, the Leadership (*L*) and Volunteer (*V*) videos have significant positive effects on pro-sociality in the experiment relative to the Neutral (*N*) video. In the DG, both videos significantly increase the average amount sent (p-value = 0.08 and p-value = 0.07 respectively, $n_L = n_V = 38$ and $n_N = 39$). Evidence suggests participants offer higher amounts in the UG. While this increase is not statistically significant for the Leadership video, it is for the Volunteer video (p-value = 0.12 and p-value = 0.03 respectively, $n_L = 20$, $n_V = 20$ and $n_N = 19$).

The Leadership video undermines trust. Amounts sent in the TG are significantly lower in the Leadership treatment than in the Neutral one (p-value = 0.09, $n_L = 18$ and $n_N = 20$). We find no such significant negative effect for the Volunteer video (p-value = 0.82, $n_V = 18$ and $n_N = 20$). Reciprocity, in terms of amounts returned, adjusts proportionally. Consistent with earlier TG experiments, a trustor's decision to transfer money is on average a breakeven strategy (*33*). Average cooperation rates in the PD are higher in the video treatments than in the control condition, but these increases are not statistically significant (p-value = 0.52 and p-value = 0.64 respectively, $n_L = n_N = 78$ and $n_V = 76$).

An ancillary question is how effective alternative message approaches are at informing the perception of risk and uncertainty, or perhaps even modulating preferences toward such scenarios. While neither treatment video significantly influences subjects' risk preferences (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 $n_N = 78$).

To check the robustness of these findings, we conduct a regression analysis of covariance (Table 3). We find that the estimated size of the treatment effects are qualitatively unchanged after controlling for the aggregate number of diagnosed virus cases at provincial level, participant gender, cell phone operating system and screen size. Furthermore, the precision of the estimated treatment effect magnitudes is increased, with a corresponding general increase in the levels of statistical significance.

Discussion

Our results suggest that viral social media communication can promote greater pro-sociality. In a time of crisis such as the COVID-19 outbreak, 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 could undermine the authorities' effectiveness in crisis response efforts.

During a crisis, leaders often favour a centralized, or top-down, approach in their communication responses (*5*). The centralization thesis asserts that a strong figurehead effectively fosters message communication down the hierarchy during a public emergency. The objective of crisis management is to improve coordination among community members. To achieve this objective, a leader must communicate legitimacy, trustworthiness and urgency, in turn fostering pro-sociality and trust (*6*). Critics of the centralization thesis argue that the realities of crisis management are very different, and that a top-down approach may lead to a backlash if leaders are not careful in their communications (*7*). It is important to cultivate a shared vision and mission (*34*). This suggests that a decentralized, or bottom-up, approach based around community cooperation, as presented in our Volunteer video, might be a greater motivator of pro-social, cooperative and trust behaviours. On this interpretation, the top-down approach may even undermine trust and/or increase levels of self-interested behaviours (*8*). Our data, with respect to trust, supports critics in the centralization thesis debate.

Individual reactions to emerging public health emergencies are context-dependent. A limitation of our study is that we cannot quantify the extent to which our findings extrapolate to real-world behaviours. To check the factors that motivated emotions in context of the COVID-19 outbreak, we administered a survey from March 12 to 20, 2020 to 5,686 non-student individuals around China. One survey question asks respondents to select five positive events, from a list of fifteen, which motivated them the most (Fig. 2). 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). This lends support to the external validity of the videos used in our experiment.

Materials and Methods

Experimental design. The recruitment of participants, deployment of the experiment tasks and payment transfers were all executed using the cloud-based Ancademy platform for conducting social science experiments (https://www.ancademy.org/). Ancademy is unique in that it is based on the open interface of WeChat, the Chinese multi-purpose messaging, social media and mobile payment app. WeChat is provided by Tencent Inc. and has 1.15 billion users. The majority of users are in the mainland of China. Typically, each person has only one account because the platform asks for ID card and bank card verification. Each WeChat account is tied to a single mobile phone number and the mobile payment facilities within WeChat are the primary delivery of electronic payments in China (https://www.businessofapps.com/data/wechat-statistics/). We recruited participants using Ancademy and sent them invitations to join an experimental session directly to their WeChat accounts. All participants were instructed to complete their participation through their mobile phones. All participants' earning were quickly transferred to their respective WeChat wallets shortly after the completion of their experimental session.

