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Psychological and behavioral response on the COVID-19 pandemic in individuals with bipolar disorder: A multicenter study

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ABSTRACT

The COVID-19 pandemic affects both mentally healthy and ill individuals. Individuals with bipolar disorder (BD) constitute an especially vulnerable group. A multicentric online study was conducted in Austria, Denmark, and Germany after the first lockdown phase in 2020. In total, 117 healthy controls (HC) were matched according to age and sex to 117 individuals with BD. The survey included the Brief Symptom Inventory-18, Beck Depression Inventory-2, Pittsburgh Sleep Quality Index, and a self-constructed questionnaire assessing COVID-19 fears, emotional distress due to social distancing, lifestyle, and compliance to governmental measures. In individuals with BD, increased symptoms of depression, somatization, anxiety, distress due to social distancing, and poorer sleep quality were related to emotional distress due to social distancing. The correlation between emotional distress due to social distancing and anxiety showed 26% of shared variance in BD and 11% in HC. Negative lifestyle changes and lower compliance with COVID-19 regulatory measures were more likely to be observed in individuals with BD than in HC. These findings underscore the need for ongoing mental health support during the pandemic. Individuals with BD should be continuously supported during periods of social distancing to maintain a stable lifestyle and employ strategies to cope with COVID-19 fears.

Introduction

The ongoing coronavirus disease (COVID-19) pandemic has brought with it a plethora of social, emotional, and economic challenges. Caused by the severe acute respiratory syndrome coronavirus (SARS-CoV)-2, this contagious airborne disease is characterized by symptoms such as fever, cough, and shortness of breath. (Li et al., 2020) Having reached pandemic status on March 11th, 2020², it has led to lockdowns and government restrictions around the world. (Kretzschmar et al., 2021) Until today, February 2022, over 386 million people have been infected and more than 5 million died from or with a COVID-19 infection. (Johns Hopkins University 2022)

From March 2020, people in Europe experienced increasing restrictions in several areas of life. Comparable measures and restrictions came into force in Austria, Denmark, and Germany, with only minor time differences (for details, see Table 1).

The pandemic and lockdowns, accompanied by feelings of uncertainty and fear (Zandifar and Badrfam, 2020), have led to an increased prevalence of mental health problems. (Goldenberg and Parwani, 2021) A global increase of fear, (Frissa and Dossa, 2020) anxiety, distress, (Fountoulakis et al., 2021) loneliness, (Grey et al., 2020) post-traumatic stress symptoms (Bonsaksen et al., 2020), and depression (Fountoulakis et al., 2021) has been observed in the general population. Although some researchers have noted that mentally ill individuals may be less

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affected by the crisis than mentally healthy individuals, (Pan et al., 2021) the majority of the literature indicates an increase in symptoms in individuals with mental disorders. (Quitkat et al., 2020; Fleischmann et al., 2021) Medical resources for treatment were scarce, leading to increased concern (Costa et al., 2020) and possible interruptions in treatment. (Pfefferbaum and North, 2020) As severe psychiatric disorders are associated with cognitive impairment, (Stefanopoulou et al., 2009) some individuals may have had difficulty complying with anti-virus measures. (Yao et al., 2020)

In addition, a psychiatric diagnosis seems to be an independent risk factor for a COVID-19 infection itself. (Wang et al., 2021) Bipolar disorder (BD) is an affective disorder characterized by the occurrence of episodes of depression and hypomania or mania affecting 1–2% of the population. (Blanco et al., 2017) Regarding COVID-19, individuals with BD represent a particularly vulnerable group, (Hölzle et al., 2020) as they are at risk of developing affective episodes during highly stressful times. (Stefana et al., 2020; Weiss et al., 2015) In addition, the risk for a more severe course of COVID-19 is increased due to a high prevalence of somatic comorbidities in people with BD. (Zareifopoulos et al., 2018)

