

BMJ Open Knowledge of COVID-19 and the psychological status of parents: a retrospective survey in Wuhan, Hubei

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ABSTRACT

Objective During the COVID-19 pandemic, many parents faced heightened stress, anxiety and depression due to the local and global COVID-19 mitigation measures and lockdowns.

Design This is a cross-sectional study.

Setting This study used stratified whole-cluster sampling to randomly select three elementary schools within Ezhou City.

Participants An online survey was administered to the parents of students in one or two classes in grades 1–6, respectively, of each school. Among them, males account for 30.4% and females account for 69.6%. The inclusion criteria included (1) the parent or legal guardian of a primary school student or a person directly responsible for the child's education and (2) the ability to operate a computer or smartphone to complete the survey. Only one representative from each family was allowed to participate, and surveys with incomplete data were considered invalid and thus excluded.

Results A total of 764 participants completed the online survey. Overall, 90.4% of the participants were concerned about their children's mental health and learning during the pandemic. Additionally, 97.0% were aware of the typical symptoms of COVID-19. Only 48.0% of the participants felt the pandemic negatively impacted their lives. The average psychological status score among parents was 87.79 ± 8.91 , with 51.6% showing signs of high psychological distress. Significant differences in psychological status were linked to age, education, professional background, sleep status, personal views on the pandemic's impact and concern for children's learning ($p < 0.05$). Multiple logistic regression analysis revealed that a negative perception of the pandemic's impact on one's life (OR 0.367, 95% CI: 0.272 to 0.493) was associated with psychological distress.

Conclusion Parents of school children in Ezhou City have a good knowledge base on COVID-19 infection and have a high awareness of the corresponding protective measures. However, priority attention and care should be given to individuals who have experienced mental distress in relation to the pandemic.

INTRODUCTION

In December 2019, multiple cases of pneumonia with a history of exposure to seafood

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study is the first cross-sectional analysis of parents' knowledge and psychological status of COVID-19 in Ezhou.
- ⇒ The study provides a broad sample that reflects the psychological status and knowledge level of parents.
- ⇒ We can only speculate about the factors that affect parents' knowledge and psychological status; causation cannot be implied.
- ⇒ Standard psychometric scales were not used to assess parents' psychological status, so the results cannot be compared with other similar studies.

markets in South China were reported in Wuhan, Hubei Province. These individuals were subsequently confirmed to have an acute respiratory disease caused by a novel coronavirus.¹ On 11 February 2020, the WHO officially named it COVID-19.² The incidence of COVID-19 in China increased rapidly due to factors such as widespread population migration before the Chinese New Year.³ Due to the rapid increase in confirmed cases and deaths, the population has experienced psychological problems such as anxiety and depression.⁴

Since the outbreak of COVID-19, the government has adopted a series of measures to stop the pandemic. While home isolation is an important strategy to break the chain of transmission, the WHO has expressed concerns about psychosocial distress associated with such measures. Authors have speculated that these new measures, such as self-isolation, have impacted people's daily activities and livelihoods and might lead to increased loneliness, anxiety, depression, insomnia, alcohol dependence, drug use and self-injurious or suicidal behaviours.^{5,6}

Primary caregivers may have faced even higher pressure during the pandemic.⁷ An online survey by Johnson *et al* that examined

parents' mental states after the Norwegian government-sponsored distancing measures were implemented showed that nearly 25% of parents reported anxiety and depression, with mothers, parents with more than one child and parents diagnosed with mental illness reporting higher levels of stress, exhaustion and anger towards their children. Deterioration of the parent-child relationship accounted for 41% of parental stress.⁸ In a two-wave longitudinal survey, the cumulative stress experienced by parents during the implementation of physical distancing protocols decreased as the measures were phased out.⁹ To reduce the spread of COVID-19, many countries put lockdown measures in place, including closing schools. As parents spent more time with their children, parent-child bonding patterns, relationships with partners and family cohesion all affected parents' mental health status.^{10 11} Parents with higher-quality marriages and parent-child relationships reported fewer mental health symptoms.¹² In addition, a significant proportion of parents reported work-related or financial issues during the COVID-19 pandemic.¹³

