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Psychological impact of the COVID-19 pandemic on individuals with serious mental disorders: A systematic review of the literature

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Abstract

BACKGROUND

The coronavirus disease 2019 (COVID-19) pandemic is having a great impact on individuals from all over the world, particularly on individuals with mental disorders. Several studies found more pronounced psychiatric symptoms, notably symptoms of depression and anxiety.

AIM

To assess the situation of patients with serious mental illness (SMI: Affective disorders and schizophrenia) regarding their mental health outcome during the pandemic.

METHODS

A systematic search using the databases PubMed and MEDLINE was conducted, employing the key words "COVID-19", "SARS-CoV-2", "psychiatric/mental disorder/illness", "affective/mood disorder", "bipolar disorder", "(major) depression", "schizoaffective disorder", and "schizophrenia". Studies that had been published up until January 9, 2021 were included. Information of studies in languages other than English and German was mostly taken from their English abstracts.

RESULTS

The literature search concluded in the finding of 36 studies containing relevant clinical data. A general impairment of the mental health of individuals with SMI could be detected, particularly in individuals with affective disorders, as compared to those with schizophrenia. Compared to healthy controls, symptoms of anxiety, depression, and stress were more pronounced in individuals with SMI. Relevant factors found that impacted their mental health were age, resilience, and socioeconomic environment, especially the shortage of mental health services, lack of social support, and inadequate information about COVID-19.

CONCLUSION

Grade A (Excellent): 0
 Grade B (Very good): 0
 Grade C (Good): C, C
 Grade D (Fair): 0
 Grade E (Poor): 0

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In light of these results, mental health services should be reinforced, notably the use of telemental health services. Furthermore, supplying individuals with SMI with adequate information about the COVID-19 pandemic and increasing their resilience is important. When researching the impact of the COVID-19 pandemic on individuals with SMI, standardization as well as follow-up studies are needed to enable better comparability and understanding.

Key Words: COVID-19 pandemic; Serious mental illness; Affective disorders; Bipolar disorder; Major depressive disorder; Schizophrenia

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Core Tip: A greater deterioration was found in individuals with affective disorders, compared to individuals with schizophrenia. Factors influencing the impact on mental health were age, resilience, and socioeconomic circumstances. Consequently, the strengthening of mental health services, including the use of telemental health services with a focus on strengthening resilience, is necessary. Additionally, psychiatric patients should be supplied with appropriate information about the pandemic. In research, follow-up studies and standardization are required.

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INTRODUCTION

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), is an infectious airborne disease. Initially detected in Wuhan, China[1], in December 2019, it subsequently spread throughout the world and reached the status of a pandemic on March 11, 2020[2]. In order to stop the propagation of the virus, lockdowns comprising measures of physical distancing, travel restrictions, and closure of public facilities were implemented in numerous countries worldwide[3].

The mental condition of both healthy and mentally ill individuals has been affected by the COVID-19 pandemic and its reverberations: Anxiety, distress[4,5], fear of the disease[5], loneliness[6], post-traumatic stress symptoms[7], and the prevalence of depression, anxiety, and suicidality[4,8,9] have been found to be higher in the general population as a consequence of COVID-19. In particular, the prevalence of depression has increased drastically[5,10,11], affecting up to a quarter of the population[12,13], compared to a prevalence of 6.8%-8.5% before the pandemic[10,14]. This is comparable to previous pandemics: During the SARS epidemic in 2003[15] and the West Africa Ebola virus disease pandemic from 2013 to 2016[16], similar effects were observed. Furthermore, economic growth has been stunted, resulting in a rising percentage of unemployment, and thus adding additional distress[17]. The individual condition during the COVID-19 pandemic might have been influenced by personality, resilience[18,19], coping strategies, and socioeconomic environment[20]. In summary, the pandemic in its entirety has led to restrictions of personal rights, heightened emotional distress, and fear of an uncertain future, and may advance the development of mental health problems[17,21].

Individuals already suffering from psychiatric disorders face additional issues that may influence their mental health: Limited resources for medical and psychotherapeutic treatment[22,23] and misinformation[22] have been an additional strain. Furthermore, an increase in social isolation and negative feelings might lead to a worsening of psychiatric symptoms and even illness exacerbation[24-26]. Literature shows conflicting results concerning the impact of the pandemic on the mental health of individuals with psychiatric disorders. On the one hand, symptoms of different mental disorders have been reported to be significantly higher in the wake of the

pandemic[27-31]. On the other hand, there was little to no change in symptomatology found in other studies[25,32-34], showing that more research in this area of interest is necessary.

Individuals with serious mental illness (SMI), which comprise bipolar disorder (BD), major depressive disorder (MDD), and schizophrenia (SZ), are an especially vulnerable group due to several risk factors[35], such as severe psychiatric illness episodes, hospitalization[36], a lower level of education[37], and cognitive deficits[38-40]. Furthermore, problems when interacting with healthcare services, for instance difficulties adapting to the clinical environment[41], might lead to a worsening of well-being. Post-traumatic stress symptoms have been on the rise in both individuals with mental illness[42-44] as well as the general population[45,46], thus we focused on these symptoms in the course of our search as well. The need for increased support of this particular group of individuals has been highlighted by numerous mental health researchers[26,41,47].

The impact of COVID-19 on individuals with SMI has already been reviewed in June 2020, emphasizing the vulnerability of individuals with SMI and advocating for an increased focus on support for them[35]. Another review by Zhand and Joobar[48] included 47 studies with the final search being completed in July 2020, however, the authors focused mainly on SZ spectrum disorders, not mentioning BD and MDD.

Furthermore, a systematic review by Barber *et al*[49], from June 2020, was found. The search yielded four studies, which found that individuals with SMI might show a decline of mental health due to COVID-19-related governmental measures. Furthermore, they experienced increased psychological distress during the crisis.

In comparison with already existing reviews, the current one focuses on the mental health outcome of individuals with SMI in general, encompassing solely papers providing scientific data and including studies that were published at a later time.

The aim of this review is to further broaden the understanding of these complex disorders and thereby provide insight in how to support individuals with SMI during a global crisis. The following questions will be answered: How are individuals with SMI affected by the pandemic in comparison to healthy controls (HC) and what are the main psychiatric symptoms they are displaying? What are risk and protective factors that influence the severity of psychiatric symptoms and who is particularly vulnerable to these factors? How does symptomatology and frequency of illness episodes change during the course of the pandemic?

MATERIALS AND METHODS

We conducted a review of literature for studies about COVID-19 and its impact on SMI in the databases PubMed and MEDLINE (Medical Literature Analysis and Retrieval System Online). The final search was conducted on January 9, 2021.

Inclusion criteria

The main criterion was whether the studies analyzed samples of adults with pre-existing psychiatric disorders (including BD, MDD, and SZ) regarding the impact of COVID-19 on their mental health. Primary outcome variables were those assessing psychological symptoms related to the pandemic.

The following Medical Subject Headings (MESH) search terms were applied in the database PubMed: "COVID-19" OR "SARS-CoV-2" [Title/Abstract] AND "psychiatric/mental disorder/illness" [Title/Abstract] OR "affective/mood disorder" [Title/Abstract] OR "bipolar disorder" [Title/Abstract] OR "(major) depression" [Title/Abstract] OR "schizoaffective disorder" [Title/Abstract] OR "schizophrenia" [Title/Abstract]. The relevance of the studies was determined by inspecting both the title and abstract of each study and the full text of several studies.

