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How will collective-level dynamics influence the spread of COVID-19?¹

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Abstract

The coronavirus disease 2019 (COVID-19) has overwhelmed the entire humanity. Even though a virus—a biological agent composed of DNA—causes the infectious disease, the virus's behavior is nearly entirely contingent on human behavior. Hence, we must bring together the theories and evidence of social and behavioral sciences to understand how the virus spreads. In this chapter, I analyze three collective-level dynamics: (a) Pluralistic ignorance (which induces complacency), (b) Ego-centric motivations (which leads to depletion of collective-level resource), and (c) Individualistic cultural ethos (which is related to both loose social norms and more frequent contacts with distant others). In combination, these three collective-level processes contribute powerfully to the spread of infectious diseases, including COVID-19. I conclude with a discussion of evidence-based policy recommendations and a plea for basic research anchored in the urgent practical issues of society.

Keywords: Collective-level dynamics, pluralistic ignorance, tragedy of the commons, individualism and collectivism, relational mobility

How will collective-level dynamics influence the spread of COVID-19?

Throughout the last year and a half, the world has witnessed an unprecedented spread of the novel coronavirus disease (COVID-19). Some fear that its magnitude could eventually be comparable to that of the 1918 flu pandemic, which killed more than 50 million people worldwide. As the virus's onslaught unfolded, I began to feel that social and behavioral scientists must join forces in the fight against the pandemic. In particular, I wondered whether massive variation in countries' vulnerability to the virus might shed light on the core mechanisms underlying its transmission. This thought might not be too far-fetched; even though the infectious disease is caused by a virus—a biological agent composed of DNA—the virus's behavior is nearly entirely contingent on human behavior (Habersaat et al., 2020; Quammen, 2012; Van Bavel et al., 2020). Thus, social and behavioral sciences might have a lot to offer. Relevant regulatory agencies, including the Centers for Disease Control and Prevention in the United States (U.S.), must heed social and behavioral science insights when formulating their policies and regulations.

In this chapter, I want to address three issues that strike me as particularly important as we face the challenge of managing the current and future pandemics. I argue that the collective-level dynamics of (a) complacency induction, (b) ego-centric versus prosocial motivations, and (c) culture and social relations powerfully influence the spread of infectious diseases, including COVID-19. I draw heavily on my first-hand experiences in the U.S., where I live. However, I hope my discussion carries relevance for readers elsewhere. I conclude with evidence-based policy recommendations.

Pluralistic Ignorance and Complacency

Any cursory observation would suggest that people's behavior during the pandemic depends on their ability and willingness to recognize COVID-19 as a threat. Once people perceive this threat as urgent, they will be alarmed. They will then try to cope with the threat. For

example, they might sacrifice some conveniences and wear face masks or socially isolate themselves. The problem, however, is that there is nothing concrete about the threat of infectious disease. The threat is often invisible until it is too late when many people have already been infected and hospitalized. These days (in the middle of 2021) in the U.S., it is not uncommon to see infected people in their hospital beds express their regret of having declined to be vaccinated, for example.

There are multiple reasons why people fail to recognize the threat they face. However, there is one mechanism that cuts across them. People are motivated to elaborate on information that serves their motivational goals while discounting information that does not (Kunda, 1990). For example, people often seek to maintain their self-image as strong and confident (Taylor & Brown, 1988). Indeed, they might be accused of being an alarmist or being too worrying and weak when they took warnings from medical experts seriously. They might therefore be motivated to perceive the warnings as hearsay. Moreover, social media often provides misleading information that assures people of their safety and invincibility (see Tsao et al., 2021, for a review). People might be motivated to believe such information since they find it quite comforting and assuring. Such motivated reasoning processes lead to complacency.

To illustrate, by February 2020, many residents I met in New York City already knew about the spread of COVID-19 in Asia and Europe. They had been informed of earlier infections in the area. The first death in the city was to emerge in the first week of March. Nevertheless, most residents failed to act, seemingly feeling safe and protected. With the benefit of hindsight, this calmness seems like complacency, which indeed eventually haunted many of them. Motivated reasoning is an important part of why such complacency comes about. This reasoning could be particularly potent, especially during the pandemic since there are abundant cues in the environment that suggest that the situation is safe and manageable. Some of the most powerful cues of this sort come from inactions of other people.

