Behavioral insights for containing the COVID-19 pandemic: Some practices in China

Ning Zhang

abstract

Although China's central and local governments do not have behavioral insights teams, they nonetheless incorporated strategies consistent with behavioral science research when they instituted plans to contain the COVID-19 pandemic. They made it easy for the public to implement health-protective behaviors; eliminated financial barriers to obtaining treatment; set the most stringent protocols as the default to protect health care professionals; simplified decisionmaking about which groups of people needed to self-isolate (thereby enhancing the efficiency of infection-control programs); and provided timely, tailored mental health services to those in need of psychological assistance. Adopting similar practices might help other countries contain the COVID-19 pandemic and enhance future pandemic preparedness and resiliency.

The COVID-19 pandemic is the most severe global public health challenge in the 21st century. By November 15, 2020, the coronavirus responsible for the disease had resulted in more than 53 million cases and more than 1.3 million deaths worldwide.[1] Since the outbreak began in December 2019, governments around the world have initiated a variety of mitigation measures. The success of these strategies depends greatly on people's compliance with and commitment to health-protective behaviors, such as handwashing and social distancing. Yet prompting behavioral change in response to pandemics is a major challenge, as the responses to the 2009 H1N1 influenza outbreak demonstrated.[2,3] Even when people intend to engage in such behaviors, they often do not because of financial, physical, mental, or situational barriers.[4]

Behavioral scientists have advocated applying insights from their field to shrink the intention–behavior gap and thereby improve the efficiency of public health emergency measures.[5–10] In China, the central and local governments have embedded behavioral principles in their strategies for promoting adherence to health-protective behaviors and other mitigation measures. In this article, I share five strategies that could be of interest to other nations and could potentially be adapted for use in their own efforts to contain the pandemic. The strategies are all aligned with the EAST principle developed by the Behavioural Insights Team in the United Kingdom.[11] EAST emphasizes using interventions that are easy, attractive, social, and timely.

What China Did

One strategy used in China was to make it easy for the public to comply with recommended protective actions. For example, local governments established online sign-up systems for residents who needed face masks and offered hand sanitizer at the entrances of communities (blocks of residence buildings with shared entrances and exits) and supermarkets and inside elevators. Beyond making it easy to physically access needed supplies, these actions communicated that most people were engaging in the behaviors. As previous research has demonstrated,[12] highlighting social norms can provide strong and persuasive cues for people to engage in health-protective behaviors and can reinforce the need to continue adherence. These actions were also complemented by the tailoring of messages about mask wearing, handwashing, and social distancing to specific communities; for example, officials and volunteers from local communities used local idioms and data in videos, animations, and other communications. According to a national survey conducted by the School of Public Health of Fudan University in early February 2020, most Chinese people were engaging in the recommended health-protective behaviors by that time: 98.1% were wearing face masks, 94.2% were cleaning their hands more frequently, and 94.5% were social distancing.[13]

A second strategy involved lowering barriers to obtaining medical care to encourage people to seek timely treatment.[6–8] Ideally, all individuals who have or are suspected of having COVID-19 would receive prompt medical treatment and stay in quarantine. Yet the medical expenses for treatment can impose a major financial burden on affected families. The average expense for a patient with mild symptoms is 23,000 yuan, approximately $3,250; a patient with severe symptoms could expect a bill of 150,000 yuan, approximately $21,200. The financial concerns initially made many people reluctant to report their contact and travel histories and hesitant to seek treatment. On January 22, 2020, the National Healthcare Security Administration of China declared that the government would cover all personal medical expenses for COVID-19 beyond amounts normally paid by government-sponsored or other health insurance.[14] The guaranteed financial support significantly enhanced people's cooperation with contact tracing and adherence to treatment. In deciding to cover medical costs, the central government prioritized infection control over minimizing COVID-19's financial impact on the state. This action, of course, will not always be feasible for other countries as they try to balance the trade-offs between infection control and economic concerns.

