Research paper

The mental health and lifestyle impacts of COVID-19 on bipolar disorder

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A B S T R A C T

Background: It is unclear how those with bipolar disorder (BD) have been affected by the coronavirus (COVID-19) pandemic. This study aimed to obtain a more detailed understanding of the current mental health needs of these individuals, which is important for both the development of intervention strategies to better manage patient distress and to better prepare for similar circumstances in future.

Methods: The sample comprised 43 individuals with a verified diagnosis of BD and 24 healthy controls. Data about pandemic-related mental health support use, socio-demographics, mood, lifestyle, social rhythm and subjective cognitive dysfunction data were collected and compared between groups. Inter-relationships between scores were also examined.

Results: No between-group differences were found in terms of age, sex, living situation, job loss or reduced work hours due to COVID-19. Most patients with BD reported a history of ongoing formal psychological support (68.3%), with most continuing this support throughout the pandemic (82.1%). A large, statistically significant pandemic-related increase in subjective cognitive dysfunction was evident in the BD group. Subjective cognitive dysfunction was significantly associated with negative symptomology, suicidal thoughts, and quality of life ratings.

Limitations: Data was collected in self-report format in an online survey and objective symptom measures were not used at this time

Conclusion: The absenceof substantial differences between patients and controls in terms of mood symptoms, COVID-19 fear or lifestyle factors and social rhythms suggests a degree of resilience in BD patients; despite large pandemic related increases in subjective cognitive dysfunction.

1. Introduction

As a disaster of unprecedented scale, the pervasive social, financial, and psychological impacts of the coronavirus-19 (COVID-19) pandemic are not well known. Although emerging knowledge suggests that the physical health impacts of the virus itself are dire, this is compounded more broadly by the economic and human costs associated with pandemic responses to virus control. As part of a relatively rapid response to the outbreak in Australia, strict measures were put in place by the state and federal governments in an effort to contain the spread of the virus (Moloney & Moloney, 2020). This involved enforced physical isolation, resulting in disconnection from family and friends as well as

reduced access to in-person physical and mental health care, and limited capacity to engage in meaningful activities. Given the importance of these factors for maintaining stable mood, it is possible that symptoms associated with bipolar disorder (BD) are exacerbated as a result of the pandemic (Stefana et al., 2020).

Research targeted at the mental health effects of COVID-19 on those with BD is minimal given the recency of the pandemic's onset globally. We recently characterised psychological distress and lifestyle changes in 1292 individuals with a *self-reported* diagnosis of BD or depressive disorder and 3167 psychiatrically healthy individuals from the COLLATE project; a general population survey aimed at understanding the mental health effects of COVID-19 in Australia (Van Rheenen et al., 2020). We

found that during the initial Australian wave of COVID-19 in April 2020, psychological distress was heightened in respondents with a mood disorder compared to healthy controls. More specifically, those with BD reported higher levels of stress, depression, and financial concern than those with a depressive disorder; and individuals with both types of mood disorder experienced more prominent sleep changes, increased alcohol use, and less social contact compared to controls.

These findings preliminarily highlight that negative emotions and adverse lifestyle changes are heightened in response to the pandemic in individuals with a predisposition for mood dysregulation. However, they are derived from a non-specific survey in which the clinical diagnosis of respondents self-reporting a mood disorder was not verified, and the full range of symptoms that are typically experienced by those with BD not sampled. A more comprehensive understanding of the current mental health needs of individuals with BD, and how this vulnerable population responds to disaster, is important, not only for devising immediate intervention strategies to better manage patient distress, but also to better prepare for similar circumstances in future. In this context, we undertook a study to identify the extent to which manic and depressive symptomatology, COVID-19 related anxiety, lifestyle factors and social rhythms, subjective cognitive functioning, quality of life and mental health support use had been affected by the pandemic in Australian individuals with a verified clinical diagnosis of BD compared to controls.

2. Method

This study was approved by the relevant Human Ethics Review Board and abided by the Declaration of Helsinki.

