Short communication

Prevalence of current mental disorders before and during the second wave of COVID-19 pandemic: An analysis of repeated nationwide cross-sectional surveys

Petr Winkler [a,b,*], Zuzana Mohrova [a], Karolina Mlada [a,f], Marie Kuklova [a], Anna Kagstrom [a], Pavel Mohr [d,e], Tomas Formanek [a,c]

[a] *Department of Public Mental Health, National Institute of Mental Health, Topolová 748, 250 67, Klecany, Czech Republic*
[b] *Health Service and Population Research Department, Institute of Psychiatry, Psychology and Neuroscience, King's College London, David Goldberg Centre, De Crespigny Park, London, SE5 8AF, United Kingdom*
[c] *Epi Centre, Department of Psychiatry, University of Cambridge, Herchel Smith Buidling for Brain & Mind Sciences, Forvie Site, Robinson Way, Cambridge, CB2 0SZ, United Kingdom*
[d] *Clinical Center, National Institute of Mental Health, Topolová 748, 250 67, Klecany, Czech Republic*
[e] *Department of Psychiatry and Medical Psychology, Third Faculty of Medicine, Charles University Prague, Ruská 87, 100 00, Prague 10, Czech Republic*
[f] *Department of Psychiatry, Faculty of Medicine, University Hospital in Pilsen, Charles University Prague, Czech Republic*

ABSTRACT

Objectives: To assess the prevalence of mental disorders during the second wave of COVID-19 pandemic in comparison with both, baseline and the first wave of the pandemic, and to identify disproportionally affected non-clinical subgroups.
Material and methods: We used data from three nationally representative cross-sectional studies and compared the prevalence of current mood and anxiety disorders, and alcohol-use disorders at baseline (November 2017, n = 3306), immediately after the first peak (May 2020, n = 3021), and during the second peak (November 2020, n = 3000) of COVID-19 in Czechia. We used the Mini International Neuropsychiatric Interview (M.I.N.I.) as a screening instrument, and calculated weighted prevalence (%) with 95% weighted confidence intervals (95% CIs). Additionally, we examined the prevalence of these disorders across different non-clinical population subgroups during the second wave of the pandemic.
Results: The proportion of individuals experiencing at least one mental disorder was highest during the second wave of the pandemic (32.94%, 95% CI = 31.14; 34.77%), when compared to both the baseline in November 2017 (20.02%, 95% CI = 18.64; 21.39%), and the first wave in May 2020 (29.63%, 95% CI = 27.9; 31.37%). Younger adults, students, those having lost a job or on forced leave, and those with only elementary education displayed disproportionally high prevalence of mental disorders.
Conclusions: Our findings suggest that population mental health has not returned to pre-COVID-19 levels. It seems that mental health of some population subgroups, such as young adults or those worse off economically, might have been affected disproportionately by the COVID-19 situation, and future studies identifying high-risk groups are warranted.

1. Introduction

Studies with reliable baseline data showed a substantial increase in mental health problems during or shortly after the first peak of the COVID-19 pandemic (Czeisler et al., 2020; Holingue et al., 2020; Price et al., 2020; Winkler et al., 2020). In Czechia alone, the proportion of the population scoring positively for at least one current mental disorder increased from 20% to almost 30%, when compared to pre-pandemic baseline levels (Formanek et al., 2019; Winkler et al., 2020). However, emerging results from longitudinal studies suggested a gradual improvement in population mental health as nations were moving further from the peak of the first wave of the pandemic and as

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restrictions on daily life activities were eased (O'Connor et al., 2020; Fancourt et al., 2020).

In response to both a second and third wave of the COVID-19 pandemics in Europe, the US and other parts of the world, many countries have re-introduced nationwide lockdowns, albeit generally more relaxed than those enforced in spring of 2020. The impact of new restriction measures on human behavior, combined and potentially amplified by economic impact of the pandemic is presumed to be profound; however, the state of population mental health in the context of further lockdowns related to second or third wave of the COVID-19 pandemic remains unknown.

In this study, we utilized data from three cross-sectional, nationally representative datasets, with the aim to compare the prevalence of current mental disorders during the second peak of the pandemic in November 2020 with both the baseline in November 2017 and the first wave of COVID-19 in May 2020. Additionally, we aimed to identify non-clinical population subgroups displaying disproportionally high rates of mental health problems in the wake of the second COVID-19 wave and related lockdown.