The impacts of COVID-19 were even more pronounced among healthcare workers. The overall incidence of mental health problems among healthcare workers during the COVID-19 pandemic was reported to be around 40%.¹⁴ Healthcare workers are directly involved in the diagnosis, treatment and care of patients with COVID-19, during the pandemic and to the present date. Many healthcare workers continue to face these challenges in harsh conditions where there is a lack of resources, pay and access to basic personal protective equipment, placing additional stress on these individuals.¹⁵ Thus, the COVID-19 pandemic has taken a huge toll on the overall health and mental well-being of healthcare workers.¹⁶

The severity of COVID-19 infection, uncertainty about how to prevent and control the pandemic and information overload are all likely to be of concern to the community.¹⁷ Arguably, the COVID-19 pandemic will have long-lasting economic, social and policy implications, and there is a need to mitigate the long-term mental health problems experienced as a result of this pandemic. The public's awareness of the prevalence of COVID-19 infection and the associated precautions may affect their level of concern and psychological distress related to the pandemic. Thus, the purpose of this study was to investigate primary school parents' understanding of COVID-19, their psychological status and the related influencing factors in order to provide a theoretical basis for mental health maintenance, psychological intervention and protection¹⁸ among this group. These findings will also provide scientific and practical guidance for the provision of psychological counselling following the pandemic.

METHODS

Participants

This study used stratified whole-cluster sampling to randomly select three elementary schools within Ezhou

City. An online survey was administered to the parents of students in one or two classes in grades 1–6, respectively, of each school. The inclusion criteria included (1) the parent or legal guardian of a primary school student or a person directly responsible for the child's education and (2) the ability to operate a computer or smartphone to complete the survey. Only one representative from each family was allowed to participate, and surveys with incomplete data were considered invalid and thus excluded.

Screening questionnaire

Surveys were distributed to parents of children in grades 1–6 of elementary school. The surveys were distributed by teachers on 18–19 March 2022, after the students returned to school (questionnaire star, <https://www.wjx.cn/jq/63026695.aspx>).

The survey assessed general demographic characteristics, COVID-19-related knowledge (main symptoms, infection route, isolation duration and protective measures) and psychological status (positive and negative emotions). Among them, the questions related to COVID-19 knowledge were designed with reference to the latest research results on COVID-19 locally and abroad and the COVID-19 prevention and control policy of Ezhou City during the study period. One point is awarded for a correct answer to the question, no points for an incorrect answer. The scores were then summed to obtain an overall score for COVID-19 knowledge. This variable was then stratified into high knowledge (scores ≥ 15) and low knowledge (scores < 15). The measurement of psychological status was adapted based on the Depression Anxiety and Stress Scale, Symptom Checklist-90, Meaning in Life Questionnaire, Self-Anxiety Scale and Self-Rating Depression Scale. The questions related to psychological status were scored on a 5-point scale. The scores were summed to obtain a total score for psychological status. This total score was then stratified into high psychological distress (scores < 88) and low psychological distress (scores ≥ 88).^{19 20}

Quality control

The same IP address could complete the survey only one time. No private information, such as participant names, was collected during the survey and sensitive language was avoided. The time taken to answer each question was monitored in the background, and those who answered the questionnaire within 100s were considered invalid.

Statistical analysis

Statistical analysis was performed using SPSS 25.0 software. The χ^2 test and unconditional logistic regression were used to study the factors affecting the psychological status of the participants. As described above, psychological status was stratified into two levels: low psychological distress and high psychological distress. The impact of different demographic characteristics and COVID-19 understanding on psychological status was analysed taking psychological status as the dependent variable and

the demographic characteristics and COVID-19 understanding variables as independent variables. Factors that were statistically significant in the χ^2 univariate analyses (ie, $p < 0.05$) were included in the non-conditional logistic multivariate regression analysis (α enter=0.05, α deleted=0.10). The variable assignment for the logistic regression analysis is shown in online supplemental table S1.

