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COVID-19 vaccine willingness amongst patients with mental illness compared with the general population*

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Short Communication

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Abstract

Patients with mental illness are at an increased risk of COVID-19 infection, morbidity, and mortality, and prioritisation of this group for COVID-19 vaccination programmes has therefore been suggested. Vaccine uptake may, however, be compromised by vaccine hesitancy amongst patients with mental illness, posing a critical public health issue. We conducted two surveys to provide weighted estimates of vaccine willingness amongst patients with mental illness and the general population of Denmark. Vaccine willingness was high in both groups, but slightly lower amongst patients with mental illness (84.8%), compared with the general population (89.5%) ($p < .001$). Based on these findings, vaccine hesitancy does not appear to be a major barrier for vaccine uptake amongst patients with mental illness in Denmark, but may be so in other countries with lower general vaccine willingness. Replication of the present study in other countries is strongly warranted.

Introduction

Patients with mental illness face an elevated risk of COVID-19 infection, morbidity, and mortality (Wang et al., 2021). Therefore, prioritising this group in COVID-19 vaccination programmes has been suggested, and, in some countries, implemented (De Hert et al., 2021, Mazereel et al., 2021, De Picker et al., 2021). However, several barriers, including vaccine hesitancy, may hinder the vaccination of individuals with mental illness. Indeed, studies on influenza vaccination programmes have found lower vaccination rates amongst individuals with mental illness compared to the general population, and have mainly attributed vaccine hesitancy to lack of information or negative perceptions about vaccine safety and efficacy (Miles et al., 2020, Lorenz et al., 2013, Druss et al., 2008). Whether this hesitancy generalises to the COVID-19 vaccine remains unknown. In a survey conducted in Ireland in the Spring of 2020, vaccine hesitancy was higher amongst respondents with a history of mental health problems (Murphy et al., 2021). It, therefore, seems likely that COVID-19 vaccine willingness may be lower amongst individuals with mental illness, especially amongst those for whom the illness is more severe, requiring hospital treatment. Despite having obvious clinical relevance (Wang et al., 2021), this issue has not been sufficiently studied, and so research on this issue is urgently needed.

Aims of the study

We aimed to compare estimates of vaccine willingness amongst patients diagnosed with mental illness by psychiatric hospital services and individuals from the general population in Denmark.

Methods

We conducted two questionnaire-based online surveys: one targeting randomly selected patients with mental illness from the psychiatric services of the Central Denmark Region ($n = 992$) (Kølbæk et al., 2021) and one targeting the general Danish population ($n = 2458$) (Sønderskov et al., 2020a) (Fig. 1A). Both were follow-ups of prior surveys (Sønderskov et al., 2020a, Kølbæk et al., 2021, Sønderskov et al., 2020b, Sønderskov Dinesen & Østergaard, 2021), and are described in detail in the Supplementary Material. The surveys were fielded from 9 February to 22 February 2021 (patient sample) and from 4 February to 21 February 2021 (general population sample). For each of the two surveys, an overall measure of weighted vaccine willingness was calculated based on the following questions: 'Have you accepted this offer?' (for those offered COVID-19 vaccination) and 'Will you accept vaccination against coronavirus,