2. Material and methods

2.1. Data

We analyzed data from three cross-sectional studies conducted on nationally representative samples of non-institutionalized Czech adults (18+). The first two studies, with data collected in November 2017 and May 2020, respectively, are described in-depth elsewhere (Winkler et al., 2018, 2020). Briefly, the November 2017 study utilized a paper and pencil interviewing method (PAPI) and a two-stage sampling method, which involved using a random starting address in randomly sampled voting districts. This study provided a sample of Czech adults representative in terms of age, gender, education, and region of residence. It consisted of 3306 participants, with response rate (RR) = 75%. Since the COVID-19 related restrictions did not allow for a replication of the sampling strategy or the interviewing technique, we utilized a mixed computer-assisted web interviewing (CAWI) and computer-assisted telephone interviewing (CATI) for data collected in May 2020. The individuals present in the database of the professional agency responsible for the data collection were randomly emailed (CAWI) or phoned (CATI) and asked to participate in the study. The dataset consisted of 3021 participants (CAWI = 2 114, RR = 93% and CATI = 907, RR = 43%), and both CATI and CAWI samples are representative of the Czech adult population in terms of age, gender, education, size and region of residence.

Data for the present study were collected between 7th November and 21st November 2020 when the national COVID-19 related measures restricted the use of face-to-face interviewing techniques, therefore we replicated the CAWI and CATI methods used for the May 2020 dataset. Participants were recruited via random emailing (CAWI) and phoning (CATI) based on the database of the professional data collection agency. For CAWI, the sampling frame was based on probabilistic sampling, stratified by age, gender, education, region, and size of the place of residence using a list of email addresses. Participants were obtained from an online database of approximately 80 000 registered (60 000 active) members. The data collection agency recruits members via a range of online and offline methods, including face-to-face personal inquiries, telephone recruitment from the agency's call center, print ads, PPC Google AdWords (Google Ads) campaigns, social networks campaigns, recruitment via affiliate programs, and snowball methods where existing panel members recommend the panel to other people. In addition, the agency conducts online and offline campaigns focused on recruitment of specific target groups (such as elderly) whenever there is an insufficient representation of a given target group in the database.

For CATI, using randomly generated telephone numbers, phone calls were conducted to obtain a distribution corresponding to the distribution of the Czech population with regard to age, gender, education, region, and size of the place of residence. Calls to mobile phones (85%) were combined with calls to landline phones (15%) located in Czech administrative districts or towns. We obtained a sample consisting of 3000 participants (CAWI = 2 100, RR = 94% and CATI = 900, RR = 41%). Both of these samples, CAWI and CATI, are representative of the Czech non-institutionalized adult population in terms of gender, age, education, size, and region of residence. We applied post-stratification weights to all samples to adjust for minor sampling imperfections and to correct for the actual population structure (CZSO, 2019).

2.2. Screening for the presence of mental health problems

In all three studies, the presence of mental disorders was assessed using the fifth version of the Mini International Neuropsychiatric Interview (M.I.N.I.; Sheehan et al., 1998). For pragmatic reasons, in both the May 2020 and November 2020 studies, we assessed only a subset of current mental disorders available in M.I.N.I.: (1) affective disorders (major depressive episode, any risk of suicidality), (2) anxiety disorders (panic disorder, generalized anxiety disorder, agoraphobia, social phobia, posttraumatic stress disorder), and (3) alcohol use disorders (alcohol dependence, alcohol abuse). Based on M.I.N.I., the time frames for current mental disorders are as follows: (1) the past two weeks for major depressive episode, (2) the past month for panic disorder, posttraumatic stress disorder, social phobia and suicidality, (3) the past six months for generalized anxiety disorder, and (4) the past twelve months for alcohol use disorders. Agoraphobia has no specified time frame.

2.3. Statistical analysis

We computed the unweighted descriptive statistics of all three samples, expressed as counts (n) with proportions (%). We computed the prevalence of mental disorders as weighted means (%) with 95% confidence intervals (95% CIs) which were obtained using the bootstrap method with 10 000 replicates. We expressed the prevalence of mental disorders across the population sub-groups as weighted means with counts (n). We conducted all analysis using R (version 3.6.0).

