


Analysis of psychological status and effect of psychological intervention in quarantined population during the epidemic of SARS-CoV-2

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Abstract

During outbreaks of the coronavirus disease 2019 (COVID-19), many countries adopted quarantine to slow the spread of the virus of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Quarantine will cause isolation from families, friends, and the public, which consequently leads to serious psychological pressure with potentially long-lasting effects on the quarantined population. Experience of specific practices to improve the psychological status of the mandatory quarantined population was limited. The aim of this study was to investigate the psychological impact of mandatory quarantine, and evaluate the effect of psychological intervention on the quarantined population.

We conducted a prospective cohort study to assess and manage the psychological status of a mandatory quarantined population in Beijing, China. A total of 638 individuals completed 2 questionnaires and were enrolled in this study, of which 372 participants accepted designed psychological intervention while other 266 participants refused it. The SCL-90 questionnaire was used to evaluate the psychological status and its change before and after the intervention. The differences of SCL-90 factor scores between participants and the national norm group were assessed by 2 samples *t* test. While the SCL-90 factor scores before and after intervention were compared with 2 paired samples *t* test.

Compared with the Chinese norms of SCL-90, the participants had higher SCL-90 factor scores in most items of the SCL-90 inventory. The SCL-90 factor scores of participants with psychological intervention significantly decreased in somatization, obsessive-compulsive, depression, anxiety, phobic anxiety, paranoid ideation, and psychoticism. In contrast, most factor scores of the SCL-90 inventory changed little without statistical significance in participants without psychological intervention.

Psychological problems should be emphasized in the quarantined individuals and professional psychological intervention was a feasible approach to improve the psychological status of the mandatory quarantined population in the epidemic of SARS-CoV-2.

Abbreviations: COVID-19 = coronavirus disease 2019, SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Keywords: coronavirus disease 2019, psychological intervention, quarantine, severe acute respiratory syndrome coronavirus 2, SCL-90 questionnaire

1. Introduction

Since December 2019, several cases of acute respiratory illness with unknown etiology have been reported in Wuhan, Hubei Province, China.^[1] Then severe acute respiratory syndrome

coronavirus 2 (SARS-CoV-2) was identified as the virus responsible for the disease named coronavirus disease 2019 (COVID-19).^[2] The disease rapidly spread across the globe, and on March 11, 2020, the World Health Organization declared it a

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The study was approved by the ethics committee of Beijing Rehabilitation Hospital of the Capital Medical University and all of the participants had signed an online informed consent.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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pandemic. Symptoms of most COVID-19 patients are mild or even absent, but a few patients may develop severe pneumonia and progress to fatal complications, including acute respiratory distress syndrome, acute kidney injury, coagulation dysfunction, multi-organ failure, and death.^[3] During outbreaks of viral respiratory infections, quarantine is essential to reduce the transmission risk of the SARS-CoV-2, and many countries adopted it to slow the spread of the virus.^[4] But quarantine will also cause isolation from families, friends, and the public, which consequently leads to serious psychological pressure with potentially long-lasting effects on the quarantined population.^[5] Although there was already a lot of research that suggested quarantine during this epidemic provoked different degrees of psychological harm,^[6–8] experience about specific practices to improve the psychological status of the mandatory quarantined population was limited. Thus, we investigated the psychological impact of mandatory quarantine and evaluated the effect of psychological intervention for the quarantined population.

2. Method

2.1. Subjects and study design

From February 10 to February 15, 2020, we conducted a prospective study to assess and manage the psychological status of a mandatory quarantined population comprised of 692 Chinese citizens from a community in Beijing, China. Of which, 638 individuals completed 2 questionnaires and were enrolled in this study. After they completed the questionnaire for the first time, we inquired about whether they were willing to receive a designed psychological intervention. A total of 372 participants eventually accepted the intervention while other 266 participants refused it for various reasons, such as busyness, nonconfidence, and lack of needed condition. The intervention began a day after they completed the questionnaire, and we assessed the psychological status of all the participants again 15 days after the intervention.

Inclusion criteria:

1. age >16 years;
2. not infected with COVID-19;
3. voluntary to join in the research.

Exclusion criteria: people with the following cases

1. serious depression and suicidal tendency;
2. cognitive impairment;
3. mania;
4. schizophrenia.

The study was approved by the ethics committee of Beijing Rehabilitation Hospital of the Capital Medical University and all of the participants had signed an online informed consent.

2.2. Survey tools and survey methods

We used the SCL-90 questionnaire to evaluate the psychological status before and after the psychological intervention. The SCL-90 inventory, including 10 factors and 90 items, is a commonly used tool with high reliability and validity to assess symptoms of psychopathology and psychological distress.^[9,10] The 10 factors are somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and others. Each item was assessed on a 5-point Likert scale, ranging from none (1 point) to severe (5 points). We

calculated factor scores to make a comparison with the national norms.^[11] All data in this study was collected via online questionnaires.

