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RESEARCH ARTICLE

Opinions from the epicenter: an online survey of university students in Wuhan amidst the COVID-19 outbreak[1]

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ABSTRACT

The outbreak of the novel coronavirus (2019-nCov, COVID) in Wuhan, China, in December 2019 quickly escalated into a global health emergency. This study seeks to investigate the attitudinal and behavioral patterns of university students in Wuhan, the epicenter. Conducted in late January 2020, an online survey collected data from more than 8000 students of four elite national universities located in Wuhan. The students sampled included both Wuhan natives and non-locals who returned home in the early stages of the outbreak. The study notes widespread psychological stress among students but positive behavioral compliance with personal hygiene practices. Official announcements were the chief source of information for the respondents, who also demonstrated high demand for transparency of information disclosure. Some aggressive anti-epidemic measures infringing citizens' legitimate rights were found at the local level. The respondents offered varying evaluations of the performance of central government, local governments, civil society, and the health system in this public health crisis. The article concludes with policy implications and caveats.

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KEYWORDS
Novel coronavirus; public health emergency; crisis management; Wuhan; China

1. Introduction

The outbreak of the novel coronavirus (2019-nCov, COVID) in Wuhan, China, in December 2019 soon escalated into a global health emergency. As of February 29, 2020, the number of infected cases registered in China reached 78,962 while 55 countries and regions have reported cases of infection. The world is facing an unprecedented public health crisis. Wuhan, the epicenter, has been put under an international spotlight, leading to the stigmatizing label 'Wuhan virus.' The death toll in Wuhan alone amounted to 47,441 as of February 25, 2020. The entire bureaucratic system of China has been mobilized in the fight against the epidemic, but the costs involved are enormous. This coronavirus outbreak has offered a series of lessons for both practitioners and researchers in public health, public administration, crisis management, and

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social policy. The current study represents the joint efforts of a group of public administration researchers in China who wish to understand popular opinions from the epicenter and draw critical policy implications for government authorities in China and beyond.

The data of this study were collected from an online survey of university students in Wuhan, conducted in late January 2020. We focused on university students for three reasons. First, Wuhan, as one of the key higher education hubs of China, hosts a huge population of university students, amounting to 1.3 million. One in 10 Wuhan residents is a university student. Mostly temporary residents of the city, they experienced the initial phase of the outbreak with the rest of the community, and many were traumatized. Therefore, a study on university students is not merely an investigation of a trivial subpopulation of the city. Second, coming from every province of China, the majority of these students returned to their hometown in mid-January during the winter vacation. This particular period witnessed the extraordinary tightening-up of anti-epidemic measures in all localities. Labelled as 'Wuhan returnees,' the students not only experienced varying degrees of psychological distress but also observed the behavioral patterns of local governments in a public health emergency, a highly valuable vantage point for understanding how the Chinese state machinery mobilizes in crisis management. Third, we purposefully invited students of four key national universities in Wuhan to participate in the survey. Their opinions are likely to be informed by their academic training and independent thinking. Moreover, many of these young educated people will become members of China's professional elites serving public, private, and third-sector institutions. Their views are thus valuable for us to understand how the next generation of Chinese elites perceives this public health crisis and the country's public administration as a whole.

This special issue at the *Journal of Chinese Governance* was planned at a critical juncture of the ongoing public health crisis. In order to get this special issue published as soon as possible for the international readership, we have worked to a very tight schedule. Therefore, this paper is not intended to present a piece of conventionally designed academic research; instead, we position it as an empirically supported evidence-based policy report. While methodological limitations are fully acknowledged in subsequent sections of the paper, we articulate its strategic purpose here: We hope that this paper, by presenting some basic attitudinal and behavioral data, is able to inspire further research, not only into the current epidemic, but also into public administration and policy, which are equally important in informing good governance in public health crises.

2. Wuhan and the epidemic

Located in central China, Wuhan is the capital city of Hubei Province. This megacity is inhabited by 12 million people, inclusive of immigrants. An industrial center since the late Qing Dynasty, Wuhan has a highly vibrant economy, with a gross domestic product (GDP) of US$224 billion in 2018.[2] The city's major industries include optics-electronics, iron and steel, automobile manufacturing, new materials production, and pharmaceuticals. Its geographic location makes Wuhan a key domestic transportation

