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Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom



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ARTICLE INFO

Keywords:

Coronavirus
Social isolation
Patients
Youth
Unemployment
Family
Psychological impact

ABSTRACT

Despite ample research on the prevalence of specific psychiatric disorders during COVID-19, we know little about the broader psychological impact of the pandemic on a wider population. The study investigates the prevalence and predictors of general psychiatric disorders measured by the 12-item General Health Questionnaire (GHQ-12) and frequency of loneliness during COVID-19 in the United Kingdom, a country heavily hit by the pandemic. We analyzed 15,530 respondents of the first large-scale, nationally representative survey of COVID-19 in a developed country, the first wave of Understanding Society COVID-19 Study. Results show that 29.2% of the respondents score 4 or more, the caseness threshold, on the general psychiatric disorder measure, and 35.86% of the respondents sometimes or often feel lonely. Regression analyses show that those who have or had COVID-19-related symptoms are more likely to develop general psychiatric disorders and are lonelier. Women and young people have higher risks of general psychiatric disorders and loneliness, while having a job and living with a partner are protective factors. This study showcases the psychological impact, including general psychiatric disorders and loneliness, of broader members of the society during COVID-19 and the underlying social inequalities.

1. Introduction

As the outbreak of COVID-19 has become a global public health crisis, an increasing number of people are affected psychologically, albeit in various forms and to different degrees (Qiu et al., 2020). Research evidences the prevalence of generalized anxiety disorders (Huang and Zhao, 2020), depression (Elbay et al., 2020), insomnia, (Kokou-Kpolou et al., 2020; Voitsidis et al., 2020) and posttraumatic stress symptoms (Liu et al., 2020) during the pandemic. Because these studies focus on specific types of psychiatric disorders and use a small or non-representative sample, we know little about how a national population suffers general psychiatric disorders from the pandemic and feel lonely as a result of such disease control measures as social distancing (Banerjee and Rai, 2020; Galea et al., 2020; Venkatesh et al., 2020), lockdown (Kokou-Kpolou et al., 2020; Tull et al., 2020), and quarantine (Reynolds et al., 2008). General psychiatric disorders and loneliness are arguably more widespread than the specific psychiatric disorders in the past studies (Hwang et al., 2020; Killgore et al., 2020a), more likely to be prevalent in the developed countries (Jia et al., 2020), and more severely affecting the socioeconomically disadvantaged

groups (Berg-Weger and Morley, 2020).

First, although the widely adopted social distancing, lockdown and quarantine measures cause severe psychiatric disorders to some people (Galea et al., 2020), much more people bear the emotional burdens of loneliness (Banerjee and Rai, 2020; Hwang et al., 2020; Killgore et al., 2020a) and develop minor psychiatric disorders that cannot be fully captured by the specific clinical measures in previous research (Lu et al., 2020). The present study alternatively adopts the 12-item General Health Questionnaire that validly predicts a wider range of psychiatric disorders (Goldberg and Williams, 1988) and measures the frequency of loneliness as a signature psychiatric risk posed by the current pandemic (Killgore et al., 2020a).

Second, while most studies focus on developing countries, developed countries are also deeply affected by the COVID-19 pandemic (Jia et al., 2020). Despite better health care services, the disruption of social lives is abrupt in the countries where people have always been connected by technologies, so the residents could have felt lonely and developed the psychiatric disorders in minor yet non-negligible forms. These unique challenges have not been addressed due to the paucity of real-time, large-scale, and nationally representative data. We use a

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recent, high-quality, nationally representative survey to assess the COVID-19's impact on 15,530 respondents in the United Kingdom. When the survey was sent out on April 24th, 2020, there had been 11,3598 confirmed COVID-19 cases and 22,792 associated deaths in this country (Public Health England, 2020).

Third, our knowledge of the psychological impact on COVID-19 patients is limited. For example, the percentages of respondents who have been diagnosed with COVID-19 in the previous surveys are lower than the confirmed prevalence rates in those countries (Cao et al., 2020; Huang and Zhao, 2020; Liu et al., 2020), which may result from sampling bias. In some studies, the sample size is too small to draw a meaningful comparison between the COVID-19 patients and the general population (Huang and Zhao, 2020; Liu et al., 2020). In this study, respondents were identified before the pandemic by using the sample of an existing nationally representative survey, and this could help attenuate the selection bias. We also use self-reported COVID-19-related symptoms instead of diagnoses to address the problem of delayed testing, as suspected patients deserve scholarly attention who suffer stress regardless of confirmation.

