

The prevalence of anxiety and depression during COVID-19 and the impact on doctor-patient relationships

Liu, Song ✉

Graduate School, Lyceum of the Philippines University – Batangas, Philippines

Landicho, Lida

Lyceum of the Philippines University – Batangas, Philippines



ISSN: 2243-7681
Online ISSN: 2243-769X

OPEN ACCESS

Received: 28 October 2024

Revised: 25 November 2024

Accepted: 6 December 2024

Available Online: 6 December 2024

DOI: 10.5861/ijrsp.2024.044

Abstract

Due to the high infectiousness of COVID-19 and its consequent wide and rapid spread, most countries in the world chose the same lockdown strategy at the early stage of the epidemic and released the social control since the pathogenicity of COVID-19 dropped close as influenza after multiple round mutation. However, the China government has continued to use the zero-tolerance policy from the low level of 2019 to the end of 2022, resulting in the long-term isolation of the people at home. People may have emotional problems, sleep disorders, somatization symptoms, etc. Therefore, there is an immediate need for us to improve our understanding of the impact of lockdown policy for pandemic control on the patient mental health, and its effects on Doctor-Patient relationship, and hence the healthcare outcomes. The current research will aim to investigate the incidence of anxiety and depression using the HAD scale and to describe the impact of mental response to the lockdown policy on the doctor-patient relationship using the PDRQ-15 scale. Some advice and health program that can improve mental health status and adapt positive coping strategies was proposed here to improve the Doctor-patient relationship.

Keywords: COVID-19, mental health, anxiety, depression, doctor-patient relationship, HAD, PDRQ-15

The prevalence of anxiety and depression during COVID-19 and the impact on doctor-patient relationships

1. Introduction

The COVID-19 epidemic has changed the world and human life (Onyeaka et al., 2021). The novel 2019 coronavirus disease (COVID-19)—caused by SARS-CoV-2—is an emerging, rapidly evolving pandemic (Ferretti et al., 2020). The first case of acute infectious pneumonia caused by COVID-19 emerged from Wuhan, China (Zhu et al., 2020). Due to the high infectiousness of COVID-19 and its consequent wide and rapid spread, Chinese schools and factories closed, and the government implemented home isolation policy (She et al., 2020). At that moment, most countries in the world chose the same lockdown strategy at the early stage of the epidemic and released the social control since the pathogenicity of COVID-19 dropped close as influenza after multiple round mutation (Khan et al., 2021, Singh et al., 2021, Menon et al., 2022). However, the China government has continued to use the zero-tolerance policy from the low level of 2019 to the present (Wang et al., 2020, Wei et al., 2020), resulting in the long-term isolation of the people at home (Molefi et al., 2021). Emotion and body are linked under the epidemic situation (Jones et al., 2021). People may have emotional problems, sleep disorders, somatization symptoms, etc. (Mukhtar, 2020). Furthermore, the impact of the COVID-19 outbreak on mental health remains poorly understood, although many Chinese people have exhibited a tendency toward increased mental health issues and sensitivity to social risks within China (Dong et al., 2020, Luo et al., 2020). Therefore, it is necessary to investigate the impact of the epidemic closure policy on the mental health of patients and Doctors, especially the occurrence of anxiety and depression, as well as the impact on the Doctor-patient relationship.

Anxiety and depressive symptoms have been common mental health problems for populations during the COVID-19 pandemic (Du et al., 2020). Patient and healthcare givers, as two vulnerable population, both are relatively prone to anxiety and depression symptoms, because their physical condition, environments and occupation (Kang et al., 2020), and the COVID-19 pandemic has led to short- and long-term anxiety and depression among them (Ahmed et al., 2020). Prolonged anxiety and depression are associated with increased levels of negative mental health, resulting in symptoms such as fear, stress, insomnia (Wang et al., 2021), and behaviors such as aggression, addiction, and suicide (Solmi et al., 2022). Especially in China, from the end of 2019 to the present, the zero-tolerance policy has been used continuously, which has led to the long-term isolation of the people at home. Long term isolation at home will induce their emotional and psychological problems. Especially those with special occupations, such as Doctors, and special groups, such as patients (Wang et al., 2020). China has experienced a relatively complete outbreak process because it took a series of social lockdown measures to control the outbreak as early as possible. Therefore, it is necessary to explore the incidence of anxiety and depression symptoms of patient and healthcare givers in China during the COVID-19 to provide data that may help in managing their relationship; doctor-patient relationship.

Under normal circumstances, doctors and patients need to communicate face to face. The patient describes and displays the problem to the Doctor. The doctor diagnoses and treats the patient based on the evaluation according to the patient's condition (Määttä et al., 2024). Moreover, in China, this kind of diagnosis and treatment must take place in the legally qualified sites permitted by the law and the health administrative department, and be carried out by qualified medical personnel only (Li et al., 2017). And resulting the relationship between medical staff and patients in the medical process, is very special in China. With the reform and opening up of China's society, the medical reform has changed from free for all to paid by patients pockets plus social insurance to hospitals under the market economy, which is equivalent to purchasing medical services (Xiong et al., 2021). In the context of this commodity economy, the increasing tension of doctor-patient relationship is not only seriously impacting the medical service system, but also has become a risk factor of

social security (Yang et al., 2020). With the emergence of the epidemic, the conflict between doctor and patient has been postponed as they all have been isolated by the quarantine rules. The Doctor-patient relationship has changed gradually and synchronously with the changing of the control policy. At the initial stage, everyone complied with the government led of prevention and control of the pandemic, the media is energetically promoting and guiding the harmony of the Doctor-patient collaboration (Xu, 2022). To reduce the risk of infection, the government requires hospitals to only open fever clinics, emergency and critical inpatient wards. Because of the lockdown policy, non-critical patients cannot receive timely treatment services from medical staff, suffering from both physical and psychological pain. On the other hand, most Doctors also stay in isolation at home for a long time, or leave their original departments and engaged in epidemic prevention, or live in isolated hotels nearby and closed transportation to the hospital without leaving the hospital (Li et al., 2022). Although lockdown and mandatory quarantine measures have played crucial roles in the sharp decrease of the number of newly confirmed/suspected COVID-19 cases, concerns have been raised over the threat that these measures pose to mental health, especially 3 years later, the helplessness of patients and the confusion of medical staff who are overworked were also exposed by various media, resulting in the doctor-patient relationship has also fluctuated with the epidemic situation and the management policies, The essential reason is the impact of prevention and control policies on the psychology of patients need to be cared during the pandemic (Jin et al., 2021).