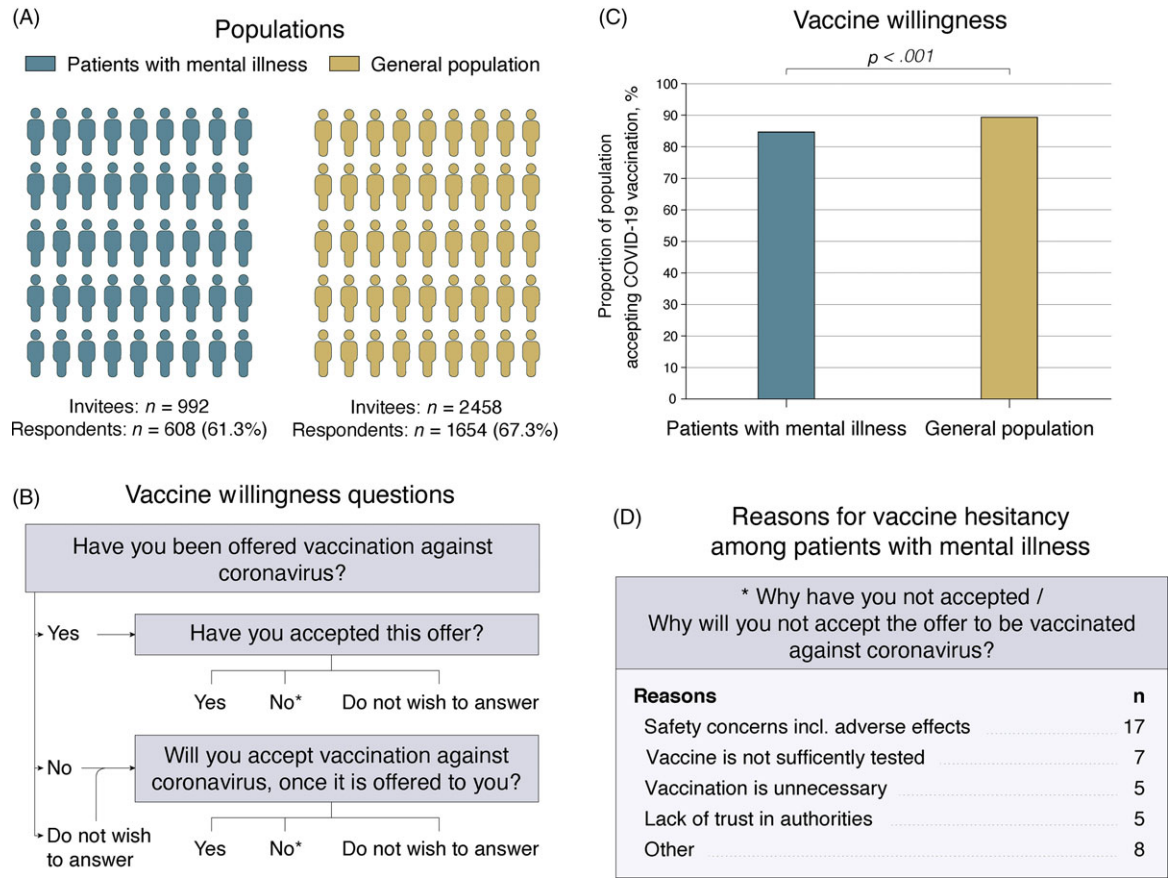

Fig. 1. Vaccine willingness amongst patients with mental illness and the general Danish population. (A) Populations assessed in the survey, number of invitees, and respondents. (B) Vaccine willingness questions used in the questionnaire. (C) Vaccine willingness estimates (proportions) weighted for attrition. Lower vaccine willingness amongst patients with mental illness (84.8%) compared with the general population (89.5%), $p < 0.001$, a two-sample test of proportions with a one-sided p-value. Further details on questionnaire responses and weighted estimates can be found in the Supplementary Tables 3 and 4. (D) Reasons for vaccine hesitancy amongst patients with mental illness.

once it is offered to you?' (for those not yet offered COVID-19 vaccination) (Fig. 1B). Responding 'Yes' to either of these two questions was considered as vaccine willingness. We compared the weighted estimate of overall vaccine willingness for the patients with mental illness, and the weighted estimate for the general population using a two-sample test of proportions with a one-sided p-value (supplemented with a one-sided Fisher's exact test when comparing small samples). We conducted equivalent comparisons of vaccine willingness for those who had been offered COVID-19 vaccination, and those who had not yet been offered COVID-19 vaccination, respectively. Finally, we performed multivariate logistic regressions for both the patient sample and the general population sample to identify correlates of vaccine hesitancy.

Results

Of the 992 patients with mental illness who were invited to participate, a total of 608 (61.3%) responded to the questions regarding vaccine willingness (Fig. 1A). Of the 2458 individuals from the general population panel invited to participate, a total of 1654 (67.3%) responded to the questions regarding vaccine willingness. Supplementary Tables 1 and 2 present the characteristics of the respondents. Vaccine willingness was high in both populations, albeit slightly lower amongst those with mental illness (84.8%) compared with the general population (89.5%) (Fig. 1C). This difference in vaccine willingness is statistically significant ($p < 0.001$). Figure 1D also reports the reasons for vaccine hesitancy amongst patients with mental illness.

The results of the logistic regression analyses are shown in Supplementary Tables 5 and 6. There was a strong and statistically significant positive association between younger age and vaccine hesitancy both amongst patients with mental illness (OR for ≤ first age quartile compared to > third quartile = 5.80, 95% CI = 1.63;22.39, $p = 0.008$) and amongst the general population (OR for ≤ first age quartile compared to > third quartile = 3.41, 95% CI = 1.48;7.84, $p = 0.004$). For patients with mental illness, divorce or repeal of the registered partnership was also positively associated with vaccine hesitancy (OR = 4.14, 95% CI = 1.50;11.94, $p = 0.007$), as was being born outside Denmark (OR = 4.51, 95% CI = 1.84;11.04, $p = 0.001$). No psychiatric diagnosis was found to be particularly strongly associated with vaccine hesitancy. For the general population, having children living in the household (OR = 1.60, 95% CI = 1.03;2.51, $p = 0.038$), having a low educational level (OR for primary and lower secondary school as the highest obtained level compared to long-cycle higher education = 3.36, 95% CI = 1.49;7.56, $p = 0.003$), and being absent from employment due to illness (OR = 3.87, 95% CI = 1.60;9.38, $p = 0.003$) were positively associated with vaccine hesitancy.