The Ancademy recruitment database contains over 9,000 students from Wuhan University alone. Invitations to participate in one of the experiment sessions were sent out to a randomly selected subset of this database in two waves. The first recruitment wave invited participation in one of the six sessions on January 28th. The second recruitment wave invited participation in one of the six sessions on January 30th. We invited three times the number of participants required, i.e., in each recruitment wave we invited 360 participants to fill the 120 available spaces. The first 120 participants to sign up in each wave secured a place in one of the experiment sessions.

The experimental protocol was approved by the Academy of Humanities and Social Sciences of Wuhan University. We obtained informed consent from all participants. To program the decision-making tasks, we used the experimental software oTree, which enables interactive experiments to be conducted online (*35*). Participants were not informed about the tasks that they would be asked to complete before registering for an experimental session. Participants were informed that they would receive monetary compensation for their participation. At the conclusion of an experimental session, participants collected their payment via the official Ancademy WeChat account by entering a code provided to them at the beginning of the session.

All participants were students at Wuhan University. At the time of running the experiment, students had already left the university for the spring festival holiday. Participants were thus located in 29 of China's 34 provincial regions (see Figure S1). More than one in seven participants were from Hubei province, which has Wuhan as the provincial capital. This is similar to the student demographic profile of Wuhan University. Participant ages range from 17 to 26, while 40% of participants are male and 60% are female.

Sampling strategy, randomization, and data exclusions. We followed a strategy of random sampling and random assignment to clusters of sessions, and within clusters random assignment to roles in multi-person decision tasks. Due to four participant no-shows, the final sample size is 236. The sample size was chosen to achieve balanced across conditions, subject to the constraints of the COVID-19 outbreak environment. Four participants were excluded from the data for using a computer rather than mobile phone to complete the experiment. We excluded these participants because they chose not to follow the experimental instructions, which explicitly stated to participate through their smartphone. For the risk and ambiguity tasks, we also excluded individuals who submitted inconsistent choices, defined as switching between the lottery and the sure amount of money options more than once. For the Leadership video treatment, this resulted in four exclusions for the risk task and one exclusion for the ambiguity task; for the Volunteer video treatment, this resulted in one exclusion for each of the risk and ambiguity tasks; and for the Neutral video treatment, this resulted in zero exclusions for the risk task and one exclusion for the ambiguity task. No outliers were identified, and no other exclusions were made. The study was not blinded.

Experimental procedures. All sessions followed the same protocol. Upon accepting an invitation to participate in the experiment, participants received an URL that took them to an active instance of the oTree application. Once all participants had entered the session remotely, they watched one of three two-minute videos, two-times. The exact video shown depended on the experimental treatment to which a participant was randomly assigned.

The Leadership video shows the Chinese Premier Li Keqiang's visit to a communicable disease hospital (Jinyintan Hospital) and a supermarket (Wushang Supermarket) in Wuhan on January 27,

2020 – the day before the first experimental session. The Volunteer video shows health care volunteers from other provinces in transit to Wuhan (created online at 2020-01-25). The Neutral video shows the sculpting of a plastic bottle (created online at 2017-03-28). All three videos were culled directly from Chinese social media. The Leadership and Volunteer videos were shared anonymously among WeChat group networks during January 2020. The Neutral video was also shared anonymously from Baidu video. We trimmed each source video to ensure that they were of comparable length, two minutes. The videos used in this study can be found in the project repository at Open Science Framework: https://tinyurl.com/sl28dg6.

After watching their randomly assigned video two-times, participants were redirected to a welcome screen describing the experiment guidelines. Participants were informed about the payment protocol and how to claim the payment at the end of an experimental session. Participants were also told that communication was prohibited. In case of some questions arising during completion of the experiment, participants had to enter their mobile phone number before commencing the tasks.

We employed a comprehensive set of twelve behavioural economics tasks commonly used to measure behaviours and preferences. One task, the Ultimatum Game, was excluded from the morning sessions. Another task, the Trust Game, was excluded from the afternoon sessions. Participants thus completed eleven tasks sequentially in a session. Each task was completed only once.

We report on the following six tasks of relevance to our research question.