Patient and public involvement

The study was approved by the Ethics Committees of the Wuhan University of Science and Technology Medical College. The ethical approval number is 2022030101. Informed consent was obtained from all subjects and/or their legal guardian(s).

RESULTS

Basic information

A total of 764 questionnaires were returned, among which 762 were valid, with an effective response rate of 99.7%. The locations of the participants included 17 provinces (autonomous regions and municipalities); the top four provinces with the largest numbers of participants were as follows: Hubei (729, 95.7%), Guangdong (8, 1.0%), Hebei (4, 0.5%) and Jiangxi (4, 0.5%), as shown in table 1.

COVID-19-related knowledge

The level of COVID-19-related knowledge included knowledge of the epidemiological characteristics of COVID-19, such as the route of infection, symptoms at onset and effective measures to prevent infection. The average COVID-19 knowledge score was 13.72 ± 2.533 points. A total of 334 participants (43.8%) had scores of 15 or above.

Knowledge of COVID-19 symptoms and protocols

The rates of knowledge of the main symptoms of COVID-19, that is, fever, anergia, dry cough and chest tightness, were 97.0%, 79.0%, 84.9% and 78.9%, respectively. Further, 97.5% of the participants were aware that face-to-face conversation with an infected individual without protective measures could lead to COVID-19 spread; 93.6% and 92.9% knew that eating together or taking the bus, respectively, with patients without protective measures could lead to infection; and 98.8% were aware that close contacts with a patient with COVID-19 required isolation under medical observation for at least 14 days.

Knowledge of protective measures

The rates of knowledge of the need for 'frequent hand-washing', 'eating cooked food', 'rejecting wild animals', 'wearing masks out' and 'refraining from going outdoors' were 99.3%, 86.7%, 91.1%, 98.8% and 87.4%, respectively.

Comparison of different subgroups

A comparison of the rates of knowledge on infection routes, onset symptoms, medical observation period in the case of close contacts and protective measures among

Table 1 Basic demographic characteristics of parents in Ezhou

Characteristic	Number	Composition ratio (%)
Gender		
Male	232	30.4
Female	530	69.6
Age group (year)		
20–30	80	10.5
31–40	509	66.8
41–50	155	20.3
51–60	18	2.4
Marital status		
Married	728	95.5
Divorced	27	3.5
Widowed	7	0.9
Level of education		
Primary school and below	53	7.0
Junior high school	405	53.1
High school	232	30.4
University and above	72	9.4
Workplace		
City	246	32.3
Suburbs	237	31.1
Rural area	279	36.6
Profession		
Healthcare worker	5	0.7
Non-medical worker	757	99.3

different subgroups revealed significant differences as a function of marital status, professional background and education level ($p < 0.05$), as shown in table 2.

Attitudes of parents towards COVID-19

Overall, 74.3% of the participants were very concerned about COVID-19 and 25.3% were comparatively concerned. When asked about their concern in relation to their children's learning status during the pandemic, the responses were as follows: no concern (0.5%), concern (26.8%), active coaching (43.3%) and accompanying the child (29.4%). When asked about their concern about their child's mental health status due to the pandemic, the responses were as follows: concern (67.2%), comparative concern (29.3%), normal (3.3%) and unresponsive (0.3%).

Perception of the COVID-19 pandemic

When asked about the impact of the COVID-19 pandemic, the participants' responses were as follows: it caused a very bad impact on oneself (48%), some bad impact (45.8%), almost no impact (6.6%), some positive impact (14.2%) and very good impact (1.3%).

