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Even those who perceive COVID-19 as low risk engage in infection prevention behavior in Japan:
COVID-19 infection prevention behavior as a social norm

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Abstract

The global outbreak of COVID-19 has caused severe physical and economic damage. The extent of damage differs across countries, and is relatively small in Japan. This study investigated the predictors of infection prevention behavior among Japanese people and attempted to understand why the damage in Japan was less compared to other countries. We explored the following predictions: (1) people who perceive higher COVID-19 risks will engage in infection prevention behaviors regardless of their perceived norms; and (2) people who perceive lower risks for COVID-19 will engage in infection prevention only when they perceive infection prevention behavior as a social norm. We conducted two studies by recruiting 1,588 and 339 participants for studies 1 and 2, respectively. In Study 1, as an indicator of the perceived infection risk, we measured whether participants had been vaccinated, assuming that unvaccinated people perceived COVID-19 to be low risk. In Study 2, we directly measured the perceived infection risk. The results were consistent with our predictions, suggesting that social norms promote infection prevention behavior, even among individuals who perceived COVID-19 as low risk. This may be one of the reasons for the relatively small COVID-19-related damage in Japan.

Keywords: COVID-19; infection prevention behavior; social norms

Introduction

The worldwide coronavirus disease (COVID-19) outbreak has caused severe physical damage. The risk of severe symptoms varies among individuals, with the risk being higher among older people and men (Wolff et al., 2020). There is also a variance in the number of cases or deaths between countries. In the United States, over 100 million infectious cases (one-third of the population) have been confirmed, and over one million people have died from the disease as of January 2023 (John Hopkins University, 2023). However, COVID-19-related damage in Japan has been relatively less severe. The confirmed cases are less than one fifth of the population, and approximately 60,000 people have died from the disease (John Hopkins University, 2023). Our study investigated the predictors of infection prevention behaviors among Japanese people and attempted to understand why the damage in Japan was less than that in other countries.

The effect of social norms on infection prevention behaviors in Japan

One study demonstrated that people engage in infection prevention behaviors not only to avoid being infected, but also to avoid infecting others (Jordan, Yoeli, & Rand, 2021). Their study suggested that people had greater infection prevention intentions, as they were afraid of the personal and public threat of COVID-19. This implies that people are less likely to engage in infection prevention behaviors when they perceive COVID-19 as low risk.

Nakayachi et al. (2020) investigated why Japanese people engaged in infection prevention behaviors by using masks. They demonstrated that mask use was promoted by the perception of the norm that masks should be worn even when the perceived risk of COVID-19 was controlled. This implies that even those who perceived COVID-19 as low risk engaged in infection prevention behaviors once they perceived the behaviors as a code of conduct. These norms may have suppressed the spread of COVID-19.

We assumed that one of the reasons why COVID-19 did not spread in Japan was because of the norm-adhering tendency of Japanese people. Japan has two socio-ecological characteristics that strongly encourage people to conform to norms. The first is cultural tightness, which refers to the strength of social norms. As tight societies, such as Japan, implement strict norms and severe punishments for deviance (Gelfand et al., 2011), people in Japan may conform to these norms and perform infection prevention behaviors (c.f., Gelfand et al., 2021).

The second characteristic is low relational mobility, which refers to the ease with which people in a society or social context can select new relationship partners when necessary (Yuki et al., 2007). The cost of reputational damage is greater in societies with lower relational mobility (c.f., Yamagishi, Jin, & Kiyonari, 1999). This is because, contrary to high-mobility societies, people in low-mobility societies cannot easily create new relationships even when they lose their reputation or are excluded. Therefore, people in societies with lower mobility are more likely to conform to norms to avoid reputational damage (Iwatani & Muramoto, 2017).

The purpose of this study

In this study, we considered infection prevention behavior as a social norm. We examined the effect of the estimated reputational damage incurred by deviating from the norm on people's infection prevention behaviors in Japan. We further examined whether risk perception moderated the effect of estimated reputational damage on infection prevention behaviors.

Our predictions were as follows: (1) people who perceive higher COVID-19 risks will engage in infection prevention behaviors, regardless of whether they perceive this behavior to be a social norm; and (2) people who perceive lower COVID-19 risks will engage in infection prevention behaviors only when they perceive the behavior to be a social norm.