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Discussion

COVID-19 vaccine willingness amongst patients with mental illness was high, albeit slightly lower than in the general population. Moreover, vaccine willingness in the general population was higher than in previous surveys of the Danish population (Lindholt et al., 2020), which could be due to the safe implementation of the vaccination programme in Denmark that began on 26 December 2020, and was well underway by the time of survey collection in February 2021. This hypothesis is supported by recent reports from England and Wales, where vaccine hesitancy fell after the vaccination programme commenced (Moberly, 2021).

Patients with mental illness generally receive less preventive care than the general population (Lord et al., 2010, Druss et al., 2002, Mitchell et al., 2009). The reason for this imbalance is likely multifactorial. In the case of the COVID-19 vaccine, however, concrete and modifiable factors may be present. Indeed, the reported reasons for COVID-19 vaccine hesitancy amongst patients with mental illness suggest that addressing safety concerns more thoroughly may increase vaccine willingness in this population (Miles et al., 2020).

Here, the findings from our logistic regression analyses are informative. Across both samples, younger age was strongly associated with vaccine hesitancy, consistent with previous reports from other western countries (Murphy et al., 2021, Daly and Robinson, 2021, Robertson et al., 2021, Schwarzinger et al., 2021). Consequently, the difference in vaccine hesitancy between the two populations in this study may be partly explained by the fact that the sample of patients with mental illness was substantially younger [weighted median age (years) = 36, IQR = 26–50] than the general population sample [weighted median age (years) = 51, IQR = 34–65].

The most important limitations of this study are related to its survey-based design. Specifically, although our findings were weighted to be representative on a set of known parameters (see the Supplementary Material), we cannot rule out social desirability and non-response biases, which may have led to an overestimation of vaccine willingness in the present study. Furthermore, the data presented in this study were collected prior to the reports of venous blood clots in relation to the COVID-19 vaccine from Oxford–AstraZeneca, which led to a pause in the use of this vaccine in many countries including Denmark (Østergaard et al., 2021, Wise, 2021, Schultz et al., 2021). In a follow-up survey of the general population sample after the reports of venous blood clots related to the Oxford–AstraZeneca vaccine, vaccine willingness appeared to be unaffected (Sønderskov et al., 2021). Whether the same is true for patients with mental illness remains unknown.

In conclusion, vaccine hesitancy does not appear to be a major barrier for the COVID-19 vaccination of patients with mental illness in Denmark. However, it could be a barrier in countries with lower general vaccine willingness (Lindholt et al., 2020) and less trust in institutions, both of which are very high in Denmark. Importantly, previous estimates of vaccine willingness exhibit very large variation between countries (Lazarus et al., 2020). We, therefore, strongly encourage replication studies in other countries to address this critical public health issue. Furthermore, we urge national health authorities worldwide to provide targeted information on COVID-19 vaccine efficacy and safety to patients with mental illness – especially amongst the younger – to increase vaccine uptake in this at-risk population.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/neu.2021.15.

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Author contributions. Dr. Østergaard had full access to all data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Concept and design: Kølbæk, Dinesen, Sønderskov, Østergaard., Acquisition, analysis, or interpretation of data: Jefsen, Kølbæk, Gil, Speed, Dinesen, Sønderskov, Østergaard. Drafting of the manuscript: Jefsen and Østergaard. Critical revision of the manuscript for important intellectual content: Kølbæk, Gil, Speed, Dinesen, Sønderskov. Statistical analysis: Speed, Sønderskov. Obtained funding: Østergaard. Administrative, technical, or material support: Jefsen, Kølbæk, Gil, Speed, Sønderskov. Supervision: Kølbæk, Dinesen, Sønderskov, Østergaard.

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References

Daly M and Robinson E (2021) Willingness to vaccinate against COVID-19 in the US: representative longitudinal evidence from April to October 2020. *American Journal of Preventive Medicine* **60**(6): 766–773

De Hert M, Mazereel V, Detraux J and Van Assche K (2021) Prioritizing COVID-19 vaccination for people with severe mental illness. *World Psychiatry* **20**, 54.

De Picker LJ, Dias MC, Benros ME, Vai B, Branchi I, Benedetti F, Borsini A, Leza JC, Kärkkäinen H and Männikkö M (2021) Severe mental illness and European COVID-19 vaccination strategies. *The Lancet Psychiatry* **8**(5), 356–359.