2.3. Psychological intervention

The psychological interventions in this study include:

1. introduce the latest epidemic situation and guide protective measures;
2. introduce positive cases and build confidence;
3. identify and treat bad psychological status rapidly;
4. build interaction with families and society;
5. offer psychological treatment methods like cognitive adjustment and relaxation training;
6. provide medical support according to the specific situations.

The intervention was carried out via social apps or telephone or online programs by a professional psychotherapy team and medical staff in the community following the confidentiality principle. We maintained the basic frequency of intervention once a day during the 15-day intervention period, and if the participants had additional needs, we would provide additional interventions. Besides, the specific measures of daily intervention and timing were adjusted according to the actual interactions with the participants.

2.4. Statistical analysis

Categorical variables were summarized as frequencies and percentages, and continuous variables were described using mean \pm SD. We assessed differences in baseline characteristics between participants with or without psychological intervention using Chi Squared (χ^2) test. The differences of SCL-90 factor scores between participants and the national norm group were assessed by 2 samples *t* test. While the SCL-90 factor scores before and after intervention were compared with 2 paired samples *t* test. All statistical analyses were performed using R software (version 3.6.1; R Foundation, Vienna, Austria). A 2-sided significance level of $P=.05$ was used to evaluate statistical significance.

3. Result

3.1. Baseline characteristics

A total of 638 participants cooperated to complete this study including 2 questionnaires, of which 372 participants received the designed psychological intervention in an interval of 15 days between the 2 surveys. The details of the baseline characteristics were shown in Table 1. The number of participants under the age of 50 years was higher (65.9%) and the gender ratio was relatively balanced. The most common academic level in the study population was bachelor (278, 43.5%). Most people lived with others before quarantine (552, 86.5%) and had a relatively healthy body (468, 73.3%). There was no significant difference in all the baseline characteristics between participants with or without psychological intervention.

3.2. Comparison of SCL-90 factor scores between participants and the national norm group

The SCL-90 factor scores of participants with or without psychological intervention were all compared with the Chinese norms of SCL-90 (Table 2). It showed that except hostility, the

Table 1**Baseline characteristics of all the participants.**

Variables	Overall N = 638	Participants with intervention N = 372	Participants without intervention N = 266	P value
Age (yrs)				.218
<30	189 (29.6%)	112 (30.2%)	77 (28.9%)	
30–50	232 (36.3%)	145 (38.9%)	87 (32.7%)	
51–70	135 (21.2%)	73 (19.6%)	62 (23.4%)	
>70	82 (12.9%)	42 (11.3%)	40 (15.0%)	
Gender (male)	336 (52.6%)	199 (53.4%)	137 (51.5%)	.619
Education level				.183
Below university	253 (39.6%)	138 (37.0%)	115 (43.2%)	
College	278 (43.5%)	171 (45.9%)	107 (40.3%)	
Master	85 (13.4%)	47 (12.7%)	38 (14.3%)	
Doctor	22 (3.4%)	16 (4.4%)	6 (2.2%)	
Marital status				.202
Single	297 (46.5%)	181 (48.6%)	116 (43.6%)	
Married	314 (49.2%)	179 (48.1%)	135 (50.7%)	
Divorced	27 (4.3%)	12 (3.3%)	15 (5.7%)	
Previous living situation				.365
Live alone	86 (13.4%)	54 (14.5%)	32 (12%)	
Live with others	552 (86.5%)	318 (85.4%)	234 (87.9%)	
Occupation status				.055
Student	158 (24.8%)	96 (25.9%)	62 (23.4%)	
Governmental employee	131 (20.6%)	85 (22.8%)	46 (17.3%)	
Private employee	173 (27.2%)	91 (24.5%)	82 (30.8%)	
manual worker	125 (19.5%)	77 (20.6%)	48 (18.0%)	
Others	51 (7.9%)	23 (6.2%)	28 (10.5%)	
Previous health status				.571
Health	468 (73.3%)	276 (74.1%)	192 (72.1%)	
With chronic disease	170 (26.7%)	96 (25.8%)	74 (27.8%)	

Data presented as number (%).

other dimensions of the SCL-90 of participants with intervention were significantly higher than those of the Chinese norm group before receiving intervention. Likewise, the participants without psychological intervention had higher SCL-90 factor scores than national the norm group in somatization, obsessive-compulsive, depression, anxiety, hostility, phobic anxiety, and psychoticism at the initial investigation.