We conducted two studies. In Study 1, we measured whether participants had been vaccinated as an indirect indicator of their COVID-19 risk perception. We assumed that unvaccinated people perceived lower COVID-19 risks than vaccinated people, based on Pennycook et al. (2022), who demonstrated that those who perceived lower COVID-19 risks were more hesitant to be vaccinated. In Study 2, we directly measured the perceived risk of COVID-19 (Pennycook et al., 2022).

We measured the estimation of reputational damage (i.e., the extent of reputational damage estimated when participants neglected engaging in infection prevention behaviors) as an independent variable. Reputation prevents people from deviating from social norms, such as cooperation norms (Milinski, Semmann, & Krambeck, 2002) or norms regarding clean-up activities (Iwatani & Muramoto, 2017).

In summary, we focused on reputational damage caused by neglecting to engage in infection prevention behaviors and explored the following predictions:

(1) There would be a positive relationship between perceived reputational damage and infection prevention behaviors among unvaccinated people (Study 1) and among those who perceive a lower infection risk (Study 2).

(2) There would be no relationship between estimated self-reputational damage and infection prevention behavior among vaccinated people (Study 1) or among those who perceive a higher infection risk (Study 2).

Moreover, we examined whether participants accurately estimated reputational damage. People sometimes overestimate the reputational damage caused by norm deviations (e.g., Iwatani & Muramoto, 2017, Prentice & Miller, 1993). We examined the following possibility:

(3) People overestimate reputational damage caused by neglecting to engage in infection prevention behaviors.

We conducted two studies in February and December, 2022 (the highest and second highest wave of infection at that time, respectively). Both studies were reviewed and approved by the Ethics Committee of the University of Tokyo. This study conformed to the protocol outlined in the latest version of the Declaration of Helsinki. All participants were informed of the purpose of the study and provided online informed consent before responding to the questions.

Study 1

This study is part of a research project, which set eight experimental conditions. We examined our hypotheses using a questionnaire answered before the participants were assigned to each experimental condition. Therefore, we have omitted the explanation of the eight experimental conditions.

Method

Participants We recruited 1,588 participants in Japan through a research company (Rakuten Insight) on February 3 and February 4, 2022, during which the number of newly infected people in Japan was 103,038 and 99,299, respectively (Our World in Data). We recruited participants over the age of 20, as in Nakayachi et al.'s (2020) study. We excluded data with missing values and that of two participants who stated their age as "5454" and "7171." We also excluded participants who answered that they were under 20 years of age (four participants), those who indicated that "they did not want to reveal their gender" (12 participants), or those who were "non-binary" (three participants) to analyze the effect of gender. In summary, we analyzed data from 1,235 participants.

Questionnaire Participants were asked to imagine a situation in which the COVID-19 infection was in *rapid infection stage*, where the number of newly confirmed cases in Tokyo was approximately 300 per day. This is the second severest stage followed by *infection explosion stage*. Although the actual number of newly confirmed cases during this period was larger than that assumed for *infection explosion stage*, we asked them to imagine *rapid infection stage* to avoid the ceiling effect, wherein most participants would perform infection prevention behavior in *infection explosion stage*. The participants were asked to answer the following questions:

(1) Participants' own reputation (estimated self-reputational damage): participants estimated reputational damage they would receive from others if they neglected performing infection prevention behavior; "How much do you estimate your friends will lower your reputation if they find you dining at a pub during the infection accelerating phase?" The answers were rated on a six-point scale ranging from 1 (not at all) to 6 (considerably; $M = 3.78$, $SD = 1.33$).

(2) Others' reputation: participants answered their evaluations of others who neglected performing infection preventing behavior; "How much would you lower your evaluation of your friends if you find them dining at a pub during the infection accelerating phase?" The answers were rated on a six-point scale ranging from 1 (not at all) to 6 (considerably; $M = 3.49$, $SD = 1.37$).

