

## Psychological responses to the Coronavirus Disease (COVID-19) outbreak

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### Abstract

The novel coronavirus (COVID-19) has infected more than 90,000 people in at least 69 countries by Feb 29, 2020. Medical interest in COVID-19 has been considerable. Mental health issues that coincide with the epidemics are rarely examined. There is a strong need for public health officials to consider how psychological effects vary at each phase of a crisis and how they relate to people to better support them in these shifting states of mind. The present study examines temporal relationships among behavioral and emotional responses towards COVID-19 and attitudinal responses to crisis management. 846 adults were invited to complete a set of Internet-based questionnaires at two time points with a range of 14 to 18 days' intervals covered by the ascending phase of the outbreak. At the baseline assessment 788 adults completed the questionnaires. At the Wave 2 survey, 318 adults from Wave 1 were retained. Results from cross-lagged models demonstrated reciprocal negative associations between anxiety and crisis management appraisal. In addition, the higher evaluation of crisis management in the initial period of outbreak predicted adoption of preventive behaviors and susceptibility to emotional contagion to a greater extent in a later period. Susceptibility to emotional contagion also positively predicted preventive behaviors taken. Furthermore, multiple group structural equation modeling revealed that evaluation of crisis management is more likely to affect the susceptibility to emotional contagion of people on the frontline of the outbreak (i.e., Wuhan) compared to people living in moderate risk areas (i.e., Outside of Hubei). These data provide experimental evidence regarding mental health during the COVID-19 outbreak, and over the course of a pandemic, which will direct governments and health authorities during disease outbreaks through their attempts to communicate with the public.

## Full Text

# Psychological Responses to the Coronavirus Disease (COVID-19) Outbreak

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## Abstract

**Aims.** The novel coronavirus (COVID-19) had infected more than 90,000 people across at least 69 countries by February 29, 2020. While medical interest in COVID-19 has been considerable, mental health issues coinciding with epidemics are rarely examined. Public health officials urgently need to understand how psychological effects vary across crisis phases and how they relate to public behavior to better support communities through these evolving challenges. The present study examines temporal relationships among behavioral and emotional responses toward COVID-19 and attitudinal responses to crisis management.

**Methods.** A total of 846 adults were invited to complete internet-based questionnaires at two time points, with intervals ranging from 14 to 18 days during the ascending phase of the outbreak. At baseline, 788 adults completed the questionnaires, and 318 of these were retained at Wave 2.

**Results.** Cross-lagged models demonstrated reciprocal negative associations between anxiety and crisis management appraisal. Additionally, more positive evaluation of crisis management during the initial outbreak period predicted greater adoption of preventive behaviors and increased susceptibility to emotional contagion at a later period. Susceptibility to emotional contagion also positively predicted preventive behaviors. Furthermore, multiple-group structural equation modeling revealed that evaluation of crisis management more strongly affected susceptibility to emotional contagion among people on the frontline of the outbreak (i.e., Wuhan) compared to those living in moderate-risk areas (i.e., outside Hubei).

**Conclusions.** These data provide empirical evidence regarding mental health during the COVID-19 outbreak and across pandemic progression, offering guid-

ance for governments and health authorities in their public communication efforts during disease outbreaks.

**Keywords:** COVID-19; emotion; anxiety; preventive measures; management; epidemic; mental health

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## Introduction

A novel coronavirus (COVID-19, also called SARS-CoV-2 or 2019-nCoV) was recently detected in Wuhan, China, triggering a global outbreak. Chinese health officials reported tens of thousands of infections and thousands of deaths nationwide. Despite China's considerable efforts and sacrifices to control the epidemic, additional cases continue to emerge in an increasing number of international locations. The World Health Organization declared the outbreak a Global Health Emergency on January 30, 2020, thereby activating enhanced capacity for Public Health Emergency Management (PHEM) at the global level.