Third, China set the default for protecting health care professionals at the highest level of rigor.

Default options, which are preset courses of action that take effect unless a decisionmaker actively makes an alternate choice,[15] have already been applied successfully to increase organ donations,[16] influenza vaccinations,[17] and the prescription of generic drugs.[18]

Early in the pandemic, inadequate protective measures led to many cases of COVID-19 among health care professionals globally. As of April 8, 2020, more than 22,000 health care workers from 52 countries around the world had been infected, according to the World Health Organization.[19] In Hubei, China, more than 3,000 health care workers were infected during the initial outbreak. On January 21, 2020, a team of experts on hospital infection control went to Wuhan, the epicenter of the pandemic in China, to help control infections among health care workers. This team set the highest protective standard (such as donning new and complete protective gear, including N95 masks and shields, when seeing each patient) as the default for protecting health care workers; it also provided on-site training and guidance on infection control in hospitals and communities in Hubei. Thereafter, no infections occurred among the 42,600 health care workers sent to assist Wuhan and other major cities in Hubei in containing the COVID-19 pandemic.[20] The standards were then adopted across the country.

Of course, to meet these standards, health facilities had to have sufficient supplies of personal protective equipment. But providing supplies is not enough by itself to achieve adherence to the standards. According to the COM-B model of behavior change proposed by Susan Michie and her colleagues,[21] behavior change requires capability, opportunity, and motivation—and interventions should be aimed at addressing any deficiencies in these requirements. In China, having sufficient supplies provided the physical opportunity to meet the stringent protective standards for health care professionals, but setting a rigorous standard as the default additionally provided a psychosocial opportunity for adherence by reducing the need for people who were overwhelmed by the challenges of treating patients to make choices about how to protect themselves.

Fourth, China made it easy to identify which groups of people needed to self-isolate. To achieve this, all levels of government required citizens who traveled outside of their homes to use an app, developed with Alibaba, that was designed to gather the information needed to identify possible exposures to the virus and make recommendations about when to quarantine, thereby minimizing the spread of COVID-19. On January 23, 2020, before the app was developed, Wuhan locked down to reduce the transmission of COVID-19 to other areas of China, and many other cities followed that lead shortly afterward. Although the lockdown enabled COVID-19 to be contained in China,[22] it was unsustainable because of its enormous economic and social impacts.

This was where the app came in. On the basis of people's health status and contact history during the past 14 days, the software displays a green, yellow, or red code indicating, respectively, whether an individual can travel without restriction or needs to stay in quarantine for seven or 14 days. Using a traffic-light coloring system to indicate risk of infection makes it easy for app users and others (such as people who monitor entrances to train stations) to readily identify which people need to stay out of circulation. The city of Hangzhou introduced the app, which is accessed through the Alipay wallet app, on February 11, and other cities and provinces soon adopted it, too. A little later, the central government issued standardized guidelines for national use. The prevalence of smartphones and electronic payment apps facilitated the app's rapid adoption by the public.

By making a person's risk of transmitting the disease visible and easy to understand, the app facilitated *precision infection control*—the prompt quarantining of those who pose the most risk of spreading the disease while minimizing interference with other people's activities. This precision enabled society as a whole to bounce back to normal while keeping the risk of human-to-human virus transmission low.

Before the central government stepped in, some provinces developed their own health-status apps, which differed in the information

being collected and the guidelines regarding the actions allowed or restricted by the color codes. Consequently, even users who had green codes sometimes had difficulty traveling across provinces. Issuing national standards for the health-status codes eliminated the barriers to travel across provinces for low-risk individuals.[23]