Psychological stress is known to adversely influence health and well-being by causing negative changes in mental health outcomes and multiple physiological processes. The health condition can instill anxious thoughts even for those without anxiety at baseline or healthy people. It forces individuals to realize their vulnerabilities and potential mortality to diseases and lethal pandemic. In addition, contracting an illness can make one feel defective, weak, less desirable, and further isolated which can produce a sense of disconnection and abandonment. Anger is a common mental response for people dealing with an illness, and it may be one of the most difficult responses to confront as physicians, nurses or other healthcare providers. These behaviors are associated with symptoms of their mood, anxiety and somatoform disorders and problematic personality styles, and the typical difficult patient has been practicing and perfecting his or her somatization, depression, anxiety and personality for many years. It is almost impossible to change them in any fundamental way. The Doctor-patient relationship is a foundation of clinical care. Ultimately, the overarching goal of this relationship is to improve patient health outcomes and their medical care. Better doctor-patient relationships are correlated with improved patient outcomes. As the relationship between doctors and patients becomes more important, it is essential to understand the factors that influence this relationship. However, literature have limited investigation of the relationship between patient mental health and Doctor- Patient relationships in China during the pandemic. And there are still many uncertain factors in the new situation of the epidemic. On the one side, the mental health of patients is related to the construction of the national healthcare system. On the other side, the psychological care of patient would play a very important role in the healthy growth and future development of the society. So, what is the core impact of the epidemic prevention and control policy on the psychological level of both sides of the doctor-patient relationship? And it is valuable to find the significance factors of doctor-patient relationship under the pandemic situation to help the formulation of epidemic policy and the improvement of doctor-patient relationship according to China's own circumstances which has longest lock-down period around the world.

With all these viewpoints, this research paper intended to investigate and understand the mental health status of respondents during the pandemic control; to find out the influence on the Doctor-Patient relationship; to create a program that will strengthen mental health services for patients during the lockdown; and to give some advice to the policy makers for better cope with the epidemic in the future.

Objectives of the Study - Taken together, there is an immediate need for us to improve our understanding of the impact of lockdown policy for pandemic control on the patient mental health, and its effects on Doctor-Patient relationship, and hence the healthcare outcomes. The current research will aim to do this by investigating the relationship between patient mental health and the Doctor-Patient relationship during their lock in the home and the healthcare outcome. Specifically, to find out the incidence of anxiety and depression of patients and doctors under the pandemic lockdown in China; to find the relationship between the profile

variables or factors and the hospital Anxiety and Depression; to describe the impact of mental response to the lockdown policy on the doctor-patient relationship in China. And to give advice for maintaining the mental health well-being of the respondents, or propose a mental health program that can improve their current mental health status, maintain the mental well-being and adapt positive coping strategies to improve Doctor-patient relationship.

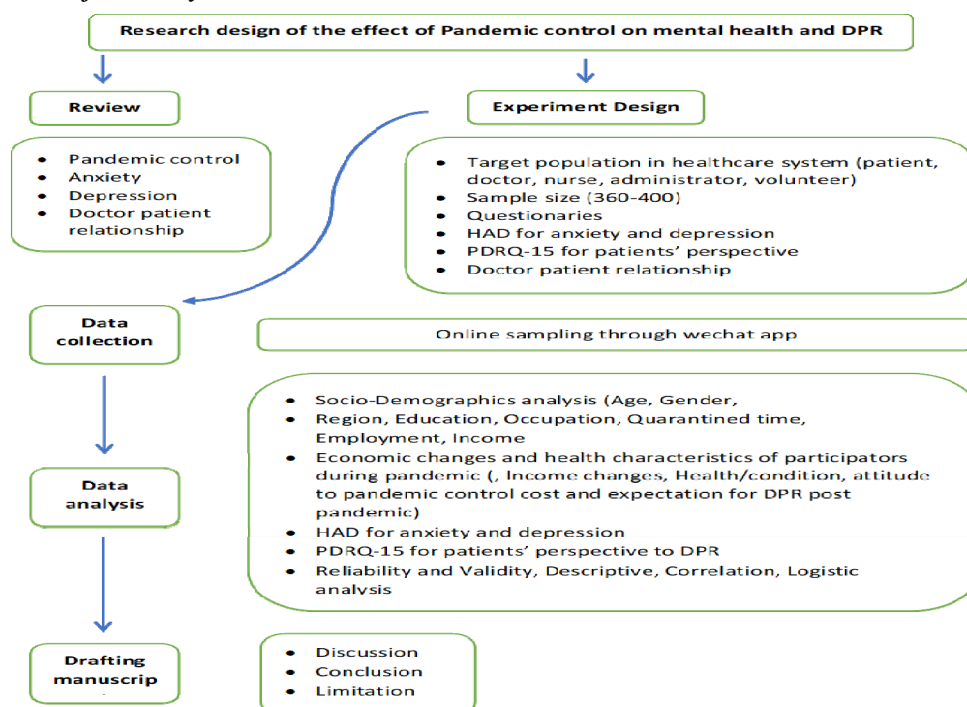
2. Methods

Research Design - This is a cross-sectional, retrospective, anonymous study and data were collected using questionnaires. The questionnaire comprised two parts. The first part collected demographic data: including age, gender, level of education, occupation or role in the healthcare system, time of home lockdown, monthly income and change of incomes, health or disease condition, attitudes to pandemic control policy and their expectations of Doctor-Patient relationship post-pandemic, all participants need to answer this part.

The second part is the screening of the anxiety and depression, the Hospital Anxiety and Depression Scale (HAD) will be used, which is self-assessment scale developed by British psychiatrist A S. Zigmond and R P. Snaith's in 1989 (Yue et al., 2020). It is mainly used to screen the anxiety and depression of examinees in general hospitals. HAD Scale consists of 14 items in total, of which 7 items assess depression and 7 items assess anxiety. Each item is scored on a 4-point Likert scale ranging from 0 - 3. The total scores for both the anxiety and depression sub-scales range from 0 to 21. A score of 7 or less on the sub-scales indicates normal anxiety and depression levels, 8-10 indicates doubtful cases of anxiety and depression, and 11–21 indicates a definite case of anxiety and depression. All participants need to answer this part.

The third part is to explore patient's perspective to the relationship of doctor and patient, we will use the Patient–Doctor Relationship Questionnaire (PDRQ-15) not DDPQ-10 (Wang et al., 2022), which is a 15-item questionnaire that evaluates the doctor and patient relationship in a primary care setting (Zhou et al., 2021). It is rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), with a total score ranging from 9 (very low quality) to 45 (very high quality). The questionnaire has been used in a previous Chinese sample with a Cronbach's alpha of 0.95 (Wang et al., 2023). Patients must finish this part, some of the volunteer and administrator did not service patients directly also could respond to this part.