(3) Intention to engage in infection prevention behavior: we used Miyajima and Murakami's (2021) scale, which comprised 15 items (e.g., try to avoid a place where many people gather) and measured answers on a 0–100 visual analog scale (0: strongly disagree, 50: neither agree nor disagree, and 100: strongly agree). We used seven of the 15 items. The average scores were used as scores for infection prevention behavior ($\alpha = .92$, $M = 76.05$, $SD = 17.78$).

Table 1: The effect of estimated self-reputational damage and vaccination (perceived risk) on infection prevention behavior.

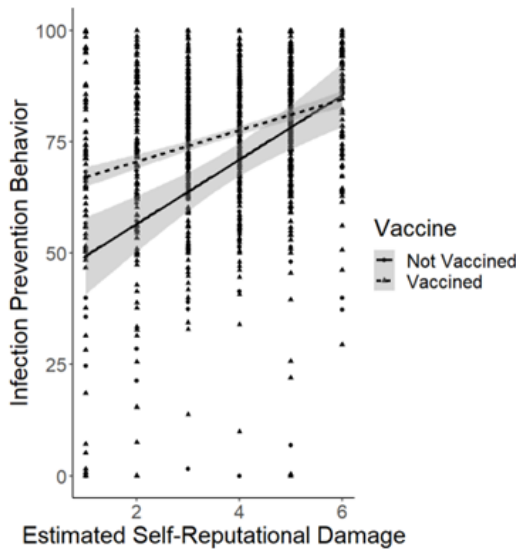| Dependent variable: infection prevention behavior	Study 1		Study 2	
	β	p	β	p
Estimated self-reputational damage	.27	< .01	.22	< .01
Study 1: vaccination (vaccinated = 1, unvaccinated = 0) or	.12	< .01		
Study 2: perceived risk			.45	< .01
Interaction	-.08	< .01	-.11	< .02
Age	.20	< .01	.09	< .08
Gender (female = 1, male = 0)	.15	< .01	.11	< .03
Residential mobility (only included in Study 2)			-.01	< .87

Figure 1: The effect of estimated self-reputational damage and vaccination on the intention to engage in infection prevention behavior (Study 1).

Figure 2: Comparison between others' reputational damage and (estimated) self-reputational damage (Study 1).

(4) Vaccination: Participants were asked whether they had been vaccinated. A total of 1,107 participants were vaccinated, whereas 128 participants were not.

(5) Control variables: we asked about participants' gender (749 men and 486 women) and age ($max = 84$, $min = 20$, $M = 50.01$, $SD = 13.37$).

Results

We investigated whether the effect of estimated self-reputational damage on infection prevention behaviors differed between vaccinated and unvaccinated individuals.

After mean centering all the variables in the following model, we regressed the intention to engage in infection prevention behaviors on estimated self-reputational damage, vaccination (whether they were vaccinated), and their interaction. We controlled for the effects of age and gender (male = 0; female =1) because older people and women more frequently performed infection prevention behaviors (Lu et al., 2021). As shown in Table 1, we found statistically significant main effects of estimated self-reputational
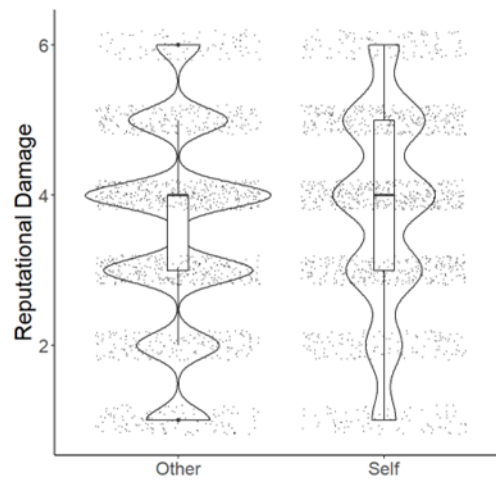
damage ($β = .27$, $p < .01$), vaccination ($β = .12$, $p < .01$), age ($β = .20$, $p < .01$), and gender ($β = .15$, $p < .01$). We also found a statistically significant interaction effect between estimated self-reputational damage and vaccination ($β = -.08$, $p < .01$). As shown in Figure 1, the correlation between estimated self-reputational damage and infection prevention behavior was stronger among unvaccinated individuals ($r = .42$, $p < .01$) than among vaccinated individuals ($r = .28$, $p < .01$).