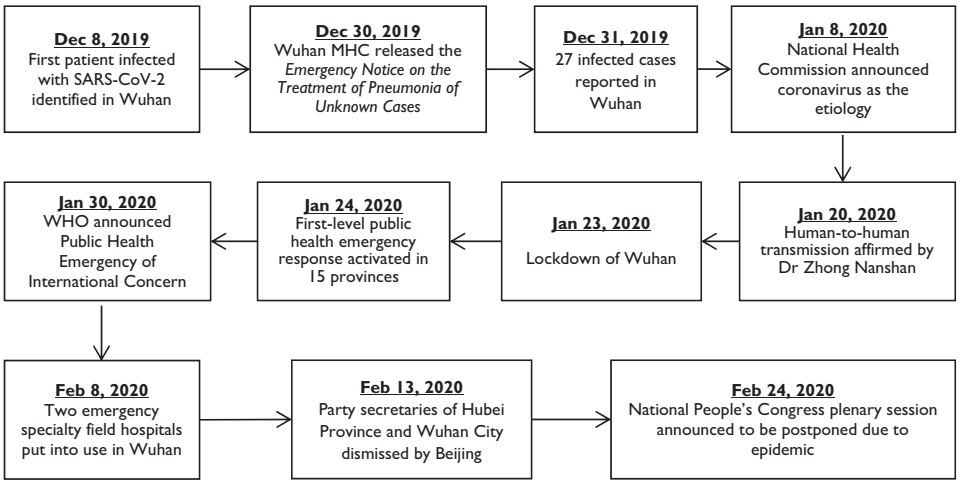

Figure 1. Timeline of the COVID-19 outbreak in China. Source: the authors.

hub of China, with highly developed railway, express way, and civil aviation networks. Wuhan's location in the heart of China, and its extensive transport network, meant that the virus quickly spread, right before the world's busiest travel season: the Spring Festival holidays. For the coronavirus, both location and timing were perfect.

Figure 1 illustrates the timeline of the outbreak. As widely reported, the first COVID-19 case was identified on December 8, 2019. On December 31, the Wuhan Municipal Health Commission (MHC) released an *Emergency Notice on the Treatment of Unknown Pneumonia Cases* and, for the first time, acknowledged the infection of 27 individuals. On the same day, the Chinese authorities alerted the World Health Organization (WHO) to a string of pneumonia-like cases in Wuhan. However, the initial official announcement indicated no evidence of human-to-human transmission. Not until January 8, 2020 did the National Health Commission (NHC) of China confirm that this was an unknown type of coronavirus. On the next day, the WHO released a similar announcement on the etiology of the outbreak in Wuhan. The first death was registered on January 11, 2020.

Amidst climbing numbers of deaths and new cases, the possibility of human-to-human transmission was affirmed by Dr. Zhong Nanshan, a distinguished epidemiologist in China on January 20. From then on, the spread of the virus accelerated, with Beijing, Shanghai, and Shenzhen reporting cases. The mounting pressure forced the Chinese government to take decisive, albeit belated, action on January 23: the lockdown of Wuhan. The rest of the cities of virus-stricken Hubei Province later followed suit with complete lockdowns. Unfortunately, the loose control of human outflow prior to Wuhan's lockdown had allowed 5 million residents to escape the city, severely escalating the spread of the virus to the rest of China and other parts of East Asia.

Since the emergency mode was switched on, the central government has mobilized tremendous resources—medical teams and all necessary supplies—to support Wuhan. Two emergency specialty field hospitals were built within two weeks to treat patients in severe conditions. Several mobile cabin hospitals were also set up to treat patients with mild symptoms. Extremely stringent measures—such as the suspension of all