Respondents of the Study



Overall, we expected that 160+ questionnaires for citizens and 160+ questionnaires for medical staff would complete. All participants were asked to recall and rate the items before and during the COVID-19 pandemic. Detailed research design showed in the flowchart (Figure 1.). Participants should: (1) have a mobile phone with an IP address in Chinese mainland; (2) be able to read and write Chinese; and (3) be voluntary to participate in this study. Participants have been excluded if: (1) the participant is illiterate; (2) same mobile phone IP address that has been filled by other persons is found and then is verified as one of other participants, for preventing one person to take the questionnaire more than twice; (3) the questionnaire is filled with all same choice, to avoid unprecise questionnaire; and (4) the questionnaire is not filled in completely.

Measures

Socio-Demographics. Socio-demographic information, including age, gender, level of education, occupation or role in the healthcare system, time of lockdown at home or in hotel, hospital or workplace, monthly income and the change of income, health or disease condition, thoughts and attitudes to pandemic control policy and their expectations of Doctor-Patient relationship post-pandemic would be collected and recorded for all respondents.

Hospital Anxiety and Depression Scale. HAD Scale is used to assess the Mental Health Status of the respondents, it is mainly used to screen the anxiety and depression of examinees in general hospitals. HAD Scale consists of 14 items in total, of which 7 items assess depression and 7 items assess anxiety. Each item is scored on a 4-point Likert scale ranging from 0 - 3. The total scores for both the anxiety and depression sub-scales range from 0 to 21. A score of 7 or less on the sub-scales indicates normal anxiety and depression levels, 8-10 indicates doubtful cases of anxiety and depression, and 11–21 indicates a definite case of anxiety and depression.

Patient–Doctor Relationship Questionnaire (PDRQ-15). Patient–Doctor Relationship Questionnaire (PDRQ-15) was been used to explore patient's perspective to the relationship of doctor and patient, which is a 15-item questionnaire that evaluates the doctor and patient relationship in a primary care setting. It is rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), with a total score ranging from 9 (very low quality) to 45 (very high quality). The questionnaire has been used in a previous Chinese sample with a Cronbach's alpha of 0.95.

Data Gathering Procedures - Convenience and snowball sampling strategies would be used to recruit participants in this study (Kalaitzaki et al., 2021). Study flyer was posted on social media sites (e.g., WeChat, Weibo, QQ) and directed toward potential participants. The flyer explained the study purpose, and all participants could drop out of the survey at any time. Interested participants would give a link to the study's ethics approval consent form via a professional survey service—Questionnaire Star (<https://www.wjx.cn>). Data would be collected using a self-administered online questionnaire, distributed through Questionnaire Star and WeChat apps. While participation in the study was voluntary, the participants would receive monetary compensation (After completed the questionnaire and submitted successfully, each respondent would receive 10 RMB.). To ensure the quality of data, not only have inclusion and exclusion criteria, but we also conducted quality control standards for this study to flag and exclude untrustworthy responses. First, questionnaires with multiple logic verification errors were eliminated. Second, participants could only answer once no matter which platform they use (i.e., computer, mobile phone). Third, participants who took <1 min to complete the survey were excluded. Finally, participants had to finish all questions they need according to their occupation before they submit the response. All data would incorporate into a Microsoft Excel spreadsheet. Data analyses were done using SPSS, The Cronbach's alpha was calculated to determine internal consistency, where values between 0.7 and 0.95 were considered as good internal consistency. The Kolmogorov–Smirnov test was used to assess normal distribution of quantitative data. The use of nonparametric tests at data analysis was found to be appropriate. Wilcoxon's Sign Rank Test was implemented to compare the differences in attitude scores between the two groups. Chi-square test was used for categorical data between the groups, and categorical data were summarized using frequency distributions and percentages. Non-parametric Correlations (Spearman's rho) was

used to evaluate correlations between variants at first, and then, participants were grouped as individuals with HAD/PDRQ-15 scores based on their cut-off scores, multiple linear and ordinal regression analysis was used to identify the factors associated with anxiety, depression and DPR when the scores are scale measure, binary and multinomial logistic regression was used to identify factors associated with anxiety and depression, DPR when the scores are ordinal measure. A value of $p < 0.05$ was considered significant.

Ethical Considerations - To comply with ethical considerations in conducting the study, all participants voluntarily participated in the study and signed an informed consent. Before the investigation, the researcher explained the purpose and process of the study in detail and promised that the information provided by the subjects would be confidential. And in the process of conducting in-depth interviews with participants, the participants' permission should be obtained and recorded. In the whole process of approval and research, we should always abide by the ethical code.

3. Results and discussion

Table 1

Frequency Table for the Respondent's Profile (n=387)

	f	%
Age		
18 – 30	154	39.8%
30 – 40	83	21.4%
40 – 50	74	19.1%
50 +	76	19.6%
Sex		
Male	160	41.3%
Female	227	58.7%
Region of working or living		
City (1 st tier)	289	74.7%
Town (2nd-tier)	87	22.5%
Village (3rd-tier)	11	2.8%
Highest Level of Education		
No-Education	1	0.3%
Primary	19	4.9%
Highschool	71	18.3%
Graduate	296	76.5%
Occupation/Role in healthcare system		
Patient	161	41.6%
Doctor or Nurse	170	43.9%
Volunteer	42	10.9%
Administrator	14	3.6%
Quarantined Days		
-1M	259	66.9%
2-3M	95	24.5%
4-6M	21	5.4%
6M+	12	3.1%
Employment Status		
Laid off	99	25.6%
Lower salary	37	9.6%
Unstable	81	20.9%
Stable and or got promotion	170	43.9%
Monthly Income		
0-5K	187	48.3%
5K-10K	116	30.0%
10K-30K	71	18.3%
30K+	13	3.4%

Socio-demographics questionnaires. A total of 395 individuals submitted the questionnaire online, of which 387 completed effectively, with an effective rate of 97.98%. Socio-demographic information of all participants included age, gender, education, monthly income, occupation, medical expenses and policy for pandemic control during the pandemic were collected. Most of the participants were young adults (39.8%, range = 18 - 30 years) living or working in the city area (74.7%). There are 160 (41.3%) males and 227 (58.7%) females, half are

patients (161, 41.6%) and half are Doctors or nurses (170, 43.9%) in the healthcare system. Most respondents have Graduate degree (296, 74.7%) or had finished high-school education (71, 18.3%) at least. Most of participants had monthly income lower than 30k (96.6%) and been quarantined at home or in hospital for 1-3 months (91.4%), and more than half (56.1%) of them lost their jobs (25.6%), or found an unstable job (20.9%) with lower salary (9.6%) during the pandemic control.