In addition, we examined whether the participants accurately estimated reputational damage. An analysis of variance was performed; the dependent variable was reputational damage, whereas the independent variable was reputation target (self or other). As shown in Figure 2, there was a main effect of reputation target [$F (1, 1234) = 136.67$, $p < .01$]; participants estimated that the reputational damage they suffer from others would be greater than the reputational damage they inflict on others who neglect performing infection prevention behaviors. This result suggests that people may overestimate the reputational damage they would suffer.
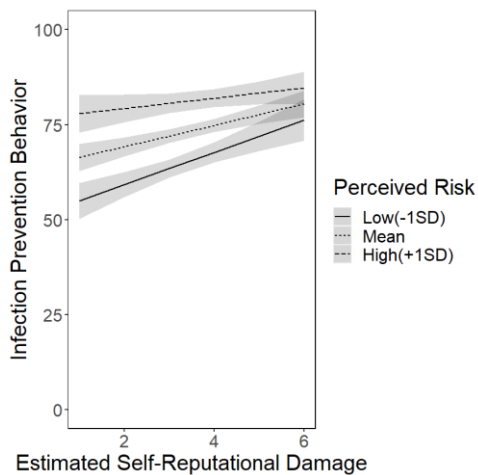
Figure 3: The effect of estimated self-reputational damage and perceived risk on the intention to engage in infection prevention behavior (Study 2).

Figure 4: Comparison between others' reputational damage and (estimated) self-reputational damage (Study 2).

Discussion

In Study 1, we demonstrated the interaction effect between estimated reputational damage and vaccination. As people estimated greater reputational damage caused by neglecting to engage in infection prevention behaviors, they were more likely to engage in such behaviors. This effect was stronger among unvaccinated individuals than among vaccinated individuals. In addition, the estimated reputational damage was greater than the actual damage. These results are consistent with our predictions.

However, the proportion of unvaccinated people was small in Study 1. Additionally, why the effect of estimated self-reputational damage differed between vaccinated and unvaccinated people is unclear, as many factors other than perceived risk are related to willingness to vaccinate [e.g., political conservatism (Baumgaertner et al., 2018; Pennycook et al., 2022) and cognitive functions (Batty et al., 2021)]. Therefore, in Study 2, we directly measured the participants' perceived risk of COVID-19 and examined the moderating effect of risk perception on the relationship between estimated self-reputational damage and infection prevention behavior, while controlling the effect of vaccination.

Study 2

Method

Participants We recruited 339 participants in Japan from a research company (Cross Marketing Inc.) between December 20 and 23, 2022, during which the number of newly infected people in Japan was between 173,336 (December 22) and 206,943 (December 20; Our World in Data). We excluded 51 participants with missing values and one participant who selected "non-binary" as their gender to analyze its effect. We also excluded two participants who answered that they were younger than 20 years because we only recruited participants
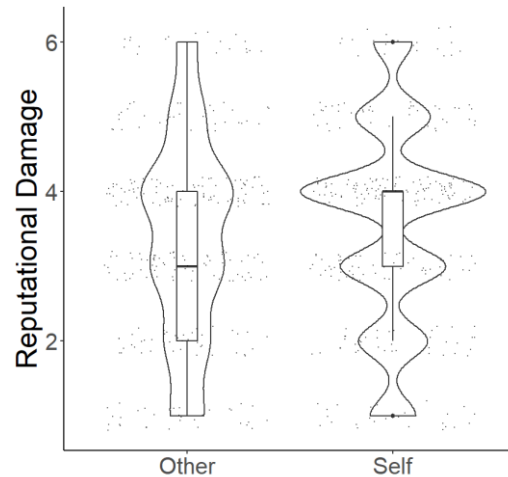
older than that, as in Study 1. Finally, we analyzed data from 285 participants. Participants were recruited from high- and low-residential mobility areas in Japan (144 and 141 participants, respectively). As in Oishi et al.'s (2009) study, we defined low (Akita, Toyama, and Fukui) and high (Tokyo, Okinawa, and Fukuoka) residential mobility societies based on the proportion of residents in each prefecture in 2020 who were living in the same place as they did in 2015 (Ministry of Internal Affairs and Communications, 2022).