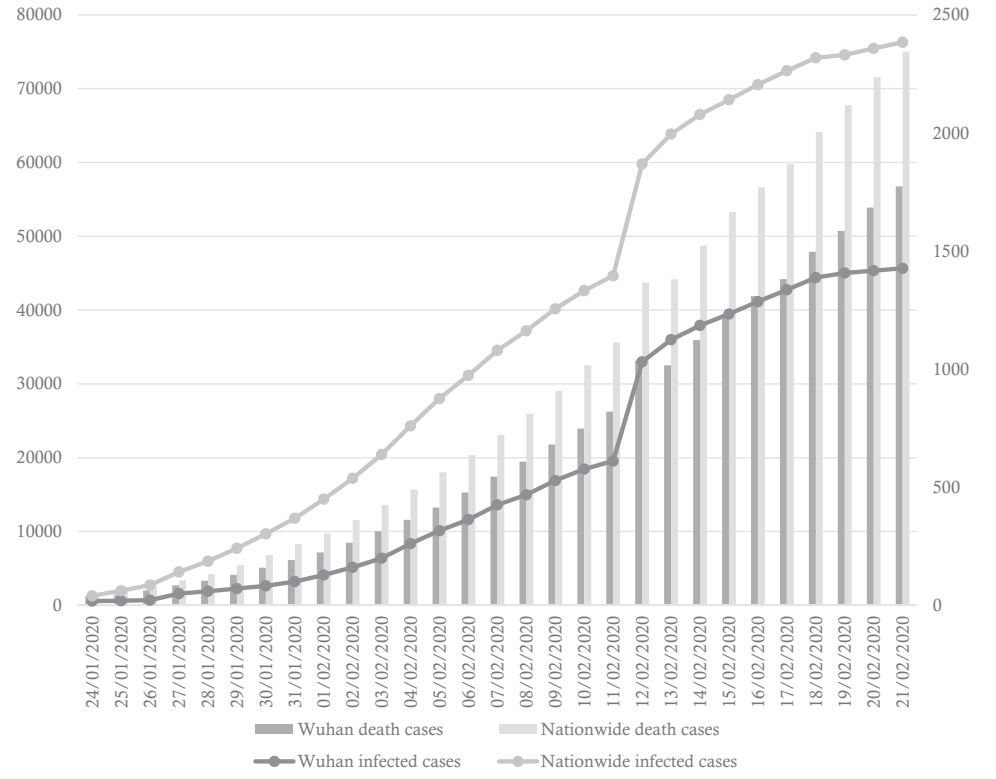

Figure 2. Number of death and infected case (Wuhan and nationwide). Source: Daily press release, the National Health Commission, http://www.nhc.gov.cn/xcs/yqtb/list_gzbd.shtml.

public transport and most socioeconomic activities, neighborhood quarantine, and the like—were adopted in Wuhan and the rest of Hubei Province to contain the massive spread of the virus. Unfortunately, this belated crisis response and poor preparedness prior to the outbreak led to high mortality and infection rates. Deemed responsible for this public health disaster, Party secretaries of Hubei Province and Wuhan City were dismissed in a major local leadership reshuffle in early February. Figure 2 presents the number of deaths and infected cases in Wuhan as well as the national average up to February 21 2020. As of the time of concluding this article, Wuhan and the rest of China were still engaged in a fierce struggle with the epidemic.

3. Methodology

The data of this study were collected via an online survey of students from four key national universities located in Wuhan. Given the obvious safety concerns, online survey—rather than a face-to-face one—was the most appropriate method for data collection in the midst of the emergency. We selected Wuhan University, Huazhong Agricultural University, Huazhong Normal University, and Huazhong University of Science and Technology as our sampling frame. Under the direct administration of the Ministry of Education, these four reputable universities have student populations of diverse geographic origins; therefore, sampling their students enabled us to

Table 1. Sample description.

Characteristics	Percentage
Sex	
Female	61.25
Male	38.25
Degree pursued	
Bachelor	77.65
Master	17.24
Doctoral	4.34
Other	0.79
Field of study	
Agriculture	26.48
Engineering	22.84
Management	19.21
Science	10.87
Law	6.97
Economics	4.91
Humanities	4.28
Medical Sciences	1.99
Education	0.91
Other	1.56
Origin	
Wuhan	6.03
The rest of Hubei	16.28
Northern China	12.57
Northeastern China	3.02
Eastern China	23.55
Central China	15.89
Southern China	6.20
Southwestern China	11.04
Northwestern China	5.42

Source: the authors' survey.

investigate the experience of not only Wuhan natives, but also non-local students both during their stay in Wuhan and after returning home.

Conducted between January 28 and 30, 2020, the online survey targeted full-time Chinese students of the above four universities. The questionnaire focused on their perceptions, behavioral response to the epidemic, psychological status, and so on. Invitations were sent via Wechat, email, and SMS. Participation was purely voluntary, without coercion or financial incentive. Given the distinctive nature of this research context, sampling bias and external validity were not our key concerns. Nonetheless, we acknowledge the potential limitations arising from the methods of sampling and data collection adopted in this study. The final sample included 8252 responses, after invalid and incomplete answers were removed. Table 1 shows the key characteristics of the sample.

4. Findings

4.1. Psychological state

This massive epidemic has inevitably caused major psychological shock among the residents of Wuhan. As younger adults, our respondents were naturally subject to severe distress. We used a five-point scale to measure their levels of anxiety and fear, from 'very weak' to 'very strong.' Descriptive statistics show a high degree of anxiety

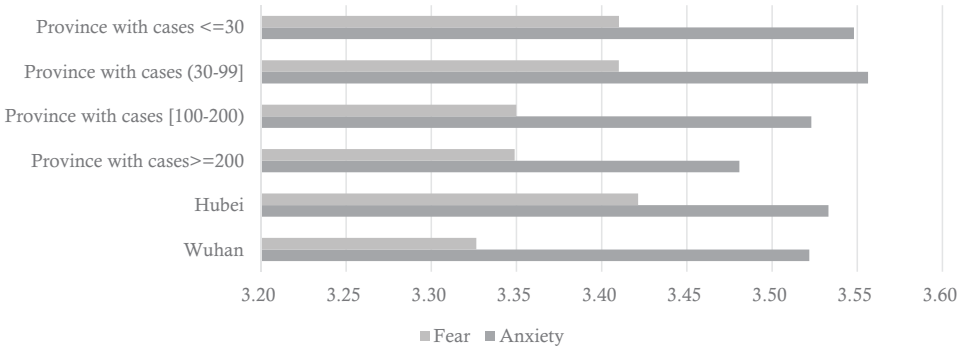

Figure 3. Respondents' psychological status and severity of outbreak reported in place of residence. Note: N = 7975. Number of confirmed infected cases was based on the data released by the time of the survey; Source: the authors' survey.

