

Coping style, social support and psychological distress in the general Chinese population in the early stages of the COVID-2019 epidemic

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Abstract

Background

The purpose of this study was to investigate the psychological status of the general population in mainland China during the outbreak of coronavirus disease 2019 (COVID-19), and to explore the factors influencing psychological distress, in order to provide the basis for further psychological intervention programs.

Methods

We administered three questionnaires on-line to a convenience sample of the general population from different regions of mainland China from February 1 to February 4, 2020. We used the Mandarin versions of the six-item Kessler psychological distress scale (K6), the Simplified Coping Style Questionnaire (SCSQ), and the Social Support Rating Scale (SSRS). We also collected demographic data and other information related to the COVID-19 outbreak. Multivariate binary logistic regression analysis was used to identify factors influencing psychological distress.

Results

Of 1607 respondents, 1588 returned valid questionnaires and were included in the analysis. Nearly one quarter (22.8%) had high levels of psychological distress (K6 score ≥ 13). Individuals with higher psychological distress spent more time searching for information about COVID-19, had a history of contact with epidemic areas, more frequently adopted a negative coping style, and reported less social support than those with lower psychological distress.

Conclusions

The COVID-19 outbreak in China has a great impact on the mental health status of the general population. Positive coping strategies and increased social support are significantly correlated with decreased psychological distress, and may serve as the basis for psychological interventions.

Background

An outbreak of infections of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), initially called novel coronavirus (2019-nCoV), began on December 8, 2019, when several cases of pneumonia of unknown etiology were reported in Wuhan, Hubei province, China [1]. In the early stages of this pneumonia, severe acute respiratory infection symptoms can occur, with some patients rapidly developing acute respiratory distress syndrome, acute respiratory failure, and other serious complications [2]. As of March 11, 2020, the total number of patients in China with confirmed coronavirus disease 2019 (COVID-19) was 80,955, of which 67,773 were in Hubei province, and the total number of COVID-19-associated deaths was 3,162 [3]. At the end of January 2020, the World Health Organization declared the COVID-19 outbreak in China as a public health emergency of international concern.

Infectious diseases cause significant psychological distress, both in the general public and in health professionals [4]. The emergence of COVID-19 has parallels with the pandemic of human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS), the severe acute respiratory syndrome (SARS) outbreak or the threat of an avian influenza pandemic, all of which caused substantial concern among health authorities, the media, and the general public [5]. As a life-threatening disease, we can consider COVID-19 outbreak as a specific stress. Psychosocial responses towards infectious disease outbreaks are variable and can range in intensity, including feelings of anxiety, a sense of shame, failure or weakness of the individual and society; an underestimation of likelihood of survival; an overestimation of likelihood of infection [6]; an urge to take flight from the outbreak; excessive, inappropriate adoption of precautionary measures; and increased demand for healthcare services during a critical shortage [7]. Few epidemiological data are available on mental health problems and psychiatric morbidity among those suspected or diagnosed with COVID-19 and among the health professionals treating them. Therefore the best strategies to respond to mental health challenges during the outbreak remain unknown [8].

Previous research indicated that coping styles and social support are moderating variables in the relationship between stress and distress [9]. Coping strategies refer to the specific efforts, both behavioral and psychological, that people employ to master, tolerate, reduce, or minimize stressful events [10]. Coping styles can be positive, i.e. stress-reducing, or negative, i.e., stress-enhancing [11]. Positive coping has been associated with well-being, while negative coping is often related to psychological distress [12]. When confronted with a single stressor or constellation of stressors, individuals are forced to consider their coping resources and select a coping response accordingly. The constellation of stressors, coping resources, and coping responses determines the extent to which coping increases or reduces psychological distress [12].

In addition to coping strategies, effective social support can protect individuals from developing mental health problems when they experience stressors [13]. Social support can be defined as a series of support measures accessible to an individual through their social relationships with other individuals, groups, and the larger community [14]. Since Durkheim first established that social support has a positive effect on health [15], many researchers have found that this support can serve as a mediator between stress and psychological problems [16]. An investigation of 1016 SARS patients in 17 provinces in China confirmed the utility of social support, with different types of support influencing different aspects of SARS-related stress [17]. That study revealed that social support directly impacted panic and cognition, and relatives or friends were a source of greater social support [17]. The beneficial effects of social support on psychological well-being have been widely studied and well documented across patients with various illnesses [18, 19]. It is reasonable to assume that social support may similarly help Chinese people during the COVID-19 outbreak, generally regarded as a major stressful event.