Questionnaire The participants were asked to imagine a situation in which healthcare workers could not respond to COVID-19 without restricting general medical care. This scenario was different from that in Study 1 because we adopted the latest definition of the infection phase revised by government. They were then asked to answer the following questions:

(1) Participants' own reputation (estimated self-reputational damage): this question was the same as that in Study 1 ($M = 3.56$, $SD = 1.33$).

(2) Others' reputation: the answers were rated on a six-point scale as in Study 1 (considerably: $M = 3.37$, $SD = 1.36$).

(3) Intention to engage in infection prevention behaviors: the questions were identical to those in Study 1. We averaged the scores as the infection prevention behavior score ($\alpha = 0.91$, $M = 73.24$, $SD = 16.71$).

(4) Perceived risk of COVID-19: participants were asked about their perceived risk of COVID-19, using Pennycook et al.'s (2022) scale, which was composed of eight items (e.g., the coronavirus poses a major threat to the public) rated on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). We included seven of these items, excluding the item, "very few people in the country are likely to actually get sick from the coronavirus," because more than 25 million cases had already been confirmed. We averaged the scores as perceived risk of COVID-19 score ($\alpha = 0.89$, $M = 4.84$, $SD = 1.07$).

(5) Control variables: we asked about participants' gender (194 men and 91 women) and age ($max = 90$, $min = 20$, $M = 57.61$, $SD = 12.23$).

Results

We investigated whether the effect of estimated self-reputational damage on infection prevention behaviors differed between those who perceived higher and lower risk of COVID-19.

After mean centering all variables in our model, we regressed the intention to engage in infection prevention behaviors on estimated self-reputational damage, perceived risk of COVID-19, and their interaction. We controlled for the effects of age and gender (male = 0; female =1).

We found statistically significant main effects of estimated self-reputational damage ($β = .22$, $p < .01$), perceived risk of COVID-19 ($β = .45$, $p < .01$), and gender ($β = .11$, $p < .03$). We also found a statistically significant interaction effect between estimated self-reputational damage and perceived risk ($β = -.11$, $p < .02$).

A simple slope analysis was conducted. As shown in Figure 3, estimated self-reputational damage promoted infection prevention behaviors among those who perceived lower (-1 SD) risks ($β = .33$, $p < .01$), while there was no relationship between estimated self-reputational damage and infection prevention behavior among those who perceived higher (+1 SD) risks ($β = .11$, $p < .10$).

In addition, we examined whether the participants accurately estimated reputational damage. An analysis of variance was performed; the dependent variable was reputational damage, whereas the independent variable was reputation target (self or other). As shown in Figure 4, reputation target had a main effect [$F (1, 284) = 18.52$, $p < .01$], indicating that participants estimated that the reputational damage they suffer from others would be greater than the reputational damage they inflict on others who neglect performing infection prevention behaviors.

Discussion

In Study 2, we demonstrated the interaction effect between estimated self-reputational damage and perceived risk. When people estimated greater reputational damage caused by neglecting to engage in infection prevention behaviors, they engaged in infection prevention behavior more frequently. This effect was stronger among those who perceived a lower COVID-19 risk than among those who perceived a higher risk. In addition, participants estimated the reputational damage they would suffer to be greater than the damage they would inflict on others. These results are consistent with our predictions.

General Discussion

First, we examined the effect of the estimated reputational damage on infection prevention behaviors. Across Studies 1 and 2, we demonstrated that people had a greater intention to engage in infection prevention behavior as they estimated greater reputational damage caused by neglecting to perform these behaviors. This result is consistent with that of Nakayachi et al.'s (2020), who demonstrated the perception of social norms promoted mask wearing in Japan. Our results imply that people in Japan are likely to perceive infection prevention behaviors as social norms, which makes them abide by these behaviors. We also demonstrated that the effect of estimated self-reputational damage on promoting infection prevention behavior is stronger among unvaccinated people (Study 1) and those who perceived a lower COVID-19 risk (Study 2) compared to vaccinated people (Study 1) or those who perceived a higher COVID-19 risk (Study 2). This result implies that even people who perceive a lower risk of COVID-19 engage in infection prevention behaviors in Japan, partially because they are concerned about reputational damage. They might engage in such behaviors to avoid reputational damage as well as to lower the risk of infection. Consistent with Nakayachi et al.'s (2020) findings, we found that social norms for infection prevention behaviors may suppress the spread of COVID-19 in Japan.