Concerns about maintaining and improving treatment adherence in individuals with BD during the COVID-19 pandemic have already been raised by several researchers. (Hernández-Gómez et al., 2021; Yocum et al., 2021) Furthermore, it was found that the pandemic was associated with more psychological distress, (Dalkner et al., 2021; Di Nicola et al., 2020) more post-traumatic stress symptoms, (Asmundson et al., 2020) and higher levels of fear and sleep problems (Fellendorf et al., 2021) in BD compared to healthy controls (HC). In contrast to that, other studies have reported no differences in mood symptomatology between individuals with BD and HC, (Karantonis et al., 2021; Pinkham et al., 2020) necessitating continued research in this area of interest.

The aims of this study were 1. to show differences in mood and anxiety symptoms between individuals with BD and HC during the first phase of the pandemic in 2020, 2. to determine whether clinical symptoms were related to COVID-19 fears or emotional distress due to social distancing in both groups during this time, and 3. to investigate differences in COVID-19-related lifestyle changes, medication adherence, and compliance with COVID-19-related supervisory and regulatory actions by individuals with BD and HC.

Table 1

Governmental measures and COVID-19 epidemiology in Austria, Denmark, and Germany during the conduction of the surveys in 2020.

		Austria (Pollak et al., 2020)		Denmark (2020)		Germany (Mitteldeutscher Rundfunk, 2020)			
		Survey open from May 5th-June 4th		Survey open from June 17th -September 22nd		Survey open from June 15th -September 22nd			
Restrictions	May 1 to May 15	Restrictions to leave home are lifted when keeping a distance of 1 meter and wearing masks in public areas Reopening of all shops, hairdressers, sports areas & gastronomy Reopening of kindergartens Resumption of services Events with participants up to 10 & funerals up to 30 participants are allowed		Until June 15	Reopening of schools and kindergartens, hairdressers, shops, & restaurants (Kildegaard et al., 2020) Events with up to 100 people are allowed again Mandatory masks at airports Borders stay closed (Tofte and HagemannNielsen, 2020)		Until June	Masks must be worn in public transport & shops; Meetings in public areas with more than one person are allowed again when keeping a distance of 1 meter Reopening of museums, schools, & shops Resumption of (church-) services	
	May 15 to June	Students in graduating classes can return to school Staggered reopening of schools Weddings and funerals of up to 100 people are allowed again Reopening of hotels & recreational centres		June 15 to September 22	Tourists can gradually enter from abroad again, at first only if staying for > 6 days, then without timely guidelines (Tofte and Hagemann-Nielsen, 2020) Mandatory masks in public transports introduced (Riedel, 2020) Private events are restricted to 50 participants (Lange Olsen, 2020)		June 4 to September	Some counties ease restrictions Visits in nursing homes are allowed again Contact restrictions are eased Kindergartens and schools are reopened Travel warnings are extended for about 160 countries Inner-German travel restrictions Inner-European borders are opened again Mandatory testing for people returning from risk areas within 72 h of arrival	
Infected Cases	05.05.2020	1582		17.06.2020	511		15.06.2020	6	
	04.06.2020	418		22.09.2020	5 123		22.09.2020	559	
Deaths	05.05.2020	606		17.06.2020	598		15.06.2020	19	
	04.06.2020	670		22.09.2020	641		22.09.2020	785	
		(Die Presse, 2020)		(NORDISCH.info, 2020)				885	
								9	
								491	
								(Mitteldeutscher Rundfunk, 2020)	

We hypothesized that increased psychological symptoms (anxiety, depression, somatization, poorer sleep quality) in BD would be related with both COVID-19 fears and emotional distress due to social distancing. We expected these associations to be higher in BD compared to controls.