Viral disease outbreaks typically spread through ordinary person-to-person contact and can trigger severe public panic. Novel and exotic threats tend to elevate anxiety levels more than familiar threats do (e.g., Wong, 2007 on SARS; see Coughlin, 2012 for review). Moreover, individuals' emotional states become extremely vulnerable during public health emergencies, and fear of a vague, terrifying new illness can spiral into dangerous skepticism. In 2018, researchers predicted that the next major outbreak might be driven not by a lack of preventive technologies but by emotional contagion, which could erode trust in government and cause serious economic and social disruption (Larson, 2018). The international threat posed by COVID-19 necessitates pooling international data in both medical and mental health domains.

While medical interest in COVID-19 has been substantial (e.g., Zou et al., 2020), mental health issues coinciding with emerging epidemics—and the appropriate behaviors needed to avoid infection—are rarely examined. During a crisis, affected individuals receive, process, and act on information differently than during non-crisis periods. Effective, timely, and credible PHEM is essential for containing fear and public threat while promoting preventive behaviors (Bao et al., 2020). Conversely, psychological traits may bias individuals against local PHEM systems. Governments face the difficult challenge of explaining dangers and advising appropriate actions without raising undue alarm. For example, individuals with higher anxiety levels may overreact to policies, while those susceptible to negative emotional contagion may more readily adopt societal beliefs that conflict with government guidance, thereby jeopardizing public health measures (e.g., Aral & Walker, 2012; Ferrara & Yang, 2015). It remains unclear whether preventive behaviors increase as a coping mechanism for negative emotions (e.g., Qian et al., 2005) or through disclosure of epidemic information (e.g., Xue & Zeng, 2019).

Thus, public health authorities urgently need to monitor mental health during pandemics. The uncertain relationship between crisis management and psychological response requires investigation. To improve understanding of public reactions to epidemic outbreaks, the present study examined temporal relationships among behavioral and emotional responses toward COVID-19 and attitudinal responses to crisis management using a two-wave longitudinal design. We hypothesized that adoption of preventive behaviors, anxiety levels, and susceptibility to emotional contagion would be associated with crisis management appraisal as the pandemic developed. This study aims to increase awareness of psychiatric events and support rapid, effective decision-making to reduce public panic.

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## Methods

### Sampling and Data Collection

Nine investigators affiliated with the International Joint Laboratory of Behavior and Cognitive Science, three research assistants, and five residential community staff members participated in survey distribution. They invited community residents to participate through their social networks. Invitations containing links to the internet-based survey and Quick Response (QR) codes were distributed to local communities in Wuhan City and outside Hubei Province via social media, moment postings, and messenger apps for convenience sampling. We attempted to maintain objectivity by giving all community members equal opportunity to complete the questionnaires.

Data were collected from January 26, 2020 (when 30 Chinese provinces had launched first-level responses to major public health emergencies, with 56 deaths and 2,014 confirmed cases worldwide) through February 17, 2020 (with 1,775 deaths and 71,429 confirmed cases worldwide) (extracted from Coronavirus Disease 2019 (COVID-19) Situation Report -28 at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>). The mean test-retest interval was 16 days ( $SD = 0.82$ ), ranging from 14 to 18 days. Data collection covered the ascending phase of the outbreak.

As is common in longitudinal studies, observations across waves were missing for various reasons, and attrition rates for web-based surveys are especially high (e.g., Hochheimer et al., 2016). Comparisons between participants who completed only Wave 1 and those who completed both waves revealed significant age differences ( $p < 0.01$ ). Higher age predicted withdrawal, likely due to less frequent internet usage (e.g., Burnett et al., 2011; cf. Adams, Stubbs, & Woods, 2005). Nonresponse analysis via independent t-tests also revealed that participants who completed both time points had slightly lower anxiety levels at Wave 1 ( $p < 0.05$ ). However, this effect was small (Cohen's  $d = 0.17$ ) and unlikely to seriously bias the results.

## Measures

**Adoption of Preventive Behaviors (APB).** We developed eight questions based on China Center for Disease Control and Prevention (CDC) guidelines. A sample item included: “Did you wash your hands after sneezing, coughing, or cleaning your nose in the past three days?” All eight behavior items were rated on a 4-point scale from 1 (“Not at all”) to 4 (“Always”). Total APB frequency was calculated by summing all eight items.