The severity of the psychological burden that COVID-19 places on the general population was not clear at the onset of the outbreak, and a model to guide successful interventions was lacking. Little is known about how Chinese are coping with the COVID-19 stressor. Here we aimed to investigate the

psychological status of the general population in the early stages of the COVID-19 outbreak, and to explore factors influencing psychological stress. We also examined major relationships between stressors and coping, as well as support systems available to the general population. Our results may help provide the basis for psychological intervention programs.

Methods

Study participants and questionnaires

The study population comprised Chinese living in mainland China. The snowball sampling method was used to invite potential study participants. Through the WeChat messaging App, the investigators invited an initial group of 10 individuals to participate, who were chosen to ensure broad representation of age, gender, education level, occupation and city. This first set of invitees then forwarded the invitations to 10 of their contacts whom they considered suitable, and this second set forwarded the invitation in the same way. Participants filled in anonymous basic information online via the Questionnaire Star (<https://www.wjx.cn>), and as long as they did not report a history of serious mental illness, they were asked to provide informed consent and were able to continue to the three questionnaires (see below). The study was approved by the Ethics Committee of West China Hospital, Sichuan University. Invitees were allowed to complete the survey from 4 p.m. on February 1, 2020 until midnight on February 4, 2020.

Instruments

First, participants filled in a custom-designed questionnaire that collected sociodemographic information about sex, age, educational level, occupation, family residence location, and family income. The questionnaire also asked about infection with SARS-CoV-2 (in the respondent or relatives), time spent searching for information about the virus everyday, history of contact with the epidemic area (Wuhan City), and presence of cases in the respondent's community (Table 1).

Table 1. Demographic and clinical characteristics of the study cohort (n = 1588).

Characteristic	Mean±SD	Subgroup	n (%)
Age (year)	33.68±11.96	18-29	652 (41.1)
		30-39	466 (29.3)
		40-49	290 (18.3)
		50-59	130 (8.20)
		≥60	50 (3.10)
Family income coefficient	0.84±0.55		
Sex		Male	526 (33.1)
		Female	1062 (66.9)
Education level		Senior high school or lower	136 (8.30)
		Technical	351 (22.1)
		Bachelor	900 (56.7)
		Postgraduate	205 (12.9)
Residence in Hubei province		Yes	140 (8.80)
		No	1448 (91.2)
Suspected COVID-19		Yes	256 (16.1)
		No	

		1332
		(83.9)
History of contact with epidemic area (Wuhan City of Hubei Province)	Yes	323
	No	(20.3)
		1265
		(79.7)
Living in communities with COVID-19 cases	Yes	331
	No	(20.8)
		1257
		(79.2)
Time spent searching for information about COVID-2019 (h/day)	1-2	766
	3-4	(48.2)
	5-6	307
	7-8	(19.3)
	>8	171
		(10.8)
		232
		(14.6)
		112 (7.1)

Family income coefficient = family income / number of people in the family

Then participants filled out the Mandarin versions of the six-item Kessler psychological distress scale (K6), the Simplified Coping Style Questionnaire (SCSQ), and the Social Support Rating Scale (SSRS).

The Mandarin version of the K6, which has been validated in the World Mental Health Survey [20], comprises six questions that ask respondents to rate how frequently they have felt 'nervous', 'hopeless', 'restless or fidgety', 'so depressed that nothing could cheer you up', 'everything was an effort', or 'worthless' during the past 30 days [21]. Items are rated on a five-point scale, with 0 indicating an absence

of the symptom and 4 indicating that the symptom was always present during the past 30 days. The final K6 score can range from 0 to 24, with higher scores (≥ 13) indicating higher levels of psychological distress [22].

The SCSQ [23], based on the 'Ways of Coping' questionnaire [24], is a 20-item self-report that includes dimensions of active coping (12 items) and passive coping (8 items). Responses are given on a four-point Likert scale (0=never; 3=very often). The instrument has been used frequently in China, with high reliability and validity [23].

