Routledge
Taylor & Francis Group

Suicide Risk in Individuals With and Without Mental Disorders Before and During the COVID-19 Pandemic: An Analysis of Three Nationwide Cross-Sectional Surveys in Czechia

Alexandr Kasal, Marie Kuklová, Anna Kågström, Petr Winkler & Tomáš Formánek

Published online: 24 Mar 2022.

Submit your article to this journal ⤤

Article views: 1237

View related articles ⤤

View Crossmark data ⤤

Citing articles: 4 View citing articles ⤤

Routledge
Taylor & Francis Group

Suicide Risk in Individuals With and Without Mental Disorders Before and During the COVID-19 Pandemic: An Analysis of Three Nationwide Cross-Sectional Surveys in Czechia

Alexandr Kasal ⅈD, Marie Kuklová, Anna Kågström, Petr Winkler, and Tomáš Formánek

ABSTRACT

Objective: The impact of the coronavirus disease 2019 (COVID-19) pandemic on suicidal thoughts and behavior has been widely hypothesized but remains largely unexplored at the population-level. We aimed to assess changes in suicide risk (SR) in people with and without mental disorders, before and during the COVID-19 pandemic in Czechia.

Methods: We analyzed data from three nationwide cross-sectional surveys of Czech adults (November 2017, May and November 2020). For the 2017 data collection, we employed paper and pencil interviewing, while for the two 2020 data collections, we used a mixed computer-assisted web interviewing and computer-assisted telephone interviewing approach. All samples were representative in terms of age, gender, education, and area of residence for the Czech adult population (18+). We used the Mini International Neuropsychiatric Interview to screen for mental disorders and SR. We calculated weighted prevalence rates with 95% confidence intervals (95% CI).

Results: When compared to baseline, we found a 4% and 6% increase in SR in individuals without mental disorders in pandemic surveys (1.95% (1.45%; 2.44%) vs. 6.29% (5.28%; 7.30%) and 8.42% (7.19%; 9.65%)). Relative to baseline, SR in people with major depressive episode or anxiety disorders was elevated in May and November 2020 (22.35% (17.64%; 27.06%) vs. 36.68% (32.45%; 40.91%) and 38.88% (34.51%; 43.25%)).

Conclusions: We found substantially increased SR in both people with and without mental disorders, however, these changes could be partially related to differing data collection methods used in the baseline and subsequent surveys. Ongoing prevention, monitoring and evaluation of nationwide suicidality is warranted.

HIGHLIGHTS

- We found that suicide risk substantially increased during the pandemic
- Suicide risk was elevated in both individuals with and without mental disorders
- Our findings support increased suicide monitoring and prevention

INTRODUCTION

In the early phases of the 2019 coronavirus disease (COVID-19) pandemic, public health experts expressed serious concerns that the pandemic and associated lockdowns could trigger a worldwide mental health crisis (Galea, Merchant, & Lurie, 2020; UN, 2020). Indeed, results of a recent global meta-analysis indicate a 27.6% and 25.6% increase in the prevalence of major depressive episode and anxiety disorders during the early phases of the pandemic, respectively (Santomauro et al., 2021). In Czechia, the prevalence rate of individuals fulfilling the criteria for at least one mental disorder increased from 20% to nearly 30%, when compared to pre-pandemic estimates (Formánek et al., 2019; Winkler et al., 2020). Following the early phases of the pandemic, the trends in shifting prevalence rates for mental illness have been inconsistent. Some countries report a gradual decrease in the prevalence of mental illness (Fancourt, Steptoe, & Bu, 2021), while others report stable (Knudsen et al., 2021) or persistently elevated rates, including Czechia (Vahratian, Blumberg, Terlizzi, & Schiller, 2021; Wiliams, Davis, Figueira, & Vizard, 2021; Winkler et al., 2021) .

While there is a growing number of studies focused on the impact of the COVID-19 pandemic and associated lockdowns on population mental health, there is limited evidence on its impact on suicide risk (SR) assessed in individuals with and without mental disorders at the population-level. In a Spanish nationally representative sample of 3,500 community-dwelling adults, SR was identified in 9.7% and 1.8% of individuals with and without pre-pandemic history of mental disorders respectively during the first wave of COVID-19 (Mortier et al., 2021). Overall, the prevalence of SR was 4.5%, which is substantially higher than the pre-pandemic estimates of 0.7–0.9% (Miret et al., 2014; Mortier et al., 2021). In a sample of 5,116 Greek adults surveyed during the first lockdown there was a substantial increase of SR in comparison to nationally representative pre-pandemic rates (4.31% and 7.70% vs 2.60%, respectively) (Economou, Angelopoulos, Peppou, Souliotis, & Stefanis, 2016; Papadopoulou et al., 2021). Conversely, in an analysis of repeated cross-sectional, nationally representative surveys of Norwegian adults ($n = 2,154$), there were no differences in the prevalence of suicidal thoughts (ST) observed before and during the pandemic (Knudsen et al., 2021). Moreover, while lacking a pre-pandemic comparator, a study based on 12 nationwide surveys, conducted between April 2021 and December 2021 in Austria, indicated a slight downward trend in ST following the first lockdown (Niederkrotenthaler et al., 2022). In addition, data from 21 countries suggested that in the early months of the pandemic, suicidality remained mostly unchanged (Pirkis et al., 2021). However, in Japan, an increase in suicide rates was found in later phases of the pandemic (Sakamoto, Ishikane, Ghaznavi, & Ueda, 2021; Tanaka & Okamoto, 2021).

There is a lack of population-level studies based on data collected at multiple phases of the pandemic and utilizing an established psychodiagnostics instrument to establish the presence of mental disorders and a reliable pre-pandemic comparator. Using nationwide data from three representative samples of the Czech adult population, collected in November 2017, May, and November 2020, we aimed to assess the population trends in SR in people with and without mental disorders. In addition, we aimed to identify changes in SR within sociodemographic and clinical subgroups.