We also found that, consistent with Lu et al.'s (2021) study, women had a greater willingness to perform infection prevention behavior than men both in Study 1 and 2. The main effect of age was significant only in Study 1. Only people over 60 years of age were allowed to get the fourth vaccination after Study 1 was conducted, which may have led some older adults to neglect performing infection prevention behaviors after the vaccination.

Second, both in Study 1 and 2, participants estimated that the reputational damage they suffer from others would be greater than the reputational damage they inflict on others who neglect performing infection prevention behaviors. They overestimate reputational damage, which could maintain norms for performing infection prevention behaviors, even when the infection risk and reputational damage decrease. Most people in Japan wore masks in January 2023. The social norm of performing infection prevention behaviors (i.e., overestimated reputational damage caused by neglecting infection prevention behavior) may be one of the reasons why the damage caused by COVID-19 has been relatively small in Japan.

Previous studies have investigated individual factors associated with infection prevention behaviors. For example, beliefs in COVID-19-related conspiracy theories (Romer & Jamieson, 2020) and political conservatism (Pennycook et al., 2022) are inversely related to infection prevention behaviors. In contrast, we focused not only on individual factors, but also on the factors of social interaction related to self-reputational damage. This study demonstrated that even those who perceived a lower infection risk of COVID-19 engaged in infection prevention behaviors when they estimated reputational damage. Thus, social norms as well as individual characteristics have also contributed to the suppression of COVID-19 in Japan.

Our study has some limitations. First, we did not examine the multiple components of risk perception separately. Slovic (1987) proposed that perceived risk is composed of two

factors: "dread risk" and "unknown risk." However, our participants might have perceived little unknown risk, because they participated in our study relatively late in the COVID-19 pandemic, when they had a certain level of knowledge about the virus. In addition, the present analysis did not examine the effect of perceived susceptibility, perceived severity (Becker, 1974), or probability of occurrence (Maddux & Rogers, 1983). Future research should focus on the different components of risk perception and examine which aspects of perceived risk would moderate the effect of estimated self-reputational damage on infection prevention behavior.

Second, it is not clear why the effect of residential mobility on infection prevention behaviors was not found in Study 2. We assumed that people in lower residential mobility societies, where the cost of reputational damage is larger (Yamagishi, Jin, & Kiyonari, 1999) and the norm is tighter (Thomson et al., 2018), would be more likely to conform to the norm for performing infection prevention behaviors. However, this prediction was not supported. People in higher mobility societies may perform infection prevention behaviors as frequently as those in lower mobility societies because there is a greater number of COVID-19 cases in high mobility societies (Salvador et al., 2020; Talhelm et al, in press). Since these two notions canceled each other, we may not have found a relationship between residential mobility and infection prevention behavior. Alternatively, some responses may have been distorted by social desirability bias because the survey was self-reported. Further investigation is needed to examine the relationship between residential mobility and infection prevention behavior.

References

Batty, G. D., Deary, I. J., Fawns-Ritchie, C., Gale, C. R., & Altschul, D. (2021). Pre-pandemic cognitive function and COVID-19 vaccine hesitancy: Cohort study. *Brain, Behavior, and Immunity*, *96*, 100-105.

Baumgaertner, B., Carlisle, J. E., & Justwan, F. (2018). The influence of political ideology and trust on willingness to vaccinate. *PLoS One*, *13*, e0191728.

Becker, M. H. (1974). The health belief model and sick role behavior. *Health Education Monographs*, *2*, 409-419.

Gelfand, M. J., Jackson, J. C., Pan, X., Nau, D., Pieper, D., Denison, E., ... & Wang, M. (2021). The relationship between cultural tightness–looseness and COVID-19 cases and deaths: A global analysis. *The Lancet Planetary Health, 5,* e135-e144.

Gelfand, M. J., Raver, J. L., Nishii, L., Leslie, L. M., Lun, J., Lim, B. C., ... & Yamaguchi, S. (2011). Differences between tight and loose cultures: A 33-nation study. *Science, 332*, 1100-1104.