2.1. Participants

The sample comprised 43 outpatients with a confirmed DSM-IV-TR diagnosis of BD type I ($n = 25$), type II ($n = 7$), and not-otherwise-specified ($n = 11$), and 24 healthy controls. Psychiatric diagnosis and healthy control status were previously assessed as part of data collection for an earlier study occurring in the 4 years prior (Karantonis et al., 2020), and confirmed using the MINI-International Neuropsychiatric Interview (MINI) or MINI screen (Lecrubier et al., 1997). Participants from this previous study were recontacted and invited to participate in an *online* survey about the mental health and lifestyle impacts of COVID-19 on bipolar disorder. All responding participants were between the ages of 18 and 65 years of age, fluent in English, and provided informed consent. The data for the current study was collected in an online format due to ongoing social distancing restrictions (see next paragraph). Although the diagnostic status of the sample had been clinically verified in the previous study, self-report symptom measures were used here to accommodate the online format whereas objective measures were used in the previous work (see below). These measures could thus not be compared across timepoints and therefore only current symptom data is presented in the results section below. However, it should be noted that all symptom-related questions in the current work were phrased so as to enquire about symptoms occurring since the pandemic began compared to before it, to ensure COVID-19 pandemic specificity.

2.2. Survey timeframe and context

Participant data was collected via an online survey between the 29th of May and the 13th of July 2020. Several significant restrictions and changes had been enacted in Victoria, specifically in Melbourne, in the lead up to this period and during it to limit the spread of the virus. A state of emergency was declared from the 16th of March, which was followed by a series of lockdowns, enforcement of physical distancing restrictions and the closure of the Victorian-NSW border. In May, multiple restrictions were eased or were in the process of being adjusted to

account for the decline in COVID-19 positive cases; hence life in Australia was beginning to return to 'normal'. On July 9'th, just prior to the survey end-date, an influx of cases appeared in several clusters, to which metropolitan Melbourne and the Shire of Mitchell entered a more restrictive lockdown again.

2.3. Survey measures

The online survey comprised questions about demographics, and clinical and mental health support, and scales assessing quality of life, anxiety about COVID-19, and the impact of COVID-19 on mood, subjective cognitive dysfunction, lifestyle factors and social rhythm regularity. Theoretical ranges for all measures are presented in Supplementary Table 1.

Socio-demographic information was obtained through a series of questions asking about age, sex, employment status, and living situation. BD participants were further asked about their illness and history, namely BD subtype, illness duration, the number of (hypo)manic and depressive episodes, and number of hospitalisations in the last 5 years, the number of months in the past year in which they had experienced euthymia, and details of their current medication regime.

Engagement with mental health support was assessed through a series of questions centred around the frequency of engagement (or lack thereof) with professional psychological support and crisis support services, and the format of these services (in person, or via telehealth) prior to and during the pandemic. Both BD and healthy controls responded to these questions.

Mania symptoms were measured using the 48-item *Self-report Mania Inventory (SRMI; Shugar, Schertzer, Toner, & Di Gasbarro, 1992)*. The response format of the scale was changed from 'yes/no' to a 4-point scale ranging from 'never' to 'always' in this study, to allow for the capture of symptoms dimensionally. Participants were asked to respond to each item by selecting what was generally true for them since the pandemic began, compared to before it. Higher scores on the SRMI in this study indicate a greater prevalence of self-reported mania symptoms in response to the COVID-19 pandemic.

Depression and other negative emotions were measured using the 21-item *Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995)*. Participants were asked to respond to the scale items by selecting what was generally true for them since the pandemic began compared to before it from a 4-point scale ranging from 'never' to 'almost always'. Higher scores on the DASS-21 indicate higher levels of depression, anxiety and stress in response to the COVID-19 pandemic.

Thoughts about suicide was assessed with a single item "I often thought I would be better off dead, or wished that I was dead", while mood lability was assessed with two items 'My mood was up and down' and "my mood would shift rapidly". Participants were asked to respond to these items by ranking what was generally true for them since the pandemic began, compared to before it from a 4-point scale ranging from 'never' to 'almost always'. Higher scores indicated greater suicidal thoughts and more labile mood in response to the COVID-19 pandemic.