METHODS

Setting

Czechia is a Central and Eastern Europe country with a population of approximately 10.70 million (CZSO., 2021b). Substantial restrictions of daily life activities were introduced in the response to the ongoing COVID-19 pandemic. During the first wave, a State of Emergency was imposed from March 12th until May 25th, 2020. Schools and non-essential services and businesses were closed. Stay at home orders were put in place, and mask-mandates were implemented in public transport, indoor settings, and places with high concentrations of people. On May 1st, 2020 the cumulative number of COVID-19-related hospitalizations reached 1,177 individuals, with 6 COVID-19 related deaths. At the end of the month (May 31st, 2020), the cumulative number of hospitalizations and deaths reached 1,351 and 252, respectively (MZCR, 2021). A second State of Emergency was imposed from October 5th, 2020 to April 11th, 2021, whereby restrictions implemented during the first wave were reinstated. Nevertheless, the second wave of COVID-19 was substantially more severe than the first, leaving the healthcare system overloaded for months. On November 1st, 2020 the cumulative number of COVID-19-related hospitalizations and deaths reached 22,915 individuals and 3,189 respectively. By November 30th, 2020, the cumulative number of hospitalizations and deaths reached 40,281 and 7,280 individuals, respectively (MZCR, 2021).

Data and Participants

We analyzed data from three nationally representative cross-sectional surveys of Czech community-dwelling adults (18+). The datasets are described in-depth elsewhere (Winkler, Formánek, Mladá, & Cermakova, 2018; Winkler et al., 2020; Winkler et al., 2021). Briefly, a professional agency conducted data collection in November 2017, employing a paper and pencil interviewing (PAPI) method, and a two-stage sampling method (randomly selected individuals from randomly chosen voting districts). The 2017 dataset consisted of 3,306 respondents (response rate (RR) = 75%).

Social distancing requirements effectively prohibited the use of face-to-face interviewing techniques; therefore, the May 2020 study utilized a mix of computer-assisted web interviewing (CAWI) and computer-assisted telephone interviewing (CATI). The procedure consisted of randomly emailing or telephoning individuals present in a database of a data collection agency. The agency recruited members for its database via online and offline methods, such as face-to-face personal inquiries, telephone recruitment, print ads, PPC Google AdWords campaigns, social networks campaigns, recruitment via affiliate programs, and snowball methods (Winkler et al., 2020). The May 2020 dataset consisted of 3,021 participants: 2,114 CAWI (RR = 93%) and 907 CATI (RR = 43%).

The November 2020 survey adhered to social distancing requirements, therefore we had to apply the same mixed methods approach as in the May 2020 survey. Random emailing and telephoning of the members of the database of the same professional agency which was used for the May 2020 survey was employed to recruit respondents. The November 2020 dataset consisted of 3,000 participants: 2,100 CAWI (RR = 94%) and 900 CATI (RR = 41%). All samples were representative in terms of age, gender,

education, and area of residence for the Czech adult population (18+). We applied post-stratification weights to all datasets to correct for small sampling imperfections and to align with the most recent population characteristics. All respondents provided informed consent. Each data collection was approved by the Ethics Committee of the National Institute of Mental Health, Czechia (registration numbers 97/18, 127/20, 198/20).

Assessment of the Presence of Mental Disorders

In all samples, we used the fifth version of Mini International Neuropsychiatric Interview (M.I.N.I.) to assess the presence of mental disorders. M.I.N.I. is a psychodiagnostics instrument which allows administration by lay-interviewers (Sheehan et al., 1998). The present study examines current mental disorders from two diagnostic groups: (1) affective disorders (major depressive episode), (2) anxiety disorders (panic disorder, generalized anxiety disorder, agoraphobia, social phobia, posttraumatic stress disorder). Past month SR was assessed using a separate M.I.N.I. module consisting of 6 questions (1) *"Think that you would be better off dead or wish you were dead?"*, (2) *"Want to harm yourself?"*, (3) *"Think about suicide?"*, (4) *"Have a suicide plan?"*, and (5) *"Attempt suicide?"*, (6) *"Did you ever make a suicide attempt?"*. In-line with the scoring procedure proposed by the authors of the instrument, we considered a positive answer to any question as indicative of past-month SR (Sheehan et al., 1998). We considered a positive answer to any of the first four and last two items as indicative of presence of ST and suicidal behavior (SB), respectively.

Sociodemographic and Clinical Characteristics

We included sociodemographic information, such as age (years or age categories), gender, educational level, work status, region of residence, and marital status. For clinical characteristics we included consumption of prescription drugs (pain killers, sleeping pills, tranquilizers, and stimulants), expressed binarily as at least one prescription consumed daily; seeking help from a professional (i.e., psychiatrist, psychologist, or general practitioner) in relation to mental health during the lifetime; and binge drinking on a daily or almost daily basis in the last 12 months.

Statistical Analysis

We computed descriptive statistics, expressed as counts (n) with proportions (%) for categorical variables, mean with standard deviation (SD) for normally distributed continuous variables, and median with interquartile range (IQR) for non-normally distributed continuous variables. We computed weighted SR prevalence rates with 95% confidence intervals (95% CI) obtained using the delta method. For subgroups with less than six individuals, we calculated exact binomial (Clopper–Pearson) confidence intervals. We performed binary logistic regression to model the association between sociodemographic and clinical characteristics and SR; we fitted bivariable models to avoid the risk of overadjustment (Schisterman, Cole, & Platt, 2009). Multivariable models are

TABLE 1. Unweighted descriptive statistics of participants across surveys.

	2017 May n (%)	2020 May n (%)	2020 November n (%)
Being female	1,774 (53.66)	1,581 (52.33)	1,534 (51.13)
Median age (IQR)	48 (29)	46 (26)	46 (29)
Education			
Basic	278 (8.41)	180 (5.96)	222 (7.40)
Vocational	1,292 (39.08)	1,159 (38.36)	1,078 (35.93)
High school graduation	1,178 (35.63)	1,046 (34.62)	1,078 (35.93)
University	558 (16.88)	636 (21.05)	622 (20.73)
Work status			
Employed	1,560 (47.19)	1,692 (56.01)	1,445 (48.17)
Self-employed	367 (11.10)	193 (6.39)	177 (5.90)
Unemployed	112 (3.39)	104 (3.44)	102 (3.40)
Retired	872 (26.38)	678 (22.44)	697 (23.23)
Student	128 (3.87)	156 (5.16)	185 (6.17)
Parental leave	120 (3.63)	166 (5.49)	180 (6.00)
Other	147 (4.45)	32 (1.06)	214 (7.13)
Population of area of residence			
<5,000 inhabitants	1,264 (38.23)	1,064 (35.22)	1,068 (35.60)
5,000–19,999 inhabitants	609 (18.42)	573 (18.97)	575 (19.17)
20,000–99,999 inhabitants	725 (21.93)	671 (22.21)	666 (22.20)
100,000+ inhabitants	708 (21.42)	713 (23.60)	691 (23.03)
Family status			
Married	1,495 (45.22)	1,308 (43.30)	1,272 (42.40)
Co-habiting	497 (15.03)	470 (15.56)	460 (15.33)
Widowed	372 (11.25)	134 (4.44)	143 (4.77)
Divorced	422 (12.76)	421 (13.94)	424 (14.13)
Separated	30 (0.91)	51 (1.69)	34 (1.13)
Single	490 (14.82)	637 (21.09)	667 (22.23)
Prescription drugs use	173 (5.23)	187 (6.19)	179 (5.97)
Current binge drinking	129 (3.90)	193 (6.39)	202 (6.73)
Lifetime help-seeking behavior	316 (9.56)	800 (26.48)	869 (28.97)
Suicide risk	127 (3.84)	371 (12.28)	425 (14.17)
Major depressive episode	132 (3.99)	359 (11.88)	382 (12.73)
Anxiety disorders			
Any	261 (7.89)	408 (13.51)	398 (13.27)
Panic disorder	7 (0.21)	30 (0.99)	35 (1.17)
Social phobia	57 (1.72)	85 (2.81)	105 (3.50)
Agoraphobia	172 (5.20)	251 (8.31)	256 (8.53)
Post-traumatic stress disorder	32 (0.97)	55 (1.82)	75 (2.50)
Generalized anxiety disorder	104 (3.15)	165 (5.46)	171 (5.70)