**Evaluation of Crisis Management (ECM).** We used a 6-item scale to assess PHEM appraisal, designed to reflect opinions on information distribution and transparency (Quah & Lee, 2004). Items were scored on a 7-point scale, with higher scores indicating more positive appraisal. The questionnaire demonstrated acceptable validity and high internal consistency, with Cronbach’s  $\alpha = 0.87$  for both waves.

**Anxiety Level.** Anxiety was assessed using the Zung Self-Rating Anxiety Scale (SAS; Zung, 1971), which comprises 20 items. Items 1–5 represent emotional anxiety symptoms, while items 6–20 represent physical symptoms. Responses range from 1 to 4, with higher scores indicating greater anxiety. This study focused on emotional anxiety symptoms. Reliability coefficients were good for both Wave 1 (Cronbach’s  $\alpha = 0.82$ ) and Wave 2 (Cronbach’s  $\alpha = 0.83$ ) samples.

**Susceptibility to Emotional Contagion (SEC).** The Emotional Contagion Scale for Public Emergency (ECS-PE; Song et al., 2017) is a self-report measure assessing susceptibility to catching emotions, particularly those generated during public emergencies. This revised version of the Emotional Contagion Scale (ECS; Doherty, 1997) contains 15 items rated on a 5-point scale, with scores calculated by summing item responses. Cronbach’s  $\alpha$  values were 0.90 and 0.91 for Wave 1 and Wave 2, respectively.

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## Results

### Descriptive Statistics and Bivariate Correlations

Inspection of Mahalanobis  $d^2$  values identified six outliers. Results were identical whether outliers were included or excluded. Repeated-measures ANOVA revealed significant main effects of time on APB,  $F(1, 316) = 48.67$ ,  $p < .001$ ,  $\eta^2 = .13$ , and region on APB,  $F(1, 316) = 10.83$ ,  $p < .01$ ,  $\eta^2 = .03$ , and anxiety level,  $F(1, 316) = 31.94$ ,  $p < .001$ ,  $\eta^2 = .10$ . A significant Region  $\times$  Time interaction on SEC emerged,  $F(1, 316) = 7.26$ ,  $p < .01$ ,  $\eta^2 = .02$ . Simple effects analyses revealed that SEC decreased significantly for participants outside Hubei,  $F(1, 317) = 4.34$ ,  $p < .05$ ,  $\eta^2 = .02$ , but remained unchanged for Wuhan participants as the epidemic progressed.

Table 1 presents bivariate correlations among Wave 1 and Wave 2 variables, indicating considerable stability in autoregressive correlations and revealing cross-

lagged relations between ECM and anxiety. Cross-sectional intercorrelations were similar across both waves.

**Table 1. Bivariate Correlations Between Measured Variables**

Variable	1	2	3	4	5	6	7
1. T1APB	—						
2. T1ECM	.375**	—					
3. T1Anxiety	-	-	—				
4. T1SEC	.298**	.246**		—			
5. T2APB	.264**	-	.683**	-	—		
6. T2ECM	.675**	.371**	-	.269**	-	—	
7. T2Anxiety	.354**	.675**	-	.394**	.371**	-	—
8. T2SEC	-	-	.683**	-	-	-	-
	.286**	.278**		.223**	.306**	.289**	
	.180**	-	-	.269**	.394**	-	.675**
		.246**	.215**			.167**	

Note. T1 = Wave 1; T2 = Wave 2.

### Longitudinal Cross-Lag Model

We tested temporal relationships among adoption of preventive behaviors (APB), anxiety, susceptibility to emotional contagion (SEC), and evaluation of crisis management (ECM) using structural equation modeling with robust maximum likelihood estimation. The full cross-lagged model demonstrated acceptable fit:  $\chi^2/df = 3.59$ ,  $p < .01$ ; CFI = 0.97, TLI = 0.90, RMSEA (90% CI) = 0.09 (0.06-0.13), SRMR = 0.05. All autoregressive paths from Wave 1 to Wave 2 were significant: APB,  $\beta = 0.58$ , SE = 0.06,  $p < .01$ ; ECM,  $\beta = 0.65$ , SE = 0.05,  $p < .01$ ; anxiety,  $\beta = 0.65$ , SE = 0.04,  $p < .01$ ; and SEC,  $\beta = 0.81$ , SE = 0.02,  $p < .01$ .