Fear of COVID-19 was assessed using the seven item *Fear of COVID-19 Scale (FCV-19S; Ahorsu et al., 2020)*. Participants were asked to rate their level of agreement with each item of the FCV-19S over the past week on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. Higher scores are indicative of a greater fear of COVID-19.

Quality of life was measured using the 12-item *Brief Quality of Life Scale for Bipolar Disorder (QOLBD; Michalak & Murray, 2010)*. Participants were asked to rate the scale items over the past week on a 5-point scale ranging from 'strongly disagree' to 'strongly agree'. Higher scores are indicative of a better current quality of life.

Subjective cognitive dysfunction was assessed using a 14-item modified version of the *Cognitive Complaints in Bipolar Disorder Rating Assessment (COBRA; Rosa et al., 2013)*. Participants were asked to rate their agreement with each item of the COBRA by thinking about what

was generally true for them since the pandemic began, compared to before it.In this study, the 4-point response anchors of the scale were changed from never, sometimes often, always to 'strongly disagree', 'disagree', 'agree', 'strongly agree' to remain consistent with other scales in this study assessing the same timeframe. As the scale was originally developed in Spanish, some minor wording changes were also implemented to improve clarity for an English-speaking population, and two items from the original 16-item scale were also removed for this reason ('I had the feeling that I did not finish what I began' and 'I have found that when people reminded me of a conversation or a comment I have heard, I get the impression that it is the first time I have heard it"). Higher scores on the COBRA are indicative of greater subjective cognitive dysfunction in response to the COVID-19 pandemic.

Changes in lifestyle factors were assessed in a series of author-devised statements asking participants to indicate the extent to which they had experienced increases, decreases or no changes in key lifestyle factors since the pandemic began, compared to before it. Positive life-style factors encompassed physical, social, and cognitive activity ('I was physically active', 'I problem solved, did puzzles, read or wrote', and 'I spent time with others socially (digitally or in person)'), whilst negative lifestyle factors encompassed sedentary and cognitively inactive be-haviours, as well as unhealthy food consumption and substance use ('While awake, I sat, lay or reclined', 'I watched TV or surfed the internet with no purpose',' I ate processed foods', 'I smoked cigarettes or to-bacco', and 'I used drugs'). A decrease was scored as a -1, an increase as +1, and no change as 0, with the subscale of negative lifestyle choices divided by the number of negative lifestyle choice statements and multiplied by three to be comparable with the positive subscale. Thus, the theoretical range of scores for these scales is -3 – 3, with a score of less than 0 indicative of a decrease in behaviour, and a score above 0 indicative of an increase. The further the score was from 0, the greater the change in behaviour in response to COVID-19. For example, an in-dividual may have a positive lifestyle score of -1, and a negative lifestyle score of +2.7, which would indicate that they engaged in more negative and less positive lifestyle choices in response to COVID-19.

Social rhythm regularity was measured through 8 questions taken from the Social Rhythm Metric (Monk, Flaherty, Frank, Hoskinson, & Kupfer, 1990) and the Brief Social Rhythm Scale (Margraf, Lavallee, Zhang, & Schneider, 2016) and adapted to the current study. These questions assessed how consistently participants engaged in certain daily routines such as getting out of bed, eating meals, engaging in physical activity or socialising with others. Responses were rated by participants based on what was generally true for them since the pandemic began, compared to before it on a 4-point scale ranging from 'very regularly' 'to 'very irregularly'. Higher total scores across the 8 questions are indicative of a greater disruption of social rhythm regularity.

2.4. Statistical analysis

All data was analysed using the Statistical Package for the Social Sciences version 27. After initial statistical assumption checking, all demographic data and mood, lifestyle, and subjective cognitive assess-ment scores were compared using either Chi-squared tests or independent *t*-tests. A series of bivariate correlations were then conducted to examine inter-relationships between each score in the BD group. For descriptive purposes, these correlations were also conducted for controls but are reported in the supplementary material (Supplementary Table 2). To account for multiple comparisons, Bonferroni correction was employed across all *t*-tests (alpha = 0.05, $p < 0.0045$) and corre-lations (alpha = 0.05, $p < 0.0038$) to avoid type I errors. Effect sizes are reported as Cohen's *D* (*d*).