The results are presented as counts and unweighted proportions; IQR: inter-quartile range.

presented in the Supplement. Next, we used binary logistic regression to assess the associations between the presence of current mental disorders and SR, adjusting for sociodemographic and clinical characteristics. Results are expressed as odds ratios (OR) with 95% CI, and associations with $p < 0.05$ were considered statistically significant. All analysis was performed using Stata (version 15.1) and R (version 3.6.0).

RESULTS

Detailed unweighted characteristics of all samples are provided in Table 1. The proportion of women was 53.66%, 52.33% and 51.13% in 2017, May 2020 and November 2020, respectively. Median age and respective IQR for the pre-pandemic survey were 48 (29) and 46 (26, 29, respectively) for both 2020 samples. Most participants had high school education (35.60%, 34.62%, 35.93%) or a university degree (16.88%, 21.05%,

TABLE 2. Prevalence of suicide risk in people with and without mental disorders across surveys.

	2017 May	2020 May	2020 November
General population	3.88 (3.22; 4.55)	11.88 (10.66; 13.09)	14.26 (12.87; 15.64)
Without major depressive episode or anxiety disorder	1.95 (1.45; 2.44)	6.29 (5.28; 7.30)	8.42 (7.19; 9.65)
Major depressive episode	32.24 (24.02; 40.47)	43.08 (37.54; 48.61)	43.21 (37.87; 48.55)
Anxiety disorders	23.37 (18.07; 28.67)	36.88 (31.96; 41.80)	44.40 (39.01; 49.80)
Panic disorder	56.90 (18.41; 90.10)	58.01 (38.03; 78.00)	74.37 (58.43; 90.32)
Social phobia	34.73 (21.78; 47.68)	53.96 (42.50; 65.41)	52.72 (42.21; 63.23)
Agoraphobia	24.69 (18.05; 31.33)	34.43 (28.28; 40.58)	42.41 (35.62; 49.20)
Post-traumatic stress disorder	53.92 (35.65; 72.20)	50.17 (36.09; 64.26)	65.00 (53.20; 76.79)
Generalized anxiety disorder	35.60 (26.06; 45.15)	52.05 (43.91; 60.19)	57.83 (49.93; 65.73)
Any above-mentioned diagnosis	22.35 (17.64; 27.06)	36.68 (32.45; 40.91)	38.88 (34.51; 43.25)
Both major depressive episode and anxiety disorder	43.23 (31.54; 54.93)	49.18 (41.70; 56.67)	59.41 (52.10; 66.73)

The results are presented as weighted proportions (%) with 95% confidence intervals.

20.73%). Approximately half of participants were employed (47.19%, 56.01%, 48.17%) and married (45.22%, 43.30%, 42.40%).

Prevalence of Suicide Risk

The prevalence of SR for all three surveys is presented in Table 2. Compared to the 2017 pre-pandemic survey (1.95%, 95% CI = 1.45%; 2.44%), the proportion of individuals exhibiting SR among people with no current major depressive episode or anxiety disorder increased by over 4% in May 2020 (6.29%, 95% CI = 5.28%; 7.30%), and nearly 6.5% in November 2020 (8.42%, 95% CI = 7.19%; 9.65%). In individuals fulfilling the criteria for any current mental disorder, the prevalence of SR increased from the 2017 baseline by over 14% and 18% in May and November 2020, respectively (22.35%, 95% CI = 17.64%; 27.06% vs. 36.68%, 95% CI = 32.45%; 40.91% and 38.88%, 95% CI = 34.51%; 43.25%). In individuals with anxiety disorders, we identified an increase in SR prevalence by over 13% and 21% in May and November 2020, when compared to the baseline (23.37%, 95% CI = 18.07%; 28.67% vs 36.88%, 95% CI = 31.96%; 41.80% and 44.40%, 95% CI = 39.01%; 49.80%).

The prevalence of SR per mode of data collection in May and November 2020 is presented in Supplement. In November 2020, the prevalence of SR in the general population was over 5% higher when collected using CAWI, instead of CATI (15.98%, 95% CI = 14.25%; 17.72% vs. 10.23%, 95% CI = 8.05%; 12.40%). Further, we observed that respondents interviewed via CAWI tended to have an elevated SR in most of the examined subgroups, when compared to individuals who were interviewed via CATI.