Miller and Prentice (1994) argued that people often believe that everyone else feels safe because they do not show any signs of discomfort or anxiety. Consistent with the notion of the fundamental attribution error (Ross, 1977), they infer others' internal states directly from their behaviors. Rarely do they consider the possibility that the others might be hiding their anxiety. Crucially, they do not show any signs of discomfort or anxiety, not because they do not feel them but rather because they find others not showing them. In the context of the current pandemic, everyone might well have suspected a real threat. However, a vast majority refrained from acting proactively to cope with the threat precisely because they witnessed others' inaction and judged that the situation was somehow manageable. The irony is that the error in judgment (i.e., the perceived safety of the situation) was based precisely on the inaction of other people, who were guided by the same judgment error. Thus, this collective failure to calibrate each other's anxiety, called pluralistic ignorance (Allport, 1924), leads to a collective failure to act properly.

In all likelihood, the people who gathered at Florida bars or Southern California beaches in the summer 2020, or those riders who blasted their Harley-Davidsons all the way to Sturgis, South Dakota, during the second week of August 2020, were complacent. Also, many Americans, nearly a half of them, who have so far declined to receive COVID vaccines, are equally complacent. Their complacency, however, was not simply due to a failure to understand the reality of the pandemic. To the contrary, their perception of that reality might have been systematically distorted by a little bit of innocuous pretension or even civility—a desire not to be seen as alarmist or as weak or feeble. The resulting distortion of reality might have made it seem completely rational not to worry much about COVID-19, which unfortunately led to the virus's spread in various communities.

The Tragedy of the Commons: Self-Protection Versus the Protection of a Community

No matter how prone individuals might be to complacency, they will eventually recognize a real threat if people around them start to fall prey to the disease and begin to die. When the

threat is duly recognized, however, another collective dynamic enters and makes it hard to organize risk-mitigating actions.

Since a virus spread in a community, any risk-mitigating actions must take place at the community level. Mask-wearing is ineffective if not practiced by most people in a community. Likewise, social distancing does not mean much unless exercised by most people in the community. However, the effectiveness of these actions is often not obvious for each of the individuals involved. Moreover, these actions are often experienced as inconveniences. Thus, even when such actions are recommended or even required by the state, there might arise a temptation not to follow such recommendations or requirements.

For example, consider the practice of wearing a mask in public. At the individual level, it could be an annoyance. This adverse reaction to mask-wearing could be rather strong in contemporary mainstream American culture. According to Masaki Yuki and colleagues, the mouth is a “window to the soul” for Americans (Yuki et al., 2007). The use of the mouth is instrumental in American society for communication, including emotional expression. According to Yuki et al. (2007), it is eyes, rather than the mouth, that are the window for the soul for Asians. Indeed, for Americans, “big smile” signifies a superb soul behind it. A recent study shows that in North American contexts, loan officers are more likely to approve loans to those with big smiles (Park et al., 2020). Such an effect is absent in Taiwan. In North America, then, a request to cover up the mouth could threaten the core of one’s identity. In line with this reasoning, in the U.S. throughout the pandemic, the simple, practical decision to wear a face mask was moralized and portrayed as a matter of individual freedom. Not surprisingly, many Americans persistently refused to cover up their mouths in public, to the detriment of the public welfare. This occurred even though the use of face masks is demonstrably effective in containing the spread of COVID-19 (Lyu & Wehby, 2020).

This discussion illustrates a conflict between personal interest and the public good. This conflict has been studied under the rubric of the tragedy of the commons (Hardin, 1968), which

refers to a collapse of the public good (e.g., a virus-free environment) when every individual in the community acts by narrowly focusing on his or her own personal interest (e.g., not wearing a mask or avoiding vaccination).