Methods

Participants

A total of 558 data sets were created in three study centers (University of Copenhagen: $n = 137$, Technische Universität Dresden, University Hospital Dresden: $n = 112$, Medical University Graz: $n = 309$). Complete data was available for 342 individuals. For this analysis, 117 HC were matched to 117 individuals with BD according to sex and age (39 males and 78 females). In Graz, individuals with BD were previously diagnosed using the Structured Clinical Interview for DSM-5⁴. In Dresden and Copenhagen, they were invited from an outpatient clinic, self-reporting their diagnosis during the survey.

HC were included if they had no psychiatric illness or family history of psychiatric illness. Participants answered the questionnaires pseudo-anonymously using a participant code. Inclusion criteria comprised voluntary participation (informed consent) and e-mail access. This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Medical University Graz (EK-number: 32–363 ex 19/20) and confirmed by the Ethics Committee of the Medical Faculty of the Technische Universität Dresden (No. SR+BO-EK-185,052,020).

Procedure

Data collection was carried out via an online survey program (Limesurvey Version 3.27.4) open in Austria from May 5th to June 4th, 2020 (during the gradual decrease of restrictions) and from June 17th and June 15th, to September 22nd, 2020 in Denmark and Germany respectively.

Demographic information included personal details (sex, age, education, relationship status), information on the living situation (number of residents in home town, number of people in household, children), involvement in activities and hobbies, existence of a daily structure, medication compliance (changes in current medication), adherence to government COVID-19 measures, and contact with a mental health professional (psychiatrist, psychologist, psychotherapist).

Inventories

The Brief Symptom Inventory-18 (BSI-18) by Derogatis and Fitzpatrick, (Derogatis and Fitzpatrick, 2004) a short version of the Symptom-Checklist-90-Revised (SCL-90-R), (Derogatis and Savitz, 1999) measures psychological symptoms in the last seven days, with the three subscales somatization, depression, and anxiety as well as a scale for global symptom load, the Global Severity Index (GSI). It shows a good internal consistency with a Cronbach's alpha of somatization $\alpha = 0.82$, depression $\alpha = 0.87$, anxiety $\alpha = 0.84$ and GSI $\alpha = 0.93$. (Derogatis and Fitzpatrick, 2004)

The Beck Depression Inventory (BDI-II) is a self-report questionnaire to assess the severity of depressive symptoms within the last 14 days. According to the manual, a score over 18 indicates clinical depression. (Beck et al., 1961) The scale has been shown to demonstrate an internal consistency with a Cronbach's $\alpha \geq 0.84$ and a reliability of $r \geq 0.75$. (Kühner et al., 2007)

The Altman Self-Rating Mania Scale (ASRM) by Altman et al. is a five-item scale for assessing mood, self-confidence, sleep disturbances, speech, and activity level within the last week. (Altman et al., 1997)

The Pittsburgh Sleep Quality Index (PSQI) is a self-report questionnaire by Buysse et al. that evaluates sleep quality within the last four

weeks. The PSQI consists of 19 items, generating seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime sleepiness. A total PSQI score (range 0–21) of more than 5 yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% ($\kappa = 0.75$, $p \leq 0.001$) to distinguish good and poor sleepers. (Buysse et al., 1989)

A COVID-19 questionnaire was created by the Department of Psychiatry and Psychotherapeutic Medicine at the Medical University of Graz assessing COVID-19 fears as follows (0 = no fears, 10 = extremely high fear):

- On a scale from 0 to 10, how strongly do you rate your concerns and fears about the coronavirus?
- On a scale from 0 to 10, how strongly do you rate your fear of contracting the coronavirus?
- On a scale from 0- 10, how strongly do you rate your fear of infecting others with the coronavirus?

The three items showed a highly significant intercorrelation (all $p < .01$) and a mean index for COVID-19 fears was created, showing a Cronbach's alpha of $\alpha = 0.78$.

Emotional distress due to social distancing was assessed by the following five items on a five-point rating scale (0 = strongly disagree, 4 = strongly agree):

- On a scale from 0 to 4, social distancing makes me feel lonely.
- On a scale from 0 to 4, social distancing makes me feel bored.
- On a scale from 0 to 4, social distancing makes me feel frustrated.
- On a scale from 0 to 4, social distancing makes me feel hopeless.
- On a scale from 0 to 4, social distancing makes me feel anxious.