Prevalence of Suicidal Thoughts and Behavior

The prevalence of ST and SB is shown in Table 3. When compared to the baseline, the prevalence of ST in the general population increased by approximately 4% in May and 5.5% in November 2020 (2.90%, 95% CI = 2.32%; 3.49% vs. 6.80%, 95% CI = 5.87%; 7.73% and 8.47%, 95% CI = 7.38%; 9.56%). In comparison with the 2017 survey, the prevalence of ST was 1% higher in May 2020 and 2.5% higher in November 2020 in those not scoring positively for major depressive episode or anxiety disorder (1.26%,

TABLE 3. Prevalence of suicidal thoughts and behavior in people with and without mental disorders across surveys.

| | 2017 November | | | | 2020 May | | | | 2020 November | | | |
| | Suicidal thoughts | | Suicidal behavior | | Suicidal thoughts | | Suicidal behavior | | Suicidal thoughts | | Suicidal behavior | |
	n	%	n	%	n	%	n	%	n	%	n	%
General population	94	2.90 (2.32; 3.49)	48	1.42 (1.02; 10.82)	218	6.80 (5.87; 7.73)	214	6.91 (5.96; 7.86)	256	8.47 (7.38; 9.56)	260	8.89 (7.75; 10.02)
Without major depressive episode or anxiety disorder	38	1.26 (0.86; 1.66)	25	0.82 (0.50; 1.15)	71	2.58 (1.96; 3.20)	103	4.28 (3.41; 5.14)	83	3.75 (2.87; 4.64)	133	5.47 (4.49; 6.46)
Major depressive episode	35	27.81 (19.89; 35.73)	14	10.23 (5.04; 15.43)	123	34.53 (29.20; 39.85)	73	19.14 (14.91; 23.37)	139	35.31 (30.19; 40.43)	88	23.36 (18.78; 27.93)
Anxiety disorders	47	19.17 (14.21; 24;13)	20	7.64 (4.37; 10.90)	102	24.08 (19.75; 28.40)	86	19.90 (15.90; 23.90)	130	30.84 (25.99; 35.70)	102	27.63 (22.57; 32.69)
Panic disorder	4	56.90 (18.41; 90.10)	1	16.57 (0.36; 57.87)	15	45.60 (26.03; 65.18)	14	45.08 (25.48; 64.69)	22	63.11 (45.32; 80.90)	15	45.64 (27.24; 64.05)
Social phobia	15	28.24 (15.85; 40.63)	9	15.35 (5.76; 24.95)	39	42.87 (31.72; 54.02)	24	26.97 (17.12; 36.82)	48	43.83 (33.49; 54.17)	34	34.23 (24.19; 44.27)
Agoraphobia	34	20.44 (14.23; 26.65)	16	9.44 (4.96; 13.92)	51	19.43 (14.30; 24.57)	60	21.76 (16.58; 26.93)	74	26.81 (21.05; 32.58)	72	30.56 (24.00; 37.12)
Post-traumatic stress disorder	14	48.14 (29.64; 66.64)	2	5.78 (0.77; 20.81)	20	35.94 (22.45; 49.43)	20	35.07 (21.83; 48.31)	39	51.41 (38.95; 63.87)	30	44.20 (31.68; 56.72)
Generalized anxiety disorder	26	27.21 (18.22; 36.20)	10	9.52 (3.75; 15.28)	70	41.81 (33.82; 49.79)	38	22.78 (15.96; 29.61)	85	50.21 (42.17; 58.25)	47	28.52 (21.17; 35.87)
Any above-mentioned diagnosis	56	18.61 (14.18; 23.03)	23	7.12 (4.28; 9.97)	147	25.54 (21.70; 29.37)	111	18.61 (15.27; 21.94)	173	28.38 (24.46; 32.30)	127	23.29 (19.36; 27.23)
Both major depressive episode and anxiety disorder	26	36.71 (25.26; 48.15)	11	14.36 (6.22; 22.49)	78	39.52 (32.23; 46.81)	48	22.28 (16.36; 28.21)	96	47.54 (40.14; 54.95)	63	32.76 (25.74; 39.77)

The results are presented as the number of individuals in a given group exhibiting suicidal thoughts and behavior and weighted proportions (%) with 95% confidence intervals.

95% CI = 0.86%; 1.66% vs. 2.58%, 95% CI = 1.96%; 3.20% and 3.75%, 95% CI = 2.87%; 4.64%). Further, compared to the pre-pandemic baseline, the prevalence of ST in people with anxiety disorders increased by over 11% (19.17%, 95% CI = 14.21%; 24.13% vs. 30.84%, 95% CI = 25.99%; 35.70%), and over 10% in those with any mental disorder (18.61%, 95% CI = 14.18%; 23.03% vs. 28.38%, 95% CI = 24.46%; 32.30%) in the November 2020 survey.

We found an approximate 5% and 7% increase in prevalence of SB in November and May 2020 among the general population (1.42%, 95% CI = 1.02%; 1.82% vs. 6.91%, 95% CI = 5.96%; 7.86% and 8.89%, 95% CI = 7.75%; 10.02%), when compared to baseline. Individuals with no symptoms of current major depressive episode or anxiety disorder exhibited approximately a 3% and 5% increase in prevalence of SB in November and May 2020, when compared to the 2017 survey (0.82%, 95% CI = 0.50%; 1.15% vs. 4.28%, 95% CI = 3.41%; 5.14% and 5.47%, 95% CI = 4.49%; 6.46%). Individuals with anxiety disorders exhibited an increase of approximately 12% and 20% in SB prevalence compared to the baseline (7.64%, 95% CI = 4.37%; 10.90% vs. 19.90%, 95% CI = 15.90%; 23.90% and 27.63%, 95% CI = 22.57%; 32.69%), and an increase of over 11% and 16% was found in those with any mental disorder (7.12%, 95% CI = 4.28%; 9.97% vs. 18.61%, 95% CI = 15.27%; 21.94% and 23.29%, 95% CI = 19.36%; 27.23%) in May and November 2020. Further, when compared to the baseline, we identified a 13% increase in SB prevalence in November 2020 in individuals fulfilling the criteria for major depressive disorder (10.23%, 95% CI = 5.04%; 15.43% vs. 23.36%, 95% CI = 18.78%; 27.93%), and an increase of 18% among those with comorbid major depressive episode and anxiety disorder (14.36%, 95% CI = 6.22%; 22.49% vs. 32.76%, 95% CI = 25.74%; 39.77%).

Association of Sociodemographic and Clinical Characteristics and Suicide Risk

Detailed results are presented in Table 4. In the pre-pandemic survey, we found no significant association between sex and SR (OR = 1.35, 95% CI = 0.94; 1.95), while in both pandemic surveys, there was a significant association, with females exhibiting an increased SR (OR = 1.36; 95% CI = 1.07; 1.72 and OR = 1.31; 95% CI = 1.04; 1.64). However, as indicated by the point estimates, the relative SR in females was virtually the same across the three surveys. Similarly, in the 2017 survey, when compared to individuals aged 18–19, we did not detect a significant association with SR in individuals aged 50–64 years (OR = 0.64, 95% CI = 0.37; 1.10), but found a significant association in both 2020 surveys, with older individuals exhibiting a lower SR (OR = 0.69, 95% CI = 0.50; 0.96 and OR = 0.55, 95% CI = 0.39; 0.78). Nevertheless, the point estimates indicate that the relative SR in this group was approximately the same pre, and post-pandemic. On the other hand, we did not detect significant differences in SR in individuals aged 65 in the pre-pandemic survey (OR = 1.38, 95% CI = 0.85; 2.25), but found substantially decreased SR in both pandemic surveys (OR = 0.44, 95% CI = 0.30; 0.65 and OR = 0.49, 95% CI = 0.34; 0.72). Next, when compared to married individuals, we did not find significant differences in SR in co-habiting individuals in the 2017 survey (OR = 1.44, 95% CI = 0.77; 2.69), but we found increased SR in both 2020 pandemic surveys (OR = 2.16, 95% CI = 1.54; 3.03 and OR = 2.55, 95% CI = 1.82; 3.56).

