

COVID-19 vaccine hesitancy in community-dwelling and hospitalized patients with severe mental illness

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Conflicts of interest

None.

A previous study reported that 28.3% of UK adults were not sure or strongly hesitant to be vaccinated against the COVID-19, and the vaccine hesitancy varies greatly by socio-demographic and clinical background (Freeman *et al.*, 2020). Patients with severe mental illness are more likely to suffer from severe clinical outcomes of COVID-19 (Wang *et al.*, 2021), thus it has been advocated that they should be prioritized for vaccination (De Hert *et al.*, 2021). However, vaccine hesitancy in this subpopulation is a major obstacle in the global efforts to control the COVID-19 pandemic. There is little research on this problem apart from two preliminary, single-center surveys conducted in Western countries. A study (Mazereel *et al.*, 2021) in a Belgium psychiatric hospital (N=1,151) found that 93% of hospitalized patients with various psychiatric disorders accepted and received COVID-19 vaccines. Another study (Danenberg *et al.*, 2021) in an Israel public psychiatric hospital (N=51) found that 23.5% of hospitalized patients with severe mental illness had no intention to get vaccinated. To date, there is no data on vaccine hesitancy in non-Western settings or in community-dwelling patients with psychiatric disorders or across various diagnostic groups. Therefore, we examined the prevalence of vaccine hesitancy and its associated factors among community-dwelling and hospitalized patients with major depressive disorder (MDD), bipolar disorder (BD), and schizophrenia (SCZ) in China, the country where the COVID-19 outbreak first occurred.

This study was conducted in both outpatient clinics for community-dwelling patients and inpatient departments attached to six major psychiatric hospitals in China between October 1 and 8, 2021. Community-dwelling and hospitalized participants who were diagnosed as MDD, BD, or SCZ according to the International Classification of Diseases, Tenth Revision (ICD-10) and older than 18 years were consecutively invited to participate in this survey. Global quality of life (QOL) was measured with the first 2 items of the World Health Organization Quality of Life Scale Brief version (WHOQOL-BREF), while severity of perceived fatigue and physical pain were assessed by a fatigue numeric rating scale and Visual Analog Scale for Pain (VAS), respectively. Depressive symptoms were measured by the Patient Health Questionnaire-2 (PHQ-2), and

perceived stigma was assessed by the Social Impact Scale (SIS). A standardized question was used to measure COVID-19 vaccination hesitancy: "Do you intend to be vaccinated against COVID-19 in the future?" (No/Not having vaccination temporarily/Yes). The first two options were categorized as "COVID-19 vaccination hesitancy" according to the WHO recommendation. All participants signed electronic written informed consent and the study protocol was approved by the ethics committees of the participating hospitals.

Chi-square tests, independent samples t-tests, and Mann-Whitney U tests were performed to compare sociodemographic and disorder-related variables between individuals with COVID-19 vaccination hesitancy and those without, as appropriate. Binary logistic analyses were performed to examine independent correlates of COVID-19 vaccination hesitancy, with variables that significantly differed in univariate analyses and primary psychiatric disorders as independent variables. Significant statistical difference was set at $P < 0.05$ (two-tailed).

Altogether, 1,853 participants were included in this study. The proportion of COVID-19 vaccination hesitancy was 45.3% (95%CI: 43.1%-47.5%), with 45.3% (95%CI: 42.6%-48.1%) in MDD, 43.6% (95%CI: 38.6%-48.7%) in BD, and 47.4% (95%CI: 41.6%-53.3%) in SCZ subgroups. The proportion of COVID-19 vaccination hesitancy was 49.2% (95%CI: 46.7%-51.8%) in community-dwelling patients, and 31.3% (95%CI: 26.9%-35.8%) in hospitalized patients. Binary logistical regression analysis revealed that unemployed patients (OR=1.257, 95%CI: 1.038-1.522, $P=0.019$), community-dwelling patients (OR=2.206, 95%CI: 1.737-2.801, $P<0.001$), and those with a higher level of perceived stigma (OR=1.011, 95%CI: 1.002-1.019, $P=0.011$) were more likely to have vaccine hesitancy (Table 1). No significant difference in vaccine hesitancy was found across the three major psychiatric disorders.

We found that the vaccine hesitancy rate was high in patients with severe mental illness, particularly in community-dwelling patients, which is considerably higher than the finding in Israel (Danenberg *et al.*, 2021). Consistent with the result in a general population in U.S. (Malik *et al.*, 2020), there is a higher rate of vaccine hesitancy in unemployed patients compared to

employed patients, which could partly be due to the strong encouragement from all employers in China for vaccination in their employees in response to the pandemic.