(mean = 3.53; SD = 0.88) and fear (mean = 3.38; SD = 0.92); 53.49% of the respondents were in a state of anxiety, while 46.83% were in a state of fear. We also attempted to examine whether the severity of the epidemic in a region led to stronger negative psychological symptoms among students living there.[3] The results defied this expectation as students living in provinces with fewer reported cases up to the time of the survey actually showed slightly higher levels of anxiety and fear (Figure 3). Clearly, the spread of psychological distress was pervasive throughout the country, irrespective of the actual severity of the risk. Theories of psychology have shown that the imagination serves as a trigger of stress, and accumulated stress can cause anxiety and fear if an overactive imagination is not properly corrected.[4] The results above underscore the critical importance of transparent and timely information disclosure to the public, who may consequently be able to exercise necessary psychological self-adaptation. Mental health interventions, especially individual counselling services, will also help manage students' psychological stress.

4.2. Behavioral response

Risk communication is pivotal in public crisis management, intended to alert citizens of mass risks and to enable them to adopt appropriate behavioral measures.[5] Epidemic containment requires the cooperation of individuals, for without it little can be done to stop the spread of a virus. Both the Chinese government and health experts have been advocating personal hygiene through various channels. Our study found positive behavioral compliance among the respondents. Close to 90% of them would wear a surgical mask when going out, while more than two thirds had increased the practice of hand hygiene. Almost all respondents reduced outdoor activities, with close to two thirds cancelling all of them. Individuals' psychological status was clearly reflected in their personal hygiene practices. Those with stronger anxiety and fear tended to adopt more stringent practices of mask-wearing and hand hygiene, as a natural behavioral reaction to perceived risks (Figure 4).

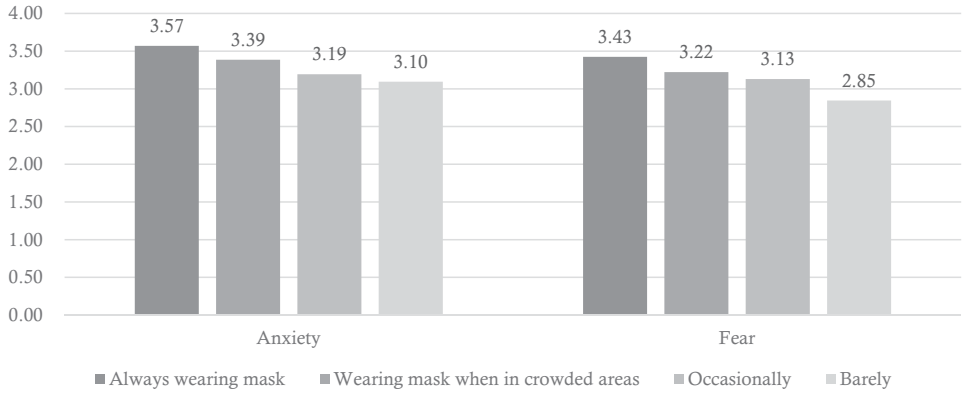

Figure 4. Respondents' psychological status and practice of mask-wearing. Note: N = 8252; Source: the authors' survey.

4.3. Personal experience of the epidemic containment campaign

As a standard measure in epidemic containment, quarantine prevents the transmission of a virus and reduces its spread by restricting the activities of healthy individuals who have been exposed to a communicable disease agent.[6] In practice, both mass quarantine in a given locality and geographical quarantine involving travel restrictions are widely adopted in public health crises.[7] Enforced by coercion, similar heavy-handed measures are justified on the basis of safeguarding the public. In China's fight against the severe acute respiratory syndromes (SARS), quarantine and other coercive measures were also extensively used.[8]

In this anti-coronavirus campaign, a series of containment measures have been employed by Chinese local governments, striving to prevent community spread, especially to vast rural areas.[9] In our survey, we invited the respondents who had returned to their hometown to indicate the type of containment measures they had experienced. Our results indicate that 93.27% had been encouraged not to leave the house or attend group gatherings; 78.41% had been contacted by local governments or community centers for epidemiological contact tracing. Aside from health checks, they were also required to report the date of their return from Wuhan. These figures suggest the considerable penetration of epidemic containment at the local level. In the meantime, close to half of the respondents reported that their local government had dissuaded people from Wuhan from entering their region.

