Title

Posttraumatic stress symptoms and associated comorbidity during the COVID-19 pandemic in Ireland: A population based study

Short title

PTSD during the COVID-19

Authors

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Abstract

The prevalence of posttraumatic stress disorder (PTSD) as it relates to people's experiences of the COVID-19 pandemic has yet to determined. This study was conducted to determine rates of COVID-19 related PTSD in the Irish general population, the level of comorbidity with depression and anxiety, and sociodemographic risk factors associated with COVID-19 related PTSD. A nationally representative sample of adults from the general population of the Republic of Ireland (N = 1,041) completed self-report measures of all study variables. The rate of COVID-19 related PTSD was 17.7% (95% CI = 15.35 - 19.99%: n=184), and comorbidity with generalized anxiety (49.5%) and depression (53.8%) was high. Meeting the diagnostic requirement for COVID-19 related PTSD was associated with younger age, male sex, living in a city, living with children, moderate and high perceived risk of COVID-19 infection, and screening positive for anxiety or depression. Traumatic stress problems related to the COVID-19 pandemic are common in the general population. Our results show that health professionals responsible for responding to the COVID-19 pandemic should expect to routinely encounter traumatic stress problems.

Key words: COVID-19; posttraumatic stress disorder; risk-factors; pandemic.

Traumatic stress disorders are relatively common in the general population (Brewin et al., 2017), and a recent study found that in 2019 approximately 13% of the general adult population of the Republic of Ireland were suffering from a traumatic stress disorder (Hyland et al., 2020). In the 11th version of the International Classification of Diseases (ICD-11) (WHO, 2018), Posttraumatic Stress Disorder (PTSD) is described in terms of six core symptoms distributed across three clusters including re-experiencing in the here and now, avoidance of reminders, and hyperarousal. PTSD is a chronic disorder with research suggesting that approximately 40% of affected persons continue to exhibit significant symptoms ten years after its onset (Kessler et al., 1995). Those with PTSD are between two and six times more likely to present with psychiatric comorbidities including depression, anxiety, and suicidality (Bresleau et al., 1991; Karatzias et al., 2019). PTSD has also been shown to be associated with significant economic costs due to work impairment, hospitalization, and health visits (Ferry et al., 2015). Thus, early intervention and appropriate management of PTSD is important.

Data derived from previous outbreaks of respiratory infections such as the Severe Acute Respiratory Syndrome (SARS) demonstrate that being infected, or the threat of being infected, can be a potentially traumatic event and increase risk of PTSD (Mak et al., 2009; Cheng et al., 2006; Wu et al., 2009). The COVID-19 pandemic represents a threatening and potentially traumatic event as it can lead to hospitalisation and even death. Many governments, including in the Republic of Ireland, imposed extensive restrictions on freedom of movement, the closure of non-essential businesses, and the requirement to stay at home and restrict social contact to slow the spread of the contagion. We are unaware of any studies that have published findings on rates of PTSD in the general population in the context of the COVID-19 pandemic. Our own research group conducted parallel surveys of the general adult populations of the United Kingdom (UK) and the Republic of Ireland, and we have

reported elsewhere that 16.79% (95% CI = 15.16-18.42%) of adults in the UK screened positive for PTSD specifically related to their experiences with COVID-19 (Shevlin et al., under review). We also found that younger age, male sex, urban dwelling, having a higher number of children living in the home, lower income, and moderate and high perceived risk of becoming infected with COVID-19 were significantly associated with screening positive for COVID-19 related PTSD.

The current study was conducted to investigate three objectives. First, we sought to determine what proportion of the general adult population of Ireland screened positive for PTSD specifically related to their experiences of COVID-19 pandemic. Second, we sought to determine the levels of comorbidity for COVID-19 related PTSD with major depression and generalized anxiety. Third, we sought to identify the key sociodemographic risk factors associated with screening positive for COVID-19 related PTSD, with and without controlling for anxiety and depression.

Method

Participants and procedure

Participants (N = 1,041) were recruited by the survey company Qualtrics using stratified quota sampling to ensure that the sample characteristics of sex, age, and region of Ireland matched known population parameters from the 2016 Irish census. Data collection started on 31st March 2020, 31 days after the first confirmed case of COVID-19 in the Republic of Ireland, 19 days after the first physical distancing measures were enacted (i.e., closure of all childcare and educational facilities), and two days after the Taoiseach (the Republic of Ireland's Prime Minister) announced that people were not to leave their homes. The survey was completed on the 5th of April 2020. Participants had to be aged 18 years or older at the time of the survey and be able to complete the survey in English. Participants were contacted by the survey company via email and requested to participate. If consenting,

participants completed the survey online (median time of completion = 37.52 minutes) and were reimbursed by the survey company for their time. Ethical approval for the study was granted by the ethical review board of the REMOVED FOR REVIEW. The sample characteristics are presented in Table 1.