- *Dictator Game*. Two-person game. Random matching of participants into pairs within the session. Within a pair, participants are assigned to the role of either player 1 or player 2. Roles are asymmetric. Player 1 is allotted 5 RMB and decides how to allocate this sum of money between the two players in the pair. Player 1's allocation is final. Player 2 has no decision to make.

- *Ultimatum Game*. Two-person game. Random matching of participants into pairs within the session. Within a pair, participants are assigned to the role of either player 1 or player 2. Roles are asymmetric and each player decides sequentially. Player 1 is allotted 8 RMB and decides how to allocate this sum of money between the two players in the pair. Player 2 can choose to accept or reject the allocation. In case of rejection, both players receive zero payoff for the task.

- *Trust Game*. Two-person game. Random matching of participants into pairs within the session. Within a pair, participants are assigned to the role of either player 1 or player 2. Roles are asymmetric and each player decides sequentially. Player 1 is allotted 8 RMB and decides how much of this sum of money to transfer to player 2. Any money transferred is multiplied by a factor of three before reaching player 2. Any money not transferred is kept by player 1. Player 2 observes the multiplied transfer and decides how much of it to return to player 1. Any money not returned is kept by player 2.

- *Prisoner's Dilemma Game*. Two-person game. Random matching of participants into pairs within the session. Within a pair, participants are assigned to the role of either player 1 or player 2. Roles are symmetric and each player decides simultaneously. Each player can choose to

Cooperate or Defect. The choices are framed neutrally as options C or D. If both players choose Cooperate, both players earn 6 RMB. If both players choose Defect, both players earn 3 RMB. If one player chooses Cooperate and the other player chooses Defect, the cooperating player earns 0 RMB and the defecting player earns 9 RMB.

- *Risk Preference Elicitation*. Individual decision-making task. Participants are presented with 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. After all choices have been made, the system randomly selects one of the nine pairs of options and, depending on the option chosen for this pair, determines the payoff for the task.

- *Ambiguity Preference Elicitation*. Individual decision-making task. Participants are presented with a series of nine pairwise choices between a lottery (option A) and a sure amount of money (option B). If participants choose the lottery, 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. The sure amount increases evenly with each choice from 3 RMB up to 9 RMB. After all choices have been made, the system randomly selects one of the nine pairs of options and, depending on the option chosen in this pair, determines the payoff for the task.

Six additional tasks for which we collected data in the experiment are not reported on here. Details of these can be found in the supplementary material.

After completion of the tasks, participants answered a short questionnaire eliciting standard demographic information. Finally, each participant viewed a screen containing his or her decision outcomes and payment to be received for each of the tasks. The session then concluded. All sessions lasted approximately forty-five minutes and payments averaged 63.79 RMB (about 9.5 US dollars), including a participation fee of 10 RMB.

References and Notes

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

2. Vaughan E, Tinker T. Effective health risk communication about pandemic influenza for vulnerable populations. American Journal of Public Health. 2009;99(S2):S324-S32.

3. Maher B. Nature. 2010;463(7278):150-3.

4. WHO. (2008). World Health Organization outbreak communication planning guide, 2008 edition. World Health Organization. https://apps.who.int/iris/handle/10665/44014.

5. Hart P, Rosenthal U, Kouzmin A. Crisis Decision making: The Centralization Thesis Revisited. Administration & Society. 1993;25(1):12-45.

6. McEntire D, Dawson G. The Intergovernmental Context. In: Waugh WLJ, Tierney K, editors. Emergency Management: Principles and Practice for Local Government. 2nd ed. Washington DC: ICMA; 2007. p. 57-70.

7. Boin A, 't Hart P. Public Leadership in Times of Crisis: Mission Impossible? Public Administration Review. 2003;63(5):544-53.

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

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

10. Kasperson RE, Kasperson JX. The social amplification and attenuation of risk. The Annals of the American Academy of Political and Social Science. 1996;545(1):95-105.

11. Pidgeon N, Kasperson RE, Slovic P. The social amplification of risk: Cambridge University Press; 2003.

12. Balinska M, Rizzo C. Behavioural responses to influenza pandemics: what do we know? PLoS Currents Influenza. 2009;1:RRN1037.

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

14. Alexander DE. Social media in disaster risk reduction and crisis management. Science and Engineering Ethics. 2014;20(3):717-33.

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

16. White MP, Eiser JR. Marginal trust in risk managers: Building and losing trust following decisions under uncertainty. Risk Analysis. 2006;26(5):1187-203.