Later on, whether the students had been approached by local governments for epidemiological contact tracing was used as a proxy to represent the degree of local epidemic control. The Kruskal-Wallis non-parametric test indicates significant differences at the provincial level[10]. Figure 5 reports the results. Provinces further from Hubei actually showed a higher ratio. Specifically, the rate was very high in Heilongjiang, Shandong, Hebei, Jiangsu, Zhejiang, Fujian, Xinjiang, Tibet, Qinghai, and Shaanxi, demonstrating a high degree of vigilance on the part of local governments. This result seems to imply regional variation in terms of the degree of local government mobilization, at least in the initial phase of nationwide epidemic control and prevention exercises.

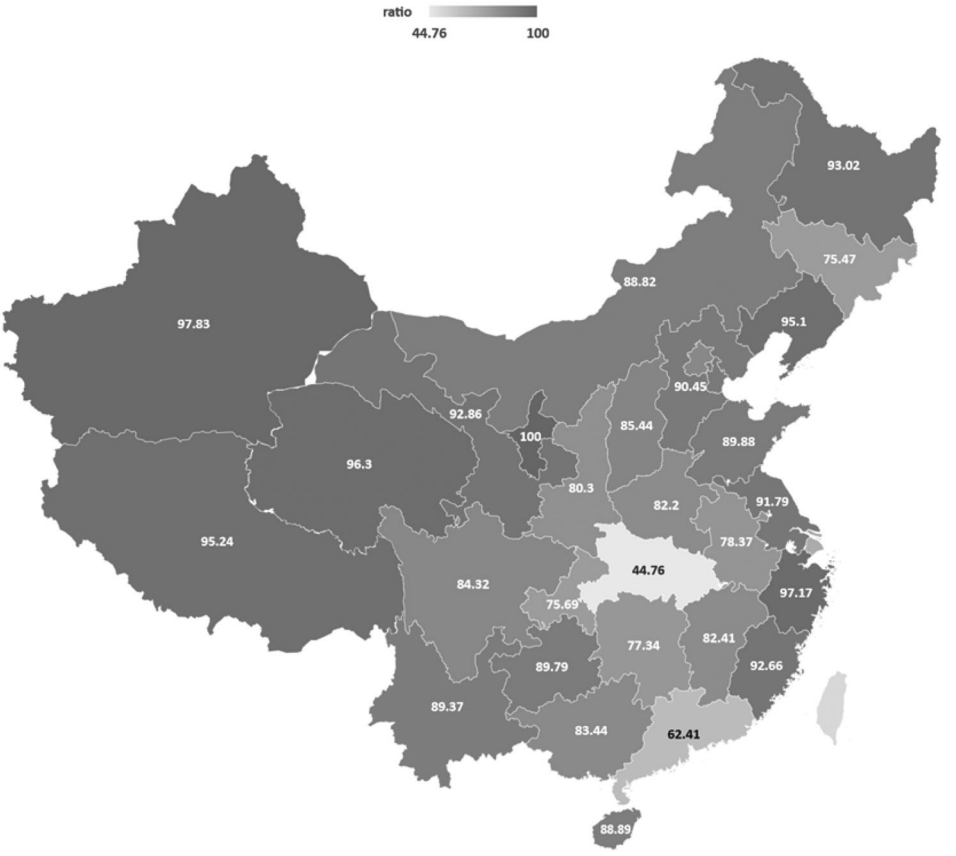

Figure 5. The percentage of respondents contacted for epidemiological tracing upon home-return, sorted by provinces in mainland China. Note: N = 7794; Source: the authors' survey.

While large-scale mobilization is certainly imperative in crisis management, over-mobilization may constitute another source of social problems. When weak rule of law is coupled with a pressing emergency, crisis management oftentimes leads to the infringement of civil rights and disregard for private property and human dignity.[11] Concerned about liability, local authorities often resort to excessive use of coercion that restricts the legitimate rights of local residents.[12] In the COVID-19 outbreak, Chinese social media have reported a multitude of aggressive behaviors at the grass-roots level, such as the leaking of personal data (e.g. mobile phone numbers, ID card numbers, and home addresses), discriminatory attitudes toward Wuhan residents or returnees, and humiliating notices.[13] Our survey found that a considerable proportion of the respondents had experienced these behaviors (Figure 6).

4.4. Sources of information and evaluation of transparency

The transparent and full disclosure of information is of crucial importance in public crisis management. In anti-epidemic campaigns, information disclosure notifies the public of the state of the crisis and guides people's behaviors regarding personal hygiene and self-protection.[14] Young students, in particular, tend to manifest a stronger media