Finally, previous research offers tentative evidence on the impact of COVID-19 on the vulnerable populations such as women and the elderly (Liu et al., 2020; Meng et al., 2020). These groups have lower socio-economic status and thus are more impacted by adverse events (Killgore et al., 2020b). Their burdens can now be assessed with a larger and more representative sample. With a more comprehensive survey, we are able to explore other social determinants of psychiatric disorders such as employment status and family structure (Cao et al., 2020; Kawohl and Nordt, 2020).

In all, the objective of the study is to explore the prevalence and predictors of general psychiatric disorders and loneliness in the United Kingdom with the first large-scale, nationally representative survey three months after the first diagnosis of COVID-19 in a developed country.

2. Methods

2.1. Data

Data for this study come from the first wave of Understanding Society COVID-19 Study, a special wave of the UK Household Longitudinal Study (UKHLS), which provides high-quality, nationally representative panel data of United Kingdom households. After pairwise deletion of 1% of missing cases, we obtain an analytic sample of 15,530 respondents.

2.2. Procedures

Participants are recruited using stratified and clustered sampling before the COVID-19 pandemic. Participants are not paid for completing the survey. The survey consists of an online questionnaire but those without internet access are interviewed through telephone by trained professionals. The survey was sent out and completed from April 24th to 30th, 2020 and publicly available on May 29th. A total of 17,450 respondents answer the current survey with an overall response rate of 41.2%. The survey procedures are approved by the Ethics Committee of University of Essex. More details of the procedures can be found in the User Guide (Institute for Social and Economic Research, 2020).

We use probability weight in all analyses to adjust for complex survey design and unequal non-response rates, which could facilitate population inferences (Institute for Social and Economic Research, 2020). The probability weight is predicted based on logistic regression models using a wide range of demographic and socio-economic characteristics, and then is calculated as an inverse response propensity (for more details, see Institute for Social and Economic Research, 2020). In the analyses, the command 'svyset' is used in Stata

14 to take into account cross-sectional probability weight, clustering variable (primary sampling unit) and stratification variable (strata).

2.3. Measures

Loneliness is measured by a question adapted from English Longitudinal Study on Ageing (ELSA). Respondents are asked "In the last 4 weeks, how often did you feel lonely?" with three options: "hardly ever or never," "some of the time," and "often". The 4-week period is when COVID-19 was widespread in the country.

General psychiatric disorders are measured using the 12 items from General Health Questionnaire (GHQ), a validated scale widely used in the community or non-clinical settings (Aalto et al., 2012; Goldberg and Williams, 1988). There are 12 questions about respondents' depressive, anxiety symptoms, confidence and overall happiness etc., which are measured on a four-point scale (1 'less than usual', 2 'no more than usual', 3 'rather more than usual', and 4 'much more than usual'). Next, 1 and 2 are recoded to 0, and 3 and 4 are recoded to 1 (James et al., 2013). Finally, the values of the 12 questions are then summed, resulting in a scale ranging from 0 (the least severe psychiatric disorder) to 12 (the most severe psychiatric disorder). GHQ-12 score equal to 4 or more indicates caseness of general psychiatric disorders (Goldberg and Williams, 1988).

In addition, we have controlled for a number of socio-demographic and health characteristics. For categorical variables containing more than two categories, we create dummy variables (n) and entered $n-1$ dummy variables into the model with the omitted one being the reference category. *Sex* is a binary variable consisting of "male" (reference group) and "female". *Age* is divided into 5 categories: "18–30" (reference group), "31–40", "41–50", "51–65", and "over 65". It is treated as a categorical variable to provide more information on each age group. *Country of residence* includes four categories: "England" (reference group), "Wales", "Scotland" and "Northern Ireland". Presence of past and current COVID-19-related symptoms is measured by three categories: "No" (reference group), "Ever had symptoms", and "currently have symptoms". Whether live with a partner consists of two categories: "Yes" (reference group) and "No". Employment status consists of two categories: "Employed" (reference group) and "Not employed". For more details about distribution of each variable, see Table A1 in Online Supplementary Material.