The following MESH search terms were applied in the database MEDLINE: "(covid19 or (covid(w)(2019 or 19)) or (corona(w)virus(w)disease(w)2019 or 19)) and (depression? or schizophren? or ptsd or (post(w)traumatic(w)stress))/ti" AND "(covid19 or (covid(w)(2019 or 19)) or (corona(w)virus(w)disease(w)2019 or 19)) and ((mental? or bipolar? or affectiv? or mood? or schizoaffect?)(w)(disorder? or illness?))/ti".

All languages were considered, with an emphasis on English and German literature. The relevance of the studies was determined by firstly inspecting the title of each study, then the abstract of a considerable portion of studies, and finally the full text of several studies.

Exclusion criteria

Scientific studies that were not accessible on publication sites or did not meet the defined criteria were not included: They were not original articles, did not contain scientific data about a sample of patients with SMI (BD, MDD, or SZ) or were not empirical studies, only reported about a single case, or, if they additionally encompassed other mental disorders, did not explicitly mention SMIs.

RESULTS

The results are displayed in [Table 1](#), which encompasses an overview of the 37 analyzed studies. In summary, the following numbers of studies investigating SMI were found either alone or in combination with other disorders: 19 (SMI in general), 9 (affective disorders), 3 (BD), 16 (MDD), and 6 (SZ). The studies included participants from mainly 19 different countries and areas in North America (Canada, United States), Asia (China, India, Taiwan, Turkey), Australia, and Europe (Austria, Czech Republic, Denmark, France, Germany, Hungary, Italy, Netherlands, Norway, Romania, Spain, United Kingdom). Most of them were conducted in the time period from February to June 2020 during periods of physical distancing, thus evaluating mainly the first response to and short-term consequences of the crisis. One study was conducted in January 2020, and another in August and September 2020. The found studies were very heterogenous in samples and study design. Furthermore, not all trials investigated and defined intervention with comparable targets.

Limitations frequently encountered by scientists were small sample sizes, the inability to draw causal conclusions due to cross-sectional sample design, self-reported mental illness without clinical evaluation due to online surveys, possible selection bias, problems of generalization, and the lack of questionnaires measuring pandemic-related variables with the subsequent need to create questionnaires themselves.

How are individuals with SMI affected by the pandemic in comparison to HC and what are the main psychiatric symptoms they are displaying?

Most individuals with SMI had a positive stance regarding measures for preventing COVID-19[50,51], which was related to marriage and a higher level of education[51]. However, they were on average not as knowledgeable about COVID-19 and measures of prevention as HC[52,53]. This reduced knowledge was associated with a low socioeconomic status, little education, and insufficient social support[52]. A higher belief in self-obtained COVID-19 information was related to both more[54,55] and less [50] fear of the disease.

Compared with HC, individuals with SMI showed both more weight gain and frequent changes of sleep patterns[56], however, duration of sleep was found to remain stable over time[57]. An increase in the number of substances used was detected[49,52]. On average, individuals with SMI had fewer social contacts and did not go grocery shopping as often as before the pandemic[58].

Individuals with SMI experienced more symptoms of depression, anxiety[56,59,60], and stress[58-62], partly due to loneliness and isolation[63]. Additional symptoms were elevated feelings of paranoia[59] and isolation[64], self-harm, and suicidal ideation[65]. Fatigue was more prominent in those with a lower quality of life, which was related to severe depressive symptoms, insomnia, and pain[66]. While the majority of subjects with SMI reported to not be worried to get infected[52], they were on average more worried and fearful of contracting COVID-19[58] and made less use of coping strategies than HC[56]. Individuals with SMI were generally more concerned about their financial situation than their own health, although this was found in a study conducted in August and September 2020 and not at the beginning of the pandemic[63].

Individuals with affective disorders displayed both more voluntary self-isolation as well as stress related to it than in HC[67]. Among different disorders, levels of both perceived stress and related somatic complaints, as well as the latter's negative correlation with Clinical Global Impression (CGI), were highest in affective disorders [68]. Psychosocial distress was related to somatization, heightened alertness, psychic anxiety, and bad mood[69]. Other psychiatric manifestations included more symptoms of PTSD in patients with affective disorders than in HC[67], elevated feelings of vulnerability[63], and sleeping problems[61]. Fear about consequences on health[8] and socioeconomic status[67] was heightened in individuals with affective disorders as compared to HC, particularly in younger persons[69].

Table 1 Results of the database search concerning the mental health outcomes of individuals with serious mental illness

Ref.	Country or area, time	Psychiatric disorders	Methods; relevant questionnaires and COVID-19-related variables	Results	Limitations
Asmundson <i>et al</i> [67]	Canada and United States, March 21–April 1, 2020 (during the lockdown)	Affective disorders (BD and MDD) and anxiety-related disorders	Cross-sectional case-control online survey of 700 individuals with anxiety-related disorders, 368 individuals with affective disorders and 500 HC; PHQ-4, CSS, self-constructed questionnaires to measure self-isolation distress and coping strategies	Individuals with anxiety-related disorders experienced more COVID-19-related stress, fear, and PTSD symptoms than individuals with affective disorders and HC. Individuals with affective disorders had more PTSD symptoms and fear of socioeconomic consequences than HC. Patients with both BD and MDD exhibited more voluntary self-isolation and stress related to it. Individuals with psychiatric disorders and HC did not differ in the perceived effectiveness of their coping behaviour.	Self-report and not clinical evaluation of mental health, data about comorbidities was not gathered
Burrai <i>et al</i> [76]	Italy, April–May, 2020 (during the lockdown)	SZ and other psychotic disorders	Cross-sectional online survey of 77 patients with psychotic disorders and 100 HC; DASS-21, BRCS, COVID-19: Risk Perception (2 items based on Cho and Lee, 2015, and Liao, 2014), self-constructed questionnaire measuring worry	Patients with psychotic disorders were less stressed, more anxious, more worried about the current situation, and perceived the risk of being infected with COVID-19 as higher than HC. Participants with psychotic disorders living in communal residences were supported by both their cohabitants and mental health professionals, remained adherent to their medication treatment, and possessed knowledge about the consequences of COVID-19.	Significant group differences in gender and education level, geographical limitations, observational design does not allow the determination of causality
Carmassi <i>et al</i> [42]	Italy, April 1-30, 2020(during the lockdown)	BD	Telepsychiatry-based cross-sectional clinical interviews and self-reports per e-mail of 100 patients with BD regarding post-traumatic stress symptoms (PTSS); IES-r, GAD-7, HAMD, YMRS	Acute PTSS were experienced by 17% of participants, which was related to COVID-19-related work/financial difficulties as well as anxiety, reported by 26% of participants. Acute symptoms of mania seemed to be protective. Furthermore, 17% of participants reported depressive symptoms.	Small sample size, self-report instruments were less accurate than an assessment by a clinician, not all COVID-19-related stress factors were considered, there was no control group
Chang <i>et al</i> [54]	Taiwan, March 23– April 23, 2020 (during the lockdown)	SMI and other disorders	Cross-sectional survey of 400 individuals with mental illness (242 with SZ, 67 with BD, 28 with MDD, and 63 with others); DASS-21, FCV-19S, BCIS, PCIBS	Participants who believed more strongly in the obtained COVID-19 information from newspapers, television, and online sources were more fearful of the disease. A higher level of fear was associated with more symptoms of depression, anxiety, stress, and less frequent behaviour concerning prevention.	Newly constructed questionnaires by using simple measures (BCIS, PCIBS), lack of examination of test-retest reliability (BCIS, SCIBS, FCV-19S) self-reported data, cross-sectional design does not allow the determination of causality
Chang <i>et al</i> [55]	Taiwan, March 23– June 30, 2020 (during the lockdown)	SMI, anxiety disorder, and substance use disorder	Cross-sectional survey of 414 patients with psychiatric disorders (197 with SZ, 141 with substance use disorder, 35 with BD, 34 with MDD, and 7 with anxiety disorder); DASS-21, SSS-S, FCV-19S, BCIS, PCIBS	Preventive behaviours recommended by the World Health Organisation could be explained by both COVID-19-related fear and trust in sources of information concerning this disease in individuals with SMI. COVID-19-related fear could be explained by trust in sources of information and self-stigma.	Cross-sectional design does not allow the determination of causality, self-report, bias (common variance, recall, social desirability), stable conditions do not allow generalizability, geographic limitations
Chen <i>et al</i> [74]	Taiwan, January–May, 2020 (during the lockdown)	MDD	Long-term follow-up study (structured interviews, at least three follow-ups over a period of three years) of a cohort of 116 patients with treatment-resistant MDD; structured interview about COVID-19-related changes and impact on participants' lives (physical, psychological, and social)	Patients with depression had confidence in the COVID-19-related prevention strategies of the government. They felt distressed about pandemic-related news reports. Patients with MDD have been found to be at a higher risk for suicidality, although the pandemic had a positive impact on some patients as well.	Time limit on interviews and therefore not sufficient collection of variables