One important implication of the current analysis is that risk-mitigating actions, including mask-wearing, during the pandemic might depend on cultural ideologies of individualism and collectivism. The ideology of individualism holds that each person's autonomy and freedom are to be weighed more heavily even at the expense of the collective good (Markus & Kitayama, 1991; Triandis, 1995). This ideology gives an unalloyed endorsement of self-interest (Miller, 1999). Since risk-mitigating actions, such as mask-wearing, protect the collective at the expense of personal conveniences, they might be less common in individualistic societies than in collectivist societies.

Consistent with this analysis, Lu et al. (2021) showed that a validated country-wise index of collectivism (vs. individualism) by Hofstede (1980) predict both the average intention to wear masks and the perceived proportion of others who wore masks. Specifically, in comparison to many other cultures that are arguably more collectivistic, including East Asian cultures such as China and Japan, the prevalence of mask-wearing in the U.S. was much less. As important, individualism vs. collectivism varies within the U.S. (Vandello & Cohen, 1999). If cultural values prioritizing collective welfare promote mask-wearing, then we might expect mask-wearing to be more common in U.S. states that are relatively high in collectivism (or low in individualism). Lu and colleagues (2021, Study 1a) tested this analysis using a large dataset collected by *The New York Times* and Dynata (N = 248,941). The participants were asked, "How often do you wear a mask in public when you expect to be within 6 feet of another person?" Their mean response on a 5-point scale (ranging between 0 = never and 4 = always) by state is shown in Figure 1. As can be seen, the self-reported mask-wearing increased by state-level collectivism. The authors controlled for several potential confounds, including state-wise COVID-19 severity, state-level