TABLE 4. Bivariable logistic regressions on association of sociodemographic and clinical characteristics and suicide risk across the surveys.

	2017 November		2020 May		2020 November	
	n (%)	OR	n (%)	OR	n (%)	OR
Being female	1,774 (53.66%)	1.35 (0.94; 1.95)	1,581 (52.33%)	1.36 (1.07; 1.72)*	1,534 (51.13%)	1.31 (1.04; 1.64)*
Age						
18–29 years	553 (16.73%)	Ref.	528 (17.48%)	Ref.	550 (18.33%)	Ref.
30–49 years	1,175 (35.54%)	0.41 (0.24; 0.72)**	1,193 (39.49%)	0.63 (0.47; 0.86)**	1,106 (36.87%)	0.82 (0.61; 1.10)
50–64 years	817 (24.71%)	0.64 (0.37; 1.10)	730 (24.16%)	0.69 (0.50; 0.96)*	694 (23.13%)	0.55 (0.39; 0.78)**
65+ years	761 (23.02%)	1.38 (0.85; 2.25)	570 (18.87%)	0.44 (0.30; 0.65)***	650 (21.67%)	0.49 (0.34; 0.72)***
Education						
Basic	278 (8.41%)	Ref.	180 (5.96%)	Ref.	222 (7.40%)	Ref.
Vocational	1,292 (39.08%)	0.27 (0.17; 0.43)***	1,159 (38.36%)	0.90 (0.56; 1.43)	1,078 (35.93%)	0.49 (0.33; 0.71)***
High school graduation	1,178 (35.60%)	0.21 (0.13; 0.35)***	1,046 (34.62%)	0.75 (0.47; 1.19)	1,078 (35.93%)	0.40 (0.27; 0.58)***
University	558 (16.88%)	0.08 (0.03; 0.19)***	636 (21.05%)	0.49 (0.29; 0.83)**	622 (20.73%)	0.25 (0.16; 0.38)***
Work status						
Employed	1,560 (47.19%)	Ref.	1,692 (56.01%)	Ref.	1,445 (48.17%)	Ref.
Self-employed	120 (3.63%)	1.31 (0.55; 3.08)	166 (5.49%)	1.26 (0.78; 2.04)	180 (6.00%)	0.47 (0.26; 0.86)**
Unemployed	147 (4.45%)	7.49 (3.56; 15.79)***	32 (1.06%)	4.05 (2.49; 6.59)***	214 (7.13%)	2.75 (1.69; 4.48)***
Retired	872 (26.38%)	4.28 (2.61; 7.04)***	678 (22.44%)	1.09 (0.81; 1.48)	697 (23.23%)	0.92 (0.67; 1.27)
Student	367 (11.10%)	4.15 (1.74; 9.89)**	193 (6.39%)	2.78 (1.82; 4.27)***	177 (5.90%)	1.86 (1.20; 2.88)**
On maternity/Paternity leave	128 (3.87%)	2.93 (1.10; 7.85)*	156 (5.16%)	1.02 (0.57; 1.83)	185 (6.17%)	1.00 (0.58; 1.72)
Other	112 (3.39%)	12.30 (6.73; 22.50)***	104 (3.44%)	3.78 (1.67; 8.53)**	102 (3.40%)	2.97 (2.08; 4.25)***
Population of area of residence						
<5,000 inhabitants	1,264 (38.23%)	Ref.	1,064 (35.22%)	Ref.	1,068 (35.60%)	Ref.
5,000–19,999 inhabitants	609 (18.42%)	1.15 (0.73; 1.80)	573 (18.97%)	1.05 (0.76; 1.46)	575 (19.17%)	0.67 (0.47; 0.94)*
20,000–99,999 inhabitants	725 (21.93%)	0.76 (0.47; 1.23)	671 (22.21%)	1.13 (0.83; 1.53)	666 (22.20%)	0.95 (0.70; 1.28)
100,000+ inhabitants	708 (21.42%)	0.46 (0.26; 0.82)**	713 (23.60%)	0.90 (0.65; 1.24)	691 (23.03%)	0.86 (0.65; 1.15)
Family status						
Married	1,495 (45.22%)	Ref.	1,308 (43.30%)	Ref.	1,272 (42.40%)	Ref.
Co-habiting	497 (15.03%)	1.44 (0.77; 2.69)	470 (15.56%)	2.16 (1.54; 3.03)***	460 (15.33%)	2.55 (1.82; 3.56)***
Widowed	372 (11.25%)	4.80 (2.88; 7.99)***	134 (4.44%)	1.16 (0.58; 2.34)	143 (4.77%)	1.65 (0.95; 2.89)
Divorced	422 (12.76%)	2.58 (1.46; 4.56)**	421 (13.94%)	2.45 (1.74; 3.43)***	424 (14.13%)	2.34 (1.63; 3.34)***
Separated	30 (0.91%)	1.46 (0.19; 11.10)	51 (1.69%)	2.58 (1.13; 5.89)*	34 (1.13%)	2.93 (1.22; 7.06)*
Single	490 (14.82%)	2.96 (1.74; 5.02)***	637 (21.09%)	2.11 (1.54; 2.88)***	667 (22.23%)	2.52 (1.87; 3.40)***
Prescription drugs use	173 (5.23%)	8.78 (5.72; 13.48)***	187 (6.19%)	1.34 (0.84; 2.15)	179 (5.97%)	1.32 (0.88; 1.99)
Current binge drinking	129 (3.90%)	2.17 (1.11; 4.27)*	193 (6.39%)	1.94 (1.32; 2.86)**	202 (6.73%)	2.45 (1.71; 3.52)***
Lifetime help-seeking behavior	316 (9.56%)	11.69 (8.04; 16.98)***	800 (26.48%)	4.81 (3.77; 6.12)***	869 (28.97%)	4.67 (3.69; 5.90)***