3. Results

3.1. Demographics

Between-group comparisons of demographic variables are presented in Table 1. There were no significant differences in age, sex, employment status, living situation, or COVID-19 related job loss or reduction in work hours between BD and healthy controls participants. In the BD sample, 65% were using mood stabilisers, 52.5% were antipsychotics, 35% were using antidepressants and 17.5% were using benzodiazepines. BD patients reported that they had been euthymic for an average of 8.4 of the previous 12 months, with the average number of hypomanic ep-isodes in the previous 5 years being 6.8, the average number of depressive episodes in the past 5 years being 9.2, and the average number of psychiatric hospitalisations in the last 5 years being 3.4.

Table 1
Demographic information for BD and healthy control participants.

	BD (*n* = 43)	HC (*n* = 24)	*t*/Chi-square	*p*
Age	*M* = 25.3 *SD* = 11.14	*M* = 22.79 *SD* =12.81	-0.838	0.41
Sex	M: 44 % F: 56 %	M: 46 % F: 54 %	0.17	0.90
Job loss due to COVID-19	Yes: 16 %	Yes: 17 %	0.002	0.97
Reduced work hours due to COVID-19	Yes: 26 %	Yes: 46 %	2.865	0.91
BD subtype	Type I: 62.5%, Type II: 17.5%, NOS: 27.5%			
Illness duration (years)	*M* = 10.53 *SD* = 7.33			
In the last 5 years, # of___)				
(Hypo)manic episodes	*M* = 6.78 *SD* = 6.74			
Depressive episodes	*M* = 9.20 *SD* = 8.79			
Psychiatric hospitalisations	*M* = 3.37 *SD* = 5.66			
Months euthymic in the past year	*M* = 8.39 *SD* = 3.25			
Medication				
Mood stabilisers	Yes: 65%			
Lithium	Yes: 35%			
Sodium Valproate	Yes: 17.5%			
Lamotrigine	Yes: 27.5%			
Other mood stabiliser	Yes: 2.5%			
Anticonvulsants	Yes: 2.5%			
Typical Antipsychotics	Yes: 2.5%			
Atypical Antipsychotics	Yes: 50%			
Antidepressants	Yes: 35%			
Benzodiazepines	Yes: 17.5%			
Anticholinergics	Yes: 0%			
Total number of medications	0: 15%, 1: 25%, 2: 27.5%, 3: 15%, 4: 17.5%			
Employment status				
Unemployed	18.6 %	12.5 %		
Student full/part time	9.3 %	25 %		
Employed full/part time	46.5 %	54.2 %		
Retired/volunteer/ homemaker	4.7 %	4.2 %		
Disability support pension	23.3 %	0 %		
Other	16.2 %	17 %		
Living situation			5.669	0.579
Single person, living alone	11.60 %	8.30 %		
Non-related adults, sharing home	16.30 %	16.70 %		
Couple, no children	18.60 %	37.50 %		
Couple, dependent children	23.30 %	16.70 %		
Single parent, dependent children	11.60 %	0 %		
Single person, living with extended family	7 %	8.30 %		
Couple living with extended family	2.30 %	4.20 %		
Other	9.30 %	8.30 %		

Note. # = number; BD, bipolar disorder; HC, healthy controls; *M*, mean; *SD*, standard deviation

3.2. Impact of COVID-19 on engagement with mental health services

Fig. 1 and supplementary Table 3 provide the breakdown for BD and healthy control participant responses to the questions regarding mental health service use since the pandemic began. The majority of BD patients reported receiving either ongoing (68.3%) or occasional (31.7%) psychological management from a health practitioner. Of those with ongoing management, most (82.1%) continued their mental health appointments during the pandemic, either in-person (39.1%) and/or via telehealth (78.3%). Irrespective of whether mental health support was continued or discontinued during the pandemic, the majority of BD patients did not report accessing crisis-support services (e.g., telephone crisis counselling) since the pandemic began (continued: 78.3%, discontinued: 80%).