Fifth, because the pandemic has had wide-ranging effects on mental health, China provided timely mental health services for those in need. Shortly after the outbreak began, the National Health Commission of China released guidelines on providing emergency psychological crisis interventions and hotlines for psychological assistance.[24,25] Mental health services were tailored to four groups of people: (a) infected patients and frontline health care workers, (b) people suspected of being infected and close contacts of infected patients who also had to stay in quarantine, (c) close contacts of people in the first two groups as well as people who were not frontline health care workers but were otherwise involved in the efforts to contain COVID-19, and (d) other vulnerable groups and the general public.[24] As part of this effort, mental health teams composed of psychiatrists, psychiatric nurses, and clinical psychologists were sent to work on-site at health facilities to provide mental health services to patients and health care workers.[26] Also, more than 600 psychological assistance hotlines were established to provide telehealth mental health services 24/7 for those in need. By reducing distress and enhancing cooperation, these mental health services have helped to improve the effectiveness of public health interventions.[27]

Conclusion

Behavioral science–based strategies have been embedded in China's centralized approach to containing the COVID-19 pandemic: making health-protective behaviors easier to implement, encouraging early treatment by providing free medical care to infected patients, setting the highest protective standard as the default for protecting health care workers, using standardized health-status codes to simplify implementation of precision infection control,

and providing timely mental health services. See Table 1 for more details about these measures. Recent evidence from tracked infection and mortality rates indicates that these strategies have greatly contributed to reducing the transmission of COVID-19 in China.[22]

I have several reasons for believing that these strategies could also help other countries contain the COVID-19 pandemic. Application elsewhere seems feasible in part because, in contrast to China, which is a late adopter of behavioral science, many other countries already have experience using behavioral science interventions in public policy. Strategies based on the EAST principle and other behavioral science principles have been well developed and successfully implemented in many countries (such as the United States and England) to increase participation in health-protective behaviors, such as handwashing and influenza vaccination.[17,28–30] What is more, China's COVID strategies are consistent with the COM-B model of behavior change (which has been empirically tested across different cultures)[21] in that they aim to reduce the physical, financial, and mental barriers to engaging in health-protective behaviors; enhance people's capabilities and motivations for taking those actions; and create opportunities to engage in the actions. More generally, the strategies are used in coordination with other COVID-fighting measures rather than in isolation, which reduces the implementation costs and increases the synergistic effects of different public health interventions in a pandemic emergency.

I realize that the strategies adopted in China should be viewed in terms of the nation's cultural and socioecological context, as researchers studying the social determinants of health often advocate for increasing the context sensitivity of behavioral interventions.[9,31,32] The culture in China has features that may have contributed to its successes. For example, cultural "tightness," or restrictiveness, may have interacted with governmental efficiency to reduce infection and mortality rates in China.[33,34] People in tight cultures tend to be motivated to prevent disease,[35] which makes them more inclined than

Table 1. Behavioral insights applied in China to contain the COVID-19 pandemic

Purpose	Behavioral insights or principles	Practices in China	Conditions that can be enabling or constraining
Enhance public engagement in health-protective behaviors	Make performing the target behavior as easy as possible Use the power of social norms to increase engagement	Established online registration systems to distribute face masks to residents in need Offered hand sanitizer at the entrance of communities and supermarkets and inside elevators Highlighted engagement in health-protective behaviors as the norm	Enabling: adequate supply of face masks and hand sanitizers; a collective cultural mindset that enhances the effects of social norms Constraining: inconsistent recommendations from place to place about behaviors to adopt; discrimination against people who wear face masks to prevent infection
Increase the prompt seeking of medical treatment	Reduce the barriers to obtaining care Increase accessibility of health care services	Implemented a national emergency policy that covered all patients' COVID-19 medical expenses Released the policy early in the COVID-19 pandemic	Enabling: elimination of the financial burden for medical care Constraining: inadequate medical resources for treating patients
Protect health care workers from infection	Leverage the power of defaults Reduce barriers to the use of infection-control measures	Set the highest protective standard as the default Provided on-site training and guidance on infection control	Enabling: adequate supplies of personal protective equipment Constraining: inconsistent standards for effective infection control
Increase adherence to epidemiological investigations and contact tracing and achieve precision infection control	Make it easy to implement measures that identify individuals who should be quarantined while allowing low-risk individuals to work and attend school Make individuals' risk of being infected salient and visible	Introduced easy-to-obtain health-status codes to aid with precision infection control Applied traffic-light color coding to the health-status codes to make them easy to understand and visible Standardized health-status codes and guidelines to reduce barriers to safe travel across provinces	Enabling: widespread smartphone use and access to a health-status code app; wide recognition of the need to monitor level of risk Constraining: low smartphone use; lack of a health-status code app; inconsistent guidelines for making use of health-status codes
Alleviate the mental health impacts of COVID-19	Make mental health resources accessible Provide psychological assistance promptly	Established more than six hundred 24/7 hotlines for psychological assistance Made mental health screening, counseling, and self-help resources freely accessible both online and offline	Enabling: wide adoption of smartphones; availability of high-speed internet; enough qualified mental health professionals Constraining: underestimation of the need for psychological assistances; stigma surrounding mental illness