Measures

Traumatic stress: The International Trauma Questionnaire (Cloitre et al., 2018) is a self-report measure of ICD-11 PTSD. Participants were asked to answer the six PTSD symptom items "…in relation to your experience of the COVID-19 pandemic" and to "…indicate how much you have been bothered by that problem in the past month". The PTSD symptoms are accompanied by three items measuring functional impairment caused by these symptoms. All items are answered on a five-point Likert scale ranging from 0 (*Not at all*) to 4 (*Extremely*), and a response of ≥ 2 (*Moderately*) is considered 'endorsement' of a symptom. A probable PTSD diagnosis requires at least one symptom to be endorsed from each symptom cluster and endorsement of at least one indicator of functional impairment. The psychometric properties of the ITQ scores have been demonstrated in multiple general population (Ben-Ezra et al., 2017; Cloitre et al., 2019) and clinical and high-risk samples (Hyland et al., 2017; Karatzias et al., 2016). The reliability of the PTSD items in this sample was high (α = .93).

Depression: The *Patient Health Questionnaire-9* (PHQ-9) (Kroenke et al., 2001) was used to screen participants for major depression. Respondents indicate how often they have been bothered by each symptom over the last two weeks using a four-point Likert scale ranging from 0 (*Not at all*) to 3 (*Nearly every day*). To identify participants likely to meet the criteria for probable major depression, a cut-off score of $\geq$ 10 was used (Kroenke et al., 2001). This cut-off produces good sensitivity (.85) and specificity (.89). The psychometric

properties of the PHQ-9 scores have been widely supported (Manea et al., 2012) and the reliability in the current sample was excellent (α = .91).

Generalized anxiety: Symptoms of generalized anxiety disorder were measured using the *Generalized Anxiety Disorder 7-item Scale* (GAD-7) (Spitzer et al., 2006). Participants indicate how often they have been bothered by each symptom over the last two weeks on a four-point Likert scale (0 = *Not at all*, to 3 = *Nearly every day*). A cut-off score of $\geq$ 10 was used, and this has been shown to have good sensitivity (.89) and specificity (.82) (Spitzer et al., 2006). The GAD-7 has been shown to produce reliable and valid scores in community studies (Hinz et al., 2017), and the reliability in the current sample was excellent (α = .94).

Data analysis

The proportion of the sample who met the diagnostic requirements for COVID-19 related probable PTSD was first calculated. Rates of comorbidity for PTSD with depression and generalized anxiety were assessed using a chi-square test. Two binary logistic regression models were used to identify the risk factors associated with screening positive for COVID-19 related PTSD. In the first model the predictor variables were age, sex (0 = males, 1 = females), urban dwelling (1 = City, 0 = Town, Suburb, or Rural), lost income due to COVID-19 ("My household has lost income because of the coronavirus COVID-19 pandemic": 1 = Yes, 0 = No), having children living at home (1 = Yes, 0 = No), being the lone adult in the household (1 = no other adult living in household, 0 = other adult(s) living in household), having a pre-existing health problem ("Were you diagnosed with a health condition (e.g. heart or lung disease; diabetes; cancer) before December 31st 2019 (i.e. before the start of the coronavirus COVID-19 outbreak)?": 1 = Yes, 0 = No), and perceived risk of infection ("What do you think is your personal percentage risk of being infected with the COVID-19 virus over the next month?" on a 0-100 scale: recoded as 'Low' (0 - 33), 'Moderate' (34 -

67), and ‘High’ (68 - 100)). In the second model, a variable representing those participants who met the criteria for either anxiety or depression was added as a predictor.

Results

The mean COVID-19 related PTSD symptom score was 5.07 (*Mdn* = 3.00, SD = 5.64, range = 0-24). In total, 17.7% (95% CI = 15.35 - 19.99%) of the sample met the diagnostic requirements for COVID-19 related PTSD. Of those who screened positive for PTSD, 53.8% met the criteria for depression (χ^2 (1) = 122.45, $p < .001$), 49.5% met the criteria for generalized anxiety (χ^2 (1) = 121.45, $p < .001$), and 60.3% met the criteria for either anxiety or depression (χ^2 (1) = 119.13, $p < .001$).

