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

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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, Xu, & Volkow, 2021), thus it has been advocated that they should be prioritized for vaccination (De Hert, Mazereel, Detraux, & Van Assche, 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, Vanbrabant, Desplenter, & De Hert, 2021) in a Belgium psychiatric hospital ($N = 1151$) found that 93% of hospitalized patients with various psychiatric disorders accepted and received COVID-19 vaccines. Another study (Danenberg et al., 2021) in an Israeli 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 are 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 largest developing country.

This study was conducted in both outpatient clinics for community-dwelling patients and inpatient departments attached to six major psychiatric hospitals in China between September 21, 2020 and October 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 was measured with the first two 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.

The χ^2 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. Significantly statistical difference was set at $p < 0.05$ (two-tailed).

Altogether, 1853 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%)

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 = 1853) n (%)	No (n = 1014) 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	1310 (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	1477 (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	1120 (60.4)	591 (58.3)	529 (63.1)	4.364	1	0.037	1.257	1.038–1.522	0.019
Having insurance	1499 (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	1152 (62.2)	616 (60.7)	536 (63.9)	1.920	1	0.166	–	–	–
Outpatients	1444 (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	1592 (85.9)	877 (86.5)	715 (85.2)	0.611	1	0.435	–	–	–
Perceived fair/good economic status	1476 (79.7)	814 (80.3)	662 (78.9)	0.534	1	0.465	–	–	–
Diagnoses				0.926	2	0.629	–	–	–
MDD	1214 (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 (s.d.)	Mean (s.d.)	Mean (s.d.)	t/Z	df	p	OR	95% CI	p
Age (years)	30.8 (13.4)	31.1 (13.4)	30.5 (13.3)	–1.385	– ^a	0.166	–	–	–
Age of onset (years)	27.8 (13.6)	28.0 (13.3)	27.5 (13.9)	–1.713	– ^a	0.087	–	–	–
Fatigue total score	5.2 (2.7)	5.1 (2.7)	5.2 (2.6)	–0.760	– ^a	0.447	–	–	–
Physical pain total score	2.9 (2.5)	2.8 (2.5)	3.0 (2.5)	–2.507	– ^a	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	– ^a	0.004	–	–	–
PHQ-2 total score	2.8 (2.0)	2.7 (2.0)	2.9 (2.0)	–2.191	– ^a	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

OR: odds ratio; CI: confidence interval; S.D., 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.

^aMann-Whitney U test; bolded values: <0.05.

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 the USA (Malik, McFadden, Elharake, & Omer, 2020), there is a higher rate of vaccine hesitancy in those unemployed compared to those employed, 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 they received 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 increase 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 (Thornicroft et al., 2016), and a lack of awareness about the efficacy and safety of 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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Conflict of interest. None.

References

- Brody, B. D., Shi, Z., Shaffer, C., Eden, D., Wyka, K., Alexopoulos, G. S., ... Kanellopoulos, D. (2021). COVID-19 infection rates in patients referred for psychiatric admission during a regional surge: The case for universal testing. *Psychiatry Research* 298, 113833. doi: 10.1016/j.psychres.2021.113833
- Danenberg, R., Shemesh, S., Tzur Bitan, D., Maoz, H., Saker, T., Dror, C., ... Bloch, Y. (2021). Attitudes of patients with severe mental illness towards COVID-19 vaccinations: A preliminary report from a public psychiatric hospital. *Journal of Psychiatric Research* 143, 16–20. doi: 10.1016/j.jpsychires.2021.08.020
- De Hert, M., Mazereel, V., Detraux, J., & Van Assche, K. (2021). Prioritizing COVID-19 vaccination for people with severe mental illness. *World Psychiatry* 20, 54–55. doi: 10.1002/wps.20826
- Freeman, D., Loe, B. S., Chadwick, A., Vaccari, C., Waite, F., Rosebrock, L., ... Lambe, S. (2020). COVID-19 vaccine hesitancy in the UK: The Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. *Psychological Medicine*, 1–15. doi: 10.1017/s0033291720005188
- Malik, A. A., McFadden, S. M., Elharake, J., & Omer, S. B. (2020). Determinants of COVID-19 vaccine acceptance in the US. *EClinicalMedicine* 26, 100495. doi: 10.1016/j.eclinm.2020.100495
- Mazereel, V., Vanbrabant, T., Desplenter, F., & De Hert, M. (2021). COVID-19 vaccine uptake in patients with psychiatric disorders admitted to or residing in a university psychiatric hospital. *The Lancet Psychiatry* 8, 860–861. doi: 10.1016/s2215-0366(21)00301-1
- Thornicroft, G., Mehta, N., Clement, S., Evans-Lacko, S., Doherty, M., Rose, D., ... Henderson, C. (2016). Evidence for effective interventions to reduce mental-health-related stigma and discrimination. *The Lancet* 387, 1123–1132. doi: 10.1016/s0140-6736(15)00298-6
- Wang, Q., Xu, R., & Volkow, N. D. (2021). Increased risk of COVID-19 infection and mortality in people with mental disorders: Analysis from electronic health records in the United States. *World Psychiatry* 20, 124–130. doi: 10.1002/wps.20806