From these significantly intercorrelated items (all $p < 0.01$), a mean index for "Emotional distress due to social distancing" was created, showing a Cronbach's alpha of $\alpha = 0.89$.

A self-constructed questionnaire was used to measure the compliance with governmental measures, comprising three intercorrelated ($p < .01$) items. Participants answered the question "To what extent do the following statements apply to your behavior in the past week?" for each of the following items, rating them on a scale from 0 (= does not apply at all) to 10 (= completely applies):

- I stayed at home, except for professional work, necessary errands, or a walk/exercise per day.
- I kept a distance of at least two metres from other people.
- I did not meet up with people who do not live with me.

A mean index for "Compliance to governmental measures" was then created, featuring a Cronbach's alpha of $\alpha = 0.71$. All questionnaires described above were used in the German and Danish versions.

Statistics

Differences between patients with BD and HC were calculated using chi-square tests (for nominal data) and the Freeman-Halton Fisher's exact test, if the expected cell size was < 5 , and t-tests (for metric data). As the questionnaires and the COVID-19 scales (with exception of the ASRM and the index for compliance to governmental measures) were moderately intercorrelated, a multivariate co-variance analyses (MANCOVA) model for testing differences between the groups in the test scores was used. Study center, education, and relationship status were included into the model as control variables. Partial correlation analyses (controlled for study center, education, and relationship status) were carried out to investigate possible associations. The Bonferroni correction was applied to correct for multiple testing, with an adjusted alpha-level of 0.0036 for $n = 14$ tests. Correlation coefficients between groups were compared for significance using Fisher's r-to-z transformation.

Normal distribution of the psychological test scores was compared in each group using the two-sample Kolmogorov-Smirnov test. All data met the appropriate assumptions of multivariate normality and linearity. There was homogeneity of the error variances for the COVID-19 scales ($p > .05$) but not for both BDI-II and BSI-18 scores and the index for compliance to governmental measures ($p < .001$), as assessed by Levene's test. As the MANCOVA is a robust statistical method, (Ateş et al., 2019) the analyses were continued despite this violation, however, inflated Type I error rates must be taken into account when interpreting the results. All analyses were performed using the Statistical Package for Social Sciences (SPSS version 29.0, IBM).

Results

As we used matched groups, there were no differences in age and sex between the groups. The median age of the participants was 43 years and 67% were females in both samples. Distribution of the frequency of patients and controls differed in the study centers, and individuals with BD differed from HC in education and relationship status (see Table 2). Thus, these variables were included as control variables in the statistical analyses.

In the BD group, 14 patients (6.0%) reported having a comorbid panic disorder, 12 patients (5.1%) had other comorbid anxiety disorders, and eight patients (3.4%) had PTSD symptoms. Four patients (1.6%) had a comorbid substance use disorder, and six patients (2.6%) stated a comorbid personality disorder or eating disorder. There were no differences between the groups regarding their adherence to medication intake (for details see Table 2).

The MANCOVA showed a multivariate group effect ($F(216,7) = 8.27, p < .001, \eta^2 = .21$) with higher psychological symptoms in the BD group (see Table 3). The univariate results indicate higher scores in PSQI, BDI-II, BSI-18 scales somatization, depression, anxiety, GSI, and emotional distress due to social distancing. The control variables study center ($F(216,7) = 1.17, p = .320, \eta^2 = 0.037$), education ($F(216,7) = 0.70, p = .669, \eta^2 = 0.022$) and relationship status ($F(216,7) = 1.97, p = .610, \eta^2 = 0.060$) were not significant confounders. In addition, lower self-reported compliance to governmental measures was found in the BD group compared with the control group.