The results are expressed as counts, unweighted proportions, and odds ratios with 95% confidence intervals.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Similarly, when compared to married individuals, we did not detect significant differences in SR in separated individuals in the 2017 survey (OR = 1.46, 0.19; 11.10), but we did detect increased SR in the pandemic surveys (OR = 2.58, 95% CI = 1.13; 5.89 and OR = 2.93, 95% CI = 1.22; 7.06). Conversely, prescription drugs use was associated with substantially elevated SR in the pre-pandemic survey (OR = 8.78, 95% CI = 5.72; 13.48), but was not significantly associated with SR in the May and November 2020 surveys (OR = 1.34, 95% CI = 0.84; 2.15 and OR = 1.32, 95% CI = 0.88; 1.99). Similarly, lifetime help-seeking behavior was associated with increased odds for SR in all three surveys, however, the odds were substantially higher in the 2017 survey (OR = 11.69, 95% CI = 8.04; 16.98) than in the pandemic surveys (OR = 4.81, 95% CI = 3.77; 6.12 and OR = 4.67, 95% CI = 3.69; 5.90).

Adjusted Association of Mental Disorders and Suicide Risk

Detailed results are presented in the Supplement. When adjusting for sociodemographic and clinical characteristics, we found that major depressive disorder was associated with higher odds of SR in all three datasets, however, the odds between the individual surveys were approximately the same (OR = 6.16, 95% CI = 3.40; 11.18 vs. OR = 6.23, 95% CI = 4.54; 8.55 and OR = 4.51, 95% CI = 3.36; 6.05). Similarly, we found increased odds of SR in individuals with anxiety disorders (OR = 6.10, 95% CI = 3.70; 10.05 vs. OR = 3.93, 95% CI = 2.94; 5.26 and OR = 4.53, 95% CI = 3.36; 6.11), comorbid major depressive disorder and anxiety disorders (OR = 6.39, 95% CI = 3.16; 12.91 vs. OR = 5.20, 95% CI = 3.50; 7.73 and OR = 7.17, 95% CI = 4.81; 10.68) and any mental disorder (OR = 7.20, 95% CI = 4.41; 11.76 vs. OR = 5.77, 95% CI = 4.37; 7.62 and OR = 4.40, 95% CI = 3.35; 5.79) in each survey, but the odds between individual surveys were largely consistent.

DISCUSSION

The COVID-19 pandemic was associated with a substantial increase in SR in individuals not fulfilling the criteria for major depressive episode and anxiety disorders. There was a profound increase in the prevalence of SR in people with any mental disorder and anxiety disorder during the COVID-19 pandemic. In certain sociodemographic groups, such as females and younger individuals, we found significant associations with SR in the 2020 surveys, but not in the pre-pandemic survey. However, the magnitude of SR in some of these groups was largely consistent with those observed in the 2017 pre-pandemic survey.

In a nationally representative Spanish sample, a substantially lower prevalence of SR among both, those with and without pre-pandemic lifetime mental disorder (Mortier et al., 2021) was detected in comparison to our study. However, in the Spanish general population, the prevalence of SR also substantially increased in relation to the last comparable data (Miret et al., 2014; Mortier et al., 2021). The prevalence rates of ST as well as the increase in ST over time reported in the present study are in-line with results from a longitudinal study from the UK (O'Connor et al., 2020). Similar prevalence rates of ST were also found in a nationally representative study from the US (Czeisler et al.,

2020) and Greece (Papadopoulou et al., 2021). A study from the UK reported substantially higher prevalence rates (Iob, Steptoe, & Fancourt, 2020), while in a Norwegian nationally representative sample, the authors did not find any significant change in suicide ideation, and the prevalence rates were well under those reported in the current study (Knudsen et al., 2021). Being younger and female were both associated with moderate increases in SR, which is consistent with a Spanish study (Mortier et al., 2021). Conversely, no significant differences between sexes were present in Greece (Papadopoulou et al., 2021). Lowered risk in older individuals, when compared to 18–29 years old, was also found for ST in the UK (O'Connor et al., 2020), and for active ST in Spain (Mortier et al., 2021), whereas in a Greek study, no age differences were found (Papadopoulou et al., 2021).

We detected a substantial increase in the prevalence of SR in people with mental disorders. However, the models adjusted for sociodemographic and clinical characteristics show the odds of having SR in people with major depressive episode or anxiety disorder were approximately the same pre and post-pandemic. These results suggest that the detected differences in prevalence may be driven by sociodemographic and clinical mediators or confounders which were all magnified as a result of COVID-19, such as financial hardship, social isolation and loneliness (Calati et al., 2019; Stravynski & Boyer, 2001; Vilhjálmsson, Sveinbjarnardottir, & Kristjansdottir, 1998). This is partially supported by the findings of a large European study, in which 12-month suicidal ideation was associated with food deprivation, greater number of chronic health conditions and higher isolation in young-and-middle aged and older individuals (Cabello et al., 2020). Similarly, a US study from May 2020 concluded, that among other factors, COVID-19-related stress symptoms, loneliness, and financial strain were associated with thoughts of suicide and self-harm (Elbogen, Lanier, Blakey, Wagner, & Tsai, 2021).

Trends in suicide-related mortality do not follow the increased SR observed in this study, with 1,191 and 1,224 deaths related to suicides in 2019 and 2020, respectively (CZSO., 2021a). Moreover, when compared to the mean number of suicides between 2015 and 2019 (1,329), the number of suicides in 2020 was slightly lower (CZSO., 2021a). This is in-line with international evidence showing mostly unchanged or declined suicide mortality associated with the pandemic (Pirkis et al., 2021). However, there are concerns that this may be due to a "honeymoon period" or "pulling together" phenomenon, leading to a short-term decreased incidence in suicides immediately after a disaster (Zortea et al., 2021). In addition, since we had no access to individual-level data, we cannot rule out that the trends in certain population subgroups do not copy the overall trend. Thus, crucially, the COVID-19 pandemic highlights the importance of timely reporting on suicide and self-harm, and countries should adopt best practice examples, such as national self-harm and suicide registries (Leske, Kõlves, Crompton, Arensman, & De Leo, 2021; NSRF, 2021).