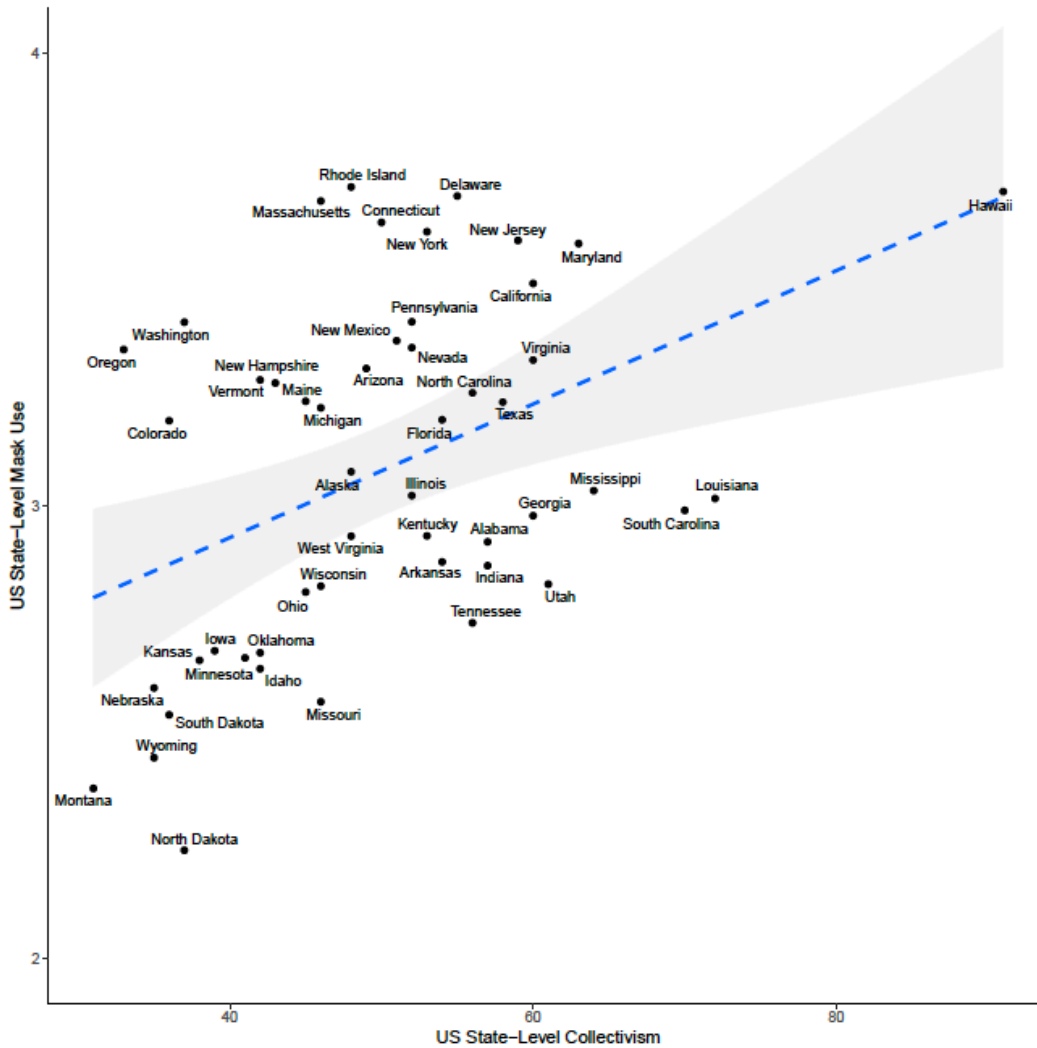


Figure 1. Self-reported mask usage in the 50 U.S. states assessed between July 2-14, 2020. Adopted from Lu et al., 2021, *Proceedings of the American Academy of Sciences*.

government stringency, political affiliation, education level, population density, state-level tightness vs. looseness of social norms.

It appears as though many Americans—especially those in relatively more individualistic states (e.g., Mountain West states, such as Montana and Wyoming)—maximized their practical convenience and their psychological welfare by not covering their mouths. This behavior, however, has come at a grave cost for the collective. Individuals are protected only insofar as

most others in the community wear masks. If a majority choose not to wear a mask, then they will not be protected even if they wear a mask. Unfortunately, again and again, many Americans prioritized their personal convenience or preference while ignoring collective consequences of doing so.

In an article published in the *New York Times* in August 2020², David Leonhardt attributed the U.S. failure to contain COVID-19 to two major factors. One is the lack of adequate federal leadership (see chapter # on leadership in the pandemic). Notably, consistent with my analysis above, as the other culprit, he highlighted American individualism. Leonhardt draws our attention to the seemingly selfish behaviors of many Americans, including the refusal to wear masks. As discussed above, unlike more communal, interdependent worldviews based on collectivism, the individualist ideology may therefore be more likely to promote and legitimize self-interested behavior (Betsch et al., 2017).

Culture and Social Relations

Although the values of independence and interdependence, or equivalently, individualism and collectivism, are important, this consideration will have to be combined with additional considerations to draw a fuller picture. One particularly important consideration concerns the form of social relations this ideology fosters. Many infectious diseases, including COVID-19, transmit through social contact. It follows that their spread should depend on the nature of social networks. If social networks are relatively open, the risk of transmission should increase, whereas if they are relatively closed, the risk may be contained. One prominent aspect of individualism lies in the liberation of individuals from socially ascribed relationships, such as social roles and kinship. People in individualistic countries are likely to be socially open. Each person is thought to be independent, even in the domain of social relations. They are therefore encouraged to choose their acquaintances, friends, and spouses freely. This ideology, an interpersonal extension of the Enlightenment idea of the social contract (Rousseau, 1762), has been ingrained into the matrix of social relations in the U.S. American social relations tend to be

highly mobile. If socialized in this cultural milieu, people naturally become socially open, seeking new relations beneficial to the self.

Bear in mind that individualism lends itself to relational mobility, but the two constructs are distinct (Thomson et al., 2018). One primary reason for the imperfect alignment between the two comes from the fact that some cultures are collectivist in the sense of prioritizing social relations over individual freedom and choice, and yet, precisely because of this, they are relationally mobile, motivating their residents to cultivate wide-ranging social relations. One prominent example is found in Latin America. Evidence is emerging that Latin Americans are highly expressive of social positive emotions, such as friendly feelings and feelings of closeness (Salvador et al., 2021). They are therefore highly amicable (Campos & Kim, 2017), which likely predispose the residents of the cultural region to be socially open. Yet, this form of social openness results from the value placed on social relations.