those in less restrictive cultures to adopt strict measures.[36] Each country should take its own situational, institutional, cultural, and socioecological factors into account when designing, tailoring, and implementing strategies for containing COVID-19 and future pandemics.[6,9,32] For example, for people in Europe and North America, framing desired behaviors for mitigating the pandemic in terms of promoting good health could be more effective than using a disease-prevention framing.

I hope my suggestions will inspire more cross-cultural empirical research into the effectiveness of applying behavioral sciences–based strategies for containing pandemics. Meanwhile, China's experience with the COVID-19 pandemic indicates that, along with making the public's health and well-being their top priority and keeping cultural sensitivity in mind, policymakers and public health officials in other countries may benefit from incorporating behavioral sciences–based strategies into their efforts to increase the adoption of health-protective behaviors. Doing so should help to both mitigate the threat posed by COVID-19 today and enhance pandemic preparedness and resiliency in the future.

author affiliation

Zhang: School of Public Health and the Second Affiliated Hospital of Zhejiang University School of Medicine. Corresponding author's e-mail: zhangning2019@zju.edu.cn.

references

1. Johns Hopkins University. (2020). COVID-19 dashboard by the Center for Systems Science and Engineering (CSSE) at John Hopkins University (JHU). Retrieved November 15, 2020, from https://coronavirus.jhu.edu/map.html

2. Davis, M. D., Stephenson, N., Lohm, D., Waller, E., & Flowers, P. (2015). Beyond resistance: Social factors in the general public response to pandemic influenza. *BMC Public Health, 15,* Article 436. https://doi.org/10.1186/s12889-015-1756-8

3. Rubin, G. J., Potts, H. W. W., & Michie, S. (2010). The impact of communications about swine flu (influenza A HINIv) on public responses to the outbreak: Results from 36 national telephone surveys in the UK. *Health Technology Assessment, 14*(34), 183–266. https://doi.org/10.3310/hta14340-03

4. Sheeran, P., & Webb, T. L. (2016). The intention–behavior gap. *Social and Personality Psychology Compass, 10,* 503–518. https://doi.org/10.1111/spc3.12265

5. Lunn, P. D., Belton, C. A., Lavin, C., McGowan, F. P., Timmons, S., & Robertson, D. A. (2020). Using behavioral science to help fight the coronavirus. *Journal of Behavioral Public Administration, 3*(1). https://doi.org/10.30636/jbpa.31.147

6. Michie, S., Rubin, G. J., & Amlôt, R. (2020, February 28). Behavioural science must be at the heart of the public health response to COVID-19 [Blog post]. Retrieved from https://blogs.bmj.com/bmj/2020/02/28/behavioural-science-must-be-at-the-heart-of-the-public-health-response-to-covid-19/

7. Michie, S., West, R., & Amlôt, R. (2020, March 3). Behavioural strategies for reducing COVID-19 transmission in the general population [Blog post]. Retrieved from https://blogs.bmj.com/bmj/2020/03/03/behavioural-strategies-for-reducing-covid-19-transmission-in-the-general-population/