Strengths of this study include its nationally representative samples, and the use of a well-established psychodiagnostics instrument prior to and during the pandemic. However, several limitations are notable. Due to COVID-19 related social distancing measures, we were not able to use the same mode of data collection and sampling strategy as in the 2017 survey. While the sampled individuals are similar to those from baseline on key sociodemographic characteristics, we cannot rule out that part of the

observed differences is due to a different structure of individuals. Importantly, in both pandemic waves we observed that individuals interviewed by means of CAWI reported generally higher SR than their CATI interviewed counterparts, likely because of lower stigma associated with SR in a remote web interview (Sudak, Maxim, & Carpenter, 2008). Thus, we cannot rule out that a non-negligible proportion of observed differences was due to the mode of data collection. Further, due to cross-sectional design, we were not able to assess causal relationships between SR, mental disorders, and sociodemographic and clinical characteristics. In addition, we did not have information on key variables, such as economic hardship, social isolation, and loneliness, which would allow to further explain the observed associations.

CONCLUSION

We found that SR substantially increased during the pandemic, in May and in November 2020, as compared to the November 2017 baseline. SR was elevated in both individuals with and without mental disorders. These findings support increased suicide prevention, and enhanced availability of mental health services. The results of this study also emphasize the importance of availability of routine and current nationwide suicide monitoring and evaluation initiatives and responsive interventions.

DISCLOSURE STATEMENT

Alexandr Kasal and Petr Winkler have been involved in preparation of Czech national suicide prevention policies and their implementation. Other authors declare no conflicts of interest.

AUTHOR NOTES

Alexandr Kasal, Department of Public Mental Health, National Institute of Mental Health, Klecany, Czech Republic; Faculty of Social Sciences, Charles University, Prague, Czech Republic.

Marie Kuklová, Department of Public Mental Health, National Institute of Mental Health, Klecany, Czech Republic.

Anna Kågström, Department of Public Mental Health, National Institute of Mental Health, Klecany, Czech Republic; Third Faculty of Medicine, Charles University, Prague, Czech Republic.

Petr Winkler, Department of Public Mental Health, National Institute of Mental Health, Klecany, Czech Republic; Health Service and Population Research Department, Institute of Psychiatry, Psychology and Neuroscience, King's College London, David Goldberg Centre, De Crespigny Park, London, United Kingdom

Tomáš Formánek, Department of Public Mental Health, National Institute of Mental Health, Klecany, Czech Republic; Department of Psychiatry, University of Cambridge, Douglas House, Cambridge, United Kingdom

Correspondence concerning this article should be addressed to Tomáš Formánek, Department of Psychiatry, University of Cambridge, Douglas House, 18B Trumpington Road, CB2 8AH Cambridge, United Kingdom. Email: tf363@cam.ac.uk

ORCID

Alexandr Kasal 🔟 http://orcid.org/0000-0002-9877-5706

DATA AVAILABILITY STATEMENT

Data are not available publicly following government regulations; however, data can be made available upon reasonable request. Similarly, the Stata and R codes will be made available upon reasonable request.

REFERENCES

Cabello, M., Miret, M., Ayuso-Mateos, J. L., Caballero, F. F., Chatterji, S., Tobiasz-Adamczyk, B., … Borges, G. (2020). Cross-national prevalence and factors associated with suicide ideation and attempts in older and young-and-middle age people. *Aging & Mental Health*, *24*(9), 1533–1542.

Calati, R., Ferrari, C., Brittner, M., Oasi, O., Olié, E., Carvalho, A. F., & Courtet, P. (2019). Suicidal thoughts and behaviors and social isolation: A narrative review of the literature. *Journal of Affective Disorders*, *245*, 653–667.

Czeisler, M. É., Lane, R. I., Petrosky, E., Wiley, J. F., Christensen, A., Njai, R., … Rajaratnam, S. M. W. (2020). Mental health, substance use, and suicidal ideation during the Covid-19 pandemic - United States, June 24-30, 2020. *MMWR. Morbidity and Mortality Weekly Report*, *69*(32), 1049–1057. doi:10.15585/mmwr.mm6932a1

CZSO. (2021a, August 06). *Databases and registries of the Czech Statistical Office*. Retrieved from https://www.czso.cz/csu/czso/databaze-registry.

CZSO. (2021b, August 08). *Population change - year* 2020. Retrieved from https://www.czso.cz/csu/czso/ari/population-change-year-2020.

Economou, M., Angelopoulos, E., Peppou, L. E., Souliotis, K., & Stefanis, C. (2016). Suicidal ideation and suicide attempts in Greece during the economic crisis: An update. *World Psychiatry*, *15*(1), 83–84.

Elbogen, E. B., Lanier, M., Blakey, S. M., Wagner, H. R., & Tsai, J. (2021). Suicidal ideation and thoughts of self-harm during the COVID-19 pandemic: The role of COVID-19-related stress, social isolation, and financial strain. *Depression and Anxiety*, *38*(7), 739–748. doi:10.1002/da.23162

Fancourt, D., Steptoe, A., & Bu, F. (2021). Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in England: A longitudinal observational study. *The Lancet Psychiatry*, *8*(2), 141–149. doi:10.1016/S2215-0366(20)30482-X

Formánek, T., Kagström, A., Cermakova, P., Csémy, L., Mladá, K., & Winkler, P. (2019). Prevalence of mental disorders and associated disability: Results from the cross-sectional CZEch mental health Study (CZEMS). *European Psychiatry*, *60*, 1–6. doi:10.1016/j.eurpsy.2019.05.001

Galea, S., Merchant, R. M., & Lurie, N. (2020). The mental health consequences of COVID-19 and physical distancing: The need for prevention and early intervention. *JAMA Internal Medicine*, *180*(6), 817–818. doi:10.1001/jamainternmed.2020.1562

Iob, E., Steptoe, A., & Fancourt, D. (2020). Abuse, self-harm and suicidal ideation in the UK during the COVID-19 pandemic. *The British Journal of Psychiatry*, 217(4), 543–546.