Despite this exception to the hypothesized link between individualism and relational mobility, it still stands that Americans are relationally mobile. I am grateful to many American friends and colleagues who initially welcomed me as a new foreign student some decades ago. I am now so happy to interact with many American students, who constantly challenge me as their intellectual equal for open intellectual discussions. Social networks in the U.S. are very open. I love this aspect of the culture. Ironically, however, this very positive attribute of individualism could be a liability during the pandemic. Social openness may have contributed to the spread of COVID-19.

Earlier in 2020 when the pandemic began to unfold, my research team decided to test the above possibility (Salvador et al., 2020). We adopted a measure of social openness of a community (the degree to which people freely choose partners of social interaction), called relational mobility. This measure is available for 39 countries across the globe (Thomson et al., 2018). We asked whether the relational mobility might predict each country's vulnerability to COVID-19.

In testing the cross-cultural differences in the vulnerability to COVID-19, one important consideration is to preempt the potential effect of cultural variations in reporting bias. For example, some cultures may be more transparent than others when reporting infections or deaths. It is also possible that different cultures have varying criteria in defining any given symptoms or deaths as caused by or related to COVID-19. Another important artifact source is the timing of the data we analyzed since the pandemic started at different times in different countries. For example, infections might look more frequent in one country than in another merely because the spread had started earlier in the first country than in the second. Further, one might also worry about the potential effects of various restrictions enforced by the government, which could vary across countries. In addition, it is important to keep in mind that relational mobility could be related to various country-level variables, including individualism vs. collectivism and tightness vs. looseness of social norms. Further, various demographic variables, such as the average age of each country, its wealth, and its population size, may also influence the spread of the disease. To draw firm conclusions about the potential effect of relational mobility on the spread of COVID-19, we must address all these concerns.

Salvador et al. (2020) overcame this challenge by examining how quickly COVID-19 infections and deaths increased in the first 30 days of country-wise outbreaks. It is possible that all sorts of biases, including reporting biases and diagnostic criteria, influence the number of infections and deaths. However, these biases are unlikely to change systematically within a short period, say, just 30 days. In this way, we excluded these biases. Moreover, we defined the beginning of this testing period as a day on which 100 infections or one death occurred. In this way, we controlled for any cross-cultural variations in the timing of outbreaks. As important, by focusing on the very initial period of an outbreak, we could effectively eliminate any effects of top-down governmental restrictions since they were rarely instituted quickly enough to influence what happened during the first 30 days. Finally, we controlled for individualism vs. collectivism,

tightness vs. looseness of social norms, and various demographic variables, including medium age, gross domestic product, and population size.

Figure 2-a shows the daily count of confirmed cases on log scale in each country over the first 30 days of country-wise outbreaks. As can be seen, on average, the rate of daily increase is greater in countries that were relatively high in relational mobility. Figure 2-b plots the slope by relational mobility. As can be seen, the slope systematically became steeper as the country-level relational mobility increases. As shown in Figures 2-c and d, we closely replicated the pattern in the analysis of COVID-related deaths. Lastly, we obtained these findings while controlling for various variables, including individualism vs. collectivism, tightness vs. looseness, and demographic variables.

It is noteworthy that in this analysis, there was no effect of individualism vs. collectivism. The absence of any effects of individualism vs. collectivism might be puzzling given its strong impacts on mask-wearing (as discussed earlier). However, in this work, we looked at the spread of COVID-19 in an initial phase of country-wise outbreaks. Therefore, it stands to reason that the primary determinant of this spread is the social network parameter of relational mobility. Cultural ideologies such as individualism and collectivism might come into play only later when people decided whether they would engage in risk-mitigating actions, such as mask-wearing.