Table 2
Frequency Table for the Respondent's Economic and Health Status (n=387)

	f	%
Income Changes		
no-income	57	14.7%
Lower	133	34.4%
Same	168	43.4%
Higher	29	7.5%
Healthcare Service		
no service at all for non-emergency patients	231	59.7%
I got special help from social workers and or visited my doctor	37	9.6%
I got advice from friends who are doctors	51	13.2%
I got medical information from internet	68	17.6%
Health/Disease/Condition		
Worse	136	35.1%
Better	171	44.2%
Same	50	12.9%
Rather up and down	30	7.8%
Medical Expenses for Pandemic Control		
Too much budget for pandemic control	186	48.1%
Medical expenses for ordinary medicine were increased dramatically	162	41.9%
Wasted lot of money for covid testing	178	46.0%
Less enough, should spend more	31	8.0%
Prediction of doctor-patient relationship post-pandemic		
Worse	52	13.4%
Better	68	17.6%
Cautiously optimistic	145	37.5%
Same	122	31.5%
What do you think about policy or pandemic control		
Excessive epidemic prevention and control	95	24.5%
Damaged economic development though we survived	186	48.1%
Human rights violations by community managers	111	28.7%
Corruption and abuse of administrators and managers during the pandemic	230	59.4%

Economic and health characteristics of participators during pandemic. For the changes of income, almost half of the participants (49.1%) have lost their income (57, 4.7%) or decreased (133, 34.4%). Only 7.5% of them have increased incomes during pandemic control. Most participants (231, 59.7%) could not get medical or healthcare service as non-emergency patients, some people got medical information or advice from their friends (13.2%) or internet (17.6%). Only 9.6% participants visited their doctors through special help from social workers as emergency patients. 35% participants thought their health status or disease condition were worse during the pandemic, while half people feel better (44.2%) or same as before (12.9%).

Almost half of participants thought government had spent too much for pandemic control (48.1%), wasted a lot for the testing of covid (46.0%) and the cost for ordinary medicine were increased dramatically at same time (41.9%). Only 8% people thought we should spend more for pandemic control. 37.5% participant were cautiously optimistic for doctor-patient relationship post-pandemic, and almost same amount (31.5%) thought there would not any change for the DPR as the fundamental problems in healthcare system are still there. Half of participants (186, 48.1%) thought the policy for pandemic control had damaged economy badly, and we should not ignore the human rights violations (111, 28.7%), the corruption and abuse (230, 9.4%) by community administrators or managers or volunteers during the excessive epidemic prevention and control (95, 24.5%). The Non-parametric Correlations analysis supplemental table S1 showed correlations between respondents' profiles.

Table 3
Respondent's Anxiety (n=387)

	Mean	Std.dev	Interpretation
Anxiety	6.41	4.00	Normal
<i>Prevalence</i>			
Normal (236, 61.0%)			
Borderline Abnormal (98, 25.3%)			
Abnormal (53,13.7%)			

Legend: 0-7 = Normal; 8-10 =Borderline abnormal (borderline case); 11-21 = Abnormal (case)

Prevalence of anxiety and depression among all participants. In our sample, the HADS exhibited adequate internal consistency with a Cronbach's alpha of 0.856 and 0.847 for the anxiety and depression subscales, respectively. Participants' mean HAD anxiety and depression scores were 6.4±4.0 and 6.0±4.4, respectively. These scores were divided into three categories: normal scores (0-7), borderline (8-10) or doubtful cases, and abnormal or definite (11-21) cases. Approximately two-third of all participants (66.1%) exhibited normal scores on the anxiety scale, followed by doubtful anxiety cases (25.3%), and finally, definite anxiety cases (13.7%).

Table 4
Respondent's Depression (n=387)

	Mean	Std.dev	Interpretation
Depression	6.00	4.40	Normal
<i>Prevalence</i>			
Normal (256, 66.1%)			
Borderline Abnormal (67, 17.3%)			
Abnormal (64,16.5%)			

Legend: 0-7 = Normal; 8-10 =Borderline abnormal (borderline case); 11-21 = Abnormal (case)

Simultaneously, most participants were normal (61.0%) cases on the depression scale, followed by borderline cases (17.3%) and then were definite depression cases (16.5%).

Table 5
Nonparametric Correlations (Spearman's rho, 2-tailed)

	HADDS	HADAS
HADDS	1.000	0.655**
HADAS	0.655**	1.000
Occupation	-0.028	-0.014
Quarantined days	0.189**	0.224**
Employment status	-0.108*	-0.045
Monthly Income	-0.031	0.027
Income changes	-0.081	-0.069
Age	0.042	0.012
Gender	0.023	0.063
Region	-0.072	-0.058
Education	-0.122*	-0.049
Medical Service	0.074	0.076
Health/Condition	0.171**	0.137**

**Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed)

From non-parametric correlation analysis, we found depression score of HAD might correlated with Quarantined days, Employment status, Education levels and Health/disease conditions, while Anxiety score might correlate with Quarantined days, and Health/disease conditions. We further used the Linear regression method to find the factors affect the HAD score. In the table of Linear regression analysis, Sig. <0.05, means Education level has weak relationship with depression score, while Quarantined days and Health/condition has strong correlation (Sig. < 0.01) with depression and anxiety, Employment status has no correlation with the depression or anxiety.

Table 6
Linear regression Coefficients

HAD score	Model	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
Depression	(Constant)	6.341	1.610	3.939	.000		
	Education	-.873	.389	-2.247	.025	.970	1.030
	Quarantined days	1.103	.300	3.677	.000	.960	1.042
	Health /Condition	.923	.245	3.761	.000	.989	1.011
	Employment	-.182	.176	-1.031	.303	.985	1.016
Anxiety	(Constant)	4.691	1.457	3.220	.001		
	Quarantined days	1.047	.272	3.856	.000	.960	1.042
	Health /Condition	.880	.222	3.963	.000	.989	1.011
	Education	-.406	.352	-1.155	.249	.970	1.030
	Employment	.003	.160	.017	.986	.985	1.016

R Square =0.087 F=9.089

We further set the HAD scores as 1 for normal, 2 for borderline or doubtful, and 3 for abnormal or definite cases. Ordinal Regression analysis was used to find out how Quarantined days or Health /Condition affect the HAD score. The score for Health / Condition were 1= Worse, 2= Better, 3= Same, 4=Rather up and down. The score for Quarantined days were 1= 1 month, 2= 2-3 months, 3= 4-5 months, 4= 6 months or more. It shown that anxiety score is positive correlated with quarantined time, anxiety and depression were negative correlated with health status.