Knudsen, A. K. S., Stene-Larsen, K., Gustavson, K., Hotopf, M., Kessler, R. C., Krokstad, S., … Reneflot, A. (2021). Prevalence of mental disorders, suicidal ideation and suicides in the general population before and during the COVID-19 pandemic in Norway: A population-based repeated cross-sectional analysis. *The Lancet Regional Health. Europe*, 4, 100071. doi:10.1016/j.lanepe.2021.100071

Leske, S., Kõlves, K., Crompton, D., Arensman, E., & De Leo, D. (2021). Real-time suicide mortality data from police reports in Queensland, Australia, during the COVID-19 pandemic: An interrupted time-series analysis. *The Lancet. Psychiatry*, 8(1), 58–63. doi:10.1016/S2215-0366(20)30435-1

Miret, M., Caballero, F. F., Huerta-Ramírez, R., Moneta, M. V., Olaya, B., Chatterji, S., … Ayuso-Mateos, J. L. (2014). Factors associated with suicidal ideation and attempts in Spain for different age groups. Prevalence before and after the onset of the economic crisis. *Journal of Affective Disorders*, 163, 1–9. doi:10.1016/j.jad.2014.03.045

Mortier, P., Vilagut, G., Ferrer, M., Alayo, I., Bruffaerts, R., Cristóbal-Narváez, P., … Olaya, B. (2021). Thirty-day suicidal thoughts and behaviours in the Spanish adult general population during the first wave of the Spain COVID-19 pandemic. *Epidemiology and Psychiatric Sciences*, 30, E19. doi:10.1017/S2045796021000093.

MZCR. (2021). *COVID-19 in Czech Republic: Open datasets and download sets.* Retrieved from https://onemocneni-aktualne.mzcr.cz/api/v2/covid-19.

Niederkrotenthaler, T., Laido, Z., Kirchner, S., Braun, M., Metzler, H., Waldhör, T., … Till, B. (2022). Mental health over nine months during the SARS-CoV2 pandemic: Representative cross-sectional survey in twelve waves between April and December 2020 in Austria. *Journal of Affective Disorders*, 296, 49–58. doi:10.1016/j.jad.2021.08.153

NSRF. (2021). *National Self-Harm Registry Ireland.* National Suicide Research Foundation. https://www.nsrf.ie/contact/about-us/structure-2/.

O'Connor, R. C., Wetherall, K., Cleare, S., McClelland, H., Melson, A. J., Niedzwiedz, C. L., … Scowcroft, E. (2020). Mental health and well-being during the COVID-19 pandemic: Longitudinal analyses of adults in the UK COVID-19 Mental Health & Wellbeing study. *The British Journal of Psychiatry*, 218(6), 326–333.

Papadopoulou, A., Efstathiou, V., Yotsidi, V., Pomini, V., Michopoulos, I., Markopoulou, E., … Tournikioti, K. (2021). Suicidal ideation during COVID-19 lockdown in Greece: Prevalence in the community, risk and protective factors. *Psychiatry Research*, 297, 113713.

Pirkis, J., John, A., Shin, S., DelPozo-Banos, M., Arya, V., Analuisa-Aguilar, P., … Baran, A. (2021). Suicide trends in the early months of the COVID-19 pandemic: An interrupted time-series analysis of preliminary data from 21 countries. *The Lancet. Psychiatry*, 8(7), 579–588. doi:10.1016/S2215-0366(21)00091-2

Sakamoto, H., Ishikane, M., Ghaznavi, C., & Ueda, P. (2021). Assessment of suicide in Japan during the COVID-19 pandemic vs previous years. *JAMA Network Open*, 4(2), e2037378–e2037378.

Santomauro, D. F., Mantilla Herrera, A. M., Shadid, J., Zheng, P., Ashbaugh, C., Pigott, D. M., … Ferrari, A. J. (2021). Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *The Lancet*, 398(10312), 1700–1712. doi:10.1016/S0140-6736(21)02143-7

Schisterman, E. F., Cole, S. R., & Platt, R. W. (2009). Overadjustment bias and unnecessary adjustment in epidemiologic studies. *Epidemiology*, 20(4), 488–495. doi:10.1097/EDE.0b013e3181a819a1

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., … Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, 59(20), 22–33.

Stravynski, A., & Boyer, R. (2001). Loneliness in relation to suicide ideation and parasuicide: A population-wide study. *Suicide & Life-Threatening Behavior*, 31(1), 32–40.

Sudak, H., Maxim, K., & Carpenter, M. (2008). Suicide and stigma: A review of the literature and personal reflections. *Academic Psychiatry*, *32*(2), 136–142.

Tanaka, T., & Okamoto, S. (2021). Increase in suicide following an initial decline during the COVID-19 pandemic in Japan. *Nature Human Behaviour*, *5*(2), 229–238.

UN. (2020). *Policy brief: COVID-19 and the need for action on mental health*. Retrieved from https://unsdg.un.org/resources/policy-brief-covid-19-and-need-action-mental-health.

Vahratian, A., Blumberg, S. J., Terlizzi, E. P., & Schiller, J. S. (2021). Symptoms of anxiety or depressive disorder and use of mental health care among adults during the COVID-19 Pandemic - United States, August 2020-February 2021. *MMWR. Morbidity and Mortality Weekly Report*, *70*(13), 490–494. doi:10.15585/mmwr.mm7013e2

Vilhjálmsson, R., Sveinbjarnardottir, E., & Kristjansdottir, G. (1998). Factors associated with suicide ideation in adults. *Social Psychiatry and Psychiatric Epidemiology*, *33*(3), 97–103. doi:10.1007/s001270050028

Wiliams, T., Davis, J., Figueira, C., & Vizard, T. (2021). *Coronavirus and depression in adults, Great Britain: January to March 2021*. https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/coronavirusanddepressioninadultsgreatbritain/januarytomarch2021.

Winkler, P., Formánek, T., Mladá, K., & Cermakova, P. (2018). The CZEch Mental health Study (CZEMS): Study rationale, design, and methods. *International Journal of Methods in Psychiatric Research*, *27*(3), e1728.

Winkler, P., Formánek, T., Mlada, K., Kagstrom, A., Mohrova, Z., Mohr, P., & Csemy, L. (2020). Increase in prevalence of current mental disorders in the context of COVID-19: Analysis of repeated nationwide cross-sectional surveys. *Epidemiology and Psychiatric Sciences*, *29*, E173. doi:10.1017/S2045796020000888.

Winkler, P., Mohrova, Z., Mlada, K., Kuklova, M., Kagstrom, A., Mohr, P., & Formanek, T. (2021). Prevalence of current mental disorders before and during the second wave of COVID-19 pandemic: An analysis of repeated nationwide cross-sectional surveys. *Journal of Psychiatric Research*, *139*, 167–171. doi:10.1016/j.jpsychires.2021.05.032

Zortea, T. C., Brenna, C. T., Joyce, M., McClelland, H., Tippett, M., Tran, M. M., … Heise, M. J. (2021). The impact of infectious disease-related public health emergencies on suicide, suicidal behavior, and suicidal thoughts. *Crisis*, *42*(6), 474–487. doi:10.1027/0227-5910/a000753