The effect of relational mobility on the spread of COVID-19 during the initial period of country-wise outbreaks was indeed substantial. As can be seen in Figures 1-c and d, the United States is very high—one of the highest—in relational mobility. In our estimation, if the United States had been much less open—say, as little as Japan, one of the least open of the 39 countries tested—U.S. deaths at the end of the 30-day period would have been 8.2% (281) of the actual number reported (3,417).

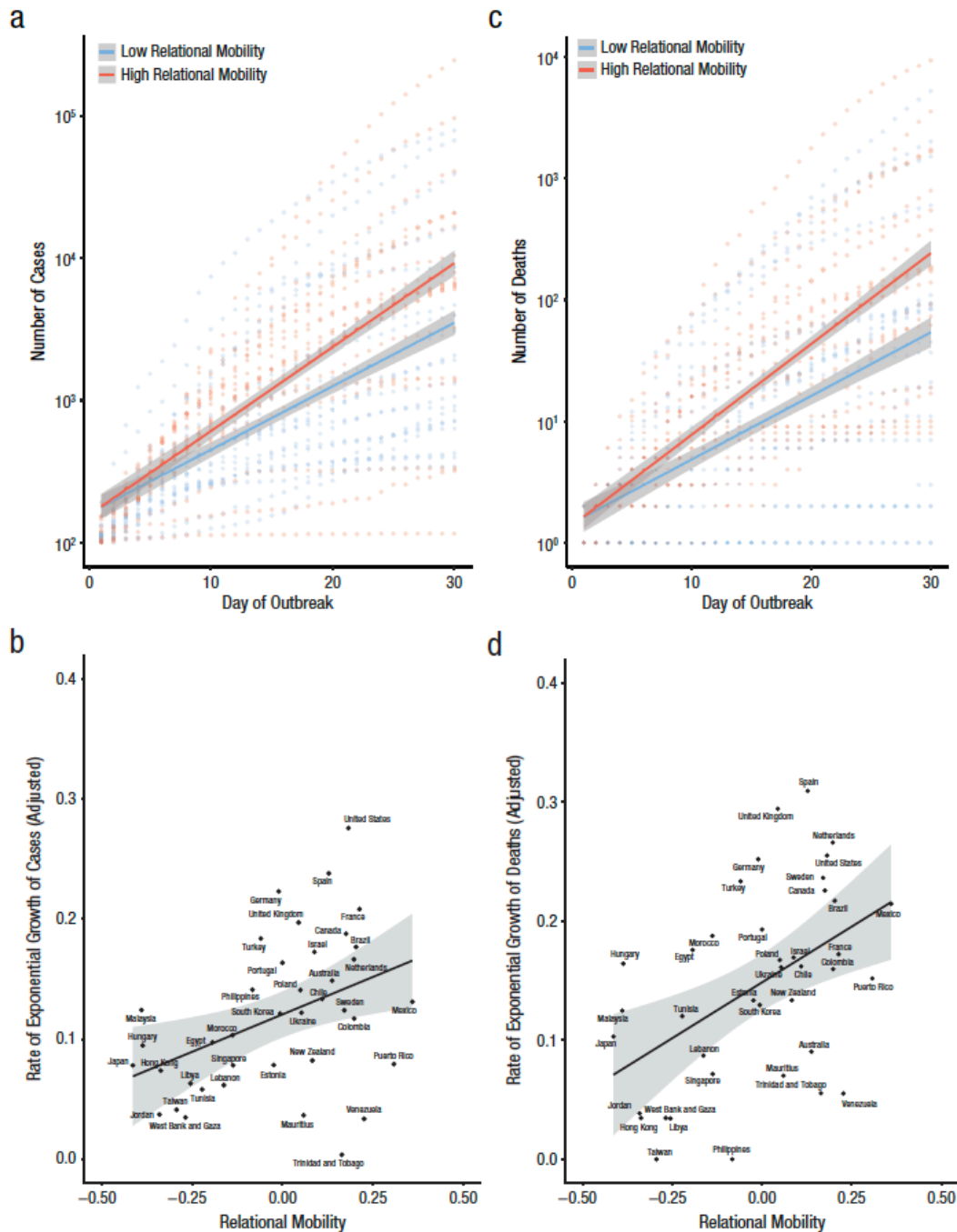


Figure 2. The spread of COVID-19 in the first 30 days of country-wise outbreaks by relational mobility. **a.** The growth curve of the number of confirmed cases. **b.** The growth rate of confirmed cases in each of the countries by relational mobility. **c.** The growth curve of the number of deaths. **d.** The growth rate of deaths in each of the countries by relational mobility. Adopted from Salvador et al., 2020, *Psychological Science*.