2.4. Statistical analyses

First, we conduct weighted univariate analyses to explore the differences in general psychiatric disorders and loneliness across different groups. Second, we run weighted multiple regression models to account for covariates (Ordinary Least Squares (OLS) regression for the continuous GHQ-12 score; logistic regression for binary GHQ-12 caseness; ordered logistic regression for ordinal outcome of loneliness). All regression models are established using entry method with all covariates being entered into models at the same time. We have also conducted a number of diagnostic tests and find that most assumptions of multiple regression are met (such as normality of residuals, no multicollinearity). One exception is that the variance of the residual is not homogeneous (Breusch-Pagan / Cook-Weisberg test, $p < 0.05$). Thus, we use robust standard errors in all analyses to control for heteroskedasticity.

3. Results

Table 1 shows the prevalence of psychiatric disorders among the whole UK population and sub-population groups, and reports results of T -tests, ANOVA F -tests and Chi-squared tests to compare prevalence of psychiatric disorder across different population groups. First, we find that the population average GHQ-12 score is 2.73 (SD = 3.26) and 29.20% of the population have caseness of psychiatric disorders. However, there are no significant differences across different UK

Table 1
Prevalence of General Psychiatric Disorders in the UK during COVID-19.
Source: Understanding Society COVID-19 Study.

| | GHQ-12 score (M, SD) | T/F tests | GHQ-12 caseness ratio (%) | χ^2 tests |
|---------------------------|----------------------|-------------|---------------------------|----------------|
| General population | 2.73 (3.26) | | 29.20 | |
| Regions | | $p = 0.491$ | | $p = 0.879$ |
| England | 2.73 (3.26) | | 29.10 | |
| Wales | 2.75 (3.38) | | 28.88 | |
| Scotland | 2.82 (3.31) | | 30.06 | |
| Northern Ireland | 2.58 (3.32) | | 29.70 | |
| COVID-19-related symptoms | | $p < 0.001$ | | $p < 0.001$ |
| Never | 2.63 (3.21) | | 27.99 | |
| Ever had symptoms | 3.29 (3.46) | | 35.81 | |
| Currently have symptoms | 4.89 (4.06) | | 54.50 | |
| Sex | | $p < 0.001$ | | $p < 0.001$ |
| Male | 2.05 (2.89) | | 21.02 | |
| Female | 3.22 (3.42) | | 35.07 | |
| Age groups | | $p < 0.001$ | | $p < 0.001$ |
| 18–30 | 3.71 (3.60) | | 42.36 | |
| 31–40 | 3.37 (3.59) | | 37.56 | |
| 41–50 | 2.86 (3.28) | | 31.26 | |
| 51–65 | 2.61 (3.25) | | 27.34 | |
| 65+ | 2.00 (2.69) | | 19.11 | |
| Live with a partner | | $p < 0.001$ | | $p < 0.001$ |
| Yes | 2.50 (3.11) | | 26.31 | |
| No | 3.35 (3.57) | | 36.81 | |
| Employment status | | $p = 0.006$ | | $p < 0.001$ |
| Employed | 2.64 (3.32) | | 27.17 | |
| Not employed | 2.79 (3.24) | | 30.47 | |
| $N = 15,530$ | | | | |

regions. Next, people who ever had or currently have COVID-19-related symptoms tend to have significantly higher GHQ-12 psychiatric disorder scores or caseness ratio than those who never had these symptoms. In addition, people who are female and younger tend to have significantly higher GHQ-12 psychiatric disorder scores and caseness ratio than their counterparts. Also, those who live with a partner and employed tend to have significantly lower GHQ-12 psychiatric disorder scores and caseness ratio than those who live alone and non-employed.

Table 2 reports results of Chi-squared tests to explore differences in frequency of loneliness between different socio-demographic groups. Overall, we find that people who ever had or currently have COVID-19-related symptoms tend to have significantly higher levels of loneliness than those who never had these symptoms. The frequency of loneliness does not significantly vary across different UK regions. In terms of demographic disparities in loneliness, females and younger people have significantly higher frequencies of loneliness than their counterparts. In contrast, people who live with a partner have significantly lower frequencies of loneliness than their counterparts. Finally, those who are out of work are more likely to often feel lonely, but also more likely to never feel lonely. Because the results do not account for various confounders, the effects of employment, as well as other predictors, on loneliness need to be further investigated with multiple regression.