A partial correlation analysis showed significant correlations between COVID-19 fears and anxiety, GSI, and PSQI only in the BD group, as shown in Table 4. Emotional distress due to social distancing correlated with BDI-II, somatization, depression, anxiety, GSI, and PSQI in the BD group, and with BDI-II, depression, anxiety, and GSI in the control group. The Fisher's r-to-z transformation to compare the coefficients between groups for significance showed a difference in the correlation between emotional distress due to social distancing and anxiety ($z = 1.81, p = .035$) with 26% of shared variance in the BD group and 11% in the control group.

Chi-square tests showed that individuals with BD had fewer changes in the frequency of social contacts than HC, who had significantly fewer contacts and fewer changes in physical activity, with HC showing more variability in exercise behavior (see Table 5). Most of HC showed no change in weight, in contrast to more individuals with BD who gained weight. No significant differences were reported regarding eating habits, changes of routine structure, subjective performance, and consumption of alcohol and nicotine.

Discussion

In 117 individuals with BD, higher psychological distress and more symptoms of depression, somatization, anxiety, emotional distress, and a poorer sleep quality due to social distancing were found during the COVID-19 pandemic between May and September 2020 in three European countries (Austria, Germany, Denmark), as compared to 117 sex- and age-matched HC. These findings were expected, as patients with BD typically have higher symptom scores on self-rated scales, including

Table 2

Sociodemographic characteristics of individuals with bipolar disorder and healthy controls.

Variable	Group		Statistics	p
	BD (n = 117) M (± SD)	HC (n = 117) M (± SD)		
Age	43.32 (13.17)	43.36 (13.82)	T(232) = -0.02	.985
Sex (n,%)				
Male	39 (33.3%)	39 (33.3%)		
Female	78 (66.6%)	78 (66.6%)		
Study center (n,%)			$\chi^2(2) = 78.37$	<0.001
Copenhagen	56 (47.9%)	2 (1.7%)		
Dresden	25 (21.4%)	19 (16.2%)		
Graz	36 (30.8%)	96 (82.1%)		
Education (n,%)			$\chi^2(5) = 37.77$	<0.001
GCSE/O levels	5 (4.3%)	7 (6.0%)		
Apprenticeship	24 (20.5%)	14 (12.0%)		
A-Levels/NVQ/HND	35 (29.9%)	21 (17.9%)		
Bachelor's degree	26 (22.2%)	9 (7.7%)		
Master's Degree	25 (21.4%)	48 (41.0%)		
Doctoral level	2 (1.7%)	18 (15.4%)		
Relationship status (n,%)			$\chi^2(4) = 14.91$.003 (Li et al., 2020)
Single	33 (28.2%)	21 (17.9%)		
In a relationship	35 (29.1%)	37 (31.6%)		
Married	36 (30.8%)	56 (47.9%)		
Divorced	10 (8.5%)	3 (2.6%)		
Widowed	4 (3.4%)	0 (0.0%)		
Number of social contacts (face to face)	10.9 (16.2)	13.0 (65.3)	T(232) = -0.33	.739
Number of social contacts (virtual)	12.0 (13.0)	18.0 (38.2)	T(232) = -1.61	.109
Compliance to governmental measures (WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 2020)	5.07 (2.96)	6.98 (2.52)	T(226.18) = 5.32	<0.001
Medication intake during the crisis in comparison to before (n,%)			$\chi^2(1) = 0.864$.759 (Li et al., 2020)
regular and as prescribed	102 (92.7%)	35 (97.2%)		
irregular and less reliable	7 (6.4%)	1 (2.8%)		

Note: BD = Bipolar disorder, HC = healthy controls, GCSE = General Certificate of Secondary Education, NVQ = National Vocational Qualifications, HND = Higher National Diploma;

¹ Fisher's exact test

² "To what extent do the following statements apply to your behavior in the past week?": "I stayed at home, except for professional work, necessary errands, or a walk/exercise per day", "I stayed at home, except for professional work, necessary errands or a walk/exercise per day" and "I did not meet up with people who do not live with me" Mean of three 0–10 scales.