Costa <i>et al</i> [64]	United States, last week of March 2020 (during the lockdown)	SMI, anxiety disorder, PTSD, OCD, borderline personality disorder, and other disorders	Cross-sectional online survey of 193 individuals with psychiatric disorder (162 with anxiety disorder, 103 with MDD, 78 with BD, 77 with PTSD, 25 with OCD, 24 with BPD, 3 with SZ, and 29 with other disorders; COVID-19-related variables: Self-constructed questionnaires to measure fear, concerns, and social situation	Most of the participants had concerns about their illness and the pandemic. Notably, they were concerned about COVID-19-related service disruption, especially individuals with MDD, who feared a shortage of medication. The diagnosis of MDD was associated with the fear of getting sick. Not coping well was related to feeling socially isolated and worry about not receiving mental health care as well as experience worse psychiatric symptoms. Staying in touch with others by using social media and text messages were seemingly the best communication methods for individuals with coping difficulties related to COVID-19.	Self-constructed questionnaires, self-reported mental illness
Di Nicola <i>et al</i> [73]	Italy, April 27-29, 2020 (directly after seven weeks of strict lockdown)	Affective disorders (BD and MDD)	Cross-sectional online survey of 59 remitted patients with MDD and 53 euthymic individuals with BD; K10, medical records, COVID-19-related variables: Lockdown conditions (living alone, changes in work routines, and working on the frontline)	In the sample, 25.9% of subjects experienced no likelihood of distress, 31.2% experienced mild and 42.9% moderate-to-severe likelihood of distress. Severe distress was predicted by low vitamin D levels and MDD diagnosis. Higher levels of distress were more frequently found in individuals who had a longer duration of psychiatric illness, were living by themselves during the lockdown, and had the habit of smoking.	Lack of longitudinal follow-up, self-constructed questionnaires, not all confounding variables for the relation between vitamin D levels and distress were included
Franchini <i>et al</i> [69]	Italy, March 9- April 9, 2020 (during the lockdown)	Affective disorders (BD and MDD)	Telephone-based, non-standardized survey of 101 euthymic patients with affective disorders; self-constructed questionnaires measuring emotional stressors and unpleasant lockdown experiences	The most frequently reported stress factor was frustration, which was significantly associated with unemployment, affecting two third of participants. Somatization, heightened alertness, psychic anxiety, and bad mood were related to unemployment as well. Associations between young age and anxiety, increased alertness, and monetary concerns could be found. The participants were satisfied with both the received supplies and information about the pandemic.	Non-standardized survey and therefore problems with generalization
Frank <i>et al</i> [61]	Germany, 2 nd , and 3 rd week of March 2020 (during the lockdown)	SMI, addictive disorders, and others	Cross-sectional, standardized interviews with 196 individuals with mental illness (121 with AD, 41 with SZ, 21 with addictive disorder, and 13 with others); CGI	More than half of participants were feeling more distressed than before the pandemic. Among individuals with affective disorders, 25% had sleeping problems.	Not mentioned
González-Blanco <i>et al</i> [62]	Spain, March 19-26, 2020 (during the lockdown, 5 d after the beginning)	SMI: Severe mental disorder (SMD: SZ and BD), and common mental disorder (CMD: MDD and anxiety)	Cross-sectional online survey of 125 individuals with SMD (65 with BD and 60 with psychotic disorders), 250 with CMD (125 with depression and 125 with anxiety), and 250 HC; DASS-21, IES, lifestyle variables	Individuals with SMD reported higher levels of anxiety, depression, and stress than HC, but lower levels than individuals with CMD. After confounding variables were controlled, HC had less anxiety than individuals with SMD with no other differences in psychological factors. In individuals with SMD, anxiety was related to being single, suffering from COVID-19 symptoms, and increased stress levels. Many individuals with SMD (87.2%) could relish free time, however the percentage of HC who could, was higher (94%).	Selection bias and limited representativeness through selective access to digital resources, self-reported diagnoses and psychiatric symptoms, binary scales instead of Likert-type scales to assess behaviour
Hamm <i>et al</i> [77]	United States, April 1-23, 2020 (during the lockdown)	MDD	Semi-structured qualitative interviews with 73 older adults (age > 60) with MDD, comparison with pre-pandemic data; PHQ-9, PROMIS anxiety scale	Patients with MDD had a lower quality of life during the pandemic than before, but did not differ in depression, anxiety, and suicidal ideation symptoms. They were resilient and mostly socially connected, worried about both contracting the virus and their mental health, and were not satisfied with governmental measures.	Patients participating may have been too distressed to do so: thus, the survey did not include MDD patients with severe symptoms, distorting results; sample was not ethnically diverse
Hao <i>et al</i> [72]	China, February 19-22, 2020 (during the	MDD and anxiety disorder	Cross-sectional online survey of 67 psychiatric patients (45 with mixed anxiety and depression,	Psychiatric patients showed more symptoms of depression, anxiety, stress, PTSD, and insomnia than HC. Additionally,	Generalisation not possible, no biological samples were obtained, low