In healthy controls, over half (58.3%) reported that they had never sought psychological support, whilst the remainder indicated that they had sought support occasionally (41.7%). Since the pandemic began, only a single individual engaged in psychological services (via telehealth), and no healthy controls engaged in additional crisis-support services. Before the pandemic began, the majority of healthy controls (87.5%) had never taken psychiatric medication in the past 5 years, and none reported taking psychiatric medication since the pandemic began.

3.3. Impact of COVID-19 on mood, lifestyle and subjective cognitive factors in BD patients compared to and healthy controls

Table 2 presents the group differences in pandemic-related mood, lifestyle and subjective cognitive factors. There were no significant differences between BD patients and controls with regards to scores on the SRMI and the depression subscale of the DASS-21. Furthermore, there were no significant differences in FCV19S scores, nor in positive and negative lifestyle changes since the pandemic began. However, BD patients had significantly higher scores than controls on the DASS-21 anxiety ($t = -2.08$, $p = 0.04$, $d = -0.48$) and stress ($t = -2.05$, $p = 0.05$, $d = -0.53$) subscales, as well as on the COBRA ($t = -3.583$, $p = 0.001$, $d = -0.933$), and social rhythm regularity assessment ($t = -1.54$, $p = 0.131$, $d = -0.40$). Further, BD participants reported significantly increased suicidal thoughts since the pandemic began ($t = -2.74$, $p = 0.01$, $d = -0.59$). Scores on the QOLBD were significantly lower in BD patients compared

Table 2
Comparison of BD and healthy controls across mood, lifestyle, and subjective cognitive dysfunction assessments.

	BD		HC				
	M	SD	M	SD	t	p	d
SRMI total score	72.52	17.90	69.74	15.03	-0.63	0.529	-0.16
DASS-21 stress*	15.29	11.53	9.48	9.69	-2.05	*0.045*	-0.53
DASS-21 anxiety*	8.52	8.68	4.78	5.74	-2.08	*0.042*	-0.48
DASS-21 depression*	12.29	10.67	7.48	9.50	-1.80	0.076	-0.47
DASS-21 total score*	36.10	27.41	21.74	22.87	-2.14	*0.037*	-0.55
FCV-19S	14.81	6.37	15.83	5.94	0.63	0.531	0.16
QOLBD	39.12	9.29	44.52	7.06	2.43	*0.018*	0.63
COBRA	18.54	9.40	9.91	8.94	-3.58	**0.001**	-0.93
Positive lifestyle factors	0.02	1.76	0.09	1.56	0.14	0.886	0.04
Negative lifestyle factors	0.81	0.86	0.42	1.23	-1.52	0.133	-0.40
Social rhythm regularity	19.83	5.93	17.48	5.89	-1.54	0.131	-0.40

*Note.***Bolded** items are significant at $p<.0045$ (Bonferroni corrected), *italicised* are significant at $p<.05$ uncorrected.
* DASS-21 scores are multiplied by 2 to be comparable with the original DASS. BD, bipolar disorder; COBRA, cognitive complaints in bipolar disorder rating assessment; *d,* Cohen's D; DASS-21, depression, anxiety, and stress scale (short version); FCV-19S, fear of COVID-19 scale; HC, healthy controls; QOLBD, quality of life scale – bipolar disorder; SRMI, self-report mania inventory.

to controls ($t = 2.428$, $p = 0.018$, $d = 0.63$). Of these findings, only the COBRA retained its significance after multiple comparison correction (alpha = 0.05, $p < 0.0045$).