Conclusions

In this chapter, I summarized the evidence that collective-level human cognition, motivation, and behavior exert profound influences on the spread of COVID-19. My argument was three-fold. First, I showed how individuals' decision to act as if they are not feeling anxious induces a false sense of safety in others. When everyone acts that way even when they feel anxious, everyone ends up believing that the others are feeling safe even though everyone is anxious. This collective-level process of pluralistic ignorance induces complacency at the community level. To fight against this collective bias, community leaders must put an extra effort to encourage people to express their anxiety and explain why this expression is not a sign of weakness or moral deficit (Schroeder & Prentice, 1998). A community-level norm of frank disclosure of anxiety and other feelings would be an important step toward breaking people's failure to see how others really feel (Miller & McFarland, 1987).

Second, when there is a conflict between personal interest and the public good, the public good might often be ignored, especially in individualistic societies. When individuals act to promote their self-interest, they often contribute to the decline of the public good. For example, wearing a mask is uncomfortable and, in fact, not always consequential at the individual level. Nevertheless, if everyone in a community ends up not wearing a mask in public space, small effects can accumulate to propagate the virus at the community level. This collective-level dynamic, called the tragedy of commons, is yet another important mechanism contributing to the spread of the virus. To fight against this collective bias, it is essential for the leaders of collectives, whether the collectives being nation, state, or municipality, to send constant messages highlighting the essential role of the collective as a source of pride and the identity of each member of the collective (Van Bavel et al., 2021). However, to make this strategy work, it would be crucial to build trust in both government and science by being transparent. There must be a constant effort to develop strong social norms for prosocial preventive actions (Habersaat et al., 2020; Van Bavel et al., 2020) (see chapter # on prosocial behavior in COVID-19).

The third collective-level dynamic discussed was related to the second but distinct. There are multiple ways in which individualism can be a risk factor during pandemics. As a constellation of values and practices prioritizing freedom and autonomy over collective good, individualism may be directly linked to the tragedy of commons discussed above. However, just as important, individualism is often related to relatively loose enforcement of social norms (Gelfand et al., 2011). When such loose normative enforcement occurs in relationships, individualism may be expected to entail relatively free and normatively unconstrained choices of who to interact with. Thus, people in individualistic countries tend to be socially more open, increasing the change of direct social contact with many strangers, which is a direct risk of spreading the virus during a pandemic.

To fight against this, policymakers may use individual incentives for engaging in behaviors that go against their individualistic intuitions and motivations. For example, mask-wearing must be rewarded. Or as some U.S. states have done, the government may offer incentives to take the vaccination. Eventually, however, it may be necessary to breed a community spirit grounded in each person's identity as a proud member of the collective of which they are part (Van Bavel et al., 2021).

The 21st century is said to be an era of infectious disease (Quammen, 2012). Humans will face increasingly frequent assaults from infectious viruses of nonhuman animal origin. This increase is inevitable, given expanding global human mobility, combined with more frequent contact with nonhuman animals resulting from a population explosion and industrialization. Challenging and problematic as this prospect might be, it also presents great opportunities for social and behavioral scientists to explore ways to preempt human misery and possibly enhance human welfare. This effort, in turn, may inform basic theories of our field. As Kurt Lewin noted decades ago, "there is nothing as practical as a good theory" (1943, p. 118). I hope this chapter will contribute in some small ways to this dialectic of applied and basic research.

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¹ This chapter is based on an Association of Psychological Science (APS) Presidential Column in the October 2020 issue of *APS Observer*.

² <https://www.nytimes.com/2020/08/06/us/coronavirus-us.html>