Druss BG, Rask K and Katon WJ (2008) Major depression, depression treatment and quality of primary medical care. *General Hospital Psychiatry* **30**, 20–25.

Druss BG, Rosenheck RA, Desai MM and Perlin JB (2002) Quality of preventive medical care for patients with mental disorders. *Medical Care* **40**, 129–136.

Kølbæk P, Jefsen OH, Speed M and Østergaard SD (2021) Mental health of patients with mental illness during the COVID-19 pandemic lockdown: a questionnaire-based survey weighted for attrition. medRxiv.

Lazarus JV, Ratzan SC, Palayew A, Gostin LO, Larson HJ, Rabin K, Kimball S and El-Mohandes A (2020) A global survey of potential acceptance of a COVID-19 vaccine. *Nature Medicine* **27**(2), 225–228.

Lindholt MF, Jørgensen FJ, Bor A and Petersen MB (2020) Willingness to use an approved COVID-19 vaccine: cross-national evidence on levels and individual-level predictors. PsyArXiv.

Lord O, Malone D and Mitchell AJ (2010) Receipt of preventive medical care and medical screening for patients with mental illness: a comparative analysis. *General Hospital Psychiatry* **32**, 519–543.

Lorenz RA, Norris MM, Norton LC and Westrick SC (2013) Factors associated with influenza vaccination decisions among patients with mental illness. *The International Journal of Psychiatry in Medicine* **46**, 1–13.

Mazereel V, Van Assche K, Detraux J and De Hert M (2021) COVID-19 vaccination for people with severe mental illness: why, what, and how? *The Lancet Psychiatry* **8**(5), 444–450.

Miles LW, Williams N, Luthy KE and Eden L (2020) Adult vaccination rates in the mentally ill population: an outpatient improvement project. *Journal of the American Psychiatric Nurses Association* **26**, 172–180.

Mitchell AJ, Malone D and Doebbeling CC (2009) Quality of medical care for people with and without comorbid mental illness and substance misuse: systematic review of comparative studies. *The British Journal of Psychiatry* **194**, 491–499.

Moberly T (2021) Vaccine hesitancy fell after vaccination programme started. *BMJ* **372**, n837.

Murphy J, Vallières F, Bentall RP, Shevlin M, Mcbride O, Hartman TK, Mckay R, Bennett K, Mason L and Gibson-Miller J (2021) Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. *Nature Communications* **12**, 1–15.

Østergaard SD, Schmidt M, Horváth-Puhó E, Thomsen RW and Sørensen HT (2021) Thromboembolism and the Oxford–AstraZeneca COVID-19 vaccine: side-effect or coincidence? *The Lancet*. **397**(10283), 1441–1443.

Robertson E, Reeve KS, Niedzwiedz CL, Moore J, Blake M, Green M, Katikireddi SV and Benzeval MJ (2021) Predictors of COVID-19 vaccine hesitancy in the UK household longitudinal study. *Brain, Behavior, and Immunity* **94**, 41–50.

Schultz NH, Sørvoll IH, Michelsen AE, Munthe LA, Lund-Johansen F, Ahlen MT, Wiedmann M, Aamodt AH, Skattør TH and Tjønnfjord GE (2021) Thrombosis and thrombocytopenia after ChAdOx1 nCoV-19 vaccination. New England Journal of Medicine.

Schwarzinger M, Watson V, Arwidson P, Alla F and Luchini S (2021) COVID-19 vaccine hesitancy in a representative working-age population in France: a survey experiment based on vaccine characteristics. *The Lancet Public Health* **6**(4), e210–e221.

Sønderskov KM, Dinesen PT and Østergaard SD (2021) Sustained COVID-19 vaccine willingness after safety concerns over the Oxford-AstraZeneca vaccine. *Danish Medical Journal* **68**, A03210292.

Sønderskov KM, Dinesen PT, Santini ZI and Østergaard SD (2020a) The depressive state of Denmark during the COVID-19 pandemic. *Acta neuropsychiatrica* **32**, 226–228.

Sønderskov KM, Dinesen PT, Santini ZI and Østergaard SD (2020b) Increased psychological well-being after the apex of the COVID-19 pandemic. *Acta neuropsychiatrica* **32**, 277–279.

Sønderskov KM, Dinesen PT, Vistisen HT and Østergaard SD (2021) Variation in psychological well-being and symptoms of anxiety and depression during the COVID-19 Pandemic: results from a 3-wave panel survey. *Acta Neuropsychiatrica* **33**(3), 156–159.

Wang Q, Xu R and Volkow ND (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.

Wise J (2021) Covid-19: european countries suspend use of Oxford-AstraZeneca vaccine after reports of blood clots. *BMJ* **372**, n699.

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