Table 3
Psychological test scores of individuals with bipolar disorder (BD) and healthy controls (HC).

Variable	Group		Statistics	p
	BD (n = 117) M (± SD)	HC (n = 117) M (± SD)		
BDI-II	15.19 (12.41)	4.25 (6.07)	F(222,1) = 44.90	<0.001
ASRM	1.32 (1.94)	1.03 (1.81)	T(229) = 81.16	.246
BSI-18 Somatization	4.06 (4.29)	1.21 (2.01)	F(222,1) = 30.07	<0.001
Depression	6.81 (5.93)	2.16 (3.42)	F(222,1) = 34.83	<0.001
Anxiety	5.56 (5.36)	2.04 (2.93)	F(222,1) = 23.69	<0.001
GSI	16.43 (13.78)	5.42 (7.44)	F(222,1) = 38.24	<0.001
PSQI	7.34 (4.15)	4.24 (2.41)	F(222,1) = 42.21	<0.001
COVID-19 fears (Li et al., 2020)	3.93 (2.27)	3.48 (1.91)	F(222,1) = 3.70	.056
Emotional distress due to social distancing (WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 2020)	1.43 (1.00)	.95 (0.92)	F(222,1) = 7.02	.006

Note: BD = Bipolar disorder, HC = healthy controls; BDI-II = Beck Depression Inventory II, ASRM = Altman Self-Rating Mania Scale, BSI 18 = Brief Symptom Inventory 18, PSQI = Pittsburgh Sleep Quality Index.

¹ “How strongly do you rate your concerns and fears about the coronavirus?”, “How strongly do you rate your fear contracting the coronavirus?” and “How strongly do you rate your fear of infecting others with the coronavirus?” Mean of three 0–10 scales.

² “Social distancing makes me feel lonely/ bored/ frustrated/ hopeless/ anxious” Mean of five 0–4-point scales.

during periods of euthymia. (Goossens et al., 2008)

A new finding, however, was that emotional distress due to social distancing was associated with somatization, depression, anxiety, global symptom load, and sleep quality in the BD group, but only with depression and anxiety in the control group. For BD, emotional distress due to social distancing was more strongly associated with anxiety than for HC. Additionally, in individuals with BD, we showed that the higher their anxiety scores, symptom load, and sleep problems were, the

Table 4
Partial correlation analysis between COVID-19 fears/emotional distress due to social distancing and psychological symptoms in individuals with bipolar disorder (BD) versus healthy controls (HC).

Variable	COVID-19 fears (Li et al., 2020)				Emotional distress due to social distancing (WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 2020)			
	BD		HC		BD		HC	
	r	p	r	p	r	p	r	p
BDI-II	.20	.038	.16	.098	.52	<0.001	.38	<0.001
ASRM	.25	.009	.05	.573	.02	.811	−0.02	.873
Somatization	.26	.007	.09	.355	.40	<0.001	.25	.007
Depression	.21	.027	.13	.183	.56	<0.001	.49	<0.001
Anxiety	.37	<0.001	.11	.237	.50	<0.001	.30	.001
GSI	.32	.001	.13	.179	.57	<0.001	.42	<0.001
PSQI	.34	<0.001	.16	.088	.42	<0.001	.27	.005

Note: BD = Bipolar disorder, HC = healthy controls; BDI-II = Beck Depression Inventory II, ASRM = Altman Self-Rating Mania Scale, BSI 18 = Brief Symptom Inventory 18, PSQI = Pittsburgh Sleep Quality Index.

² “How strongly do you rate your concerns and fears about the coronavirus?”, “How strongly do you rate your fear contracting the coronavirus?” and “How strongly do you rate your fear of infecting others with the coronavirus?” Mean of three 0–10 scales.