3.4. Inter-relationships between variables in the BD group

The results of the correlational analysis in the BD group can be found in Table 3. All reported correlations are significant after Bonferroni correction. In this group, the SRMI total score was positively associated with DASS-21 stress, anxiety, and total scores, as well as COBRA and mood lability scores. DASS-21 stress and total scores were positively associated with FCV-19S, COBRA, mood lability, and suicidal thought
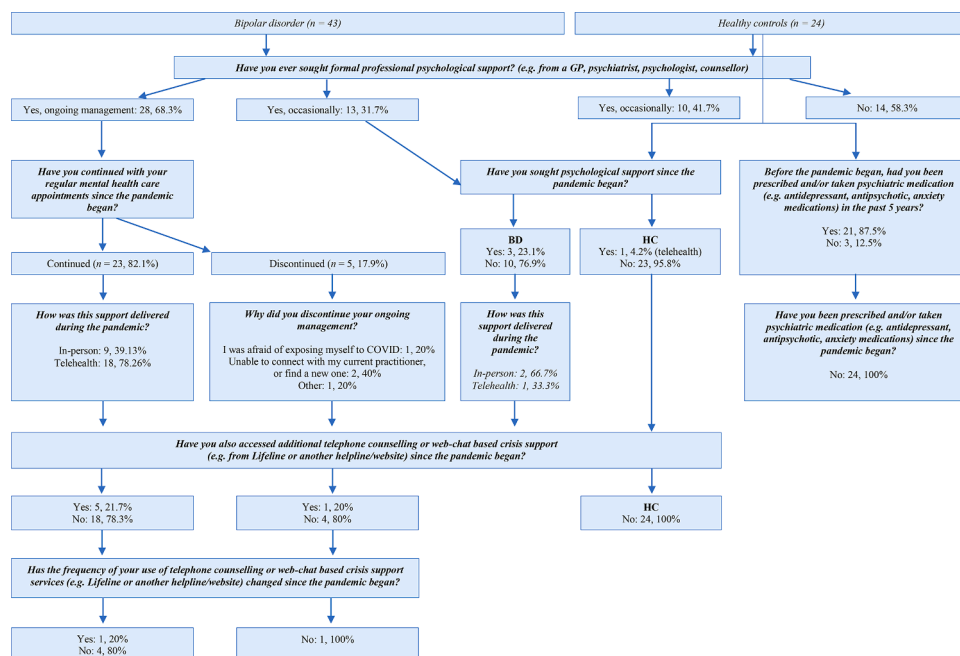

Fig. 1. Visual representation of psychological support engagement during the pandemic for BD and healthy controls.

Table 3
Correlations between assessment scores in the BD sample.

	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) SRMI total score	—												
(2) DASS-21 stress	**.696** **(<.001)**	—											
(3) DASS-21 anxiety	**.538** **(<.001)**	**.783** **(<.001)**	—										
(4) DASS-21 depression	.320 (.039)	**.631** **(<.001)**	**.632** **(<.001)**	—									
(5) DASS-21 total score	**.588** **(<.001)**	**.914** **(<.001)**	**.892** **(<.001)**	**.855** **(<.001)**	—								
(6) FCV-19S	.390 (.011)	**.491** **(.001)**	**.535** **(<.001)**	0.271 (.082)	**.482** **(.001)**	—							
(7) QOLBD	-0.196 (.214)	**-.472** **(.002)**	-.384 (.012)	**-.545** **(<.001)**	**-.533** **(<.001)**	-0.183 (.246)	—						
(8) COBRA	**.566** **(<.001)**	**.699** **(<.001)**	**.686** **(<.001)**	**.644** **(<.001)**	**.762** **(<.001)**	.394 (.011)	**-.489** **(.001)**	—					
(9) Positive lifestyle factors	0.023 (.886)	-0.263 (.092)	-.317 (.041)	-.390 (.011)	-.363 (.018)	-0.047 (.765)	0.291 (.062)	-0.268 (.091)	—				
(10) Negative lifestyle factors	0.026 (.871)	0.238 (.129)	0.236 (.132)	.416 (.006)	.337 (.029)	0.096 (.545)	-0.261 (.095)	**.484** **(.001)**	-0.168 (.286)	—			
(11) Social rhythm regularity	0.236 (.133)	.324 (.036)	.343 (.026)	.336 (.030)	.376 (.014)	0.069 (.664)	-0.237 (.131)	.329 (.036)	-0.142 (.369)	0.275 (.078)	—		
(12) Mood lability	**.604** **(<.001)**	**.616** **(<.001)**	**.535** **(<.001)**	**.405** **(<.001)**	**.586** **(<.001)**	**.462** **(.002)**	-.377 (.014)	.315 (.045)	-0.196 (.214)	0.023 (.886)	0.179 (.257)	—	
(13) Suicidal thoughts	0.267 (.088)	**.539** **(<.001)**	.429 (.005)	**.753** **(<.001)**	**.656** **(<.001)**	0.103 (.515)	**-.526** **(<.001)**	**.505** **(.001)**	-0.253 (.107)	0.288 (.064)	0.258 (.099)	.308 (.048)	—