After controlling for demographic variables, we identified two positive cascade pathways (from ECM to later APB and from Wave 1 SEC to Wave 2 APB) and one negative path (from Wave 1 ECM to Wave 2 SEC). Reciprocal associations between ECM and anxiety also emerged. We therefore removed nonsignificant paths and retested the model. The final model demonstrated excellent fit:  $\chi^2/df = 1.29$ ,  $p = .25$ ; CFI = 1.00, TLI = 0.99, RMSEA (90% CI) = 0.03 (0.00-0.079), SRMR = 0.03. Standardized path coefficients for the final model appear in Figure 2 [Figure 2: see original paper]. The model accounted for 47.2%, 47.1%, 47.7%, and 67.1% of total variance in Wave 2 APB, anxiety, ECM, and SEC, respectively.

## Multiple-Group Structural Equation Modeling

We used multiple-group SEM to assess whether cross-lagged associations varied by region. A significant chi-square difference indicated non-equivalence across groups,  $\Delta^2 = 40.92$ ,  $p < .05$ . Wald tests examining differences among the five cross-lagged paths revealed that the coefficient for the path from Wave 1 ECM to Wave 2 SEC was significantly higher for Wuhan than for areas outside Hubei,  $Wald(1) = 5.32$ ,  $p < .05$ . ECM significantly predicted SEC for Wuhan,  $\beta = -0.20$ , but not for areas outside Hubei,  $\beta = -0.03$ .

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## Discussion

This study captured a snapshot of attitudinal and behavioral responses during the early COVID-19 epidemic. As expected, respondents adopted more preventive measures as the epidemic developed, and individuals in high-risk areas adopted such measures to a greater extent. Unexpectedly, however, evaluation of crisis management did not change over time. In the epidemic's early stages, public health officials faced numerous challenges, including limited treatment technologies, poor understanding of the virus, and inability to adequately address public concerns. Although management quality gradually improved, the rapid outbreak deterioration may have undermined public confidence in these enhanced capabilities. Repeated-measures ANOVA also showed that anxiety levels were significantly higher in high-risk than moderate-risk areas. Factors such as virus accessibility, lockdown controls, and living condition disruptions likely contributed to short-term mental health problems in epidemic areas.

Information scarcity leads to speculation and gap-filling, which increases susceptibility to emotional contagion—a catalyst that accelerates rumor spread (Na, Garrett, & Slater, 2018). The significant reduction in susceptibility in low-risk areas suggests that emergency-induced susceptibility may diminish over time as information is gradually disclosed, although high-risk area participants showed no change. Cross-lagged panel analysis further confirmed this: initial management appraisal predicted later susceptibility to emotional contagion, with stronger effects among frontline populations (i.e., Wuhan). Numerous studies have noted that effective management can mitigate susceptibility and relieve public anxiety (e.g., Liu et al., 2019). However, this study demonstrated reciprocal prediction between anxiety and management evaluation, suggesting that anxiety may also lead to mistrust and dissatisfaction with crisis management.

Previous research on respiratory infectious disease epidemics (RIDEs) has identified factors motivating preventive measures. For example, Lee-Bagley et al. (2004) found that individuals high in empathic responding (e.g., listening to others' feelings about SARS) were more likely to adopt health precautions. Consistent with these cross-sectional findings, individuals with greater susceptibility to emotional contagion at Wave 1 were more likely to adopt preventive behaviors at Wave 2. However, not all mood states predict behavior. Unlike

susceptibility, initial anxiety did not predict later preventive behavior adoption. A possible explanation is that during early epidemic stages when threats are highly uncertain, cognitive risk responses may optimally drive behavior as the epidemic evolves (Liao et al., 2014). Anxiety generally involves less intense cognitive components than emotional contagion susceptibility and therefore is less likely to predict behavioral change. Respondents' crisis management appraisal predicted their preventive behavior engagement, indicating that preventive measures are closely linked to effective and timely dissemination of epidemic and virus-related information. Additionally, we found no support for a causal relationship between anxiety and susceptibility to emotional contagion. Although mixed evidence suggests anxious individuals tend to catch negative emotions from others (e.g., Dijk et al., 2018), our findings indicate anxiety was unrelated to emotional contagion susceptibility, possibly because our bipolar scale measured reactions to both positive and negative emotions.