3. Results

3.1. Description of the sample

A detailed description of the samples is provided in Table 1. In the November 2020 sample, about 63% of the sample were aged 18–55 years, 51% were women. Approximately 57% of participants had a high school or university-level education, 22% were single, 36% had one or more economically dependent children, and 3.4% unemployed. In the past 6 months, about 8% of participating individuals lost their job and 7% had their FTE reduced, while 14% experienced salary reduction and 12% forced leave.

3.2. Prevalence of mental disorders per M.I.N.I

The proportion of individuals fulfilling the criteria for at least one mental disorder during the second wave of the pandemic (November 2020; 32.94%, 95% CI = 31.14%; 34.77%) was nearly 13 percentage point higher than the pre-pandemic baseline (November 2017; 20.02%, 95% CI = 18.64%; 21.39%). From November 2017 to November 2020, the proportion of individuals scoring positively for affective disorders more than tripled (6.57%, 95% CI = 5.71%; 7.4% vs 21.16%, 95% CI = 19.56%; 22.74%), while the prevalence of anxiety disorders almost doubled (7.79%, 95% CI = 6.87%; 8.7% vs 13.08%, 95% CI = 11.75%; 14.36%). The prevalence of alcohol use disorders did not significantly change between November 2017 and November 2020 (10.84%, 95% CI = 9.78%; 11.89% vs 12.06%, 95% CI = 10.77%; 13.27%). Between the first wave of the pandemic (May 2020) and the second wave (November

Table 1

Descriptive statistics of the November 2017, May 2020 and November 2020 samples.

	November 2017	May 2020	November 2020
Age			
18-25	306 (9.26)	325 (10.76)	334 (11.13)
26-35	577 (17.45)	540 (17.87)	557 (18.57)
36-45	605 (18.3)	606 (20.06)	565 (18.83)
46-55	560 (16.94)	531 (17.58)	442 (14.73)
56-65	575 (17.39)	520 (17.21)	530 (17.67)
65+	683 (20.66)	499 (16.52)	572 (19.07)
Gender			
Females	1774 (53.66)	1581 (52.33)	1534 (51.13)
Education			
Elementary School	278 (8.41)	180 (5.96)	222 (7.4)
High School	1178 (35.63)	1046 (34.62)	1078 (35.93)
University	558 (16.88)	636 (21.05)	622 (20.73)
Vocational School	1292 (39.08)	1159 (38.36)	1078 (35.93)
Marital Status			
Divorced	422 (12.76)	421 (13.94)	424 (14.13)
Married/Living with Partner	1992 (60.25)	1778 (58.85)	1732 (57.73)
Other	30 (0.91)	51 (1.69)	34 (1.13)
Single	490 (14.82)	637 (21.09)	667 (22.23)
Widowed	372 (11.25)	134 (4.44)	143 (4.77)
Number of Economically Dependent Children			
0	NA	NA	1932 (64.4)
1-2	NA	NA	922 (30.73)
3-4	NA	NA	131 (4.37)
5+	NA	NA	15 (0.5)
Work Status			
Disability Pension	107 (3.24)	NA	118 (3.93)
Employed	1521 (47.19)	1692 (56.01)	1445 (48.17)
On Maternity/Paternity Leave	120 (3.63)	166 (5.49)	180 (6)
Other	40 (1.21)	32 (1.06)	96 (3.2)
Retired	872 (26.38)	678 (22.44)	697 (23.23)
Self-Employed	367 (11.1)	193 (6.39)	177 (5.9)
Student	128 (3.87)	156 (5.16)	185 (6.17)
Unemployed	112 (3.39)	104 (3.44)	102 (3.4)
Income			
0 - 9999	NA	NA	504 (16.8)
10 000–19 999	NA	NA	1293 (43.1)
20 000–29 999	NA	NA	833 (27.77)
30 000–39 999	NA	NA	238 (7.93)
40 000+	NA	NA	132 (4.4)
Employment Sector			
Education	NA	NA	122 (4.07)
Health	NA	NA	97 (3.23)
Other	NA	NA	2680 (89.33)
Social Services	NA	NA	101 (3.37)
Loss of Job	NA	NA	232 (7.73)
FTE Reduction	NA	NA	217 (7.23)
Salary Reduction	NA	NA	417 (13.9)
Forced Leave	NA	NA	365 (12.17)

Table 2

Prevalence of current mental disorders in November 2017, May 2020 and November 2020.