8. Michie, S., West, R., Amlôt, R., & Rubin, G. J. (2020, March 11). Slowing down the COVID-19 outbreak: Changing behaviour by understanding it [Blog post]. Retrieved from https://blogs.bmj.com/bmj/2020/03/11/slowing-down-the-covid-19-outbreak-changing-behaviour-by-understanding-it/

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

10. Webster, R. K., Brooks, S. K., Smith, L. E., Woodland, L., Wessely, S., & Rubin, G. J. (2020). How to improve adherence with quarantine: Rapid review of the evidence. *Public Health, 182,* 163–169. https://doi.org/10.1016/j.puhe.2020.03.007

11. Behavioural Insights Team. (2014). *EAST: Four simple ways to apply behavioural insights*. Retrieved from https://www.bi.team/publications/east-four-simple-ways-to-apply-behavioural-insights/

12. McFerran, B. (2015). Social norms, beliefs, and health. In C. A. Roberto & I. Kawachi (Eds.), *Behavioral economics and public health* (pp. 133–160). Oxford, United Kingdom: Oxford University Press. https://doi.org/10.1093/med/9780199398331.003.0005

13. Fudan University, School of Public Health. (2020). Xīnxíng guānzhuàng bìngdú fèiyán yìqíng xià de gōngzhòng xiāngguān rèn zhī, xíngwéi hé xīnlǐ jiànkāng diàochá [A national survey on people's attitudes, behavior, and mental health during COVID-19]. Retrieved from https://mp.weixin.qq.com/s/XjAdJft6UkFsmoCVJ7p8uw

14. National Healthcare Security Administration and Ministry of Finance of China. (2020). Guānyú zuò hǎo xīnxíng guānzhuàng bìngdú fèiyán yìqíng yīliáo bǎozhàng de tōngzhī [Announcement on the medical security and financial support for COVID-19 infected patients]. Retrieved from http://www.nhsa.gov.cn/art/2020/1/23/art_37_2284.html

15. Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, CT: Yale University Press.

16. Johnson, E. J., & Goldstein, D. (2003, November 21). Do defaults save lives? *Science, 302,* 1338–1339. https://doi.org/10.1126/science.1091721

17. Chapman, G. B., Li, M., Leventhal, H., & Leventhal, E. A. (2016). Default clinic appointments promote influenza vaccination uptake without a displacement effect. *Behavioral Science & Policy, 2*(2), 41–50.

18. Malhotra, S., Cheriff, A. D., Gossey, J. T., Cole, C. L., Kaushal, R., & Ancker, J. S. (2016). Effects of an e-prescribing interface redesign on rates of generic drug prescribing: Exploiting default options. *Journal of the American Medical Informatics Association, 23,* 891–898.

19. World Health Organization. (2020, April 11). *Coronavirus disease 2019 (COVID-19) situation report–82*. Retrieved from https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200411-sitrep-82-covid-19.pdf

20. People.cn. (2020, March 7). Quánguó yuán è yīwù rényuán líng gǎnrǎn [Zero infection among healthcare workers assisting Hubei Province during COVID-19]. Retrieved from http://bj.people.com.cn/n2/2020/0307/c233087-33857502.html

21. Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel: A guide to designing interventions*. London, United Kingdom: Silverback.

22. Tian, H., Liu, Y., Li, Y., Wu, C.-H., Chen, B., Kraemer, M., . . . Dye, C. (2020, March 31). An investigation of transmission control measures during the first 50 days of the COVID-19 epidemic in China. *Science, 368,* 638–642. https://doi.org/10.1126/science.abb6105

23. Xinhua News Agency. (2020, May 23). "Guóbiāo" guīfàn gèdì "jiànkāng mǎ" jiànshè yùnxíng biāozhǔn ["National standard" standardizes the operation standards for "health code" everywhere]. Retrieved from http://www.xinhuanet.com/politics/2020-05/23/c_1126021895.htm