Several limitations warrant consideration. First, our preventive behavior questions may not have captured all infection prevention measures. Additionally, we extracted emotional anxiety symptoms from the general Zung Self-Rating Anxiety Scale (SAS) for anxiety screening, which differs from the State-Trait Anxiety Inventory (STAI) used in some previous epidemic research (e.g., Cowling et al., 2010). Consistent with those studies, anxiety levels remained low throughout the pandemic, suggesting low anxiety has minimal effect on behavioral and emotional responses to COVID-19. Second, generalizability may be limited by our sample's lack of diversity, as most participants were middle-aged and healthy, with females slightly overrepresented. Nevertheless, to our knowledge, these data provide some of the first empirical evidence regarding mental health during the COVID-19 outbreak across pandemic progression.

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## Conclusion

The Ministry of Science and Technology of China recently suggested that epidemic-related research should target epidemic situations directly (The State Council of the People's Republic of China, 2020, January 26). As noted, mental health concerns raised by COVID-19 are critical. During public health emergencies, people experience diverse emotions, and psychological barriers may impede public cooperation and response. Government agencies should anticipate these patterns and recognize their influence on communication. For empirical psychological research, a major contribution to epidemic response is understanding psychological responses and their dynamic changes—the prerequisites for psychological intervention, emergency management improvement, and relief of public anxiety and fear.

At this study's completion, China showed new success in controlling the coronavirus outbreak, with declining infection rates. However, this progress was overshadowed by unbridled pandemic spread in Japan, South Korea, Iran, Europe,

the United States, and other regions, underscoring the risk of a global pandemic spiraling out of control. We emphasize the need to strengthen global public health management and the importance of information campaigns encouraging appropriate countermeasures against virus outbreaks in both psychological and medical domains.

Officials who withhold information or over-reassure the public to avoid chaos cause more harm than rational public action during crises. Pre-crisis preparation must establish open and honest information flow.

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## Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## References

- Adams, N., Stubbs, D., & Woods, V. (2005). Psychological barriers to Internet usage among older adults in the UK. *Medical Informatics and the Internet in Medicine*, 30(1), 3-17.
- Aral, S., & Walker, D. (2012). Identifying influential and susceptible members of social networks. *Science*, 337(6092), 337-341.
- Bao, Y., Sun, Y., Meng, S., Shi, J., & Lu, L. (2020). 2019-nCoV epidemic: Address mental health care to empower society. *The Lancet*, 395, 37-38.
- Burnett, J. S., Mitzner, T. L., Charness, N., & Rogers, W. A. (2011). Understanding predictors of computer communication technology use by older adults. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 55(1), 172-176.
- Coughlin, S. S. (2012). Anxiety and depression: Linkages with viral diseases. *Public Health Reviews*, 34(2), 7.
- Cowling, B. J., Ng, D. M. W., Ip, D. K. M., Liao, Q., Lam, W. W. T., Wu, J. T., ...Fielding, R. (2010). Community psychological and behavioral responses

through the first wave of the 2009 influenza A(H1N1) pandemic in Hong Kong. *The Journal of Infectious Diseases*, 202(6), 867-876.

Dijk, C., Fischer, A. H., Morina, N., van Eeuwijk, C., & van Kleef, G. A. (2018). Effects of social anxiety on emotional mimicry and contagion: Feeling negative, but smiling politely. *Journal of Nonverbal Behavior*, 42(1), 81-99.

Doherty, R. W. (1997). The emotional contagion scale: A measure of individual differences. *Journal of Nonverbal Behavior*, 21(2), 131-154.