Table 3 uses OLS multivariate regression analyses to explore the effects of COVID-19-related symptoms and socio-demographic characteristics on GHQ-12 psychiatric disorders caseness scores. Both model Chi-squared and F statistics are statistically significant, suggesting that the fitness of the model is significantly better than null model with only constant. Both raw and standardized coefficients show that females have significantly higher levels of psychiatric disorders than males. Compared with people aged 18–30, people aged 41–50, 51–64 or 65+ have significantly lower levels of psychiatric disorders. We also find that people who live with a partner and are in paid employment have significantly lower levels of psychiatric disorders than those who do not live with a partner and are out of work. Moreover, compared with

Table 2
Prevalence of Loneliness in the UK during COVID-19.
Source: Understanding Society COVID-19 Study.

| | Frequency of feeling lonely (%) | | | χ^2 tests |
|--------------------------------|---------------------------------|-----------|-------|----------------|
| | Never | Sometimes | Often | |
| General population | 64.14 | 28.63 | 7.22 | |
| Regions | | | | $p = 0.300$ |
| England | 64.49 | 28.36 | 7.15 | |
| Wales | 63.35 | 28.34 | 8.32 | |
| Scotland | 63.08 | 29.55 | 7.37 | |
| Northern Ireland | 60.90 | 32.24 | 6.87 | |
| Have COVID-19-related symptoms | | | | $p < 0.001$ |
| Never | 65.07 | 28.14 | 6.79 | |
| Ever had symptoms | 59.00 | 31.83 | 9.17 | |
| Currently have symptoms | 45.50 | 34.50 | 20.00 | |
| Sex | | | | $p < 0.001$ |
| Male | 73.32 | 22.04 | 4.64 | |
| Female | 57.56 | 33.37 | 9.08 | |
| Age groups | | | | $p < 0.001$ |
| 18–30 | 39 | 44.99 | 16.01 | |
| 31–40 | 55.75 | 35.13 | 9.12 | |
| 41–50 | 65.29 | 28.63 | 6.09 | |
| 51–65 | 69.72 | 24.22 | 6.06 | |
| 65+ | 73.48 | 22.41 | 4.11 | |
| Live with a partner | | | | $p < 0.001$ |
| Yes | 72.39 | 23.64 | 3.96 | |
| No | 42.42 | 41.77 | 15.81 | |
| Employment status | | | | $p < 0.001$ |
| Employed | 63.55 | 29.82 | 6.63 | |
| Not employed | 65.09 | 26.73 | 8.18 | |
| $N = 15,530$ | | | | |

people without COVID-19-related symptoms, people who ever had symptoms, and especially people who currently have symptoms have significantly higher levels of psychiatric disorders. Finally, there are no significant differences between different UK countries. Overall, 8% (R-squared) variance of psychiatric disorders can be explained by these COVID-19-related symptoms and socio-demographic characteristics.

Table 4 uses logistic multivariate regression analyses to explore the net effects of COVID-19-related symptoms and socio-demographic characteristics on GHQ-12 psychiatric disorders caseness. Both model Chi-squared and F statistics are statistically significant, suggesting that the fitness of the model is significantly better than null model with only constant. In terms of socio-demographic differences, both raw and standardized odds ratios show that females and younger people have significantly higher odds of developing psychiatric disorders caseness than males and older people. We also find that people who live with a partner and are in paid employment have significantly lower odds of developing psychiatric disorders caseness than those who do not live with a partner and are out of work. Moreover, compared with people without COVID-19-related symptoms, people who ever had symptoms, and especially people who currently have symptoms have significantly higher odds of developing psychiatric disorders caseness. Finally, there are no significant differences between different UK countries. Overall, 5% (pseudo R-squared) variance of psychiatric disorders caseness can be explained by these COVID-19-related symptoms and socio-demographic characteristics.