	lockdown)		19 with other anxiety disorders, and 12 with MDD) and 109 HC; IES-R, DASS-21, ISI	they had more concerns about their physical health and higher levels of anger, impulsivity, and suicidal ideation than HC. The diagnostic criteria for PTSD were possibly fulfilled by more than 30% of participants with mental illness. More than 25% of them had moderate to severe insomnia.	response rate due to online recruitment, geographical limitation, cross-sectional study
Hölzle <i>et al</i> [68]	Germany, middle of May 2020 (during the lockdown with loosened restrictions)	SMI, psychotropic dependence, and other disorders	Cross-sectional assessment of 139 psychiatric inpatients (89 with affective disorders, 26 with SZ, 17 with psychotropic substance abuse, and 7 others); CGI, PSS, SRS	The disorders lead to differences in the CGI-score ($M = 4.9$, $SD = 1.0$), however, women had higher scores than men. Individuals with AD had the highest levels of both perceived stress and related somatic complaints. Higher CGI-scores were not associated with stress, but with stress-related somatic problems. These correlations were especially high in individuals with AD, and non-existent in individuals with SZ.	Not mentioned
Iasevoli <i>et al</i> [59]	Italy, April 13-17, 2020 (during the lockdown, one month after the beginning)	SMI	Telephone-based cross-sectional case-control study of 205 patients with SMI, 51 first-degree relatives, and 205 HC; PSS, GAD-7, PHQ-9, SPEQ	Individuals with SMI were of lower economic status and had more concordant diseases than HC. They experienced more symptoms of anxiety, depression, stress, and paranoia than HC. COVID-19-related stress was an important predictor for anxiety. Comorbidities had an independent influence on anxiety, depression, and stress. Caregivers showed more depressive symptoms than HC.	Not mentioned
Korsnes <i>et al</i> [50]	Norway, March-June, 2020 (during and after the lockdown)	SMI, anxiety, and other disorders	Cross-sectional online survey of 19 older (age > 65) psychiatric outpatients (15 with MDD, 2 with cognitive deficit/dementia, 1 with anxiety, and 3 with other diagnoses), 14 inpatients (12 with MDD, 6 with anxiety, 2 with BD, 2 with psychosis, and 1 with another diagnosis), and 46 employees working with them; COVID-19-related variables: Self-constructed questions about fear, prevention measures, risk, and consequences	The majority of patients approved of the strict prevention measures, were not afraid of being infected with COVID-19, and did not think that they would die in case of an infection. Psychiatric patients were generally less concerned about the repercussions of COVID-19 on their health than healthcare employees. Few were very worried, did not welcome the governmental measures, thought the infection risk to be increased the clinic, and/or saw a negative impact on their daily life.	Small sample size, generalisation not possible, self-constructed questionnaires, different times of response (similar measures, but different medial climate)
Liu X. <i>et al</i> [82]	China, January 30-February 21, 2020 (during the lockdown)	SZ	Retrospective double centre study of hospitalized SZ patients: 21 suspected to have COVID-19 (11 confirmed), and 30 without suspected COVID-19 infection; PANSS, PSS, HAMA, HAMD, PSQI, COVID-19-related variables: Treatment, symptoms	Schizophrenic patients with suspected COVID-19 had higher levels of stress, depression, and anxiety, and a worse quality of sleep, even after the adjustment for the use of benzodiazepines	Retrospective study: Longitudinal studies and follow-up are needed, assessments for the groups were performed by different doctors
Liu <i>et al</i> [70]	United States, April 13-May 19, 2020 (during and after the lockdown)	MDD, anxiety disorder, post-traumatic stress disorder, attention deficit hyperactivity disorder, insomnia, and others	Cross-sectional online survey of 898 young adults: 44.6% with mental illness: 38.2% with treatment and 6.2% without treatment (31.7% with depression, 29.0% with anxiety, 8.0% with PTSD, 6.9% with ADHD, 6.7% with insomnia, and 17.7% with others), 23.4% with a suspected mental illness, and 32.2% HC; PHQ-8, GAD-7, PCL-C, MOS-SS, HRQoL, COVID-19-related variables: Self-constructed questionnaires to measure worry and grief	Individuals with a diagnosed (treated or untreated) or suspected psychiatric illness were more likely to have symptoms of depression, anxiety, and PTSD than HC. Individuals who were diagnosed with or suspected to have a psychiatric illness experienced more worries connected to COVID-19, more sleeping problems, and a lower health-related quality of life.	No generalizability due to sample from possible COVID-19 "hotspots", variability in circumstances concerning the time of receiving treatment and/or diagnosis, no diagnosis in suspected cases, no information about treatment and adherence to it, no baseline data for comparison
Ma <i>et al</i> [81]	China, January 10-April 30, 2020(before, during, and after the lockdown)	SZ	Case-control assessment of 30 SZ inpatients who were isolated for 14 d and 30 who were not, with a longitudinal comparison of isolated patients	The isolation group experienced more stress, anxiety, and depression than the non-isolation group. After isolation, patients with SZ exhibited higher levels of stress and C-reactive	Small sample size, short observation period, several inflammatory markers were not sufficiently researched with

			before and after isolation; CPSS, PANSS, HAMD, HAMA, PSQI	protein and had a lower quality of sleep.	regard to their impact on social isolation and their correlation with the mental health
Matei <i>et al</i> [53]	Romania, March 16–May 14, 2020 (during the lockdown)	SMI and severe AUD	Cross-sectional survey of 115 male psychiatric inpatients (65 with SMI and 50 with severe AUD) and 57 HC; self-constructed questionnaires to measure general knowledge about COVID-19, prevention, and the ability to identify false statements about COVID-19	Patients with SMI were less informed about general knowledge as well as prevention of COVID-19 than HC. Additionally, they were less able to single out false information about COVID-19. Apart from patients with severe AUD being as informed about prevention measures as HC and therefore more informed than patients with SMI, there was no difference between these two groups.	Small sample size, all-male sample, potential selection bias due to the method of selecting HC from residential areas and shopping centres, not representative of all psychiatric illnesses
Muruganandam <i>et al</i> [52]	India, at the end of April 2020 (during the lockdown, one month after the beginning)	SMI	Telephone-based cross-sectional survey of 132 patients with SMI and their caregivers; self-constructed interview about COVID-19: Knowledge, perceived social support and aggression, psychiatric symptoms, somatic status	Among the participants, 8.3% did not know about the current pandemic and 75% were neither worried about being infected nor knowledgeable about the symptoms. Additionally, 66% possessed little knowledge about prevention and 20% did not know about the way of transmission. A lack of knowledge was associated with low socioeconomic status, little education, and meager social support. A third exhibited symptoms indicative of a recurrence of their illness.	Small sample size, lack of longitudinal follow-up, lack of healthy control group, self-constructed interview, assessment was not structured, dependence on caregivers' reports on patients' situations
Mutlu and Anil Yağcıoğlu[36]	Turkey, March 23–April 13, 2020 (before and during the lockdown)	SMI	Telephone-based cross-sectional interviews of 155 individuals with SMI (131 with SZ and 24 with BD) and retrospective data analysis; collection of data about clinical characteristics, medication adherence, and relapse	The total relapse rate in the first trimester of the pandemic was 11% ($n = 15$ with SZ, $n = 2$ with BD), with the most frequently related influence being the interruption of antipsychotic medication (59%). However, the relapse rate did not differ from the rate in 2019. Individuals suffering from a relapse had been hospitalized at a more recent date than the individuals who remained stable. Very few patients ($n = 2$) attempted suicide or had suicidal thoughts during the pandemic.	Not mentioned
Orhan <i>et al</i> [77]	Netherlands, January 1, 2018– December 31, 2018 and April 2020 (during the lockdown)	BD	Baseline interviews and cross-sectional survey of 81 older (age ≥ 50) patients with BD; YMRS, CES-D, BAI, SPS, LS, PMS, UC, NEO-FFI, COVID-19-related variables: Fear, mental health impact, positive coping (see Pan <i>et al.</i> , 2020)	Older patients with BD experienced less psychiatric symptoms during the pandemic compared to the baseline. Loneliness, not having children, passive coping style, low mastery, and neuroticism were associated with more psychiatric symptoms.	Large interval between the collection of baseline data and the interviews during COVID-19 pandemic, only short-time impact, relatively small sample
Pan <i>et al</i> [25]	Netherlands, 2006–2016 and April 1–May 13, 2020 (during and after the lockdown)	MDD, anxiety disorder, OCD	Three longitudinal studies with several follow-ups and a cross-sectional online survey of 1181 individuals with psychiatric disorders (1051 with MDD or anxiety and 130 with OCD) and 336 HC during the pandemic; QIDS, BAI, PSWQ, DJGLS	Participants with psychiatric disorders had higher symptoms of depression, anxiety, worry, and loneliness than HC. This was the case before as well as during the pandemic, however, the severity of symptomatology did not increase over time, even showing a slight decrease during the lockdown. In comparison, HC experienced a greater decrease of their mental health than individuals with mental illness.	Different modes of collecting data during face-to-face interviews compared to online surveys during the pandemic, low response rate, no standardised assessment for mental disorders, symptom severity was measured by number of diseases
Pellegrina <i>et al</i> [71]	France, during the first wave of the pandemic (during the lockdown)	MDD and anxiety disorder	Retrospective survey of 85 individuals with MDD or anxiety disorder; STAY-YA, Beck BDI-II, COVID-19-related variables: Perception, psychological resources, life conditions	Some participants experienced a worsening of their mood during the lockdown. More pronounced symptoms of both anxiety and depression, sleep disorders and addiction could be found.	Retrospective study: Longitudinal studies and follow-up are needed,
Pinkham <i>et al</i> [57]	United States, December 4, 2018–now (still ongoing) and April 3–June 4, 2020 (during and after the lockdown)	SMI	Baseline interviews, online surveys administered three times a day during a 10- or 30-d period before pandemic EMA, and ID-5 (psychosis module), PANa telephone-based cross-sectional survey during the pandemic of 148 patients with	Both affective and psychotic symptoms as well as the duration of sleep remained stable over time. An increase in the number of substances used and psychological well-being was reported, the latter of which was related to female gender and more time spent with other people. The two disorders did not differ in	Data was collected early; longer longitudinal studies should be conducted