The binary logistic regression model of COVID-19 related PTSD was statistically significant (χ^2 (13) = 178.73, $p < .001$), as was the model when the anxiety/depression variable was added as a predictor (χ^2 (14) = 229.94, $p < .001$). The unadjusted and adjusted odds ratios are presented in Table 2. Without controlling for anxiety/depression, the three oldest age categories were less likely to screen positive for COVID-19 related PTSD compared to those in the 18-24 age category. Additionally, living in a city (AOR = 1.78), having children living at home (AOR = 1.46), having a pre-existing health condition (AOR = 1.67), and perceiving your risk of COVID-19 infection in the next month as moderate (AOR = 2.65) and high (AOR = 5.66) were also associated with screening positive for COVID-19 related PTSD. When the anxiety/depression variable was added to the model the estimates remained similar; the coefficient for the 45-54 year age band became non-significant, the coefficient for sex became significant indicting a lower risk for females, and the adjusted odds ratio for the anxiety/depression variable was high (AOR = 4.03).

Discussion

In this study we set out to determine the level of COVID-19 related traumatic distress in the general population of the Republic of Ireland, and to identify key risk factors associated with experiencing traumatic distress related to the pandemic. We found that just under one-in-five people (17.67%) met diagnostic requirements for PTSD. This figure is somewhat higher than the rate of traumatic stress disorders that was reported in the general adult population of Ireland in 2019 (i.e., 13.2%) (Hyland et al., 2020), but it is extremely similar to findings from our parallel survey conducted in the UK (16.79%) (Shevlin et al., under review). The current survey and the parallel survey in the UK were carried out within the first week of the lockdown measures being enacted. Thus, it appears that a significant proportion of the general adult populations of Ireland and the UK are being affected by COVID-19 related traumatic stress, and that rates of traumatic distress may have increased slightly during the initial lockdown period. Given the well-established capacity for humans to adapt to major stressful life events, this minor increase in rates of traumatic stress disorders is likely to be transitory, although further research is required to delineate the long term effects of COVID-19 pandemic. Following these participants across the pandemic – which our research group will do – will reveal if rates of traumatic stress decline as time proceeds. Nonetheless, even what current and past results (Hyland et al., 2020) show is that a significant proportion of the adult general population of the Republic of Ireland suffer from trauma-based psychopathology.

Consistent with the wider trauma and PTSD literature (Karatzias et al., 2019), high levels of comorbidity with depression and generalized anxiety were evidenced for those who screened positive for COVID-19 related PTSD. Approximately half of all of those people who met diagnostic requirements for COVID-19 related PTSD also screened positive for depression, and also for generalized anxiety. These results indicate that those experiencing

traumatic stress about the COVID-19 pandemic are likely to be suffering from an array of mental health problems such as anxiety and depression. The results from the binary logistic regression also indicate that co-occurring anxiety or depression may be an additional risk factor for PTSD.

The results of the binary logistic regression analysis indicated that screening positive for COVID-19 related PTSD was associated with younger age, urban dwelling, having children at home, having an existing health condition that increases risk of mortality from COVID-19, and having moderate and high perceived risk of COVID-19 infection within the next month. These findings were extremely consistent with our findings in the UK, and with the exception of having a pre-existing health condition, each of these variables were associated with COVID-19 related PTSD in the UK (Shevlin et al., under review). Notably, the dose-response effect observed in the current study for moderate and high levels of perceived risk of COVID-19 infection was also evidenced in the UK sample, and in these analyses remained significant after controlling for anxiety and depression. These findings are also consistent with findings during the SARS epidemic (Mak et al., 2009; Cheng et al., 2006; Wu et al., 2009). These findings may be used by public health officials to identify people more effectively in different parts of society at risk of developing traumatic stress problems in response to the current pandemic.

Several limitations should be noted. Firstly, all mental health problems were assessed using self-report measures, therefore, the extent to which people's PTSD symptoms were directly tied to the COVID-19 pandemic could not be ascertained. Secondly, we only assessed PTSD symptoms in relation to the current pandemic and we did not also assess history of exposure to other traumatic events or previous PTSD diagnosis. Third, the current sample was drawn for the general adult population and was not inclusive of members of the population who were institutionalised at the time of the survey. Populations in hospitals,

prisons, and refugee centres, for example, are all known to have higher rates of PTSD and this poses a threat to the generalizability of these findings.

Despite these limitations, the current study provides important and novel information about the rates of traumatic stress problems in the population related to the COVID-19 pandemic. Taking these findings in conjunction with our highly congruent results from the UK general population, we can confidently conclude that approximately 17% of adults in the general population are reporting clinically relevant signs of PTSD. Furthermore, having traumatic stress problems is associated with younger age, living with children, living in a city, having an existing chronic health problem, and higher levels of perceived vulnerability to COVID-19. Clinicians and public health officials who will be responsible for the mental health response to COVID-19 should be aware that many people that they will encounter, and many people in society, will be suffering from PTSD.