Table 7
Ordinal Regression analysis for ordinal score of Anxiety and Depression

			Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
								Lower Bound	Upper Bound
Anxiety	Threshold	[HADA = 1.00]	-0.582	0.675	0.745	1	0.388	-1.904	0.740
		[HADA = 2.00]	0.977	0.676	2.089	1	0.148	-0.348	2.301
	Location	[Health=1]	-1.386	0.386	12.876	1	0.000	-2.144	-0.629
		[Health=2]	-1.859	0.387	23.125	1	0.000	-2.617	-1.101
		[Health=3]	-0.778	0.435	3.199	1	0.074	-1.631	0.075
		[Health=4]	0a	.	.	0	.	.	.
		[Quarantined=1]	0.134	0.626	0.046	1	0.830	-1.093	1.360
		[Quarantined=2]	0.742	0.644	1.330	1	0.249	-0.519	2.004
		[Quarantined=3]	1.817	0.740	6.033	1	0.014	0.367	3.267
		[Quarantined=4]	0a	.	.	0	.	.	.
Depression	Threshold	[HADD = 1.00]	-.648	.631	1.052	1	.305	-1.885	.590
		[HADD = 2.00]	.362	.631	.329	1	.566	-.875	1.600
	Location	[Health=1]	-1.028	.397	6.715	1	.010	-1.805	-.250
		[Health=2]	-.863	.385	5.039	1	.025	-1.617	-.110
		[Health=3]	.103	.437	.055	1	.814	-.754	.959
		[Health=4]	0a	.	.	0	.	.	.
		[Quarantined=2]	-.299	.590	.256	1	.613	-1.456	.858
		[Quarantined=2]	-.299	.590	.256	1	.613	-1.456	.858
		[Quarantined=3]	.160	.691	.054	1	.816	-1.195	1.516
		[Quarantined=4]	0a	.	.	0	.	.	.

Patients' Perceptions of Impacts of Mental health on Doctor–Patient Relationships. According to table 8, there 161 participants have finished all questions for patient from the Patient-Doctor Relationship Questionnaire (PDRQ-15). They were recognized as the Patient for analysis though 3 Administrators in the healthcare system were included. A total score of PDRQ-15 < 46 (60% of the full score 75) can be classified as having poor cognition of the doctor-patient relationship, and score of 46-59 (80% of the full score) can be classified as average doctor-patient relationship awareness, with a total score of PDRQ-15 ≥ 60 points can be classified as having good awareness of the doctor-patient relationship and distinguishing them. The questionnaire score showed that there were 42 cases (26.1%) with poor awareness of DPR, and 70 cases (43.5%) with average DPR.

Table 8
Impact on Patient Doctor Relationship (n=161)

	Mean	Std.dev	Interpretation
My doctor understands me	3.30	1.04	Appropriate
I trust my doctor	3.70	0.94	Mostly Appropriate
My doctor is dedicated to help me	3.62	0.96	Mostly Appropriate
I can talk to my doctor	3.71	0.96	Mostly Appropriate
I fell content with my doctor's treatment	3.63	0.93	Mostly Appropriate
I think my PCP finds me hard to deal with	3.03	1.03	Appropriate
My doctor helps me	3.75	0.90	Mostly Appropriate
My doctor has enough time for me	3.54	0.95	Mostly Appropriate
I benefit from the treatment of my doctor	3.68	0.88	Mostly Appropriate
My doctor and I agree on the nature of my medical symptoms	3.63	0.91	Mostly Appropriate
I find my doctor easily accessible	3.73	0.84	Mostly Appropriate
Thanks to my doctor, I feel better	3.68	0.88	Mostly Appropriate
Thanks to my doctor I gained new insight	3.60	0.93	Mostly Appropriate
I can handle my medical symptoms now (even if my doctor and I have no further meeting)	3.72	0.89	Mostly Appropriate
My medical symptoms will probably disappear	3.67	0.80	Mostly Appropriate
Composite Mean	3.60	0.06	
	<i>(md- 3.67)</i>		

Legend: 1.00 – 1.49 Not at all appropriate, 1.50 – 2.49 somewhat appropriate, 2.50 – 3.49 appropriate, 3.50 – 4.49 mostly appropriate, 4.50 – 5.00 totally appropriate.

There were 49 cases (30.4%) with good DPR. The mean of PDRQ-15 score is 54, and the SD is 10.48. Table 8 showed the impact of 15 questions on the Patient Doctor Relationship, which means all questions were appropriate or mostly appropriate.

Table 9
Nonparametric Correlations (Spearman's rho, 2-tailed)

	HADAS	HADA	HADDS	HADD	PDRQS	PDRQ
Quarantined days	.287**	.277**	.215**	.205**	-0.117	-0.118
Employment status	-0.082	-0.084	-0.096	-0.072	-.155*	-0.113
Health/Condition	.217**	0.146	.224**	.218**	-.166*	-0.134
HADAS	1.000	.891**	.662**	.497**	-.261**	-.204**
HADA		1.000	.598**	.491**	-.222**	-.159*
HADDS			1.000	.863**	-.495**	-.450**
HADD				1.000	-.442**	-.404**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The Non-parametric Correlations analysis table showed that PDRQ-15 might correlated with Employment status, Health status and HAD scores. We further used the Linear and Ordinary regression method to find the factors affect the PDRQ-15 score.

Table 10
Linear regression Coefficients of PDRQ-15 score

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	66.064	2.966		22.275	.000		
Employment status	-1.293	.633	-.148	-2.041	.043	.996	1.004
Health	-.261	.853	-.023	-.306	.760	.945	1.058
HADA	.560	1.222	.040	.459	.647	.704	1.420
HADD	-5.685	1.159	-.424	-4.907	.000	.699	1.431

In the table of Linear regression analysis, Sig. <0.05, means Employment status has weak negative relationship with PDRQ-15 score, while HAD Depression score has strong negative correlation (Sig. < 0.01) with PDRQ-15.

Table 11
Ordinal Regression analysis for PDRQ-15 ordinal score

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
						Lower Bound		Upper Bound
Threshold	[PDRQ = 1.00]	-0.131	0.716	0.033	1	0.855	-1.534	1.272
	[PDRQ = 2.00]	2.227	0.741	9.043	1	0.003	0.776	3.679
Location	[Situation=1]	0.721	0.405	3.173	1	0.075	-0.072	1.513
	[Situation=2]	0.121	0.578	0.044	1	0.835	-1.012	1.253
	[Situation=3]	0.083	0.403	0.042	1	0.837	-0.707	0.872
	[Situation=4]	0 ^a			0			
	[Health=1]	0.447	0.645	0.479	1	0.489	-0.818	1.711
	[Health=2]	-0.517	0.656	0.621	1	0.431	-1.802	0.768
	[Health=3]	0.457	0.687	0.442	1	0.506	-0.890	1.803
	[Health=4]	0 ^a			0			
	[HADD=1.00]	2.055	0.537	14.661	1	0.000	1.003	3.106
	[HADD=2.00]	0.173	0.556	0.096	1	0.756	-0.918	1.263
	[HADD=3.00]	0 ^a			0			
	[HADA=1.00]	-0.435	0.582	0.559	1	0.455	-1.577	0.706
	[HADA=2.00]	-0.689	0.581	1.407	1	0.236	-1.829	0.450
	[HADA=3.00]	0 ^a			0			

Because PDRQ scores had been divided as poor, average and good DPR, Ordinal Regression analysis was used to find out how Employment status or Depression affect the ordinal PDRQ score. The score for Employment status were 1= laid-off or jobless, 2= found a new job with lower salary, 3= unstable and might be laid-off at any time, 4= stable or got promotion and confident for future. The score for Depression of HAD were 1= Normal, 2= Doubtful, 3= Definite case. It shown that the ordinal PDRQ score was negative correlated with Depression score, and not correlated with Employment status.