3.3. Change of the SCL-90 factor scores during quarantine period

We conducted the same questionnaire survey again 15 days after the first investigation. The SCL-90 factor scores of participants with psychological intervention significantly decreased in

somatization, obsessive-compulsive, depression, anxiety, phobic anxiety, paranoid ideation and psychoticism, and the other 3 factors showed no significant change (Table 3). In contrast, most factor scores of SCL-90 inventory changed little without statistical significance in participants without psychological intervention (Table 3).

4. Discussion

This study was conducted between February to March, 2020, when the epidemic in China turned to stable from a widespread outbreak, while it was spreading around the world rapidly. The virus triggered a worldwide crisis of psychological health besides attacking solid organs such as the lung and heart.^[12,13] This

Table 2**Comparison of SCL-90 factor scores between participants and the national norm group.**

Variables	Participants with intervention N = 372	National norm N = 1388	P value	Participants without intervention N = 266	National norm N = 1388	P value
Somatization	2.16 ± 0.84	1.37 ± 0.48	<.001	2.10 ± 0.67	1.37 ± 0.48	<.001
Obsessive-compulsive	1.91 ± 0.71	1.62 ± 0.58	<.001	1.81 ± 0.84	1.62 ± 0.58	<.001
Interpersonal sensitivity	1.84 ± 0.83	1.65 ± 0.61	<.001	1.68 ± 0.70	1.65 ± 0.61	.474
Depression	2.28 ± 0.79	1.50 ± 0.59	<.001	2.15 ± 0.84	1.50 ± 0.59	<.001
Anxiety	2.27 ± 0.72	1.39 ± 0.43	<.001	2.18 ± 0.60	1.39 ± 0.43	<.001
Hostility	1.49 ± 0.65	1.46 ± 0.55	.372	1.56 ± 0.75	1.46 ± 0.55	.001
Phobic anxiety	1.56 ± 0.71	1.23 ± 0.41	<.001	1.72 ± 0.68	1.23 ± 0.41	<.001
Paranoid ideation	1.51 ± 0.64	1.43 ± 0.57	.021	1.49 ± 0.73	1.43 ± 0.57	.133
Psychoticism	1.84 ± 0.70	1.29 ± 0.42	<.001	1.91 ± 0.75	1.29 ± 0.42	<.001

Data presented as Mean ± SD.

Table 3
Change of the SCL-90 factor scores in participants with or without psychological intervention.

Variables	Participants with intervention N = 372			Participants without intervention N = 266		
	Before intervention	After intervention	P value	Initial investigation	After 15days	P value
Somatization	2.16 ± 0.84	1.42 ± 0.85	<.001	2.10 ± 0.67	1.57 ± 0.78	<.001
Obsessive-compulsive	1.91 ± 0.71	1.78 ± 0.74	<.001	1.81 ± 0.84	1.77 ± 0.79	.634
Interpersonal sensitivity	1.84 ± 0.83	1.75 ± 0.66	.131	1.68 ± 0.70	1.62 ± 0.58	.348
Depression	2.28 ± 0.79	1.84 ± 0.67	<.001	2.15 ± 0.84	2.04 ± 0.79	.127
Anxiety	2.27 ± 0.72	1.57 ± 0.72	<.001	2.18 ± 0.60	2.10 ± 0.73	.210
Hostility	1.49 ± 0.65	1.48 ± 0.70	.690	1.56 ± 0.75	1.62 ± 0.67	.288
Phobic anxiety	1.56 ± 0.71	1.36 ± 0.62	<.001	1.72 ± 0.68	1.53 ± 0.57	<.001
Paranoid ideation	1.51 ± 0.64	1.43 ± 0.73	<.001	1.49 ± 0.73	1.46 ± 0.55	.482
Psychoticism	1.84 ± 0.70	1.59 ± 0.64	<.001	1.91 ± 0.75	1.72 ± 0.61	<.001
Others	1.41 ± 0.67	1.36 ± 0.68	.183	1.56 ± 0.62	1.50 ± 0.86	.359

Data presented as number (%).

challenge stood out in individuals who had to be quarantined to stop SARS-CoV-2 from progressing and got a lot of attention.^[6,14]

The study suggested the quarantined population faced a different degree of psychological pressure in the epidemic, thus showing 1 or more types of psychological symptoms. This result was to with previous studies.^[4,7,15] COVID-19 was different from previous epidemics with a strong transmission capacity and spread speed, and the country's measures against the epidemic were also unprecedented. The health commissions in various places updated the epidemic situation, including the death number every day. Besides, all kinds of information appeared quickly on the net. While the public lacked discriminative ability of professional knowledge to eliminate the wrong information. These factors eventually caused amplification of anxiety, fear, depression, and other unhealthy psychological conditions in some citizens, which was associated with dire consequences such as suicide.^[16]

The quarantined population usually had enough time to spare, and their psychological status could be improved if they were treated with good psychological intervention. However, psychological intervention studies with high quality were limited in this epidemic. We designed the project of psychological intervention and applied it to the mandatory quarantined population. The result showed the psychological status of the participants with intervention was improved in some aspects such as somatization, obsessive-compulsive, depression, and anxiety. In addition, the SCL-90 factor scores of participants without psychological intervention decreased in some dimensions, which might be attributed to the situation that the SARS-CoV-2 was gradually under control. Compared with those of participants without psychological intervention, the scores of participants with intervention had declined in more factors of SCL-90 inventory, which suggested the intervention was effective to some extent.