			SMI (92 with SZ or schizoaffective disorder and 56 with affective disorder); baseline: MINI, SCSS, YMRS, MADRS, SUMD; EMA: Questionnaires about social life, mood, psychiatric symptoms, substance use well-being, and sleep; phone survey was a combination of baseline and EMA	patterns concerning stability or change.	
Pogany <i>et al</i> [63]	Hungary, August 1–September 15, 2020 (after the lockdown)	SMI, anxiety disorder, personality disorder, and others	Retrospective survey of 438 psychiatric patients (39.4% with SZ, 34.6% with affective disorder, 25.0% with anxiety disorder, 0.9% with personality disorder, and 2.7% with others); COVID-19-related variables: “Problem Evaluation Scale” to measure fear, isolation, and healthcare	A third of psychiatric patients felt a worsening of their condition during the time of governmental physical distancing measures, with 12% of them not believing it was related to these measures. Half of patients were feeling distressed because of loneliness and isolation, notably more woman than men. The percentage of individuals with psychiatric disorders who were concerned about their financial situation was higher than the percentage of those who were concerned about own health. Younger patients (age < 50 yr) experienced on average worsened health, were feeling more fearful, and had more difficulties adapting than older patients. In comparison to patients with psychotic disorders, patients with affective disorders were feeling more vulnerable. Patients with SZ had the least problems with a lack of information about COVID-19.	Not mentioned
Quittkat <i>et al</i> [58]	Germany, April 2–May 6, 2020(during the lockdown)	MDD, SZ, SP, OCD, GAD, SAD, IA, ED, panic disorder and PA, and BDD	Cross-sectional online survey and retrospective data assessment of 1207 individuals with psychiatric disorders (586 with depression, 135 with GAD, 86 with SAD, 83 with PA, 62 with ED, 47 with OCD, 30 with IA, 16 with BDD, 6 with SP, and 135 others) and 1026 HC; BDSI, CAHSA, DASS-21 (depression subscale), EDE-Q – 2 nd ed., PHQ (Panic Model and Stress Subscale), PSWQ-d, SIAS, SPhS, WI, Y-BOCS	All participants had on average fewer social contacts and did not go grocery shopping as often as before the pandemic. All individuals reported augmented levels of psychosocial stress, worried more about COVID-19, and were more fearful of contracting this illness than HC. Among individuals with depression, a quarter perceived an improvement, whereas 57.51% experienced a decrease of their mental health and 45.9% felt the need for more therapeutic support. Individuals with SZ reported mostly no or only slight changes in their mental health and did not find further therapeutic support to be necessary.	Small sample sizes of some groups, retrospective data assessment, self-identification of mental disorders, individuals with mental illness and HC were not matched, possible gender bias, selection bias through method of recruitment, online assessment
Riblet <i>et al</i> [78]	United States, October 2019–March 2020 and April 23–May 4 (before and during the lockdown)	SMI	Longitudinal interviews of 11 veterans with SMI (5 with MDD, 5 with BD, and 1 with psychotic disorder), with three in-person interviews conducted before the stay-at-home order (baseline, 1- and 3-mo follow-up) and one telephone-based interview during the lockdown; baseline: MINI; later additions: Hopelessness, social connections, treatment engagement, and suicidal ideation	There were no relevant changes concerning psychiatric symptoms during the pandemic compared to before. Few participants, who were significantly older ($M = 71.7$ yr) experienced an increase in symptomatology.	Small sample size, geographical limitation: low infection rate in Northern New England, participants consisted solely of veterans with possibly easier treatment access, participants had been hospitalized because of their illness, no long-term follow-up
Rohde <i>et al</i> [60]	Denmark, February 1–March 23, 2020 (before and during the lockdown)	SMI, stress-related and adjustment disorders, personality disorders, autism, ED, hyperkinetic disorder, and others	Analysis of clinical notes of 14561 psychiatric inpatients, with 918 of them being further analyzed (198 with SZ, 130 with MDD, 68 with BD, and 522 others); screening of clinical notes for COVID-19-related psychiatric symptoms	The final number of patients with notes describing pandemic-related psychopathology was 918, with two thirds of them being female. Most notes contained symptoms related to logistical problems. The most common symptoms were anxiety ($n = 539$), stress ($n = 174$), delusions ($n = 149$), depression ($n = 146$), suicidality ($n = 102$), and obsessive-compulsive symptoms ($n = 85$).	Lack of systematic assessment for COVID-19-related psychopathology
Solé <i>et al</i> [56]	Spain, May 14–June 8, 2020 (during the lockdown)	SMI (SZ or BD and MDD and/or anxiety)	Cross-sectional online survey of 206 individuals with psychiatric illness (148 with BD or SZ and 50 with MDD or anxiety) and 413 HC; self-	In comparison to HC, individuals with psychiatric disorders reported less use of coping strategies, such as having a routine, social interactions, and a healthy lifestyle. Furthermore, they	Lack of generalizability, self-reported mental illness, different restrictions at different times when conducting the