Community-dwelling patients with severe mental illness had a higher rate of vaccine hesitancy than hospitalized patients, probably because of less public education on the importance and safety of the vaccines compared to hospitalized patients. Additionally, hospitalized patients are more likely to experience crowded living conditions compared to their community-dwelling counterparts (e.g., shared common dining and bathroom spaces, and group activities that increases close contacts) (Brody *et al.*, 2021), which may lead to greater awareness of the need to protect themselves. We also found that patients with a higher level of perceived stigma were more likely to have vaccine hesitancy. Psychiatric patients with a higher level of stigma usually have more limited medical knowledge (Thorncroft *et al.*, 2016), and a lack of awareness about the efficacy and safety COVID-19 vaccination.

In conclusion, this was the first multicenter study on COVID-19 vaccine hesitancy involving both community-dwelling and hospitalized patients with severe mental illness. Due to the high rate of vaccine hesitancy, vaccination promotion strategy should focus on patients with severe mental illness, particularly those who are unemployed and community-dwelling, or have a high level of perceived stigma.

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Table 1. Characteristics and analyses of participants with and without COVID-19 vaccination hesitancy

Variables	COVID-19 vaccination hesitancy			Univariate analysis			Multiple logistic regression		
	All (N=1,853)	No (n=1,014) n (%)	Yes (n=839) n (%)	χ^2	df	P	OR	95% CI	P
Male gender	492 (26.6)	260 (25.6)	232 (27.7)	0.952	1	0.329	---	---	---
Urban residence	1,310 (70.7)	734 (72.4)	576 (68.7)	3.089	1	0.079	---	---	---
College education and above	966 (52.1)	543 (53.6)	423 (50.4)	1.806	1	0.179	---	---	---
Living with family members	1,477 (79.7)	815 (80.4)	662 (78.9)	0.614	1	0.433	---	---	---
Married	665 (35.9)	375 (37.0)	290 (34.6)	1.166	1	0.280	---	---	---
Unemployed	1,120 (60.4)	591 (58.3)	529 (63.1)	4.364	1	0.037	1.257	1.038-1.522	0.019
Having insurance	1,499 (80.9)	828 (81.7)	671 (80.0)	0.839	1	0.360	---	---	---
Family history of psychiatric disorders	209 (11.3)	104 (10.3)	105 (12.5)	2.340	1	0.126	---	---	---
Suicidality in the past year	1,152 (62.2)	616 (60.7)	536 (63.9)	1.920	1	0.166	---	---	---
Outpatients	1,444 (77.9)	733 (72.3)	711 (84.7)	41.412	1	<0.001	2.206	1.737-2.801	<0.001
Perceived fair/good health status	1,592 (85.9)	877 (86.5)	715 (85.2)	0.611	1	0.435	---	---	---
Perceived fair/good economic status	1,476 (79.7)	814 (80.3)	662 (78.9)	0.534	1	0.465	---	---	---
Diagnoses				0.926	2	0.629	---	---	---
MDD	1,214 (65.5)	664 (65.5)	550 (65.6)				1	---	---
BD	367 (19.8)	207 (20.4)	160 (19.1)				1.085	0.849-1.387	0.514
SCZ	272 (14.7)	143 (14.1)	129 (15.4)				1.217	0.920-1.612	0.169
	Mean (SD)	Mean (SD)	Mean (SD)	t/Z	df	P	OR	95% CI	P
Age (years)	30.8 (13.4)	31.1 (13.4)	30.5 (13.3)	-1.385	---	0.166	---	---	---
Age of onset (years)	27.8 (13.6)	28.0 (13.3)	27.5 (13.9)	-1.713	---	0.087	---	---	---
Fatigue total score	5.2 (2.7)	5.1 (2.7)	5.2 (2.6)	-0.760	---	0.447	---	---	---
Physical pain total score	2.9 (2.5)	2.8 (2.5)	3.0 (2.5)	-2.507	---	0.012	1.027	0.986-1.070	0.196
Global QOL score	5.2 (1.8)	5.3 (1.8)	5.1 (1.7)	-2.915	---	0.004	---	---	---
PHQ-2 total score	2.8 (2.0)	2.7 (2.0)	2.9 (2.0)	-2.191	---	0.028	1.009	0.956-1.065	0.756
SIS total score	62.1 (12.1)	61.3 (12.1)	63.2 (12.0)	-3.467	1851	0.001	1.011	1.002-1.019	0.011

Note: * Mann-Whitney U test; Bolded values: <0.05.
M: mean; SD: standard deviation; COVID-19: Corona Virus Disease 2019; PHQ-2: 2-item Patient Health Questionnaire; SIS: Social Impact Scale; QOL: Quality of Life; MDD, major depressive disorder; BD, bipolar disorder; SCZ, schizophrenia.