	November 2017	May 2020	November 2020
Any mental disorder	20.02 (18.64; 21.39)	29.63 (27.9; 31.37)	32.94 (31.14; 34.77)
Affective disorders	6.57 (5.71; 7.4)	18.58 (17.09; 20.05)	21.16 (19.56; 22.74)
Anxiety disorders	7.79 (6.87; 8.7)	12.84 (11.6; 14.05)	13.08 (11.75; 14.36)
Alcohol use disorders	10.84 (9.78; 11.89)	9.88 (8.74; 10.98)	12.06 (10.77; 13.27)
Affective disorders			
Major depressive episode	3.96 (3.28; 4.62)	11.77 (10.56; 12.99)	12.15 (10.91; 13.39)
Suicidality (any risk)	3.88 (3.21; 4.52)	11.88 (10.64; 13.07)	14.26 (12.86; 15.62)
Anxiety disorders			
Panic disorder	0.21 (0.04; 0.36)	0.88 (0.53; 1.18)	1.15 (0.73; 1.53)
Generalized anxiety disorder	3.14 (2.52; 3.72)	5.17 (4.31; 5.95)	5.32 (4.49; 6.13)
Agoraphobia	5.16 (4.4; 5.91)	7.99 (6.99; 9)	8.67 (7.55; 9.75)
Social phobia	1.67 (1.22; 2.09)	2.53 (1.94; 3.07)	3.35 (2.65; 4)
Posttraumatic stress disorder	0.96 (0.61; 1.28)	1.7 (1.23; 2.15)	2.34 (1.75; 2.89)
Alcohol use disorders			
Alcohol dependence	6.61 (5.72; 7.48)	4.25 (3.49; 5)	4.97 (4.16; 5.76)
Alcohol abuse	9.42 (8.39; 10.41)	7.85 (6.85; 8.79)	10.39 (9.18; 11.59)

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

2020), we observed an insignificant increase in prevalence across all diagnostic groups (Table 2, Fig. 1).

3.3. Disproportionally affected non-clinical subgroups

The population sub-groups that demonstrated the highest prevalence of mental disorders include individuals that reported having lost a job in the last 6 months (54.88%, n = 127), students (52.26%, n = 98), individuals receiving disability pension (51.7%, n = 57), and individuals on forced leave (47.21%, n = 177). On the other hand, individuals aged 65+ (20.14%, n = 111), self-employed (25.01%, n = 44) and with university-level education (26.67%, n = 168) were associated with the lowest prevalence of disorders (Table 3).

4. Discussion

Our findings suggest that mental health of the Czech adult population during the second wave of COVID-19 pandemic and associated second nationwide lockdown has not returned to pre-pandemic levels. On the contrary, population mental health seems to follow a downward trajectory, with prevalence rates exceeding those detected during the first wave of pandemic. Importantly, the distribution of mental disorders across non-clinical population sub-groups is uneven, with younger adults and students, those who lost job or were on a forced leave in the last 6 months, and those with elementary education displaying particularly high rates of mental disorders.

The prevalence rates estimated in the present study are considerably higher than either, the Czech baseline (Formanek et al., 2019) or, in most cases, the existing pre-pandemic European estimates (Wittchen et al., 2011). Given this large and persistent or repeated increase in mental distress associated with lockdowns, and recent research showing increased risk of depression and anxiety for individuals following hospitalization due to COVID-19 (Huang et al., 2021), it is likely that the need for mental health services will increase in the upcoming time period. In England, which experienced a similar increase in prevalence

Table 3

Prevalence of current mental disorders in November 2020 stratified by non-clinical population subgroups.