The SSRS is a 10-item self-report that assesses the level of an individual's social support over the past year [25]. This measure consists of three subscales: subjective support (4 items), objective support (3 items), and utilization of support (3 items). Subjective support refers to perceived social support, meaning that people feel supported, cared for and helped by family members, friends and colleagues [e.g., Question: How many close friends do you have? Responses: (1) None, (2) 1-2, (3) 3-5, or (4) 6 or more]. Objective support refers to visible, practical and direct support (e.g., financial or other tangible resources that you received when you needed help). The utilization of support reflects the degree of social support used [Question: How do you get help when in need? Responses: (1) I am self-reliant, (2) I seldom ask for help from others, (3) I sometimes ask for help from others, or (4) I often ask for help from relatives and friends]. The total SSRS score ranges from 12 to 66 points, with higher scores indicating higher level of social support. The SSRS has shown good reliability and validity, with Cronbach's α ranging between 0.89 and 0.94 [25].

Quality control

Only one set of surveys was accepted from the same Internet Protocol address, and surveys were not accepted if the time to complete all questionnaires was less than 120 seconds. Surveys did not request any identifying information.

Statistical analysis

All statistical analyses were performed using SPSS 21 (IBM, Armonk, NY, USA). Exploratory data analysis was conducted using frequencies for categorical variables and mean values for continuous variables. Where appropriate, odds ratios (ORs) were reported.

Differences in demographic characteristics, coping style and social support between respondents who suspected or did not suspect that they themselves had COVID-19 were assessed for significance using the independent two-samples *t* test or the chi-squared test as appropriate.

To identify predictors of high psychological distress, we classified respondents into those with high psychological distress (K6 score ≥ 13) and those with low psychological distress (K6 score ≤ 12) [21].

To identify factors influencing high psychological distress among respondents who did not suspect that they had COVID-19, we performed simple binary logistic regression and backward stepwise multiple

logistic regression. The dependent variable was the dichotomous classification of low or high psychological distress. The model was constructed with the following covariates: age, sex, educational level, family income coefficient (total family income/number of family members), residence location (Hubei province or other), history of contact with the epidemic area (Wuhan City) or not, time spent searching for information about COVID-19 per day, and questionnaire scores for positive coping style, negative coping style, subjective support, objective support and utilization of support. The least significant variables were removed one at a time until only significant variables ($P < 0.05$) remained.

Logistic regression was not performed on data from respondents who suspected that they had COVID-19, since only one of them showed low psychological distress.

Results

Study population

A total of 1607 people submitted survey responses, taking a mean of 10.7 ± 7.57 min to complete all questionnaires. Three people finished in fewer than 120 seconds, and 16 did not finish all questionnaires. After excluding these individuals, 1588 respondents (33.1% men) were included in the final analysis. Their average age was 33.7 ± 12.0 years, 8.3% had at most a senior high school level of education, 22.1% had a technical qualification, 56.7% had a bachelor's degree, and 12.9% had a postgraduate qualification. A total of 8.8% of respondents were from Hubei province, the initial area of the COVID-19 outbreak. Fewer than a quarter of participants (16.1%) were suspected of having COVID-19, 20.3% had a history of contact with the epidemic area, and 20.8% lived in communities where COVID-19 cases had been reported. Nearly one third (32.5%) of respondents spent more than 4 h per day searching for information about COVID-19 (Table 1). Of the 1588 respondents, 22.8% had high levels of psychological distress (K6 score ≥ 13). Mean scores were as follows: positive coping style, 20.7 ± 9.42 ; negative coping style, 9.02 ± 4.18 ; subjective social support, 19.4 ± 6.72 ; objective support, 7.88 ± 3.92 ; and utilization of support, 7.07 ± 2.42 (Table 2).

Table 2. Psychological distress, coping style and social support in the study cohort (n = 1588).