			constructed questionnaires for psychological distress (inspired by GAD-7 and PHQ-9), trauma experiences (inspired by EGS-R), psychotic-like experiences (adapted from CAPE-42), resilience (derived from BRS and RS-14), affective temperament (inspired by TEMPS-A), perceived family environment (inspired by FES), cognitive reserve (based on CRASH), physical aggressiveness (derived AQ); lifestyle	experienced more symptoms of depression and anxiety during the lockdown. They showed more frequently changes of sleep patterns, weight gain, and tobacco consumption than HC. Individuals with depression and/or anxiety were more distressed and concerned about the future, suffered from more sleeping problems, and exercised more than individuals with SZ or BD.	survey, lack of longitudinal follow-up, possible gender bias, questionnaires were only based on validated scales and not these scales themselves were used
Somer <i>et al</i> [80]	Mostly in the United States, Italy, Turkey, UK, and Canada, mid-April-mid-May 2020 (during the lockdown)	MDD, anxiety disorder, MD	Cross-sectional online survey of 326 individuals with MD and 546 HC (417 with anxiety disorders, 226 with MDD, and 189 with others in both groups); MDS-16, COVID-19-related variables: Questions about changes in daydreaming and psychosocial functioning	Individuals with depression and anxiety, who were suspected to have MD, were feeling an elevated urge to daydream during the pandemic and had more problems controlling it than individuals with MD and none of these disorders.	No generalizability due to sampling limitations, cross-sectional design does not allow the determination of causality, low effect size, no clinical diagnosis of MD
Van Rheenen <i>et al</i> [75]	Australia, April 1-4, 2020 (during the lockdown)	Affective disorders (BD and MDD)	Cross-sectional online survey of 1292 participants with a self-reported affective disorder and 3167 HC; DASS-21, PANAS, COVID-related variables: Questionnaires about primary concerns, changes in personal situation, perceptions, or behaviour	Individuals with affective disorders reported higher psychological distress than HC. Individuals with BD experienced more stress and depressive symptoms compared to individuals with depression; men with BD had more symptoms of distress and depression than women. Both groups did not differ in their mild symptoms of anxiety. Individuals with BD showed more pronounced financial concerns than individuals with depressive disorder and HC.	Self-selection and potentially selection bias, cross-sectional design led to a retrospective self-analysis of changes by the participants with no validation by the authors, self-reported affective disorders, mood disorder group was not balanced regarding gender distribution, no baseline measures of mood and lifestyle
Winkler <i>et al</i> [8]	Czech Republic, November 2017 and May 6- 20, 2020 (during and shortly after the lockdown)	Affective disorders (BD and MDD), anxiety disorders, and AUD	Two cross-sectional interviews of 3306 participants in 2017 (10.84% with AUD, 7.79% with anxiety disorders, and 6.57% with affective disorder) and 3,021 in 2020 (18.58% with affective disorder, 12.84% with anxiety disorders, and 9.88% with AUD); MINI, COVID-19-related variables: Lifestyle, worries, seeking of mental professional help, psychiatric symptoms	In 2020, 29.63% of individuals in Czech Republic suffered from mental illness in comparison to 20.02% in 2017. The prevalence of MDD tripled and there was no difference in the prevalence of alcohol use disorder, however, more individuals exhibited binge drinking behavior (4.07% vs 6.39%). The suicide risk rose from 3.88% to 11.88% in 2020. Having a mental disorder was associated with more worries about COVID-19-related impacts on health and economy.	No cohort study and therefore no assessment of the development of mental illness in previously health individuals, lack of face-to-face interviews, relaxation of MINI criterion, data collection after loosening of strictest COVID-19-related measures
Zhu <i>et al</i> [51]	China, 28 February-6 March, 2020 (during the lockdown)	SMI	Cross-sectional online survey of 925 inpatients with SMI (657 with SZ and 268 with affective disorder) in economically less developed geographic regions; clinical characteristics, COVID-19-related variables: Self-constructed questions about prevention, knowledge, information sources	The majority of participants (84.4%) had a positive stance regarding measures for preventing COVID-19, which was related to marriage and a higher level of education. The latter was additionally associated with more knowledge about the pandemic. The main sources of information were public media and individuals' attending physicians.	Lack of an outpatient control group, lack of examination of variables associated with attitude and knowledge pertaining COVID-19
Zou <i>et al</i> [66]	China, May 22-July 15, 2020 (during and after the lockdown)	SMI, organic mental disorders, and others	Cross-sectional online survey of 1063 older (age ≥ 50 yr) psychiatric patients (485 with MDD, and 578 with BD, SZ, organic mental disorders, and others); Patient Health Questionnaire (PHQ-9), ISI, NPRS, WHOQOL-BREF, self-constructed questionnaires to measure fatigue, COVID-19-related variables: Access to psychiatric services, treatment adherence, concerns	Nearly half of participants were feeling fatigue (47.1%), which was associated with a lower quality of life. A higher level of fatigue was related to more severe symptoms of depression, insomnia, and pain.	Results cannot be generalized, as the patients were of older age, cross-sectional design does not allow the determination of causality, several factors of importance were not researched due to logistical reasons

BD: Bipolar disorder; HC: Healthy controls; MDD: Major depressive disorder; OCD: Obsessive-compulsive disorder; PTSD: Post-traumatic stress disorder; SMI: Serious mental illness; questionnaires: AQ: Aggression Questionnaire; ASRM: Altman Self-Rating Mania Scale; BAI: Beck Anxiety Inventory; BCIS: Believing COVID-19 Information Scale; BDI-II: Beck Depression Inventory II; BDIS: Body Dysmorphic Symptoms Inventory; BRCS: Brief Resilient Coping Scale; BRS: Brief Resilience Scale; CAHSA: Continuum of Auditory Hallucinations-State Assessment; CAPE-42: Community Assessment Psychic Experiences; CES-D: Center for Epidemiologic Studies Depression Scale; CGI: Clinical Global Impression; CPSS: Chinese Perceived Stress Scale; CRASH: Cognitive Reserve Assessment Scale in Health; CSS: COVID Stress Scales; DASS-21: Depression, Anxiety, and Stress Scale-21 Items; DJGLS: De Jong Gierveld Loneliness Scale; EDE-Q: Eating Disorder Examination-Questionnaire – 2nd Ed.; EGS-R: Posttraumatic Stress Disorder Symptom Severity Scale-Revised; FCV-19S: Fear of COVID-19 Scale; FES: Family Environment Scale; GAD-7: Generalized Anxiety Disorder-7; HAMA: Hamilton Anxiety Rating Scale; HAMD: Hamilton Depression Rating Scale; IES(-r): Impact of Event Scale(-revised); HRQoL: Health-related quality of life; ISI: Insomnia Severity Index; K10: Kessler 10 Psychological Distress Scale; LS: Loneliness Scale; MADRS: Montgomery-Asberg Depression Rating Scale; MDS-16: Maladaptive Daydreaming Scale; MINI: Mini International Diagnostic Interview; MOS-SS: Medical Outcomes Study Sleep; NEO-FFI: NEO-Five Factor Inventory; NPRS: Numeric Pain Rating Scale; PANSS: Positive and Negative Syndrome Scale; PCIBS: Preventive COVID-19 Infection Behaviours Scale; PCL-C: PTSD Checklist – Civilian Version; PHQ-4/8/9: Patient Health Questionnaire-4/8/9; PMS: Pearlin Mastery Scale; PSQI: Pittsburgh Sleep Quality Index; PSS: Perceived Stress Scale; PSWQ: Penn State Worry Questionnaire; QIDS: Quick Inventory of Depressive Symptoms; RS-14: Resilience Scale; SCID-5: Structured Clinical Interview for DSM-5; SIAS: Social Interaction Anxiety Scale; SPEQ: Specific Psychotic Experience Questionnaire; SPS: Social participation scale; SPhS: Social Phobia Scale; SRS: Stress-Related Somatic complaints; SSS-S: Self-Stigma Scale-Short; STAY-YA: Spielberger's anxiety questionnaire (French: L'échelle d'anxiété état de Spielberger); SUMD: Scale to Assess Unawareness of Mental Disorder; TEMPS-A: Temperament evaluation of Memphis, Pisa, Paris, and San Diego-autoquestionnaire; UC: Utrechtse Copinglijst; WHOQOL-BREF: World Health Organization Quality of Life-brief version; WI: Whitley Index; Y-BOCS: Yale-Brown Obsessive Compulsive Scale – Symptom Checklist; YMRS: Young Mania Rating Scale.