Our designed psychological intervention was performed by a professional psychotherapy team following previous experience and instruction from the Chinese government.^[17–19] It mainly involves transmitting information, identifying bad psychological status, psychological counseling, assisting exercises, and so on. The result of the study suggested the validity of these measures.

The study had some limitations. First, the sample was small, and the study design was nonrandom, which led to relatively lower statistical efficiency. Second, although there was no significant difference in the baseline characteristics between

participants with or without psychological intervention, the study population might have underlying psychological disorders themselves, and this bias could not be avoided completely. Third, the changing situation of the epidemic could cause psychological changes in the population, and it had an effect on the study results, which was also a bias that could not be eliminated. Last, it lacked a subsequent survey to further demonstrate the exact effect of psychological intervention.

In conclusion, our preliminary exploration showed that psychological problems should be emphasized in the quarantined individuals and professional psychological intervention was a feasible approach to improve the psychological status of the mandatory quarantined population in the epidemic of SARS-CoV-2.

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References

- [1] Lu H, Stratton CW, Tang Y-W. Outbreak of pneumonia of unknown etiology in Wuhan, China: the mystery and the miracle. *J Med Virol* 2020;92:401–2.
- [2] Lu R, Zhao X, Li J, et al. Genomic characterization and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet* 2020;395:565–74.
- [3] Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395:497–506.
- [4] Kim H, Park KJ, Shin YW, et al. Psychological impact of quarantine on caregivers at a children's hospital for contact with case of COVID-19. *J Korean Med Sci* 2020;35:e255.
- [5] Gostin LO, Bayer R, Fairchild AL. Ethical and legal challenges posed by severe acute respiratory syndrome: implications for the control of severe infectious disease threats. *JAMA* 2003;290:3229–37.

- [6] Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* 2020;395:912–20.
- [7] Xin M, Luo S, She R, et al. Negative cognitive and psychological correlates of mandatory quarantine during the initial COVID-19 outbreak in China. *Am Psychol* 2020;75:607–17.
- [8] Zheng L, Miao M, Lim J, et al. Is lockdown bad for anxiety in COVID-19 regions?: a national study in the SOR perspective. *Int J Environ Res Public Health* 2020;17:4561.
- [9] Crespo-Maraver M, Doval E, Fernández-Castro J, et al. Caregiver's health: adaptation and validation in a Spanish population of the experience of caregiving inventory (ECI). *Gac Sanit* 2019;33:348–55.
- [10] Holi MM, Samallahti PR, Aalberg VA. A Finnish validation study of the SCL-90. *Acta Psychiatr Scand* 1998;97:42–6.
- [11] Jin H, Wu W, Zhang M. Preliminary analysis of SCL-90 evaluation results of Chinese normal people. *Chin J Nerv Mental Dis* 1986;12:260–3.
- [12] Bao Y, Sun Y, Meng S, et al. 2019-nCoV epidemic: address mental health care to empower society. *Lancet* 2020;395:37–e38.
- [13] Pappa S, Ntella V, Giannakas T, et al. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun* 2020;88:901–7.
- [14] Xiang Y-T, Yang Y, Li W, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry* 2020;7:228–9.
- [15] Wu L, Guo X, Shang Z, et al. China experience from COVID-19: Mental health in mandatory quarantine zones urgently requires intervention. *Psychol Trauma* 2020;12(S1):S3–5.
- [16] Barbisch D, Koenig KL, Shih F-Y. Is there a case for quarantine? Perspectives from SARS to ebola. *Disaster Med Public Health Prep* 2015;9:547–53.
- [17] Farooq A, Laato S, Islam A. Impact of online information on self-isolation intention during the COVID-19 pandemic: cross-sectional study. *J Med Internet Res* 2020;22:e19128.
- [18] Goodman-Casanova JM, Dura-Perez E, Guzman-Parra J, et al. Telehealth home support during COVID-19 confinement for community-dwelling older adults with mild cognitive impairment or mild dementia: survey study. *J Med Internet Res* 2020;22:e19434.
- [19] Wang G, Zhang Y, Zhao J, et al. Mitigate the effects of home confinement on children during the COVID-19 outbreak. *Lancet* 2020;395:945–7.