Note. **Bolded** items are significant at $p = 0.0038$ (Bonferroni corrected). BD, bipolar disorder; COBRA, cognitive complaints in bipolar disorder rating assessment; DASS-21, depression, anxiety, and stress scale (short version); FCV-19S, fear of COVID-19 scale; QOLBD, quality of life scale – bipolar disorder; SRMI, self-report mania inventory.

scores, and negatively associated with QOLBD scores. DASS-21 anxiety scores were positively associated with FCV-19S, COBRA, and mood lability scores, and DASS-21 depression scores were positively associated with COBRA, mood lability, and suicidal thoughts. FCV-19S was positively associated with mood lability scores, while QOLBD was negatively associated with both COBRA and suicidal thought scores. Finally, COBRA scores were positively associated with negative lifestyle factors and suicidal thoughts.

4. Discussion

This study aimed to examine the effects of the COVID-19 pandemic on the mental health and wellbeing of Australian individuals with a verified clinical diagnosis of BD compared to healthy controls. We found no between-group differences in terms of age, sex, living situation, job loss or reduced work hours due to COVID-19, highlighting the demographic similarity of the two groups. Most patients with BD reported a history of ongoing formal psychological support, with most continuing this support throughout the pandemic and minimal numbers engaging with crisis-support services.

There were no differences between patients and controls in terms of pandemic-related changes in mania symptoms, COVID-19 fear, or positive and negative lifestyle factors and social rhythms. However, moderate effects were evident with regards to the latter two variables, with a bias toward an elevation of negative lifestyle changes and irregular social rhythms in BD patients. A large and statistically significant pandemic-related increase in subjective cognitive dysfunction was also evident in the BD group; and there were trend-level effects (significant at $p < .05$ uncorrected) indicating that increases in stress, anxiety, and overall psychological distress in response to the pandemic were higher in those with BD compared to controls. At the same time, trends for increases in suicidal thoughts and decreases in subjective quality of life were evident in BD.

A non-significant patient-control effect numerically biased to BD

patients was also apparent in relation to pandemic-related increases in depression. Further, *trend-level* effects of a similar moderate size were also evident for pandemic-related increases in anxiety, stress and general psychological distress in BD patients. These *qualitative* increases in negative mood symptoms in BD are congruent with the findings of our previous study on this topic in an Australian cohort (Van Rheenen et al., 2020). However, in that sample, patient-control effect sizes were larger, particularly regarding stress. Depression levels were also considered to be in the severe range while anxiety and stress were of a moderate level. In contrast, in the current sample all three components of psychological distress were mild. This raises the possibility that psychological distress *may* have reduced over time in BD, despite remaining somewhat elevated compared to controls. Caution should be taken in considering this interpretation however, given this study and the previous one are not equivalent in nature.

In general, the current findings suggest an overall pattern of relatively *mild* pandemic-related negative mood symptom changes, as well as lifestyle factors and social rhythms in the BD group, of which most case-control group differences did not meet thresholds for statistical significance. This suggests a degree of resilience in these BD patients, in that they appeared able to adjust and function in this novel pandemic situation at a level comparable to psychiatrically healthy individuals. It is possible that this was owed in part, to the large proportion of BD patients who continued their ongoing formal psychological support with a relevant health professional. This may have provided a 'buffer' that allowed BD patients to better cope with the challenges presented by the pandemic.