Table 5 uses ordered logistic multivariate regression analyses to explore the net effects of COVID-19-related symptoms and socio-demographic characteristics on loneliness. Both model Chi-squared and F statistics are statistically significant, suggesting that the fitness of the model is significantly better than null model with only constant. In terms of socio-demographic differences, both raw and standardized odds ratios show that females and younger people have significantly higher odds of loneliness than males and older people. We also find that people who live with a partner and are in paid employment have significantly lower odds of frequent loneliness than those who do not live with a partner and are out of work. Moreover, compared with people

Table 3
Weighted Ordinary Least Squares (OLS) Models Predicting Severity of General Psychiatry Disorders (GHQ-12 scores).

| | Unstandardized coefficients | Standardized coefficients | Standard errors | T statistics | p-values | 95% confidence intervals (lower and upper bound) | |
|--|-----------------------------|---------------------------|-----------------|--------------|----------|--|-------|
| Sex (Ref. = Male) | 1.04 | 0.15 | 0.08 | 13.26 | 0.000 | 0.89 | 1.19 |
| Age groups (Ref. = 18–30) | | | | | | | |
| 31–40 | 0.06 | 0.00 | 0.19 | 0.32 | 0.748 | –0.31 | 0.43 |
| 41–50 | –0.49 | –0.06 | 0.17 | –2.97 | 0.003 | –0.82 | –0.17 |
| 51–64 | –0.82 | –0.11 | 0.15 | –5.48 | 0.000 | –1.11 | –0.53 |
| 65+ | –1.86 | –0.22 | 0.17 | –10.72 | 0.000 | –2.20 | –1.52 |
| Live with partner (Ref. = Yes) | 0.54 | 0.08 | 0.10 | 5.52 | 0.000 | 0.35 | 0.73 |
| Employment status (Ref. = Employed) | 0.69 | 0.08 | 0.13 | 5.50 | 0.000 | 0.44 | 0.93 |
| Have COVID-19-related symptoms (Ref. = No) | | | | | | | |
| Ever had symptoms | 0.63 | 0.05 | 0.14 | 4.46 | 0.000 | 0.35 | 0.91 |
| Currently have symptoms | 1.53 | 0.07 | 0.39 | 3.93 | 0.000 | 0.77 | 2.29 |
| Regions (Ref. = England) | | | | | | | |
| Wales | 0.12 | 0.00 | 0.22 | 0.54 | 0.587 | –0.31 | 0.54 |
| Scotland | 0.18 | 0.01 | 0.14 | 1.27 | 0.204 | –0.10 | 0.47 |
| Northern Ireland | –0.15 | –0.01 | 0.27 | –0.57 | 0.570 | –0.68 | 0.38 |
| Constant | 2.46 | | 0.15 | 16.22 | 0.000 | 2.16 | 2.76 |

Note. R squared = 0.08, Chi2 (12) = 543.72, Prob > Chi2 = 0.000, F(12, 2155) = 45.31, Prob > F = 0.000, *** p<0.001, ** p<0.01, * p<0.05.

without COVID-19-related symptoms, people who ever had symptoms, and especially people who currently have symptoms have significantly higher odds of frequent loneliness. Finally, there are no significant differences between different UK countries. Overall, 8% (pseudo R-squared) variance of loneliness can be explained by these COVID-19-related symptoms and socio-demographic characteristics.

4. Discussion

Despite ample research on the prevalence of specific psychiatric disorders during COVID-19, we know little about how the pandemic could affect a wider population in broader ways. The study examines the prevalence and predictors of general psychiatric disorders and loneliness in a developed country. Using nationally representative survey data from 15,530 respondents in the United Kingdom, the study documents the high prevalence rates of general psychiatric disorders (29.2%) and loneliness (35.86%) during the COVID-19 pandemic. It also shows that people with current or past COVID-19-related symptoms or various disadvantaged socioeconomic backgrounds are at significantly higher risks of general psychiatric disorders and loneliness. It contributes to the extant literature and informs public health policies in five distinctive ways.

First, the high prevalence rate of general psychiatric disorders from

April 24th to 30th, 2020 lends support to numerous studies on the impact of COVID-19 on mental health (Qiu et al., 2020). It also extends previous research on more specific and severe psychiatric disorders (Huang and Zhao, 2020; Liu et al., 2020; Voitsidis et al., 2020) by showing that nearly one-third of the population are affected by COVID-19 in various forms and to different degrees. Although the minor psychiatric disorders are often less urgent concerns of the public health policies, they are not negligible given the large proportion of the population that have been affected. Only focusing on specific disorders underestimates the psychiatric burdens of the pandemic in more subtle forms and overlooks the needs for psychiatric care of the people who have not been clinically diagnosed.