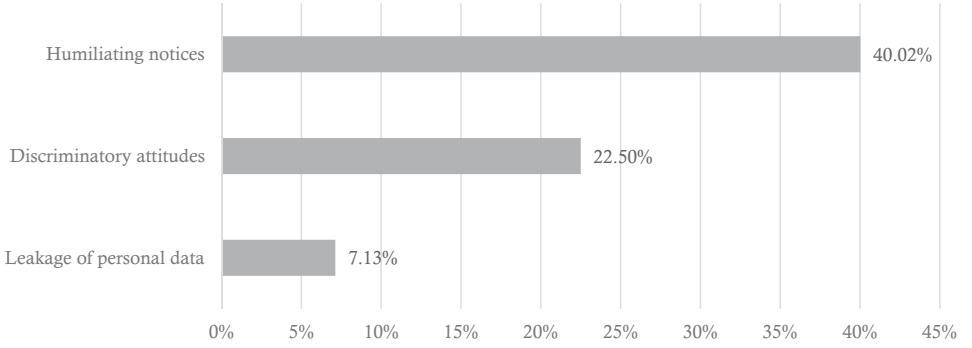

Figure 6. Aggressive behaviors experienced by respondents after returning from Wuhan. Note: N = 7794; Source: the authors' survey.

Table 2. When were the respondents first aware of the virus?

Key dates	Percentage
Before Dec 30 2019	33.29
Dec 30 2019 (Wuhan MHC released the Emergency Notice on the Treatment of Pneumonia of Unknown Cases)	37.06
Dec 31 2019 (27 infected cases reported in Wuhan)	20.14
Feb 9 2020 (first death reported in Wuhan)	5.66
Feb 19 2020 (Central government instruction on epidemic containment)	2.80

Source: the authors' survey.

dependency during public health crises.[15] In the early stages of the COVID-19 outbreak, the best time window for containing its spread was missed due to sluggish reporting. In this survey, we investigated when the students first became aware of the virus. As Table 2 indicates, one third of the respondents had actually already known of the existence of a respiratory disease before the first local government notice was released on December 30, 2019. We posit that the message from the well-known whistle-blowers, including the late Dr. Li Wenliang, had already reached many Wuhan residents in December, through social media such as Weibo and Wechat.[16] In other words, the government's slow information disclosure had not prevented the message from spreading to the student population.

Our study finds that official announcements released by the government remain the chief source of information for these university students. The vast majority of our sample had obtained information about the epidemic from central government press releases (95.47%) and those of local governments (71.80%). One may certainly contend that this domination of government voices is ultimately due to the rigid media control in China, but we also note the rising prominence of commercial media and social media that are not only more popular among the younger generations but are also believed to be relatively impartial as compared to their state-run counterparts.[17] Around one third of the respondents sought epidemic-related information from the commercial media (39.02%) and social media (32.94%). Although the respondents still appear to trust official information, non-official media are arguably more flexible and

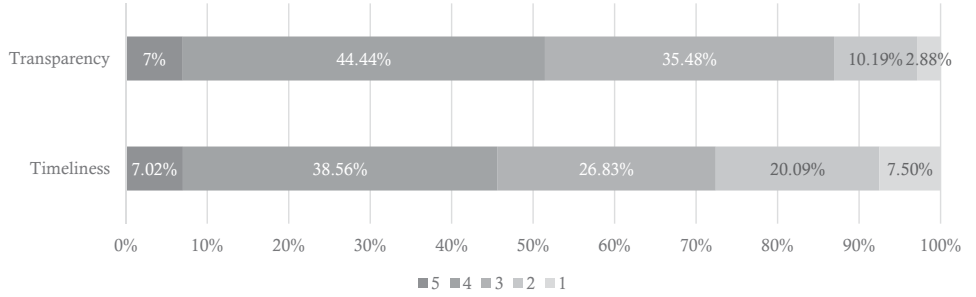

Figure 7. Respondents' evaluation on government's information disclosure. Note: N = 8252; Source: the authors' survey.

informative when it comes to issues related to local developments of the virus, essential daily supplies, and so forth. In terms of the actual channel through which the respondents received epidemic-related information, Weibo and Wechat appear to dominate 65.53% of the respondents considered Weibo the most important source of information, while 49.06% obtained information mainly from groups and friend chats on Wechat.

We also assessed respondents' evaluation of the timeliness and transparency of official reporting in general, on a five-point scale, with higher values representing better performance. Figure 7 indicates moderate ratings on both aspects, as the mean score of 'timeliness' and 'transparency' were 3.17 (SD = 1.07) and 3.42 (SD = 0.87), respectively. Only 45.58% and 51.44% of the respondents offered a positive evaluation of the two aforementioned aspects of government information disclosure, respectively.

4.5. Perceived performance of relevant parties in the anti-epidemic campaign

We invited respondents to rate the perceived performance of relevant parties in this anti-epidemic campaign on a ten-point ascending scale. Figure 8 suggests that the central government received the highest average score (mean = 8.83; SD = 1.42), but scores decline as one descends through the level of authority toward the grassroots. Provincial and sub-provincial governments were rated 7.76 (SD = 2.04) and 7.62 (SD = 2.01), respectively. We also singled out Wuhan Municipal Government and Hubei Provincial Government in the survey and invited our respondents to assess the perceived performance of these authorities, which were scored low: 5.89 (SD = 2.94) and 5.92 (SD = 2.81), respectively, on average. Five percent of the respondents rated both zero, reflecting an extraordinary level of dissatisfaction with their performance during the initial period of the outbreak.