Conflicts of interest

None

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Table 1. Sociodemographic characteristics of the Republic of Ireland sample.

	%
Sex	
Female	51.5
Male	48.2
Age	
18-24	11.1
25-34	19.2
35-44	20.6
45-54	15.9
55-64	21.0
65+	12.2
Birthplace	
Ireland	70.7
Region of Ireland	
Leinster	55.3
Munster	27.3
Connaught	12.0
Ulster	5.4
Ethnicity	
Irish	74.8
Irish Traveller	0.3
Other White background	17.3
African	1.9
Other Black background	0.3

Chinese	0.4
Other Asian	3.2
Mixed Background	1.8
Living location	
City	24.5
Suburb	18.1
Town	26.8
Rural	28.8
Highest Education	
No qualification	1.2
Finished mandatory schooling	6.4
Finished secondary school	22.4
Undergraduate degree	22.5
Postgraduate degree	19.8
Other technical qualification	27.9
2019 income	
0-€19,999	24.6
€20,000-€29,999	21.3
€30,000-€39,999	19.5
€40,000-€49,999	12.7
€50,000+	21.9
Employment status	
Full-time (self)/employed	43.3
Part-time (self)/employed	15.7
Retired	15.0

Unemployed	8.4
Student	6.3
Unemployed (disability or illness)	5.6
Unemployed due to COVID-19	5.7
Religion	
Christian	69.8
Muslim	1.6
Jewish	0.2
Hindu	1.1
Buddhist	0.6
Sikh	0.1
Other religion	3.8
Atheist	15.3
Agnostic	7.5
Lone adult in household	
Yes	18.4
Children in the household	
Yes	39.7

Table 2. Binary Logistic Regression Results Predicting COVID-19 related PTSD Status (N = 1,041).

	N	**PTSD** N (%)	**Unadjusted OR**	**Adjusted OR[a]**	**Adjusted OR[b]**
Age					
18-24	116	31 (26.7%)	-	-	-
25-34	200	64 (32.0%)	1.290 (.777 - 2.143)	1.013 (.581 - 1.767)	1.268 (.710 - 2.264)
35-44	214	48 (22.4%)	.793 (.471 - 1.336)	.641 (.363 - .132)	.942 (.517 -1.715)
45-54	165	25 (15.2%)	.490 (.271 - .885)*	.414 (.217 - .789)**	.668 (.342 -1.305)
55-64	219	14 (6.4%)	.187 (.095 - .370)***	.182 (.087 - .381)***	.323 (.150 -.695)**
65+	127	2 (1.6%)	.044 (.010 - .188)***	.045 (.010 - .200)*	.088 (.019 -.402)***
Sex					
Male	502	97 (19.3%)	-	-	-
Female	536	87 (16.2%)	.809 (.588 - 1.113)	.699 (.488 - 1.003)	.608 (.417 -.888)*
Living location					
Suburb, Town, Rural	786	111 (14.1%)	-	-	-
City	255	73 (28.6%)	2.439 (1.740 - 3.419)***	1.776 (1.211 - 2.604)**	1.831 (1.228 -2.730)**
Lost Income					
No	596	84 (14.1%)	-	-	-
Yes	445	100 (22.5%)	1.767 (1.282 - 2.434)**	1.241 (.870 - 1.772)	1.054 (.725 -1.530)
Children at home					
No	628	81 (12.9%)	-	-	-
Yes	413	103 (24.9%)	2.244 (1.625 - 3.098)***	1.460 (1.011 - 2.110)*	1.490 (1.015 - 2.187)*
Lone adult					
No	849	155 (18.3%)	-	-	-
Yes	192	29 (15.1%)	.797 (.517 - 1.227)	1.180 (.723 - 1.925)	1.065 (.639 -1.773)
Pre-existing health condition					
No	867	149 (17.2%)	-	-	-
Yes	174	35 (20.1%)	1.213 (.805 - 1.829)	1.665 (1.034 - 2.679)*	1.601 (.982 -2.610)
Personal Risk 1month					
Low	374	30 (8.0%)	-	-	-

Moderate	448	75 (16.7%)	2.306 (1.473 - 3.609)***	2.645 (1.654 - 4.229)***	2.322 (1.432 -3.768)**
High	219	79 (36.1%)	6.470 (4.068 - 10.291)***	5.664 (3.477 - 9.226)***	4.747 (2.871 -7.851)***
Anxiety/Depression					
No	753	73 (9.7%)	-		-
Yes	288	111 (38.5%)	5.842 (4.164 - 8.195)***		4.032 (2.740 -5.933)***

* p <.05, ** p <.01, ***p <.001. OR^a = multivariate model, OR^b = multivariate model with anxiety/depression variable included.