Category and value	Alcohol use disorder	Anxiety disorders	Major depressive episode	Suicidality (any risk)	Any mental disorder
Gender					
Females	7.54 (127)	16.95 (263)	14.22 (231)	15.86 (245)	34.76 (539)
Males	16.8 (235)	9.03 (135)	9.99 (151)	12.58 (180)	31.04 (445)
Age					
18–25	27.12 (84)	19.7 (68)	21.8 (73)	20.97 (72)	50.57 (168)
26–35	17.73 (89)	16.04 (86)	15.95 (91)	19.75 (104)	42.77 (224)
36–45	14.46 (76)	14.33 (88)	12.14 (72)	14.83 (85)	34.3 (192)
46–55	10.26 (45)	14.53 (61)	11.85 (51)	12.15 (53)	33.56 (143)
56–65	7.91 (42)	11.05 (59)	11.85 (63)	12.02 (60)	27.91 (146)
65+	3.73 (26)	7.36 (36)	5.61 (32)	9.95 (51)	20.14 (111)
Education					
Elementary	16.26 (35)	22.06 (51)	16.6 (46)	27.03 (62)	50.29 (115)
High School	12.78 (144)	12.94 (148)	11.81 (135)	12.82 (139)	32.32 (351)
University	10.88 (71)	9.93 (63)	11.15 (66)	8.34 (54)	26.67 (168)
Vocational School	10.74 (112)	12.34 (136)	11.73 (135)	15.31 (170)	31.99 (350)
Forced Leave					
Forced Leave	20.6 (75)	22.55 (87)	20.44 (81)	18.93 (75)	47.21 (177)
No Forced Leave	10.88 (287)	11.77 (311)	11 (301)	13.61 (350)	30.97 (807)
FTE Reduction					
FTE Not Reduced	11.68 (321)	12.45 (349)	11.42 (329)	13.74 (376)	32.09 (881)
FTE Reduced	17.04 (41)	21.23 (49)	21.63 (53)	20.95 (49)	44.05 (103)
Income					
0–9999	15.22 (76)	21.29 (105)	21.46 (115)	23.42 (110)	47.04 (234)
10 000–19 999	8.31 (113)	13.21 (176)	11.59 (151)	13.81 (184)	31.13 (405)
20 000–29 999	13.45 (110)	10.85 (93)	9.03 (83)	11.78 (96)	28.91 (239)
30 000–39 999	15.31 (36)	7.29 (17)	9.5 (22)	8.54 (22)	27.09 (64)
40 000+	22.37 (27)	6.01 (7)	7.63 (11)	10.43 (13)	34 (42)
Loss of Job					
Yes	20.19 (48)	20.21 (48)	27.41 (68)	29.2 (66)	54.88 (127)
No	11.45 (314)	12.55 (350)	11.01 (314)	13.14 (359)	31.31 (857)
Marital Status					
Divorced	10.03 (42)	15.84 (65)	10.35 (48)	18.08 (71)	34.45 (143)
Married/ Living with Partner	10.34 (180)	11.11 (197)	11.32 (199)	11.4 (192)	29.2 (500)
Other	12.24 (5)	15.24 (4)	14.29 (6)	21.67 (8)	41.91 (14)
Single	21.17 (133)	16.31 (114)	15.53 (112)	19.21 (135)	42.68 (287)

Table 3 (*continued*)

Category and value	Alcohol use disorder	Anxiety disorders	Major depressive episode	Suicidality (any risk)	Any mental disorder
Widowed	0.69 (2)	13.58 (18)	12.26 (17)	13.52 (19)	29.06 (40)
Number of Children					
0	11.66 (232)	13.06 (254)	11.65 (235)	14.48 (277)	32.51 (631)
1–2	12.95 (114)	12.6 (119)	12.33 (118)	14.07 (128)	33.28 (299)
3–4	11.55 (14)	16.5 (23)	16.67 (25)	11.59 (16)	37.18 (49)
5+	16.46 (2)	12.25 (2)	24.64 (4)	21.27 (4)	29.8 (5)
Salary Reduction					
Salary Not Reduced	11.08 (287)	11.99 (310)	10.79 (288)	13.65 (343)	30.91 (789)
Salary Reduced	18.39 (75)	20.1 (88)	20.91 (94)	18.18 (82)	46 (195)
Employment Sector					
Education	5.13 (6)	13.23 (16)	10.14 (12)	10.99 (11)	26.63 (30)
Health Sector	11.72 (12)	14.69 (15)	12.76 (15)	14.4 (14)	29.88 (31)
Other	12.26 (327)	12.87 (348)	12.19 (341)	14.29 (381)	33.18 (882)
Social Services	15.99 (17)	17.69 (19)	13.19 (14)	17.58 (19)	37.75 (41)
Work Status					
Disability Pension	10.1 (11)	28.16 (29)	25.7 (30)	28.65 (34)	51.7 (57)
Employed	14.39 (196)	11.97 (183)	9.57 (149)	12.64 (184)	32.11 (460)
On Maternity/ Paternity Leave	7.72 (13)	14.12 (23)	14.4 (25)	12.68 (20)	31.18 (50)
Other	13.85 (15)	29.39 (29)	30.63 (32)	31.93 (31)	56.81 (57)
Retired	4.61 (36)	9.43 (61)	8.5 (57)	11.8 (73)	24.64 (166)
Self-Employed	10.39 (19)	9.8 (16)	9.06 (15)	6.4 (14)	25.01 (44)
Student	30.61 (53)	19.4 (38)	24.18 (46)	21.19 (39)	52.26 (98)
Unemployed	16.28 (19)	17.75 (19)	26.94 (28)	28.47 (30)	50.1 (52)