Table 2 The cognition of COVID-19 by different characteristics subjects (n (%))

Variable	Low cognition	High cognition	χ^2	P value
Gender			0.710	0.400
Male	125 (53.9%)	107 (46.1%)		
Female	303 (57.2%)	227 (42.8%)		
Age (years)			4.807	0.187
20–30	49 (61.3%)	31 (38.8%)		
31–40	282 (55.4%)	227 (44.6%)		
41–50	83 (53.5%)	72 (46.5%)		
51–60	14 (77.8%)	4 (22.2%)		
Marital status			6.477	0.039
Married	402 (55.2%)	326 (44.8%)		
Divorce	21 (77.8%)	6 (22.2%)		
Widowed	5 (71.4%)	2 (28.6%)		
Level of education			32.264	<0.001
Primary school and below	42 (79.2%)	11 (20.8%)		
Junior high school	248 (61.2%)	157 (38.8%)		
High school	110 (47.4%)	122 (52.6%)		
University and above	28 (39.4%)	44 (60.6%)		
Profession			18.377	0.005
Healthcare workers	1 (20.0%)	4 (80.0%)		
Non-medical workers	427 (62.4%)	330 (37.6%)		

Physical activity and sleep status

The vast majority of participants reported that they exercised at home; the average daily exercise time was 20–30 min for 59.6% of the participants, 30–60 min for 18.9% of the participants and more than 1 hour for 7.3% of the participants. The participants' bedtimes in the 2 weeks prior to the survey were as follows: before 21:00 (10%), 12:00–22:00 (41.5%), 22:00–23:00 (29.4%), 23:00–00:00 (8.7%), after 00:00 (4.2%) and irregular bedtime (6.3%). The overall sleep condition as reported by the participants was as follows: very good (37.5%), good (29.3%), common (29.9%), poor (2.6%) and very poor (0.7%).

The psychological status and factors influencing the psychological status of parents

The average psychological status score was 87.79 ± 8.913 . According to the stratification, 393 (51.6%) were experiencing high psychological distress, and 369 (48.4%) were experiencing low psychological distress. The χ^2 test indicated that the psychological status of individuals varied as a function of age, education level, professional background, sleep status, the degree of the impact of the pandemic on life and concern for the effects of the pandemic on the learning of children. The findings ($p < 0.05$) are presented in table 3.

Factors influencing psychological status

Multiple logistic regression analysis was performed with psychological status as the dependent variable (1=high

psychological distress and 2=low psychological distress), and age, education level, professional background, sleep, self-perceived level of impact of the epidemic on life and concern about the child's learning situation as independent variables. The results showed that a very bad self-perceived level of impact of the epidemic on life (OR 0.362, 95% CI: 0.270 to 0.485, $p < 0.001$) and a somewhat bad self-perceived level of impact of the epidemic on life (OR 0.367, 95% CI: 0.272 to 0.493, $p < 0.001$) were associated with high psychological distress, as shown in table 4.

DISCUSSION

In this study, 43.8% of the participants had a high level of knowledge of COVID-19, among which, those with a higher level of education had a higher knowledge level. At the same time, well-educated participants had a better psychological status than those with a lower education level. This may be because a higher cultural literacy level offers better access to information or understanding of information related to COVID-19.

Further, medical workers had higher knowledge levels than non-medical workers. Due to their occupational requirements, medical workers have a greater chance of being exposed to COVID-19 than other occupational groups. Therefore, they have a greater understanding of the pandemic and the morbidity characteristics of COVID-19 and are better able to understand and adopt protective measures.²¹ It is important to understand

Table 3 Psychological status of people with different characteristics

Variable	Mental health disorder	Good mental health	χ^2	P value
Gender				
Male	111 (47.8%)	121 (52.2%)	1.858	0.173
Female	282 (53.2%)	248 (46.8%)		
Age group (years)				
20–30	46 (57.5%)	34 (42.5%)	8.744	0.033
31–40	274 (53.8%)	235 (46.2%)		
41–50	64 (41.3%)	91 (58.7%)		
51–60	9 (50.0%)	9 (50.0%)		
Marital status				
Married	374 (51.4%)	354 (48.6%)	0.271	0.874
Divorce	15 (55.6%)	12 (44.4%)		
Widowed	4 (57.1%)	3 (42.9%)		
Level of education			12.869	0.012
Primary school and below	36 (67.9%)	17 (32.1%)		
Junior high school	220 (54.3%)	185 (45.7%)		
High school	105 (45.3%)	127 (54.7%)		
University and above	32 (44.4%)	40 (55.6%)		
Sleep condition				
Well	114 (39.9%)	172 (60.1%)	38.218	<0.001
Better	115 (51.6%)	108 (48.4%)		
General	143 (62.7%)	85 (37.3%)		
Poor	16 (80.0%)	4 (20.0%)		
Very bad	5 (100%)	0 (0%)		
Self-perceived level of impact of the epidemic on life				
Very bad effect	236 (64.5%)	130 (35.5%)	46.970	<0.001
A little bad effect	152 (43.6%)	197 (56.4%)	16.591	<0.001
Almost no effect	18 (36.0%)	32 (64.0%)	5.197	0.023