¹ “Social distancing makes me feel lonely/ bored/ frustrated/ hopeless/ anxious” Mean of five 0–5-point scales; Bonferroni correction for multiple comparisons threshold of significance: $p \leq 0.0036$ (0.05/14 tests) in bold.

greater their fear of COVID-19 was, and vice versa. In contrast, no correlations were found in controls between symptoms and COVID-19 fears. However, COVID-19 fears were not significantly different between the groups.

Overall, the impact of social distancing on mood appeared to be greater than the fear of the virus itself. Social distancing represented a more immediate change and drastically altered people’s daily lives. Due to social distancing, many have not come into contact with the virus, instead experiencing feelings of loneliness, boredom, frustration, hopelessness, and fear. As such, fears about the virus may have been overshadowed by these more pressing concerns.

Individuals with BD reported poorer sleep quality than HC in the period studied shortly after the first lockdown, in line with the results from recent studies. (Yocum et al., 2021; Carta et al., 2021) The occurrence of sleep problems in BD is well-known (Steardo et al., 2019) and has been shown to impact overall functioning. (Grunze and Born, 2020) Sleep deprivation serves as a recognized trigger for manic episodes, (Colombo et al., 1999; Lewis et al., 2017) and a depressive state is associated with insomnia or hypersomnia. (Stein et al., 2016) Circadian rhythm disorders have been found to be associated with both manic and depressive episodes, (Gershon et al., 2017) the latter of which may be favored by the circumstances of the COVID-19 pandemic. This was supported by the negative correlation between COVID-19 fears and both sleep quality and anxiety

Additionally, sleep problems could be partly due to a less structured routine reported by a third (34.2%) of individuals with BD compared to before the pandemic. In accordance with the result obtained by Rajkumar, (Rajkumar, 2020) social distancing and the resulting distress were associated with sleep problems in individuals with BD, but not in HC. Carta et al. hypothesized that circadian rhythm dysregulation may make individuals with BD more susceptible to mood episodes. (Carta et al., 2021)

Furthermore, considering the correlation between emotional distress due to social distancing and depression in BD, social distancing may be an integral factor in the development of depressive symptoms as well as sleep problems, which can reinforce each other. The poor mental status of individuals with BD associated with social distancing and fears of COVID-19 could be a possible explanation for why individuals with BD reported less compliance to government measures.

HC reported more COVID-19-related changes in the frequency of social contacts and physical activity than individuals with BD. Overall, the changes reported by individuals with BD tended to be potentially unfavorable, and while some HC experienced negative changes as well, there were also HC with positive changes. Compared to pre-pandemic times, the incidence of weight gain in individuals with BD (21.4%)

Table 5
Changes in lifestyle of individuals with bipolar disorder (BD) and healthy controls (HC) that occurred during the COVID-19 pandemic, as opposed to the time before.

Variable	Group		Statistics	p
	BD (n = 117) M (± SD)	Controls (n = 117) M (± SD)		
Change of routine structure			$\chi^2(2) = 3.07$.216
No change	64 (54.7%)	69 (59.0%)		
Less structure	40 (34.2%)	29 (24.8%)		
More structure	13 (11.1%)	19 (16.2%)		
Change of the frequency of social contacts			$\chi^2(2) = 15.69$	<0.001
No change	67 (57.3%)	42 (35.9%)		
Less contact	41 (35.0%)	71 (60.7%)		
More contact	9 (7.7%)	4 (3.4%)		
Change of performance (at work, home)			$\chi^2(2) = 4.62$.099
No change	64 (54.7%)	72 (61.5%)		
Less productive	44 (37.6%)	30 (25.6%)		
More productive	9 (7.7%)	15 (12.8%)		
Change of physical activity			$\chi^2(2) = 10.56$.005
No change	63 (53.8%)	39 (33.3%)		
More activity	16 (13.7%)	28 (23.9%)		
Less activity	38 (32.5%)	50 (42.7%)		
Change of eating habits			$\chi^2(2) = 3.95$.139
No change	66 (56.4%)	79 (67.5%)		
Less healthy eating	28 (23.9%)	17 (14.5%)		
More healthy eating	23 (19.7%)	21 (17.9%)		
Change of weight			$\chi^2(2) = 20.96$	<0.001
No	84 (71.8%)	110 (94.0%)		
Lost > 5 kg	8 (6.8%)	3 (2.6%)		
Gained > 5 kg	25 (21.4%)	4 (3.4%)		
Change of smoking habits			$\chi^2(2) = 0.48$	1.000 ^a
No change	33 (70.2%)	11 (68.8%)		
Less smoking	2 (4.3%)	1 (6.3%)		
More smoking	12 (25.5%)	4 (25.0%)		
Change of alcohol consumption			$\chi^2(2) = 1.80$.406
No change	62 (74.7%)	77 (76.2%)		
Less consumption	12 (9.5%)	9 (8.9%)		
More consumption	9 (10.8%)	15 (14.9%)		

