Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

The psychological impact of quarantine on coronavirus disease 2019 (COVID-19)

To the editor

Quarantine played an important role in the coronavirus disease 2019 (COVID-19) outbreak and can also cause mental disorders. Dr Brooks and her colleagues conducted a rapid review (Brooks et al., 2020) about the psychological impact of quarantine in 2020. However, their review did not include any articles related to the ongoing COVID-19 outbreak.

We conducted a rapid review about psychological impact of quarantine during the COVID-19 outbreak. We systematically searched the following databases from their inception until 30 March 2020: Medline, CNKI (China National Knowledge Infrastructure), WANFANG Data, CBM (SinoMed), and Google Scholar with the combination terms relating to COVID-19 (eg, "COVID-19″ OR "SARS-CoV-2″ OR "2019 novel coronavirus" OR "2019-nCoV" OR "novel coronavirus") AND quarantine (eg, "quarantine" and "patient isolation") AND psychological outcomes (eg, "psych" and "stigma"). The inclusion criteria are original studies published in peer-reviewed journals in Chinese or English. The literature focuses on the psychological state of patients and physicians in quarantine. We used Endnote X9 for literature screening. Two trained researchers (XL, QW) screened first by title and abstract, then the third researcher (YC) checked the results. Full text screening was done by one researcher (XL) and checked by another (ML).

A total of 389 records were identified. After reading the full texts, eight studies were included (Cheng et al., 2020; Dong et al., 2020; Ma et al., 2020; Wang et al., 2020; Li et al., 2020a; Li et al., 2020b; Zhong et al., 2020; Ju et al., 2020), all from China, of which seven were cross-sectional studies (Cheng et al., 2020; Dong et al., 2020; Ma et al., 2020; Wang et al., 2020; Li et al., 2020a; Li, X. et al., 2020; Zhong et al., 2020) and one a case report (Ju et al., 2020) (Supplementary material). The studies involved a total of 687 participants, of whom 649 were quarantined (Table 1).

Two studies (Wang et al., 2020; Li et al., 2020a) evaluated the symptoms of depression and anxiety in children (8–18 years) after quarantine. One study (Dong et al., 2020) compared the psychological outcomes for people quarantined with those not quarantined. One (Cheng et al., 2020) compared the psychological outcomes for people quarantined in hospital and at home. One (Ma et al., 2020) compared the quality of sleep and state of mental health between patients quarantined in hospital and at home. One (Li, X. et al., 2020) explored the risk factors of anxiety and depression in patients with suspected COVID-19. One (Zhong et al., 2020) conducted a psychological health survey for front-line medical staffs. The case report (Ju et al., 2020) analyzed two patients with COVID-19 who developed the acute stress disorder (ASD) during the quarantine.

Based on these studies, a great amount of psychologic symptoms or problems developed during the quarantine period, including anxiety (228/649, 35.1%), depression (110/649, 16.9%), loneliness (37/649, 5.7%) and despair (6/649, 0.9%). One study (Dong et al., 2020) reported that people quarantined had suicidal tendencies or ideas than those not quarantined.

We also examined the factors influencing the development of psychologic symptoms. Two studies (Wang et al., 2020; Li et al., 2020b) showed that the mental health status of COVID-19 patients and people under medical observation differed across gender, age, marital status, education, occupational status, monthly income per capita, and place of residence. However, according to another study (Ma et al., 2020), no significant associations between age, gender, marital status, and education level with psychological problems in patients quarantined in hospital and at home. For children, age, gender, place of residence, and awareness of the epidemic were the main factors affecting mental health (Wang et al., 2020; Li et al., 2020a).

Three studies (Cheng et al., 2020; Dong et al., 2020; Ma et al., 2020) explored the stressors during quarantine. One study (Cheng et al., 2020) indicated that not being able to reunite with family members, not being able to complete work, and having only limited possibility for activities in the isolation room were the main sources of psychological stress. Another article (Dong et al., 2020) reported that concerns about infection, disorder of life, isolation of the surrounding environment, and stigma were the main stressors during quarantine. A cross-sectional study (Ma et al., 2020) showed that worrying about own and families' illness, disruptions in normal life, and too small isolation space were the main sources of psychological health problems. In contrast to the review by Brooke et al., however, problems in insufficient supplies or insufficient information were rarely mentioned. Included studies did not report the presence of stressors affecting the mental health of COVID-19 patients after the end of the quarantine.