Individuals with MDD were worried about their health and felt the need for more therapeutic support[58]. Numerous studies found more symptoms of depression[25, 42,62,70,71], anxiety[42,62,70,72], PTSD[42,70,72], problems of sleep[70-72], stress[62, 72], suicidality, anger, impulsivity[72], worry, loneliness[25], and elevated substance consumption[71] in patients with MDD compared to either HC or measured symptoms before the pandemic. MDD was a predictor of severe distress[73], which was connected to pandemic-related news[74]. Individuals with BD experienced more stress and depressive symptoms than those with MDD, with men having more severe depressive symptoms than women[75].

Individuals with SZ reported to be less stressed during the COVID-19 pandemic than HC[76] and had the least amount of problems with a lack of information about COVID-19 in comparison to other psychiatric disorders[63]. However, they were apparently both more anxious and worried about the current situation and perceived the risk of being infected with COVID-19 as higher than HC[76].

In comparison to individuals with SZ, patients with affective disorders were experiencing more feelings of vulnerability[63]. Furthermore, correlations between high CGI scores and stress-related somatic problems were especially increased in individuals with affective disorders, but could not be found in individuals with SZ[68]. Compared with BD and SZ, individuals with MDD were more worried about contracting the virus[64,77] and had more concerns about service disruption[64]. Furthermore, they were more concerned about the future, suffered from more sleep problems, and exercised more[56].

What are risk and protective factors that influence the severity of psychiatric symptoms and who is particularly vulnerable to these factors?

Regarding SMI in general, it was found that participants experiencing a worsening of psychiatric symptomatology were mainly elderly individuals[78] or had been hospitalized at a more recent date than the individuals who remained stable[36]. Nearly half

of them were experiencing fatigue, which was related to a lower quality of life[66]. However, most of elderly individuals with SMI experienced less psychiatric symptoms [79], approved of the strict governmental measures, and were not afraid of being infected with COVID-19. A higher level of fear was associated with more symptoms of depression, anxiety, stress, and less frequent behavior concerning prevention in older patients with SMI[50]. One study investigating elderly individuals with MDD found a lower quality of life, but not increased symptoms of depression and anxiety[77]. On average, younger patients experienced worse overall health, were feeling more fearful, and had more difficulties adapting than older patients[63]. Additionally, young age was related to increased anxiety and financial concerns in individuals with affective disorders[69].

Stress and distress in individuals with affective disorders were related to a longer duration of psychiatric illness, living alone during the lockdown, the habit of smoking, and frustration, which was associated with unemployment[69]. Especially younger individuals were concerned about pandemic-related consequences regarding their health[8] and socioeconomic status[67,69].

Concerning BD, symptoms of posttraumatic stress were related to anxiety and both work and financial difficulties in the wake of the pandemic. Acute manic symptoms seemed to be protective[42]. Loneliness, not having children, a passive coping style, low mastery, and neuroticism were associated with more psychiatric symptoms[79]. One study found that men had depressive symptoms to a greater extent than women [75]. Individuals with MDD and maladaptive daydreaming were feeling an elevated urge to daydream during the pandemic and had more problems controlling it[80].

Individuals with SZ living in isolation due to a suspected COVID-19 infection were more stressed, anxious, depressed[81], and had a worse quality of sleep than individuals with SZ who were not quarantined[82]. After the quarantine, this symptomatology continued[81]. When living in communal residencies, they were supported by both their cohabitants and mental health professionals, remained adherent to their treatment, and possessed knowledge about the consequences of COVID-19[74].

How does symptomatology and frequency of illness episodes change during the course of the pandemic?

On the one hand, two studies found that psychiatric symptoms remained stable over time in individuals with SMI[57,78], while another one found that the relapse rate did not significantly increase during the pandemic[36]. On the other hand, several studies showed a third of individuals with SMI to exhibit symptoms indicative of a recurrence of their illness or a worsening of symptomatology[52,63].

Pinkham *et al*[57] found that affective symptoms remained stable over time. In contrast, other studies showed that individuals with affective disorders apparently displayed a high likelihood of psychological distress[73,75]. In line with the latter finding, individuals with BD reported to have more psychiatric symptoms compared to the time before the pandemic in one study[75].

The research on MDD was contradictory: On the one hand, few studies showed that individuals with MDD were resilient, mostly socially connected, and did not experience increased symptoms of depression, anxiety, and suicidal ideation[77], with a quarter of them even perceiving an improvement of their mental health during the pandemic in one study[58]. On the other hand, the majority of studies found that individuals with MDD reported both a lower quality of life[70,72,77] and a decrease in mental health compared to the time before the pandemic[58].

Individuals with SZ reported mostly no or only slight changes in their mental health [57,58], and did not find further therapeutic support to be necessary[58].

DISCUSSION

This review is about the impact of COVID-19 on the mental health situation of individuals with BD, MDD, and SZ, gaining data from 19 different countries and areas. In the first months of the crisis, individuals with mental disorders experienced, on average, more pronounced psychiatric symptoms. Nevertheless, some studies showing a reduction of psychiatric symptomatology were found as well. Individuals with affective disorders showed an impairment in mental health, while those with SZ seemed to be mostly unaffected by the pandemic on a mental level. Overall, older patients experienced fewer decline in mental health than younger patients.

First and foremost, contradictory results about the impact of the pandemic on individuals with mental illness in general were found, showing both an increase and a decrease in psychiatric symptoms during the pandemic. The latter was reported more often, showing most commonly symptoms of depression, anxiety[56,59,60], and stress [58-62]. Notwithstanding, these results suggest that individuals with SMI were less affected by the pandemic than HC[25]. This observation was made by numerous authors researching not only individuals with SMI but mental illness in general[27,83] and might be applicable to this specific subgroup as well. The reason for this might be that individuals with mental disorders may be more used to periods of physical distancing and emotional upheaval due to disorder episodes, as Pan *et al*[25] similarly described. For HC, the pandemic has been a more drastic experience, severely influencing their daily lives and therefore leading to more pronounced symptoms of mental illness and a “normal”[25] reaction to this crisis. However, these results only feature the beginning of the COVID-19 pandemic, and the long-term effects on both HC and individuals with mental disorders require continued research.

While individuals with MDD were generally more worried about the pandemic and practiced more preventive behavior[62,77], those with BD seemed to suffer from more depressive symptoms without being as proactive about changing their situation[75]. Factors associated with higher levels of distress were largely connected to lifestyle[73] and socioeconomic environment[69], emphasizing the influence of these factors as well as the importance of outside help and a stable social network[35]. Unemployment was a particularly important factor, as it was related to frustration, anxiety, and bad mood [69], possibly leading to heightened fear about socioeconomic consequences[67]. Individuals with affective disorders are known to have a lower socioeconomic status and higher rates of unemployment than HC[84], making them more vulnerable for mental health degeneration in times of financial instability. In this context, the concept of resilience and strengthening it in individuals with psychiatric disorders, especially in individuals with BD, should be kept in mind for future interventions[85].