This study investigated the levels of mental health (depression, anxiety) and their impact on the doctor-patient relationship in China mainland society during the COVID-19 pandemic control. Combining respondents in the categories of doubtful and definite cases, approximately 40% and 34% of all can be reported as cases of anxiety and depression, respectively. Various measures are being taken during the pandemic to reduce the spread of the virus such as social distancing, lockdowns of the whole city and self-isolation at homes, hotels, workplaces or in hospital. At the same time, the number of positive tests of virus, jobless of the middle age workers and death rates of elders continue to grow rapidly. All these factors can have adverse effects on the mental health of the society. The relatively high depression and anxiety levels and rates (34% and 40%, respectively) are therefore expected findings in terms of pandemic psychological effects. And these findings were consistent with another study from China reported that approximately 35% of people were psychologically affected by the pandemic (Qiu et al., 2020). Regression analysis confirmed that quarantined days and health/condition has strong correlation (Sig. < 0.01) with depression and anxiety. More than 90% of our respondents had quarantined (home, hotel, or hospitals) at least 1-3 months, and this long-term lockdown would impact on the employment status severely that more than half of participants had been laid-off or changed to an unstable job with lower salary. Further, we done the cross-sectional, retrospective study to explore the DPR and its related factors of mental health during the COVID-19 pandemic from the patients' perspective. We also evaluated participants' attitudes toward DPR post pandemic control. Our results showed that only 30% patient have good awareness of DPR. Correlation analysis implied that anxiety and depression, employment status and health/condition might correlated with DPR. Regression analysis confirmed that depression have strong correlation (Sig. < 0.01) with DPR. These results implied that mental health, such as anxiety and depression has influence to DPR significantly during pandemic control in China.

Our results are similar with others. Some studies showed a negative association between health - related anxiety and the doctor-patient relationship (Orrù et al., 2021). And the quality of the patient doctor relationship was significantly negatively associated with patient suicidality (Cybulski et al., 2021). Several studies of quarantine in home have shown that psychological reactions may emerge from the physical and social isolation

(Berg-Weger et al., 2020). In addition to the depression that might arise with social isolation or being restricted to working home, there is also the anxiety of worrying about infection and losing health service to the disease (Smith et al., 2020). For many families, this stress and depression is compounded by the challenge of working at home while also caring for children (Usher et al., 2020). Notably, a few studies have found that young adults report higher levels of loneliness even though their online social networks are larger than elders (Child et al., 2019). In addition, contracting an illness can make one feel defective, weak, less desirable, and further isolated which can produce a sense of disconnection and abandonment (Loades et al., 2020). When patients' symptoms progressed, they became quite fearful and anxious, and the anxiety progressively worsened over time as the shortage or delay in healthcare support acted as a stimulus for anger (Zhao et al., 2023). After the anger and anxiety, depression, sadness, and the sense of loss are quite common for individuals with medical illness (Premraj et al., 2022). For these reasons, interactions with difficult patients are time consuming, frustrating and emotionally draining, which will decrease the efficacy of the doctor patient communication and damage their relationship (Mallapaty et al., 2023).

Our results indicated that higher doctor-patient trust would help improve DPR. For example, most patients thought their doctors looked them as "hard to deal with" and could not understand them. These are typical loss of trust between patient and doctor which would induce misunderstands and conflicts between them. All kinds of media were presenting shocking news about the deadly conflict between patients and doctors before pandemic. At the same time, there is more content about the conflicts between patients and the social workers for pandemic control on the social media. Sensationalism are using rumors and negative news to create confrontations and to tempt the masses to hate healthcare system and the government. The statistics also reflect that although 17.6% participants expected DPR would be better, 13.4% predicted it would be worse, about 70% people just cautiously optimistic or thought no change as the fundamental problems of healthcare system are still there though we have more experiences to keep mental health for epidemic crisis. One particular advantage of this study is that it measured the public psychological state during the pandemic and correlated with the Doctor-Patient Relationship. Depression, Anxiety and DPR were evaluated in a cross-sectional manner. Hence, one of the principal limitations of this study is that due to the cross-sectional nature, it is difficult to draw any conclusions regarding its long-term effect. In addition, there is also the possibility of selection bias since the study was performed with an online questionnaire. Individuals without Internet and unable or unwilling to use smartphones or no social media accounts could not be included in the study.

4. Conclusion and recommendations

This study investigated the levels of depression, anxiety and the impact on the Doctor-patient relationship in China mainland society during the COVID-19 pandemic control. More than 90% of our respondents had quarantined at least 1-3 months, and this long-term lockdown had impacted on the employment status severely that more than half of participants had been laid-off or found an unstable job with lower salary. Combining respondents in the categories of doubtful and definite cases, approximately 40% and 34% of all can be reported as cases of anxiety and depression, respectively. Regression analysis confirmed that quarantined days and health/condition has strong correlation (Sig. < 0.01) with depression and anxiety. Among all respondents, only 30% patient have good awareness of Doctor-Patient Relationship (DPR). Correlation analysis implied that anxiety and depression, employment status and health/condition might correlated with DPR. Regression analysis confirmed that depression of patients and doctors have strong correlation (Sig. < 0.01) with DPR. In conclusion, our findings suggest that the pandemic control policy may have a greater effect individuals' mental health such as anxiety and depression, which has influence to Doctor-Patient Relationship significantly during pandemic control in China.

Based on our findings, we think that shorter quarantine time and cautiously using lockdown policy should be the better way for pandemic control, which would have positive effect on the mental health of patients and doctors and improve their relationship. Especially, there are should have more active involvement of Psychologists during the pandemic control, such as setting up the community psychology studio with online or

telephone consulting program to identify mental health problems as earlier as possible, mental health education and stress management under the guidance of psychologists, mindfulness activities and social worker support. On the other way, improving doctor–patient communication, medical service quality, and service satisfaction are important issues in rebuilding doctor–patient trust. And the most important things are reforms to the medical system, such as improve salary and the job satisfaction for doctors, decrease economic burden by commercial health insurances for patients, and thereby achieving a more healthy and harmonious care-giving relationship from the fundamental obstacles to their mental health.