the characteristics of the pandemic and adopt timely targeted strategies to effectively prevent and control the spread of the disease in order to reduce the experience

of negative emotions and panic.^{22 23} A hospital survey showed that the overall awareness rate of healthcare workers in relation to COVID-19 was higher than 90%.²⁴

Table 4 The results of logistic regression analysis

Variable	β	SE	P value	OR	95% CI
Age (year)					
20–30	Ref				
41–50	0.951	0.300	0.002	2.589	1.437 to 4.662
Level of education					
Primary and below	Ref				
Junior	0.700	0.335	0.037	2.014	1.044 to 3.886
High school	1.022	0.345	0.003	2.779	1.413 to 5.468
University	0.964	0.405	0.017	2.623	1.186 to 5.801
Self-perceived level of impact of the epidemic on life					
Almost no effect	Ref				
Very bad effect	−1.017	0.150	0.000	0.362	0.270 to 0.485
A little bad effect	−1.004	0.151	0.000	0.367	0.272 to 0.493

Comprehensive basic knowledge of COVID-19 prevention and control can effectively ensure the treatment capacity of medical institutions, which is of great significance for protecting individuals from infection and preventing nosocomial infection. In addition, it has been suggested that healthcare workers, especially those in fever clinics and isolation wards, have experienced mild-to-moderate depression during the pandemic.²⁴ Healthcare workers in pandemic prevention and control positions have experienced serious psychological problems; however, in this study, the difference in psychological status between healthcare workers and non-healthcare workers was not statistically significant. This may be because there were few participants in this study engaged in healthcare work (6.6%), leading to inaccurate statistical results.

More than half (51.6%) of the participants reported that their psychological status was negatively affected by the pandemic. The majority of these participants were aged between 20 and 30 years (57.5%) and had a primary school education or below (67.9%). The multivariate logistic regression analysis showed that the perception that the pandemic has had a negative impact on life was an independent risk factor for high psychological distress. One review indicated that parents suffered more psychological stress during the pandemic than non-parents and parents were twice as likely to self-harm.²⁵ This phenomenon largely stems from the inability of healthcare providers, teachers, childcare staff and extracurricular instructors to offer support during the pandemic lockdown. Consequently, parents were compelled to assume full responsibility for their children's upbringing, resulting in significant economic, psychological and physical stress.^{7 26 27} A longitudinal study in the Netherlands demonstrated that during the lockdown parents homeschooled their children, worked remotely and worried excessively about the pandemic; their negative emotions (depression, anxiety, hostility and interpersonal sensitivity) were significantly increased but decreased over time.²⁸ Jarvers *et al.*²⁹ conducted surveys on the mental health status of parents of preschool children preceding (T1), during (T2) and after (T3) a pandemic-induced lockdown. The findings revealed pronounced increments in depressive and anxiety symptoms among parents at T1 and T2, with these symptoms persisting at elevated levels into T3. These findings highlight the sustained effect of the pandemic on mental health. Moreover, Jarvers and colleagues posited that psychological manifestations of stress and anxiety in parents could adversely influence the mental state of their children, with low parental education serving as a salient contributing factor. These findings are consistent with the findings of the current study, highlighting the critical need to closely monitor parental mental health during and following the pandemic and its potential repercussions for children's psychological development. Similarly, Li *et al.*³⁰ recommend that parents of elementary and adolescent children should refrain from exhibiting excessive worry in front of their children

and should actively seek out information related to the pandemic.