Iwatani, S., & Muramoto, Y. (2017). Two types of reputation leading to normative behavior: The effect of reputation depending on residential mobility and individuals' ability to build relationships. *Japanese Journal of Social Psychology, 33*, 16-25.

Cumulative Cases by Days Since 50th Confirmed Case. (2023). John Hopkins University of Medicine. Retrieved January 27, 2022 from https://coronavirus.jhu.edu/data/cumulative-cases

Jordan, J. J., Yoeli, E., & Rand, D. G. (2021). Don't get it or don't spread it: Comparing self-interested versus prosocial motivations for COVID-19 prevention behaviors. *Scientific Reports, 11*, 1-17.

Lu, J. G., Jin, P., & English, A. S. (2021). Collectivism predicts mask use during COVID-19. *Proceedings of the National Academy of Sciences*, *118*, e2021793118.

Maddux, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology*, *19*, 469-479.

Milinski, M., Semmann, D., & Krambeck, H. J. (2002). Reputation helps solve the 'tragedy of the commons'. *Nature, 415*, 424-426.

Ministry of Internal Affairs and Communications. (2022). Census in 2022. Retrieved April 11, 2023 from https://www.stat.go.jp/data/kokusei/2020/kekka/pdf/outline_05.pdf.

Miyajima, T., & Murakami, F. (2021). Self-interested framed and prosocially framed messaging can equally promote COVID-19 prevention intention: A replication and extension of Jordan et al.'s study (2020) in the Japanese context. *Frontiers in Psychology, 12,* 605059.

Nakayachi, K., Ozaki, T., Shibata, Y., & Yokoi, R. (2020). Why do Japanese people use masks against COVID-19, even though masks are unlikely to offer protection from infection? *Frontiers in Psychology, 11*, 1918.

Oishi, S., Ishii, K., & Lun, J. (2009). Residential mobility and conditionality of group identification. *Journal of Experimental Social Psychology*, *45*, 913-919.

Pennycook, G., McPhetres, J., Bago, B., & Rand, D. G. (2022). Beliefs about COVID-19 in Canada, the United Kingdom, and the United States: A novel test of political polarization and motivated reasoning. *Personality and Social Psychology Bulletin, 48*, 750-765.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: Some consequences of misperceiving the social norm. *Journal of Personality and Social Psychology, 64*, 243-256.

Romer, D., & Jamieson, K. H. (2020). Conspiracy theories as barriers to controlling the spread of COVID-19 in the US. *Social Science & Medicine, 263*, 113356.

Salvador, C. E., Berg, M. K., Yu, Q., San Martin, A., & Kitayama, S. (2020). Relational mobility predicts faster spread of COVID-19: A 39-country study. *Psychological Science*, *31*, 1236-1244.

Slovic, P. (1987). Perception of risk. *Science*, *236*, 280-285.

Talhelm, T., Lee, C. S., English, A. S., & Wang, S. (in press). How rice fights pandemics: Nature–crop–human interactions shaped COVID-19 outcomes. *Personality and Social Psychology Bulletin*

Thomson, R., Yuki, M., Talhelm, T., Schug, J., Kito, M., Ayanian, A. H., ... & Visserman, M. L. (2018). Relational

mobility predicts social behaviors in 39 countries and is tied to historical farming and threat. *Proceedings of the National Academy of Sciences*, *115*, 7521-7526.

Wolff, D., Nee, S., Hickey, N. S., & Marschollek, M. (2021). Risk factors for Covid-19 severity and fatality: A structured literature review. *Infection*, *49*, 15-28.

Yamagishi, T., Jin, N., & Kiyonari, T. (1999). Bounded generalized reciprocity: Ingroup boasting and ingroup favoritism. *Advances in Group Processes*, *16*, 161-197.

Yuki, M., Schug, J., Horikawa, H., Takemura, K., Sato, K., Yokota, K., & Kamaya, K. (2007). Development of a scale to measure perceptions of relational mobility in society. (CERSS working paper 75). Sapporo, Japan: Center for Experimental Research in Social Sciences, Hokkaido University.