Ferrara, E., & Yang, Z. (2015). Measuring emotional contagion in social media. *PLOS ONE*, 10(11), e0142390.

Glik, D. C. (2007). Risk communication for public health emergencies. *Annual Review of Public Health*, 28(1), 33-54.

Hochheimer, C. J., Sabo, R. T., Krist, A. H., Day, T., Cyrus, J., & Woolf, S. H. (2016). Methods for evaluating respondent attrition in web-based surveys. *Journal of Medical Internet Research*, 18(11), e301.

Hornsveld, R. H., Kraaimaat, F. W., & Van Dam-Baggen, R. M. (1979). Anxiety/discomfort and handwashing in obsessive-compulsive and psychiatric control patients. *Behaviour Research and Therapy*, 17(3), 223-228.

Larson, H. J. (2018). The biggest pandemic risk? Viral misinformation. *Nature*, 562(7726), 309-310.

Lee-Baggley, D., DeLongis, A., Voorhoeve, P., & Greenglass, E. (2004). Coping with the threat of severe acute respiratory syndrome: Role of threat appraisals and coping responses in health behaviors. *Asian Journal of Social Psychology*, 7(1), 9-23.

Liao, Q., Cowling, B. J., Lam, W. W., Ng, D. M., & Fielding, R. (2014). Anxiety, worry and cognitive risk estimate in relation to protective behaviors during the 2009 influenza A/H1N1 pandemic in Hong Kong: Ten cross-sectional surveys. *BMC Infectious Diseases*, 14(1), 169.

Liu, W., Wu, X., Yang, W., Zhu, X., & Zhong, S. (2019). Modeling cyber rumor spreading over mobile social networks: A compartment approach. *Applied Mathematics and Computation*, 343, 124-144.

Na, K., Garrett, R. K., & Slater, M. D. (2018). Rumor acceptance during public health crises: Testing the emotional congruence hypothesis. *Journal of Health Communication*, 23(8), 791-799.

Qian, M., Ye, D., Zhong, J., Xu, K., Zhang, L., Huang, Z., ...Wang, C. (2005). Behavioural, cognitive and emotional responses to SARS: Differences between college students in Beijing and Suzhou. *Stress and Health: Journal of the International Society for the Investigation of Stress*, 21(2), 87-98.

Quah, S. R., & Lee, H. (2004). Crisis prevention and management during SARS outbreak, Singapore. *Emerging Infectious Diseases*, 10(2), 364.

Song, Z., Shi, R., Wang, X., Guo, Y. P., & Zang, G. S. (2017). Development of emotional contagion scale for public emergency. *China Journal of Health Psychology, 25*(1), 38–43.

The State Council of the People' s Republic of China. (2020, January 26). *The Ministry of Science and Technology suggests that research work in the epidemic situation needs to be targeted to address the epidemic situation*. Retrieved from [http://www.gov.cn/zhengce/zhengceku/2020-02/01/content\\_5473242.htm](http://www.gov.cn/zhengce/zhengceku/2020-02/01/content_5473242.htm)

Viboud, C., Simonsen, L., & Chowell, G. (2016). A generalized-growth model to characterize the early ascending phase of infectious disease outbreaks. *Epidemics, 15*, 27–37.

Wong, T. W., Gao, Y., & Tam, W. W. S. (2007). Anxiety among university students during the SARS epidemic in Hong Kong. *Stress and Health: Journal of the International Society for the Investigation of Stress, 23*(1), 31–35.

World Health Organization. (2020). Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). Retrieved January 30, 2020, from [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov))

Xue, L., & Zeng, G. (2019). Evaluations from different parties on influenza A (H1N1) prevention and control. In *A Comprehensive Evaluation on Emergency Response in China* (pp. 179–222). Springer, Singapore.

Zou, L., Ruan, F., Huang, M., Liang, L., Huang, H., Hong, Z., ...Wu, J. (2020). SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *The New England Journal of Medicine* (In press).

Zung, W. W. (1971). A rating instrument for anxiety disorders. *Psychosomatics: Journal of Consultation and Liaison Psychiatry, 12*(6), 371–379.

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