Second, the prevalence rate of loneliness, an example of minor psychological problem, is high three months after the first case of COVID-19 in the United Kingdom. Over one-third of the respondents sometimes or often feel lonely. This could have arisen from such disease control measures as social distancing, lockdown and quarantine (Tull et al., 2020). It has been repeatedly argued that social isolation during COVID-19 increases loneliness (Killgore et al., 2020a), for which the study offers empirical support using a large-scale, nationally representative survey. Loneliness is linked to long-term health outcomes including all-cause mortality (Step toe et al., 2013), so public health policies need to be aware of the (mental) health consequences of the

Table 4
Weighted Logistic Models Predicting General Psychiatry Disorders Caseness (GHQ-12 >= 4).

| | Unstandardized odds ratios | Standardized odds ratios | Standard errors | T statistics | p-values | 95% confidence intervals (lower and upper bound) | |
|--|----------------------------|--------------------------|-----------------|--------------|----------|--|------|
| Sex (Ref. = Male) | 1.86 | 1.36 | 0.10 | 11.03 | 0.000 | 1.67 | 2.08 |
| Age groups (Ref. = 18–30) | | | | | | | |
| 31–40 | 1.02 | 1.00 | 0.11 | 0.17 | 0.862 | 0.82 | 1.26 |
| 41–50 | 0.73 | 0.90 | 0.07 | –3.14 | 0.002 | 0.60 | 0.89 |
| 51–64 | 0.59 | 0.80 | 0.05 | –5.95 | 0.000 | 0.50 | 0.70 |
| 65+ | 0.32 | 0.62 | 0.03 | –10.81 | 0.000 | 0.26 | 0.39 |
| Live with partner (Ref. = Yes) | 1.38 | 1.17 | 0.09 | 5.11 | 0.000 | 1.22 | 1.56 |
| Employment status (Ref. = Employed) | 1.36 | 1.13 | 0.10 | 4.24 | 0.000 | 1.18 | 1.57 |
| Have COVID-19-related symptoms (Ref. = No) | | | | | | | |
| Ever had symptoms | 1.38 | 1.09 | 0.11 | 3.9 | 0.000 | 1.17 | 1.63 |
| Currently have symptoms | 2.05 | 1.13 | 0.46 | 3.18 | 0.001 | 1.32 | 3.20 |
| Regions (Ref. = England) | | | | | | | |
| Wales | 1.04 | 1.00 | 0.14 | 0.31 | 0.758 | 0.80 | 1.37 |
| Scotland | 1.08 | 1.02 | 0.10 | 0.81 | 0.419 | 0.90 | 1.29 |
| Northern Ireland | 1.02 | 1.00 | 0.17 | 0.12 | 0.906 | 0.73 | 1.42 |
| Constant | 0.35 | 1.36 | 0.03 | –10.93 | 0.000 | 0.29 | 0.42 |

Note. Pseudo R squared = 0.05, Chi2 (12) = 402.36, Prob > Chi2 = 0.000, F(12, 2155) = 33.53, Prob > F = 0.000, *** p<0.001, ** p<0.01, * p<0.05.

Table 5
Weighted Ordered Logistic Models Predicting Frequency of Loneliness.