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

18. Fischhoff B, Slovic P, Lichtenstein S, Read S, Combs B. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. Policy Sciences. 1978;9(2):127-52.

19. Slovic P. Perception of risk. Science. 1987;236(4799):280-5.

20. Fischhoff B. Risk perception and communication unplugged: twenty years of process. Risk Analysis. 1995;15(2):137-45.

21. Holmes BJ. Communicating about emerging infectious disease: The importance of research. Health, Risk & Society. 2008;10(4):349-60.

22. Short JF. The social fabric at risk: toward the social transformation of risk analysis. American Sociological Review. 1984;49(6):711-25.

23. Sadique MZ, Edmunds WJ, Smith RD, Meerding WJ, de Zwart O, Brug J, Beutels P. Precautionary behavior in response to perceived threat of pandemic influenza. Emerging Infectious Diseases. 2007;13(9):1307.

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

25. Leung GM, Ho L-M, Chan SKK, Ho S-Y, Bacon-Shone J, Choy RYL, Hedley AJ, Lam T-H, Fielding R. Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. Clinical Infectious Diseases. 2005;40(12):1713-20.

26. Jones JH, Salathé M. Early assessment of anxiety and behavioral response to novel swine-origin influenza A (H1N1). PLoS ONE. 2009;4(12).

27. Bults M, Beaujean DJMA, de Zwart O, Kok G, van Empelen P, van Steenbergen JE, Richardus JH, Voeten HACM. 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. 2011;11(1):2.

28. van der Weerd W, Timmermans DR, Beaujean DJ, Oudhoff J, van Steenbergen JE. 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. 2011;11(1):575.

29. Prati G, Pietrantoni L, Zani B. Compliance with recommendations for pandemic influenza H1N1 2009: the role of trust and personal beliefs. Health Education Research. 2011;26(5):761-9.

30. Hertel G, Fiedler K. Affective and cognitive influences in social dilemma game. European Journal of Social Psychology. 1994;24(1):131-45.

31. Hertel G, Neuhof J, Theuer T, Kerr NL. Mood effects on cooperation in small groups: Does positive mood simply lead to more cooperation?. Cognition & Emotion. 2000;14(4):441-72.

32. Drouvelis M, Grosskopf B. The effects of induced emotions on pro-social behaviour. Journal of Public Economics. 2016;134:1-8.

33. Berg J, Dickhaut J, McCabe K. Trust, Reciprocity, and Social History. Games and Economic Behavior. 1995;10(1):122-42.

34. Lester W, Krejci D. Business “Not” as Usual: The National Incident Management System, Federalism, and Leadership. Public Administration Review. 2007;67(S1):583-91.

35. Chen DL, Schonger M, Wickens C. oTree—An open-source platform for laboratory, online, and field experiments. Journal of Behavioral and Experimental Finance. 2016;9:88-97.

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

Figures and Tables

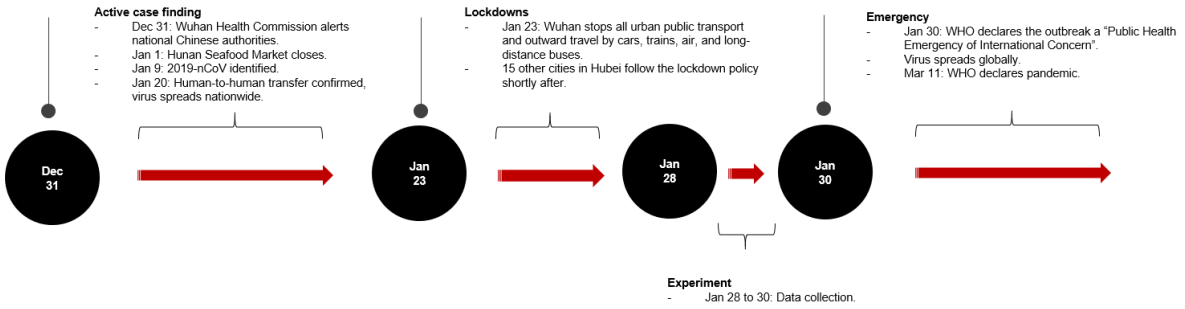

Fig. 1. Timeline of COVID-19 events in Hubei province, 2019 to 2020. Figure shows the dates of experiment data collection in context of wider events relating to the public emergency.