<i>Six-item Kessler psychological distress scale</i>	N (%)	
Score ≤12	1226 (77.2)	
Score ≥13	362 (22.8)	
<i>Simplified Coping Style Questionnaire</i>	Mean±SD	Range
Positive coping style	20.66±9.42	0-36
Negative coping style	9.02±4.18	0-24
<i>Social Support Rating Scale</i>	Mean±SD	Range
Subjective support	19.37±6.72	8-32
Objective support	7.88±3.92	1-22
Utilization of support	7.07±2.42	3-12

Differences in demographic characteristics, coping style and social support between respondents who suspected or did not suspect that they had COVID-19

Only one of 256 respondents with suspected infection showed low psychological distress, indicating that suspected cases in our sample had high psychological distress. In contrast, only around 8% of respondents without suspected infection had high psychological distress. Respondents with or without suspected infection were different in demographic characteristics: those with suspected infection were younger (mean age, 21.2±5.51), and they had lower family income (0.62 ±0.34), higher education level, and more contact with Wuhan City. Compared to respondents without suspected infection, those with suspected infection also spent more time searching for information about COVID-19, rarely used any coping style to deal with the stressor, and had less social support (Table 3).

Table 3. Differences in demographic characteristics, coping style and social support between respondents who suspected or did not suspect that they had COVID-19.

	Suspected (n = 256)	Not suspected (n = 1332)	df	t/ χ^2	P- value
Age, years	21.2 (5.51)	36.08 (11.4)	746.39	32.01	<0.001
Family income coefficient	0.62 (0.34)	0.88 (0.57)	1090.88	70.51	<0.001
Sex			1	3.13	0.08
Male	97 (37.9)	429 (32.2)			
Female	159 (62.1)	903 (67.8)			
Education level			3	45.09	<0.001
Senior high school or lower	2 (0.80)	130 (9.80)			
Technical	63 (24.6)	288 (21.6)			
Bachelor	178 (69.5)	722 (54.2)			
Postgraduate	13 (5.1)	192 (14.4)			
Residence in Hubei province			1	320.93	<0.001
Yes	97 (37.9)	43 (3.20)			
No	159 (62.1)	1289 (96.8)			
History of contact with epidemic area			1	1166.16	<0.001
Yes	254 (99.2)	69 (5.20)			
No	2 (0.80)	1263 (94.8)			
Presence of COVID-19 in respondent's community			1	100.40	<0.001
Yes	113 (44.1)	218 (16.4)			
No	143 (55.9)	1114 (83.9)			
Time spent searching for information about COVID-2019 (h/day)			4	713.0	<0.001
1-2	0	766 (57.5)			
3-4	22 (8.6)	285 (21.4)			
5-6	39 (15.2)	132 (9.90)			
7-8	167 (65.2)	65 (4.90)			
≥8	28 (10.9)	84 (6.30)			

Six-item Kessler Psychological Distress Scale

Score ≤ 12	1 (0.04)	1225 (92.0)
Score ≥ 13	255 (99.6)	107 (8.00)

Simplified Coping Style Questionnaire

Positive coping style	5.50 (2.62)	23.58 (7.20)	1090.88	70.51	<0.001
Negative coping style	5.57 (1.59)	9.69 (4.20)	10.34.16	27.03	<0.001

Social Support Rating Scale

Subjective support	9.01 (1.49)	21.37 (5.36)	1419.38	71.06	<0.001
Objective support	2.34 (1.13)	8.95 (3.33)	1187.55	57.46	<0.001
Utilization of support	3.73 (0.84)	7.71 (2.07)	955.53	51.63	<0.001

Factors predicting high psychological distress in respondents without suspected infection

Binary logistic regression identified three factors that predicted high psychological distress among our respondents without suspected infection: spending >4h daily searching for information about COVID-19 (OR for 5-6 h, 6.91; OR for 7-8 h, 8.78; OR for >8 h, 9.07, all $P < 0.001$), history of contact with the epidemic area (OR=4.36, $P < 0.001$), and negative coping style (OR=1.12, $P=0.002$).

The binary logistic regression also identified four factors that predicted low psychological distress: positive coping style (OR=0.87, $P < 0.001$), objective support (OR=0.79, $P=0.045$), subjective support (OR=0.909, $P=0.003$) and utilization of support (OR=0.84, $P=0.044$) (Table 3).

These regression analyses did not include the following factors: age, sex, education level, family income coefficient, residence location, or presence of COVID-19 cases in the respondent's community, because they did not correlate significantly with psychological distress (Supplementary Table 1).