The health system was rated highly at 8.80 (SD = 1.58), while the medical workers were rated 9.7 (SD = 0.75) on average by our respondents; 80.97% of the respondents gave full marks to medical workers, manifesting high appreciation of their unfailing contribution and personal sacrifice. The respondents also evaluated the performance of civil society organizations highly in this anti-epidemic campaign (mean = 8.38; SD = 1.58). In fact, disaster relief efforts after the 2008 Sichuan earthquake witnessed great contributions from civil society organization, which has grown

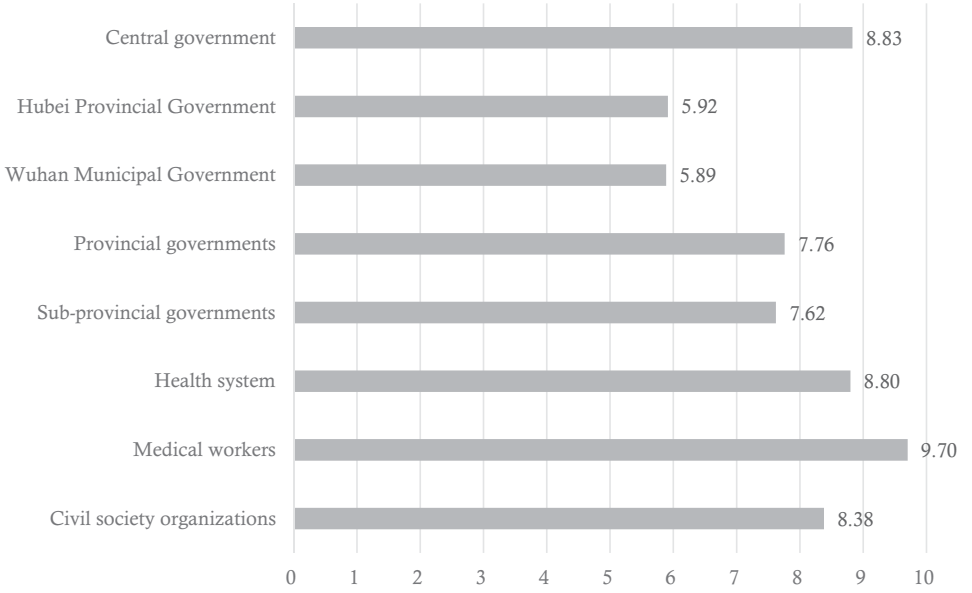

Figure 8. Respondents' evaluation (mean score) on the performance of various parties in the anti-epidemic campaign. Note: N = 8252; Source: the authors' survey.

phenomenally in the past decade. Rescue workers, volunteers, and charity foundations from civil society have actively participated in major natural disaster relief and domestic aid.[18] In the current epidemic, their valuable contribution has also been widely reported.

5. Concluding remarks

Conducted in very particular circumstances, this study has sought to investigate various aspects of the perceptions and behaviors of university students in Wuhan, the epicenter of the novel coronavirus outbreak in 2020. Several key observations are in order. First, negative psychological symptoms were found to be prevalent among the respondents, transcending regional boundaries. In spite of the strong psychological reaction observed above, the majority of respondents demonstrated a highly positive behavioral response to crisis management. Mounting risk perception prompted most students to exercise stronger compliance with personal hygiene practices. In the course of this epidemic, intensive public education campaigns and aggressive enforcement of preventive protocols in neighborhoods have been undertaken extensively at the local level. Anecdotal evidence also suggests good compliance on the part of local communities and ordinary citizens.[19] In this regard, China's rigid social control and discipline became positive factors for effective epidemic containment.[20]

Second, strong mobilizational capacity is a key self-promoted strength of authoritarian states, especially China.[21] With concerted political will from the top, the bureaucratic machinery quickly became a mighty combat squad, irrespective of costs. The evidence gleaned from university students' perspective indicates extensive penetration of tight epidemic control measures at the grassroots level. Yet, as seen elsewhere, it is

often a policy paradox to distinguish overreaction from underreaction in a time of soaring public crisis.[22] Echoing mass media reports, a series of aggressive epidemic containment measures were found at the local level, leading to inappropriate and even unlawful infringement of individuals' legitimate rights. Notwithstanding the virtual impossibility of legislating every specific crisis management measure, the bottom line is that they must be performed within the law.