The results are presented as weighted proportions (%) with counts (n).

of mental disorders during the first wave as Czechia (Pierce et al., 2020), it has been estimated that up to 10 million people (or almost 20% of the population) will require some new or additional mental health services (O'Shea, 2020). Since people with pre-existent mental health problems seem to be less affected by the pandemics (Pan et al., 2020), we suggest that special attention be paid to disproportionally affected non-clinical groups.

Several mechanisms could account for the observed trends. First, while previous research showed a gradual decrease in symptoms of mental disorders after the introduction of lockdown (Fancourt et al., 2020), it is possible that mental health symptoms oscillate significantly given the presence or absence of strong triggers (such as a lockdown and easing of restrictions), and could gradually return to the same or even higher levels with the implementation of additional lockdowns. Second, mental health problems in non-clinical population might be more chronic than previously assumed (Ten Have, 2020), implying that mental health problems experienced during the first wave might have

been persisting. Finally, continued and compounded adverse life events and exposure to multiple distinctive adverse life events can prompt chronic stressors that could lead to more profound effects than isolated adverse events. Since populations are exposed to additional waves of the pandemic, continued restrictions of daily activities, and livelihood-threatening economic prospects, the levels of stress may be higher and/or lengthier than during the first wave. Long-term stress is known to exacerbate and accelerate pre-existing vulnerabilities in individuals (Marin et al., 2011), which could in part explain the persistently high prevalence of mental health problems.

Although this study benefits from a well-defined sample and the use of an established diagnostic instrument, it has several limitations. Above all the cross-sectional design of the studies does not allow assessment of within-individual changes over time and for an inference of causality. Likewise, cross-sectional studies examining associations between health status and characteristics of the respondents are inherently prone to confounding, leading to a risk that high rates of mental problems observed in subgroups of our respondents could be at least partially explained by additional unaccounted for socio-demographic factors. In addition, because of the COVID-19 related restrictions in place during both, the first and the second wave of pandemic, the sampling strategy and interviewing technique used for the baseline data collection were not replicable. As such, different strategies were employed to adhere to national regulations when collecting data during COVID-19, and the differences in study designs could partly contribute to the observed differences between the baseline and subsequent data collections. However, the combined use of both, CAWI and CATI interviewing techniques likely attenuated the potential selection bias. .

5. Conclusions

The increase in mental health disorders observed globally during the first wave of the COVID-19 pandemic seems to be persistent and rising with the wake of the second wave. Long-term consequences on population health are likely, and pose significant challenges to national and international responses to COVID-19. The rise in mental disorders warrants significant emphasis on assessment, treatment, and prevention of further deterioration of public mental health. Mental health promotion and prevention of mental disorders should be treated as a global priority, in order to address emerging mental health needs related to the COVID-19 pandemic, particularly in disproportionally affected non-clinical sub-groups.

Authors' contribution

Petr Winkler initiated, planned and designed the study, coordinated the study, conducted the literature review, and co-led the writing of the manuscript. Tomas Formanek planned and designed the study, conducted the statistical analyses, contributed to the literature review, and co-led the writing of the manuscript. Karolina Mlada contributed to both, designing the study and to the statistical analyses. Zuzana Mohrova contributed to the statistical analysis. All authors, including Pavel Mohr, Marie Kuklova and Anna Kagstrom, contributed to the interpretation of the results and to the writing of the manuscript.

Ethical standards

Ethical approvals for all studies were obtained from the ethical committee of the National Institute of Mental Health, Czech Republic.

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Availability of data and materials

Data are not available publicly because of government regulations; however, data will be made available upon a reasonable request. Likewise, the R code will be made available upon a reasonable request.

Declaration of competing interest

Authors declare that they have no conflict of interest.

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