Note: BD = Bipolar disorder, HC = healthy controls.

^a Fisher's exact test.

was higher than in HC (3.4%), at least in subjective reports. In addition, nearly a quarter of the BD group reported less healthy eating habits and increased nicotine use during the pandemic, and a third said they were exercising less than before. Regarding the differences between the pre- and post-COVID situation, the potentially unfavorable lifestyle changes

induced by the pandemic and surrounding circumstances have possibly contributed to more symptoms of depression and distress. This is in line with other findings that individuals with BD may have been more affected by pandemic-related changes. (Yocum et al., 2021) Consequently, they might be more prone to develop depressive symptoms as well as have an elevated risk for a worsening of somatic comorbidities, which are more prevalent in BD.

Given our findings, further periods of lockdown and social distancing may continue to negatively impact individuals with BD and require increased mental health support. Evidently, individuals with BD could benefit from of a healthier and more structured lifestyle, increased social support, more addiction cessation programs, and increased psychological help for coping with distress and sleeping problems due to social distancing.

Limitations

This study was limited by several factors. First, it was conducted via an online survey and was therefore based on self-reports rather than external ratings, so it was unknown whether individuals with BD were euthymic or not. This also included psychiatric diagnoses and comorbidities: although individuals with BD were diagnosed with the SCID-I in Graz, they were invited from an outpatient clinic in Dresden and Copenhagen, and thus reported their diagnosis, which was checked for plausibility. Furthermore, both groups differed in their education and relationship status, both of which were therefore used as covariates in statistical analyses. In addition, to assess COVID-19 aspects, self-constructed questionnaires were used, for which no reference values exist, and the variances of the BDI-II and BSI-18 scales and the index for compliance to government measures were not equal. Another weakness of this study is that pre-pandemic patient measures were not available and therefore no conclusions can be drawn about psychological symptoms before the COVID-19 outbreak. It is therefore very likely that the differences between the groups existed before the pandemic. Last, the variable "Medication intake during the crisis in comparison to before" does not differentiate between somatic and psychiatric medication.

Conclusion

Increased psychological symptoms in individuals with BD were related to emotional distress due to social distancing and to a minor extent to COVID-19 fears. The findings implicate the need to ensure access to mental health services especially during times of crisis, also to maintain lifestyle habits and daily structures. The reduction of excessive fears concerning the infectious disease and the enhanced support during periods of social distancing in times of lockdowns is essential for vulnerable individuals during and after such a crisis.

Authors statement

All authors concur with the submission and have approved the final manuscript.

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Clinical trials registration

Trial registry name: Psychological Impact of the Corona Virus (SARS-CoV-2) and COVID-19 Pandemic in Individuals With Psychiatric Disorders

URL: <https://clinicaltrials.gov/ct2/show/NCT04410835>

Registration number: NCT04410835

Conflict of interest

All authors declare no conflict of interest in relation to this study.

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