In China, two main types of quarantine are being used during the COVID-19 epidemic. Those who have no symptoms but had contact with people with confirmed cases are usually required to stay at home for about 14 days. Suspected patients and patients discharged after treatment need to stay in collective quarantine in a hospital or other facility. For people quarantined at home, the social media such as WeChat and Weibo have become the main sources of information. But the information from such sources is mixed including some fake news (Shimizu, K., 2020), which may cause public panic. In hospitals medical assistance is the first priority, but the mental health of people quarantined is an equally important matter and should not be ignored. Considering the huge number of people with mental illness in China (Huang et al., 2019), psychological interventions are urgently needed. However, the lack of psychiatrists has become a major challenge for effective psychological care in China (Que et al., 2019; Shi, S., 2019; Wu, J., and Pan, J., 2019).

In conclusion, we systematically analyzed eight studies and found that the main psychological problems of patients with COVID-19 were anxiety, depression and loneliness. The main source of the problems seems to be the small isolation space and the surrounding environment, but the stress may also be related to concerns about delayed work or infecting family members. Professional psychological care and the

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Table. 1
Study characteristics.

Study	Country	Design	Participants	Age of participants (in years; range or mean ± SD)	Quarantine period	Evaluation methods
Cheng et al., 2020	China	Cross-sectional	60 patients with COVID-19 and 60 patients suspected with COVID-19 (all quarantined)	NR	Length unclear; COVID-19 exposure	Self-developed questionnaire via online system (https://www.wjx.cn/)
Dong et al., 2020	China	Cross-sectional	40 suspected COVID-19 patients being quarantined, and 38 residents not quarantined	21–50	Length unclear; COVID-19 exposure	GAD-7 and PHQ-9 to assess psychological disorders
Ju et al., 2020	China	Case report	2 residents suspected with COVID-19	46 and 78	11 days and 12 days	Interview
Ma et al., 2020	China	Cross-sectional	13 quarantined in hospital and 110 at home	Group 1: 35.38 ± 11.01 ;Group 2: 38.24 ± 5.17	Length unclear; COVID-19 exposure	SF-36 health survey, PSQI to evaluate the sleep quality and DASS-21 to evaluate general mental health
Wang et al., 2020	China	Cross-sectional	396 children	12.8 ± 2.6	Length unclear; COVID-19 exposure; home quarantine	DSRS to assess depressive symptoms
Li et al., 2020a	China	Cross-sectional	396 children and adolescents aged 8–18 years	12.8 ± 2.6	Length unclear; COVID-19 exposure; home quarantine	SCARED to assess anxiety symptoms
Li et al., 2020b	China	Cross-sectional	76 quarantined in hospital	36 ± 15	Length unclear; COVID-19 exposure; hospital quarantine	HAMA to assess anxiety symptoms
Zhong et al., 2020	China	Cross-sectional	20 quarantined in hospital	21–46	Length unclear; COVID-19 exposure; hospital quarantine	Self-developed questionnaire

NR: Not Report; **GAD-7**: Generalized Anxiety Disorder-7; **PHQ-9**: Patient Health Questionnaire; **SF-36**: Short-Form Health Survey-36 items; **PSQI**: Pittsburgh sleep quality index; **DASS-21**: Depression Anxiety Stress Scale 21; **DSRS**: Depression Self-rating Scale for Children; **SCARED**: Screen for Child Anxiety Related Emotional Disorders; **HAMA**: Hamilton Anxiety Scale; **SD**: standard deviation.

access to reliable information are essential for minimizing the mental health problems during quarantine.

Author contributions

Enmei Liu and Yaolong Chen contributed to study concept and design. Xufei Luo, Meng Lv and Yunlan Liu contributed to data collection and data analyses. Xufei Luo and Janne Estill drafted the manuscript. Qi Wang revised the manuscript. Yaolong Chen supervised this study. All authors read and approved the final manuscript.

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Declaration of Competing Interest

We declare no competing interests.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.113193.

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