Third, adept in social media communication, the young generation shows highly frequent access to a much wider spectrum of information than their parents. It will be increasingly difficult to prevent them from accessing the truth. As can be seen from this study, a substantive proportion of the respondents had already known about the outbreak before the government's belated reporting. Much of the remarkably high dissatisfaction with the local governments of Wuhan and Hubei—as reflected in our results—was arguably due to lack of transparency in the initial stages of the outbreak. The majority of these students of elite national universities will become professionals in important institutions in China; their confidence in the country's political system, and governance as a whole, is ultimately derived from their perception of a transparent state that is confident enough to tell its citizens the truth, be it a matter of glorious success or unfortunate failure.

In the aftermath the SARS crisis, Joan Kaufman of Harvard University wrote in a research article: 'China's lack of transparency at the outset of the SARS epidemic was troubling, and there is no guarantee that it would not happen again'.[23] Tragically, history has repeated itself, in just twelve years' time. To be fair to the Chinese authorities, its public health network has been substantially strengthened since the SARS epidemic taught the country a painful lesson.[24] Despite the tremendous efforts in capacity building, organizational reforms and fiscal spending,[25] none of these has helped prevent this colossal epidemic, one that is of a much larger magnitude and global devastation. This study, together with other companion papers of this special issue, underscores the central importance of not only institutional and operational capacity of the public health system but also full surveillance, timely reporting, and transparency, all of which require strong political determination on the part of the Chinese state.

Notes

1. Some of the contents were originally published in Yang, Bin, and Jingwei He, "Psychological Status and Behavioral Response of University Students in the Epicenter of the Novel Coronavirus," 59–74.
2. National Statistics Bureau, PRC, "National Data" Section. Accessed February 19, 2020. http://data.stats.gov.cn/search.htm?s=%E6%AD%A6%E6%B1%89%20GDP.
3. By the time this survey was conducted, the majority of non-local students had returned to their hometown for the winter vacation.
4. Armfield, "Cognitive Vulnerability," 746–768; Craske et al., "Specific Fears and Panic Attacks," 1–19.
5. Covello, "Best Practices in Public Health," 5–8; Glik, "Risk Communication for Public Health," 33–54.
6. Barbera, "Large-Scale Quarantine Following Biological," 2711–2717.
7. Gostin et al., "Ethical and Legal Challenges," 3229–3237.
8. Schwartz and Evans, "Causes of Effective Policy Implementation," 195–213; Ding, "Transnational Quarantine Rhetorics," 191–210.

9. WHO-China Joint Mission on COVID-19, *Report of the WHO-China*, https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf.
10. Chi-squared (32)=1459.724, $p = 0.0001$.
11. Gross, "How to Justify an Emergency," 1–34.
12. Bowen and Heath, "Narratives of the SARS," 73–91.
13. Selected illustrative reports include: "Face-Slapping, Shame-Parade, Hand-Cuffing: Abusive Acts During Epidemic." *Times Weekly*, February 19, 2020. Accessed February 25, 2020. https://news.163.com/20/0219/02/F5NC6MSR0001899O.html; "A Family Mahjong Game Leads to Physical Abuse." *China Fund Daily*, February 19, 2020. Accessed February 25, 2020. http://news.stcn.com/2020/0219/15648107.shtml
14. Wester, "Fight, Flight or Freeze," 207–214; Tai and Sun, "Media Dependencies in a Changing Media," 987–1009.
15. Lyu, "How Young Chinese Depend," 799–806.
16. The authors of this article also personally received related messages during the same time.
17. Fu and Lee, "Chinese Journalists' Discursive Weibo," 80–99.
18. Roney, "Earthquakes and Civil Society," 83–104; Peng and Wu, "Building Up Alliances and Breaking," 463–485.
19. Selected illustrative reports include: "Strictest Neighborhood Lockdown in Hubei, Safeguarding the Communities." *Hubei Daily*, February 19, 2020. Accessed February 28, 2020. https://m.chinanews.com/wap/detail/zw/sh/2020/02-19/9096468.shtml; "All Urban Neighborhoods and Rural Villages Locked Down in Huizhou." *South Metropolis Daily*, February 9, 2020. Accessed February 12, 2020. https://www.sohu.com/a/371735406_161795; "Masks and Temperature-Taking Made Compulsory in Neighborhoods in Beijing." *Beijing Youth Daily*, February 11, 2020. Accessed February 20, 2020. http://house.people.com.cn/n1/2020/0211/c164220-31580729.html.
20. Schwartz and Evans, "Causes of Effective Policy Implementation," 195–213.
21. Kennedy and Chen, "State Capacity and Cadre Mobilization," 393–405.
22. Maor, "Policy Overreaction Doctrine," 539–545.
23. Kaufman, "China's Health Care System," 7.
24. Frost et al., "Progress in Public Health," 475; Tong et al., "Public Health Professionals' Perceptions," fdz070.
25. Zhang, "What Has China Learnt from Disasters?" 234–244; Lu and Xue, "Managing the Unexpected," 414–429.

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No potential conflict of interest was reported by the author(s).

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