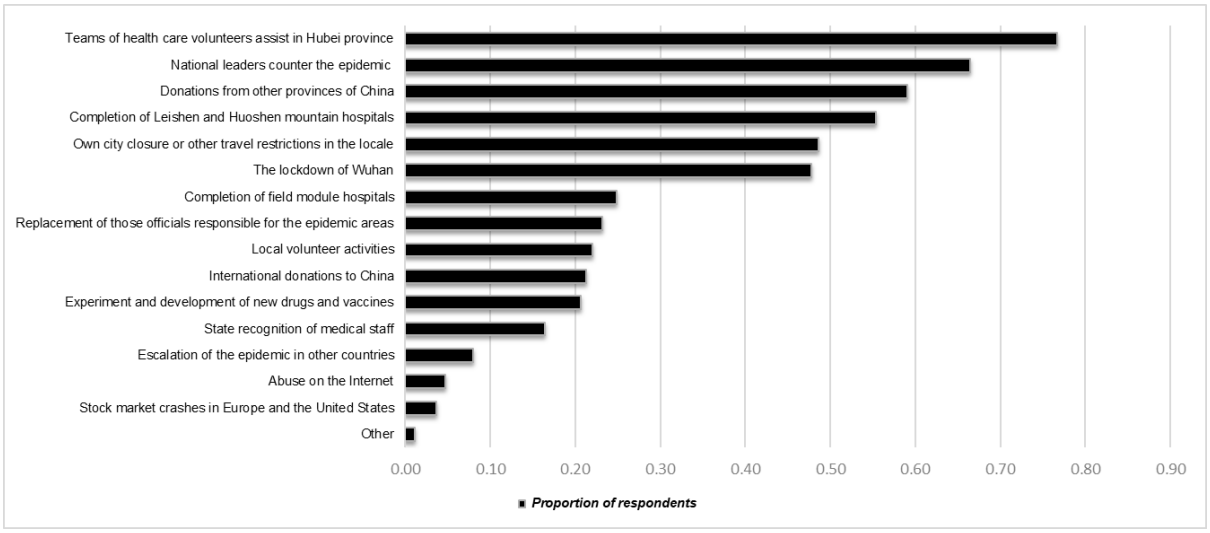

Fig. 2. Positive motivating factors during the COVID-19 outbreak. Figure presents the results of a survey question administered from March 12 – 20, 2020 to 5,686 non-student individuals around China. The survey question asked respondents to consider the development of the epidemic and select five factors 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] (C=1, D=0)	78/78/76	greater cooperation	0.40 (0.49)	0.46 (0.50)	0.45 (0.50)
Risk preference[a,d] (3 – 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] (3 – 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 was 4 for risk and 1 for ambiguity; for the Volunteer video, this was 1 for risk and 1 for ambiguity; and for the Neutral video, this was 0 for risk and 1 for ambiguity.

Table 3. Regression analysis of covariance. All regression models use the Ordinary Least Squares (OLS) estimation method.

	Dependent Variable			
	DG amount sent	UG offer	TG amount sent	Ambiguity preference
	(1)	(2)	(3)	(4)
Diagnosed cases[a]	0.031	-0.125	-0.363*	0.023
	(0.062)[d]	(0.098)	(0.209)	(0.054)
Volunteer video[b]	0.414*	1.200***	-0.503	-0.578**
	(0.242)	(0.387)	(0.813)	(0.225)
95% CI	*[-0.061,0.888]*	*[0.442, 1.958]*	*[-2.097, 1.090]*	*[-1.020, -0.136]*
Leadership video	0.334	0.857**	-1.496**	-0.334
	(0.237)	(0.435)	(0.716)	(0.239)
95% CI	*[-0.131, 0.798]*	*[0.004, 1.709]*	*[-2.900, -0.092]*	*[-0.802, 0.135]*
Control variables		Gender, iOS[c], Screen size		
Constant	2.522*	3.804	6.646	3.185**
	(1.042)	(3.736)	(6.461)	(1.564)
Observations	114	59	55	224
R-squared	0.043	0.158	0.153	0.052

Notes: *p<0.1; **p<0.05; ***p<0.01.

[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] Dummy variable for iOS mobile operating system.

[d] Robust standard errors are shown in the parentheses.