In the current study, 3.3% of the participants reported sleep disturbances. Research has shown a correlation between mental health and sleep quality.^{31 32} Some studies have suggested that quarantining people at home due to COVID-19 affects the mental state and sleep quality of individuals to different degrees.³³ Further, the vast majority of participants (90.4%) had high concerns about their children's learning and mental health following the pandemic. During the pandemic, the learning of children was actively provided by or accompanied by the parents in 43.3% and 29.4% of cases, respectively. Parents who were concerned about their children's academic status had a better psychological status, which indicates that parents who are aware of their children's academic status are less prone to anxiety and depression. A study in France suggested that training programmes for parents through telephone consultations and online meetings during the pandemic effectively helped parents regulate their emotions and guide their children correctly.³⁴ High parental involvement and acceptability are important factors that affect the outcomes of treatment. Therefore, when face-to-face education is not possible, targeted communication and guidance for parents through online education is conducive to positive behaviours and attitudes among parents.³⁵

Following the outbreak of the COVID-19 pandemic, the National Health Commission of China issued several guidelines for intervention in the case of emergency psychological crises, established a psychological assistance line and developed a web-based mental health education platform for COVID-19.^{36 37} These measures have contributed to the relief of psychological distress and psychological harm among the public, but challenges remain.³⁸ The findings of this study offer an overview of the public's understanding of COVID-19 and their related psychological status and may provide a basis for governments to develop targeted health education and behavioural intervention strategies. The sample size for this study was large enough to accurately reflect the psychological status of parents immediately after the COVID-19 pandemic.

The following recommendations are made based on the findings of this research: (1) attention should be paid to vulnerable groups, such as the elderly, women, medical personnel and people with lower education levels; attention should also be paid to people's social activities and family conditions.³⁹ (2) Authoritative psychological assessment procedures and online psychotherapy should be provided to parents. (3) Education on COVID-19 should be offered to reduce psychological distress, and individuals with higher negative cognitive processing biases should be encouraged and educated to use emotion regulation strategies that separate attention from negative emotions in the event of anxiety or depression in order to maintain and promote their mental health.^{36 40} (4) It is important to pay more attention to the psychological status of parents, encourage the positive role of new

media during the aftermath of the pandemic, promote psychological interventions and related measures and establish social stress prevention and control strategies.⁴¹

As far as we know, this is the first cross-sectional study to analyse the COVID-19 knowledge and psychological status of parents in Ezhou City. Moreover, a representative sample of rural primary schools was selected for recruitment, offering a generalised sample to reflect parents' psychological status and knowledge levels.

This study also has several limitations. First, this is a cross-sectional study that can only speculate about the factors that affect parents' awareness and mental health status of COVID-19 and cannot determine causation. Second, our study only investigated rural primary school, and whether the results can be extrapolated to urban school needs further study. Third, the assessment of mental state did not use standard psychometric scales, resulting in no comparison of other studies of the same type.

CONCLUSION

In this study, parents of students in Ezhou City had a high knowledge level of COVID-19 infection and a high awareness of the corresponding protective measures. However, some parents experienced high psychological distress following the pandemic, with the level of psychological distress varying as a function of age, education, occupation and concern for children's learning status. Therefore, authorities should carry out online health education for the different stages of the pandemic and should resolutely implement pandemic prevention measures to restore life to normal as best as possible and protect the mental health of parents. Further, relevant departments must establish a long-term mental health management system to ensure continuous attention to and effective intervention for mental health problems.

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Contributors JC conceived and designed the study. LW offered key support to the online survey and HG and YZ drafted the paper and finalised the manuscript, and CX, GW, CM, LC, YX, LH, LL and SP performed the study, JZ instructed the survey. JC is the guarantor. All authors contributed to discussions and the writing of the manuscript.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the Ethics Committees of the Wuhan University of Science and Technology Medical College. The ethical approval number is 2022030101. Informed consent was obtained from all subjects and/or their legal guardian(s). All methods were performed in accordance with the relevant guidelines and regulations.

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