5. References

- Ahmed, M. Z., Ahmed, O., Aibao, Z., Hanbin, S., Siyu, L., and Ahmad, A. (2020). Epidemic of COVID-19 in China and associated psychological problems. *Asian J. Psychiatry* 51:102092. doi: 10.1016/j.ajp.2020.102092
- Berg-Weger M, Morley J (2020) Loneliness and social isolation in older adults during the COVID-19 pandemic: implications for gerontological social work. *J Nutr Health Aging* 24(5):456–458.
- Child ST, Lawton L (2019) Loneliness and social isolation among young and late middle age adults: associations with personal networks and social participation. *Aging Mental Health* 23:196–204.
- Cybulski M, Wojszel ZB, Wojszel A, Jahel S, Sliwinska P, Krajewska-Kulak E. (2021) Assessment of COVID-19 anxiety levels and attitudes to COVID-19 vaccine among older adults in Poland: a pilot study. *Vaccines (Basel)*.10(11). <https://doi.org/10.3390/vaccines10111918>.
- Dong, L., & Bouey, J. (2020). Public Mental Health Crisis during COVID-19 Pandemic, China. *Emerging infectious diseases*, 26(7), 1616–1618. <https://doi.org/10.3201/eid2607.200407>
- Du, J., Mayer, G., Hummel, S., Oetjen, N., Gronewold, N., Zafar, A., & Schultz, J. H. (2020). Mental Health Burden in Different Professions During the Final Stage of the COVID-19 Lockdown in China: Cross-sectional Survey Study. *Journal of medical Internet research*, 22(12), e24240. <https://doi.org/10.2196/24240>
- Ferretti L, Wymant C, Kendall M, Zhao L, Nurtay A, Abeler-Dörner L, et al. . Quantifying SARS-CoV-2 transmission suggests pandemic control with digital contact tracing. *Science*. (2020) 368:eabb6936. 10.1126/science.abb6936
- Jin, Y., Sun, T., Zheng, P., & An, J. (2021). Mass quarantine and mental health during COVID-19: A meta-analysis. *Journal of affective disorders*, 295, 1335–1346. <https://doi.org/10.1016/j.jad.2021.08.067> <https://www.who.int/news-room/fact-sheets/detail/depression>
- Jones, E. A. K., Mitra, A. K., & Bhuiyan, A. R. (2021). Impact of COVID-19 on Mental Health in Adolescents: A Systematic Review. *International journal of environmental research and public health*, 18(5), 2470. <https://doi.org/10.3390/ijerph18052470>
- Kalaitzaki A, Rovithis M.(2021) Secondary traumatic stress and vicarious posttraumatic growth in healthcare workers during the first COVID-19 lockdown in Greece: The role of resilience and coping strategies. *Psychiatriki*. 2021 Apr 19;32(1):19-25. doi: 10.22365/jpsych.2021.001.
- Kang, L., Ma, S., Chen, M., Yang, J., Wang, Y., Li, R., Yao, L., Bai, H., Cai, Z., Xiang Yang, B., Hu, S., Zhang, K., Wang, G., Ma, C., & Liu, Z. (2020). Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain, behavior, and immunity*, 87, 11–17. <https://doi.org/10.1016/j.bbi.2020.03.028>
- Khan, W. H., Hashmi, Z., Goel, A., Ahmad, R., Gupta, K., Khan, N., Alam, I., Ahmed, F., & Ansari, M. A. (2021). COVID-19 Pandemic and Vaccines Update on Challenges and Resolutions. *Frontiers in cellular and infection microbiology*, 11, 690621. <https://doi.org/10.3389>
- Li, J., Zhou, L., Van der Heijden, B., Li, S., Tao, H., & Guo, Z. (2022). Lockdown Social Isolation and Lockdown Stress During the COVID-19 Pandemic in China: The Impact of Mindfulness. *Frontiers in psychology*, 13, 778402. <https://doi.org/10.3389/fpsyg.2022.778402>
- Li, X., Lu, J., Hu, S., Cheng, K. K., De Maeseneer, J., Meng, Q., Mossialos, E., Xu, D. R., Yip, W., Zhang, H.,

- Krumholz, H. M., Jiang, L., & Hu, S. (2017). The primary health-care system in China. *Lancet* (London, England), 390(10112), 2584–2594. [https://doi.org/10.1016/S0140-6736\(17\)33109-4](https://doi.org/10.1016/S0140-6736(17)33109-4)
- Loades ME, Chatburn E, Hignson-Sweeney N et al.(2020) Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J Am Acad Child Adolesc Psychiatry* 2020;59(11):1218–1239.e3
- Luo, M., Guo, L., Yu, M., Jiang, W., & Wang, H. (2020). The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public - A systematic review and meta-analysis. *Psychiatry research*, 291, 113190. <https://doi.org/10.1016/j.psychres.2020.113190>
- Määttä S, Björkman I. (2024) We are not even allowed to call them patients anymore: Conceptions about person-centred care. *Health Expect.* 2024 Feb;27(1):e13887. doi: 10.1111/hex.13887. Epub 2023 Oct 18.
- Mallapaty S. (2023) China is opening up after 3 years - what does it mean for research? *Nature.* 2023;613(7945):622. <https://doi.org/10.1038/d41586-023-00091-4>.
- Menon, N. G., & Mohapatra, S. (2022). The COVID-19 pandemic: Virus transmission and risk assessment. *Current opinion in environmental science & health*, 28, 100373. <https://doi.org/10.1016/j.coesh.2022.100373>
- Molefi, M., Tlhakanelo, J. T., Phologolo, T., Hamda, S. G., Masupe, T., Tsima, B., Setlhare, V., Mashalla, Y., & Wiebe, D. J. (2021). The Impact of China's Lockdown Policy on the Incidence of COVID-19: An Interrupted Time Series Analysis. *BioMed research international*, 2021, 9498029. <https://doi.org/10.1155/2021/9498029>
- Mukhtar S. (2020). Psychological health during the coronavirus disease 2019 pandemic outbreak. *The International journal of social psychiatry*, 66(5), 512–516. <https://doi.org/10.1177/0020764020925835>
- Onyeaka, H., Anumudu, C. K., Al-Sharify, Z. T., Egele-Godswill, E., & Mbaegbu, P. (2021). COVID-19 pandemic: A review of the global lockdown and its far-reaching effects. *Science progress*, 104(2), 368504211019854. <https://doi.org/10.1177/00368504211019854>.
- Orrù G, Bertelloni D, Diolaiuti F, Conversano C, Ciacchini R, Gemignani A. (2021) A psychometric examination of the coronavirus anxiety scale and the fear of coronavirus disease 2019 scale in the Italian population. *Front Psychol.* 2021;12:669384. <https://doi.org/10.3389/fpsyg.2021.669384>.
- Premraj L, Kannapadi NV, Briggs J, Seal SM, Battaglini D, Fanning J, et al. (2022) Mid and long-term neurological and neuropsychiatric manifestations of post-COVID-19 syndrome: A meta-analysis. *J Neurol Sci.* 2022;434:120162. <https://doi.org/10.1016/j.jns.2022.120162>.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General psychiatry*, 33(2), e100213. <https://doi.org/10.1136/gpsych-2020-100213>
- She J, Jiang J, Ye L, Hu L, Bai C, Song Y. (2020)novel coronavirus of pneumonia in Wuhan, China: emerging attack and management strategies. *Clin Transl Med.* 9:19. 10.1186/s40169-020-00271-z
- Singh, J., Pandit, P., McArthur, A. G., Banerjee, A., & Mossman, K. (2021). Evolutionary trajectory of SARS-CoV-2 and emerging variants. *Virology journal*, 18(1), 166. <https://doi.org/10.1186/s12985-021-01633-w>
- Smith B, Lim M (2020) How the COVID-19 pandemic is focusing attention on loneliness and social isolation. *Public Health Res Pract* 30(2):e3022008. <https://doi.org/10.17061/phrp3022008>.
- Solmi, M., Estradé, A., Thompson, T., Agorastos, A., Radua, J., Cortese, S., Dragioti, E., Leisch, F., Vancampfort, D., Thygesen, L. C., Aschauer, H., Schloegelhofer, M., Akimova, E., Schneeberger, A., Huber, C. G., Hasler, G., Conus, P., Cuénod, K. Q. D., von Känel, R., Arrondo, G., ... Correll, C. U. (2022). Physical and mental health impact of COVID-19 on children, adolescents, and their families: The Collaborative Outcomes study on Health and Functioning during Infection Times - Children and Adolescents (COH-FIT-C&A). *Journal of affective disorders*, 299, 367–376. <https://doi.org/10.1016/j.jad.2021.09.090>
- Usher K, Bhullar N, Jackson D (2020). Life in the pandemic: social isolation and mental health. *J Clin Nurs* <https://doi.org/10.1111/jocn.15290>.
-