Table 4. Factors predicting high psychological distress in respondents who did not suspect that they had COVID-19 (n=1332).

	95% CI		OR	β	P-value
	Lower	Upper			
History of contact with epidemic area					
No ^a			1.0		
Yes	2.18	8.74	4.36	1.47	<0.001
Time spent searching for information about COVID-19 (h/day)					
1-2 ^a			1.0		
3-4	0.94	4.14	1.97	0.68	0.07
5-6	3.33	14.37	6.91	1.93	<0.001
7-8	3.73	20.70	8.78	2.17	<0.001
≥8	4.03	20.42	9.07	2.21	<0.001
Coping style					
Positive	0.82	0.90	0.87	-0.15	<0.001
Negative	1.05	1.20	1.12	0.12	0.001
Social support					
Subjective support	0.85	0.97	0.91	-0.10	0.003
Objective support	0.79	0.99	0.89	-0.10	0.045
Utilization of support	0.70	0.99	0.84	-0.18	0.044

^a Reference group.

Abbreviations: OR, odds ratio; CI, confidence interval.

Discussion

This appears to be the first study to examine psychological distress in the general population in mainland China during the COVID-19 outbreak, and to investigate factors associated with that distress. The results of the present study show that in December 2019, when there were significant public concerns about the new coronavirus pandemic outbreak, 22.8% of our participants reported high levels of psychological distress (K6 score ≥ 13). Respondents with suspected infection reported higher levels of psychological distress than those without suspected infection, and the two groups differed in several sociodemographic variables, coping styles and support systems. Among those without suspected infection, factors significantly associated with high distress were a history of contact with the epidemic area, spending >4h per day searching for information about COVID-19, a negative coping style and lower social support.

The present study was conducted during the first two weeks of the COVID-19 outbreak, since human-to-human transmission was announced on January 20, 2020 [26]. In our study, 22.8% of participants had high psychological distress based on the cut-off score of 13 [27]. The prevalence of high psychological distress in our cohort is much higher than the prevalence of high psychological distress among the general population in Australia (8.0%) [28], undergraduates in China (4.0%) [27] and workers in Japan (10.8%) [29]. These findings suggest that COVID-19 outbreak places a substantial burden on the mental health of the general population in China. Therefore urgent measures are needed to enhance mental health services during the COVID-19 crisis.

The high psychological distress among nearly all respondents with suspected infection may indicate higher probability of having a severe mental illness [30]. Compared with respondents without suspected infection, those with suspected infection used less positive coping styles and more negative coping styles during the outbreak; they also had lower objective social support, subjective social support and utilization of social support. Some demographic factors were also associated with higher risk of psychological distress, such as younger age and less income. We hypothesize that young people may feel that they have less social support because they have lower income [31], which may intensify perceived stress.

For respondents without suspected infection, an active coping style and social support were protective factors against psychological distress in our regression model. On the other hand, time spent searching for information about the outbreak, a history of contact with individuals from Wuhan City, travelling to or living in Wuhan City during the outbreak, and negative coping styles were risk factors of high psychological distress. We performed regression modeling of data only from participants without suspected infection, and we excluded sociodemographic variables that did not correlate significantly with psychological distress in this subgroup (see Supplementary Table 1).

Compared to respondents without a history of contact with individuals from Wuhan City, those with a history of contact and who had traveled to or lived in Wuhan within one month before the survey were at 4.36-fold higher risk of high psychological distress. This is not surprising, since COVID-19 was first observed in Wuhan. News coverage of the COVID-19 outbreak in Wuhan initially focused on the high infectivity and fatality, potentially creating fear and panic. In addition, in order to decrease the risk of disease transmission, Wuhan authorities suspended public transport indefinitely from January 23, 2020. A range of measurements were urgently adopted, such as early identification and isolation of suspected and diagnosed cases, contact tracing and monitoring, collection of clinical data and biological samples from patients, dissemination of regional and national diagnostic criteria and expert treatment consensus, establishment of isolation units and hospitals, and prompt provision of medical supplies and dispatching of external expert teams to Hubei province [32]. The process of SARS-CoV-2 infection control and prevention involves the use of personal protective equipment, quarantine, and isolation, all of which may be further associated with fear and anxiety. It is reasonable to conclude that under these circumstances, the general population is under substantial stress and may need special care and psychological intervention.