24. National Health Commission of the People's Republic of China. (2020). Guānyú yìnfā xīnxíng guànzhuàngbìngdú gǎnrǎn de fèiyányìqíng jǐnjí xīnlǐwēijīgānyù zhǐdǎoyuánzé de tōngzhī [The guideline of psychological crisis intervention for COVID-2019 pneumonia epidemic]. Retrieved from http://www.nhc.gov.cn/jkj/s3577/202001/6adc08b966594253b2b791be5c3b9467.shtml

25. National Health Commission of the People's Republic of China. (2020). Guānyú yìnfā xīnxíng guànzhuàngbìngdúfèiyán yìqíngfángkòng qījiān xīnlǐyuánzhùrèxiàn gōngzuòzhǐnán de tōng zhī [Guidelines for psychological assistance hotlines for COVID-2019 pneumonia epidemic]. http://www.nhc.gov.cn/jkj/s3577/202002/f389f20cc1174b21b981ea2919beb8b0.shtml

26. National Health Commission, Department of Human Resources and Social Security, & Department of Finance of the People's Republic of China. (2020, February 12). Guānyú gǎishàn yíxiàn yīwù rényuán gōng zuòtiáojiàn, qièshí guānxīn yīwù rényuán

shēnxīn jiànkāng ruògān cuòshī de tōngzhī [Measures to improve the working conditions and well-being of medical personnel during the COVID-19 pneumonia epidemic]. Retrieved from http://www.gov.cn/zhengce/content/2020-02/11/content_5477399.htm

27. Liu, S., Yang, L., Zhang, C., Xiang, Y.-T., Liu, Z., Hu, S., & Zhang, B. (2020, February 18). Online mental health services in China during the COVID-19 outbreak. *The Lancet: Psychiatry, 7*(4), e17–e18. https://doi.org/10.1016/S2215-0366(20)30077-8

28. Aarestrup, S. C., Moesgaard, F., & Schuldt-Jensen, J. (2016). *Nudging hospital visitors' hand hygiene compliance.* https://doi.org/10.13140/RG.2.2.25911.52641

29. Grant, A. M., & Hofmann, D. A. (2011). It's not all about me: Motivating hand hygiene among health care professionals by focusing on patients. *Psychological Science, 22,* 1494–1499. https://doi.org/10.1177/0956797611419172

30. Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. *Proceedings of the National Academy of Sciences of the United States of America, 108,* 10415–10420. https://doi.org/10.1073/pnas.1103170108

31. Alcántara, C., Diaz, S. V., Cosenzo, L. G., Loucks, E. B., Penedo, F. J., & Williams, N. J. (2020). Social determinants as moderators of the effectiveness of health behavior change interventions: Scientific gaps and opportunities. *Health Psychology Review, 14,* 132–144. https://doi.org/10.1080/17437199.2020.1718527

32. Michie, S., West, R., & Spring, B. (2013). Moving from theory to practice and back in social and health psychology. *Health Psychology, 32,* 581–585. https://doi.org/10.1037/a0030205

33. Anderson, R. M., Heesterbeek, H., Klinkenberg, D., & Hollingsworth, T. D. (2020, March 21). How will country-based mitigation measures influence the course of the COVID-19 epidemic? *The Lancet, 395,* 931–934. https://doi.org/10.1016/S0140-6736(20)30567-5

34. Gelfand, M. J., Raver, R. L., Nishii, L., Leslie, L. M., Lun, J., Lim, B. C., . . . Yamaguchi, S. (2011, May 27). Differences between tight and loose cultures: A 33-nation study. *Science, 332,* 1100–1104. https://doi.org/10.1126/science.1197754

35. Kurman, J., & Hui, C. (2011). Promotion, prevention or both: Regulatory focus and culture revisited. *Online Readings in Psychology and Culture, 5*(3). https://doi.org/10.9707/2307-0919.1109

36. Higgins, E. T. (2005). Value from regulatory fit. *Current Directions in Psychological Science, 14,* 209–213. https://doi.org/10.1111/j.0963-7214.2005.00366.x