- Wang Y, Wu A, Jiang Y, Duan Y, Geng W, Wan L, Li J, Du J, Hu J, Jiang J, Shi L, Wei J. (2023) The Chinese version of patient-doctor-relationship questionnaire (PDRQ-9): Factor structure, validation, and IRT psychometric analysis. *Front Psychiatry*. 2023 Feb 16;14:1117174. doi: 10.3389/fpsy.2023.1117174.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., Choo, F. N., Tran, B., Ho, R., Sharma, V. K., & Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, behavior, and immunity*, 87, 40–48. <https://doi.org/10.1016/j.bbi.2020.04.028>
- Wang, C., Tee, M., Roy, A. E., Fardin, M. A., Srichokchatchawan, W., Habib, H. A., Tran, B. X., Hussain, S., Hoang, M. T., Le, X. T., Ma, W., Pham, H. Q., Shirazi, M., Taneepanichskul, N., Tan, Y., Tee, C., Xu, L., Xu, Z., Vu, G. T., Zhou, D., ... Kuruchittham, V. (2021). The impact of COVID-19 pandemic on physical and mental health of Asians: A study of seven middle-income countries in Asia. *PloS one*, 16(2), e0246824. <https://doi.org/10.1371/journal.pone.0246824>
- Wang, J., & Wang, Z. (2020). Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of China's Prevention and Control Strategy for the COVID-19 Epidemic. *International journal of environmental research and public health*, 17(7), 2235. <https://doi.org/10.3390/ijerph17072235>
- Wang, Y., Wang, P., Wu, Q., Wang, Y., Lin, B., Long, J., Qing, X., & Wang, P. (2022). Doctors' and Patients' Perceptions of Impacts of Doctors' Communication and Empathy Skills on Doctor-Patient Relationships During COVID-19. *Journal of general internal medicine*, 1–6. Advance online publication. <https://doi.org/10.1007/s11606-022-07784-y>.
- Wei, J., Wang, L., & Yang, X. (2020). Game analysis on the evolution of COVID-19 epidemic under the prevention and control measures of the government. *PloS one*, 15(10), e0240961. <https://doi.org/10.1371/journal.pone.0240961>
- Xiong, W., Deng, Y., Yang, Y., Zhang, Y., & Pan, J. (2021). Assessment of Medical Service Pricing in China's Healthcare System: Challenges, Constraints, and Policy Recommendations. *Frontiers in public health*, 9, 787865. <https://doi.org/10.3389/fpubh.2021.787865>
- Xu B. (2022). The impact of COVID-19 on the doctor-patient relationship in China. *Frontiers in public health*, 10, 907009. <https://doi.org/10.3389/fpubh.2022.907009>
- Yang J, Song L, Yao X, Cheng Q, Cheng Z, Xu K. (2020) Evaluating the Intention and Behaviour of Private Sector Participation in Healthcare Service Delivery via Public-Private Partnership: Evidence from China. *J Healthc Eng*. 2020 Jan 16;2020:5834532. doi: 10.1155/2020/5834532.
- Yue, T., Li, Q., Wang, R., Liu, Z., Guo, M., Bai, F., Zhang, Z., Wang, W., Cheng, Y., & Wang, H. (2020). Comparison of Hospital Anxiety and Depression Scale (HADS) and Zung Self-Rating Anxiety/Depression Scale (SAS/SDS) in Evaluating Anxiety and Depression in Patients with Psoriatic Arthritis. *Dermatology (Basel, Switzerland)*, 236(2), 170–178. <https://doi.org/10.1159/000498848>
- Zhao S, Akhter S. (2023) Negative psychological and educational impacts of Corona Virus anxiety on Chinese university students: exploring university students' perceptions. *Heliyon*. 2023;9(10):e20373. <https://doi.org/10.1016/j.heliyon.2023.e20373>.
- Zhou Y, Ma Y, Yang WFZ, Wu Q, Wang Q, Wang D, Ren H, Luo Y, Yang D, Liu T, Wu X. (2021) Doctor-patient relationship improved during COVID-19 pandemic, but weakness remains. *BMC Fam Pract*. 2021 Dec 22;22(1):255. doi: 10.1186/s12875-021-01600-y.
- Zhu H, Wei L, Niu P. (2020)The novel coronavirus outbreak in Wuhan, China. *Global Health Res Policy*. 5:1–3. 10.1186/s41256-020-00135-6