Respondents without infection who showed high psychological distress (K6 score ≥ 13) also showed a higher frequency of negative coping style, such as problem-avoidance, fantasy, self-blame, and asking for help from others. This result is consistent with a meta-analysis reporting a strong association between negative coping style and depression [33]. Previous research [34] indicated that coping styles can affect how a stressful event is perceived and how it is managed. Since coping can involve “all efforts to manage taxing demands, without regard to their efficacy or inherent value” [34], it is not necessarily associated with a good outcome. Our findings are consistent with other studies that associate higher stress with greater use of emotion-oriented and social diversion-oriented coping [35].

We found that active coping style and higher social support were protective factors against psychological distress in the early stages of the COVID-19 outbreak. Our results emphasize the need to research coping strategies in the general public and interventions to teach coping during epidemic outbreaks. Such work may lay a solid foundation for individuals to cope positively and actively with various stress factors and circumstances [36]. In general, strong social support exerts weak to moderate effects on the relationship between stressors and distress [37]. As an external resource available to individuals under stress, social support functions as a buffer to improve psychological condition [38]. Indeed, a lack of social support can itself be a source of stress, leading to a long-term feeling of loneliness [39]. Social support can improve individual coping ability and resilience, indirectly buffering the individual from daily life and mitigating stress reactions [36]; consistently, we found that social support can protect against psychological distress.

Our findings also suggest that media reports about how the government is fighting the outbreak, how to protect oneself from COVID-19, and how many suspected infections and cases were reported every day can engender intense confusion and panic in the general population. We suggest that the public should limit the time they spend searching for COVID-19 information to fewer than 4h per day.

Limitations

There are several limitations in our study. First, a potential selection bias existed in our online survey. Elderly are more susceptible to the SARS-CoV-2 virus, but only 3.1% of our sample was older than 60 years, so our results may not be representative of the segment of society at greatest risk of mental and physical suffering due to COVID-19.

Second, we did not assess whether and how respondents were engaging in prevention; preventive self-behaviors can also mediate stress levels [40]. Finally, our study design was cross-sectional and so could not capture changes in psychological distress and its predictors over the course of the COVID-19 outbreak. At one year after the SARS outbreak, survivors still had elevated stress levels and disturbing levels of psychological distress [30]. Therefore the long-term psychological implications of infectious disease outbreaks should not be ignored.

Conclusions

The COVID-19 outbreak in China is substantially affecting the mental health of the general population. Mental health interventions should be implemented in a timely manner for individuals with suspected infection. Our results showed that positive coping strategies and increased social support significantly correlated with lower psychological distress. This suggests that the general population, especially those directly affected by the epidemic, should be taught active coping strategies and be encouraged to seek and maintain social support [41]. We believe that efficient mental healthcare in the national public health emergency system will empower China and the world during the campaign to contain and eradicate COVID-19 [42].

Abbreviations

COVID-19: Coronavirus disease 2019; K6: Six-item Kessler psychological distress scale; SCSQ: Simplified Coping Style Questionnaire; SSRS: Social Support Rating Scale; SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2; 2019-nCoV: 2019-Novel coronavirus; HIV: Human immunodeficiency virus; AIDS: Acquired immune deficiency syndrome; ORs: Odds ratios

Declarations

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Authors' Contributions

ZL and ZZK had the idea for and designed the study and had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. HY and MLL drafted the paper. MLL did the analysis. ZZK, WYX, YWY, and YYL collected the data. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors critically revised the manuscript for important intellectual content and gave final approval for the version to be published.

Availability of data and materials

The identified data used in this study can be made available upon necessary request. Inquiries of the data should be sent to the corresponding authors.

Ethics approval and consent to participate

This study was conducted in accordance with the ethical standards put forth in the Declaration of Helsinki. Informed consent was obtained from the participants via the Questionnaire Star before they

were able to continue to the survey. The study was approved by the Ethics Committee of West China Hospital, Sichuan University (reference number 2020-178).

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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