In the BD group, subjective quality of life was lower in patients reporting pandemic-related increases in depression, stress, suicidal thoughts and subjective cognitive impairment. However, subjective life quality did not appear to be influenced at all by fear of the virus, mood lability, or changes in lifestyle factors or social rhythms in the BD group. Pandemic-related increases in stress, anxiety, and mood lability were also all higher in those who were more fearful of COVID-19. Those with

higher stress levels also reported increases in suicidal thoughts, as did those reporting high levels of pandemic-related depression and subjective cognitive dysfunction. Depression and anxiety were also all higher in BD patients reporting pandemic-related increases in subjective cognitive dysfunction. This was in turn, higher in patients reporting pandemic-related increases in mania symptoms and/or who engaged in more maladaptive lifestyle behaviours since the pandemic began.

This study should be considered in the context of some limitations. Firstly, the data reported in this paper was derived from a participant sample that included patients with a verified diagnosis of BD and healthy controls that were previously screened for the absence of mental disorder. However, it was still collected in self-report format in an online survey and objective symptom measures were not used at this time. Secondly, this was a cross-sectional study and while we did phrase the questions within it in such a way as to measure pandemic related change in mood symptoms, lifestyle factors, and social rhythms, we could not directly compare responses to these questions with levels of functioning as assessed prior to the pandemic. Related to this, is that the timepoint in which this data was collected corresponded to the end of the first COVID-19 wave in Australia, when life was beginning to return to a period of relative 'normality'. Although we specifically phrased the questions/scales to enquire about the whole pandemic experience (i.e. since it began in Australia at the end of March 2020), it is possible that recall bias was present and participants felt a reprieve in psychological distress during this time such that state dependent memory influenced their responding for the whole reporting period. Indeed, subjective and objective reports of cognitive function do not always correlate (Petersen, Porter, & Miskowiak, 2019; Svendsen, Kessing, Munkholm, Vinberg, & Miskowiak, 2012).

Finally, the BD sample in this study was originally recruited as part of a larger neuroimaging study during a period in which they were all outpatients and relatively affectively stable. In the current work, the subset of these participants that responded to our request for follow-up reported a relatively high average number of months that they considered themselves to have been euthymic in the past year ($M = 8.39$), and a relatively low average number of psychiatric hospitalisations in the past five years ($M = 3.37$). They also continued to engage with psychological support services and thus seemed to be cognisant that this was important for stability and self-care. Hence the generalisability of the current study results should be considered with caution, as it possible that this group of patients is one that is particularly stable and perhaps not representative of the broader BD population.

In sum, our data indicated relative comparability between BD patients and controls in terms of a range of demographic factors, subjective quality of life, and pandemic-related changes in mood symptoms, lifestyle factors, and social rhythm regularity. Further, most of our BD cohort reported engaging in ongoing or occasional mental health support, which was mostly continued throughout the pandemic. Nonetheless, BD patients reported significantly elevated levels of subjective cognitive dysfunction, which were particularly related to higher symptoms of depression, stress, anxiety, and suicidal thoughts. While the direction of these effects could not be determined here, these findings highlight the potential impact that the experience of negative emotions can have on perceptions of one's capacity for effective cognitive function under disaster-like conditions in BD. Thus, clinicians seeking strategies to maintain patient-wellbeing under these conditions may benefit from the knowledge that the indirect effects on one's negative emotions on subjective cognitive function should be considered. Even more simply, a strategy for reducing the impact of future disasters may be to ensure professional mental health support is kept consistent for individuals with BD.

Contributors

TEVR conceptualised the study and collected the data. JK conducted the statistical analysis and wrote the first draft of the manuscript. All authors contributed to the protocol design as well as to intellectual input into the revision of the manuscript.

Declaration of Competing Interest

The authors of this paper report no financial relationships with commercial interests.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2020.12.186.

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