| | Unstandardized odds ratios | Standardized odds ratios | Standard errors | T statistics | p-values | 95% confidence intervals (lower and upper bound) | |
|--|----------------------------|--------------------------|-----------------|--------------|----------|--|------|
| Sex (Ref. = Male) | 1.79 | 1.32 | 0.10 | 10.86 | 0.000 | 1.61 | 1.99 |
| Age groups (Ref. = 18–30) | | | | | | | |
| 31–40 | 0.83 | 0.96 | 0.09 | −1.72 | 0.085 | 0.68 | 1.03 |
| 41–50 | 0.57 | 0.82 | 0.06 | −5.63 | 0.000 | 0.47 | 0.70 |
| 51–64 | 0.47 | 0.69 | 0.04 | −8.75 | 0.000 | 0.39 | 0.55 |
| 65+ | 0.29 | 0.59 | 0.03 | −11.46 | 0.000 | 0.23 | 0.35 |
| Live with partner (Ref. = Yes) | 3.22 | 1.67 | 0.19 | 19.68 | 0.000 | 2.87 | 3.62 |
| Employment status (Ref. = Employed) | 1.40 | 1.16 | 0.11 | 4.25 | 0.000 | 1.20 | 1.63 |
| Have COVID-19-related symptoms (Ref. = No) | | | | | | | |
| Ever had symptoms | 1.21 | 1.07 | 0.10 | 2.38 | 0.018 | 1.03 | 1.42 |
| Currently have symptoms | 2.10 | 1.10 | 0.51 | 3.08 | 0.002 | 1.31 | 3.37 |
| Regions (Ref. = England) | | | | | | | |
| Wales | 1.29 | 1.02 | 0.17 | 1.9 | 0.057 | 0.99 | 1.68 |
| Scotland | 1.12 | 1.03 | 0.11 | 1.06 | 0.288 | 0.91 | 1.36 |
| Northern Ireland | 1.26 | 1.02 | 0.22 | 1.31 | 0.190 | 0.89 | 1.77 |
| Constant cut1 | 0.79 | | 0.09 | 8.63 | 0.000 | 0.61 | 0.98 |
| Constant cut2 | 2.90 | | 0.10 | 28.76 | 0.000 | 2.71 | 3.10 |

Note. Pseudo R squared = 0.08, Chi2 (12) = 2173.06, Prob > Chi2 = 0.000, F(12, 2155) = 181.19, Prob > F = 0.000, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

disease control measures, especially in the developed countries where disruption of social lives could be more abrupt (Jia et al., 2020).

Third, because the respondents were recruited before the pandemic and were asked about COVID-19-related symptoms rather than diagnoses, we obtained a large enough sample size to compare suspected patients with the general population. People with current or past symptoms of COVID-19 are significantly more likely to develop general psychiatric disorders, perhaps because they are anxious about possible infection and its potentially fatal consequences. They are also more likely to feel lonely, possibly as a result of quarantine or isolation from family and friends. In sum, the results evidence the urgent psychiatric needs of suspected patients.

Fourth, risk factors for psychiatric disorders are examined during the pandemic. Consistent with previous research, being female is a significant predictor of general psychiatric disorders and loneliness (Liu et al., 2020). Contrary to the popular belief (Meng et al., 2020), compared to people ages 18 to 30, older age groups are significantly less likely to feel lonely or develop psychiatric disorders, perhaps because younger people's economic and social lives are more disrupted by a public health crisis (Cao et al., 2020).

Finally, the study identifies two social determinants of general psychiatric disorders and loneliness during COVID-19. Having a job and living with a partner are both significant protective factors for general psychiatric disorders and loneliness. Moving beyond individual demographics, further studies could explore how social support from work and family buffer the psychological impacts of a pandemic (Cao et al., 2020; Kawohl and Nordt, 2020; Killgore et al., 2020b).

A limitation of the study is that we cannot make a causal claim with the cross-sectional design. Further research could use panel data to improve causal inference. With such data, they could also study incidence rates in addition to prevalence rates, offering an accurate assessment of the mental health consequences that are directly attributed to the COVID-19 pandemic. Moreover, our single-question measurement of loneliness could be validated in future research or compared to other validated measures such as the full-length UCLA Loneliness Scale.

In all, future research and public health policies need to move beyond specific psychiatric disorders to attend to the general psychiatric disorders and loneliness of a larger proportion of the population. They need to pay special attention to vulnerable populations including women, the younger, the unemployed, those not living with a partner, and those who have or had COVID-19 symptoms. A pandemic like COVID-19 could exaggerate social disparities in mental health in subtle ways, calling for research on effective interventions such as mindfulness

mediation-based stress reduction and timely provision of psychiatric services (Duan and Zhu, 2020).

Declaration of Competing Interest

There are no conflicts of interest.

Funding information

This research was partly funded by The Major Project of the National Social Science Fund of China (No. 19ZDA149) at Nanjing University, China.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.113267.

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