Although those diagnosed with SZ were more worried and anxious than HC[76], they seemed to be least affected by the crisis on a mental level among individuals with SMI, as the majority of SZ patients reported only little or no changes in their mental health[57,58,68]. This was explained by both a small sample size[58] and a disregard for “mundane worldly business”[68]. Possibly, they were indeed more preoccupied with their inner world, not focusing particularly on what happened during the pandemic. This coincides with the results about their apparent acceptance of a lack of information about COVID-19[63]. In addition, individuals with SZ reported support from their social network[76], helping them to lessen the mental burden in the wake of the pandemic.

Interestingly, more case reports were found about the exacerbation of SZ than of affective disorders, but these were not included in this review. This could be indicative either of a particular interest in such cases or an increased frequency of them. The latter may be explained by the diathesis-stress model[86], according to which environmental triggers can influence psychiatric symptoms of SZ. Amongst other factors, stress and the subsequent increase in cortisol levels lead to an increased release of dopamine[86,87]. Moreover, exacerbation might be associated with COVID-19 infection. Some patients who were infected were taking clozapine[87-89], which supports the hypothesis of this widely used drug increasing the risk for infection with COVID-19[90,91]. Likewise, stress, depression, and anxiety occurring in SZ patients with COVID-19 might advance an exacerbation[81,82]. COVID-19 itself might cause delirium as well[92]. In conclusion, individuals with SZ may not have been profoundly affected, however, they are vulnerable, especially in case of an infection, which could lead to an exacerbation.

Young age seems to be a risk factor for developing more severe psychiatric symptoms during the pandemic. Younger individuals with SMI had worse mental health and more feelings of fear[63] and anxiety[69] than older individuals, who were mostly reported to remain stable[77,79]. A connection of young age to financial concerns could be found[69], which might be related to unemployment, an important factor for the development of mental health problems during the pandemic. Moreover, social relations played an important part in maintaining the mental health of older adults (age > 60 years)[77]. Many of them were perhaps retired, making the measures of physical distancing a less severe change to their lives. After all, unlike younger adults, they did not have to adjust to the abrupt change of working from home instead of daily meeting their co-workers and thereby connecting socially. Additionally, they did not have the burden of caring for their children staying at home as well. Furthermore, resilience, a protective factor, was found to be high in older adults with SMI[77,79]. Resilience is known to rise with age[93], making it a possible reason for the

better coping ability of older individuals with SMI, which indicates the need for increased resilience once again, especially in younger individuals with SMI.

An increased belief in pandemic-related news was found to be associated with both increased[55] and decreased[50] fear in individuals with SMI, which may be related to the nature of information. Regardless of whether these individuals were more or less [53] informed about COVID-19 and its prevention than HC, they were generally more fearful and worried about the pandemic[58,76,77]. This is concerning if it is related to less prevention behavior[50], because individuals with SMI show more vulnerability to infection with COVID-19 than HC[94,95] and should therefore practice strict measures of prevention. Notably, COVID-19 patients with SZ featured a higher in-hospital mortality rate than HC[96,97]. Consequently, it is important for individuals with SMI to be supplied with information about the pandemic of adequate quality, which would lead to decreased fear and encourage them to protect both themselves and others.

Regarding the situation, increased treatment options for individuals with SMI are integral: Recommendations to use telepsychiatry have been made[98-100] and reports about its effectiveness have been given by several authors[101]. This kind of therapy seems to be well suited to face the situation of physical distancing, at least when it comes to patients without acute exacerbation of their condition requiring immediate medical intervention. In the light of elevated concerns about COVID-19-related healthcare shortages in individuals with mental illness[60,64], telepsychiatry gains in significance for easing the worries of these patients and helping them from afar.

Inconsistent results were found across different studies researching whether the mental health situation of individuals with SMI increased or decreased, although the latter was reported more often. These conflicting outcomes could be explained by cultural, social, and economic background, the pandemic-related situation of different countries, as well as factors pertaining to the implementation of the studies, such as the use of non-standardized questionnaires. Nevertheless, this shows that generalizing the results might not be possible in some cases and should be taken into consideration, as many authors mentioned in their studies. Additionally, these discrepancies highlight the need for measuring individuals' socioeconomic situation and other variables influencing their mental health situation. This was done by several authors; however, it would be important to not only report these results, but also use the aforementioned variables as covariates to facilitate international comparison. Further limitations implicate more aspects to be taken into account for future research: The sample should be of adequate size, follow-up studies are needed to research causality and observe long-term effects, and standardized questionnaires about COVID-19-related variables, such as those proposed by Chang *et al*[54], should be used to enable better comparability. Additionally, the conduction of a meta-analysis would be ideal to better evaluate the impact of the pandemic on individuals with SMI.

CONCLUSION

The pandemic and its consequences have been leading to a decrease in the mental health situation of individuals with SMI across the world, especially those with affective disorders. Increasing symptoms of anxiety, depression, and stress were most frequent and higher in comparison to HC. Along with age and resilience, the main contributing factors seem to be of socioeconomic nature, with the shortage of treatment options, fear, adequate information, and social support being particularly important. This precarious situation necessitates a reinforcement of mental health services, first and foremost the usage of telepsychiatry. Moreover, it is paramount to supply patients with adequate information about COVID-19 and its prevention and to increase their resilience. Respecting scientific research about psychiatric disorders, both standardizations to enable generalization of results and the conduction of long-term follow-up studies are integral to further investigate SMI.

ARTICLE HIGHLIGHTS

Research background

The coronavirus disease 2019 (COVID-19) is greatly influencing the mental state of individuals from all walks of life. Individuals with serious mental illness (SMI: bipolar disorder, major depressive disorder, and schizophrenia) are especially vulnerable to the reverberations of such a crisis, leading among other symptoms to an increase of

depression and anxiety. The pandemic is an excellent opportunity to broaden the understanding of these disorders and improve methods of treatment.

Research motivation

Individuals with SMI having been researched in the course of several studies calls for a coherent analysis of all findings to gain an insight in the mind of these individuals, making their support more efficient. At the time of the search, no other review focusing on solely the clinical characteristics of individuals with SMI had been published in the searched databases.

Research objectives

This review aimed to assess the situation of individuals with SMI and their mental state during the COVID-19 crisis. The following questions were answered: (1) How are individuals with SMI affected by the pandemic in comparison to healthy controls (HC) and what are the main psychiatric symptoms they are displaying? (2) What are risk and protective factors that influence the severity of psychiatric symptoms and who is particularly vulnerable to these factors? And (3) How does symptomatology and frequency of illness episodes change during the course of the pandemic?

Research methods

We systematically searched MEDLINE and PubMed (day of the final search: January 9, 2021), including terms related to the impact of the COVID-19 pandemic on the mental health of individuals with bipolar disorder, major depressive disorder, and schizophrenia. Only studies providing original data were included.

Research results

The search yielded 36 studies. The impact of the COVID-19 pandemic generally affected the mental health of individuals with SMI in a negative way, with individuals with affective disorders being more impacted than those with schizophrenia. The most common symptoms were those of depression, anxiety, and stress. Mental health was mainly influenced by age, resilience, and socioeconomic circumstances, particularly the shortage of mental health services, lack of social support, and inadequate information about COVID-19.

Research conclusions

Mental health services, particularly telemental health services, should be reinforced to better support individuals with SMI and strengthen their resilience. Moreover, individuals with SMI should be supplied with information about the pandemic and the employment of protection measures.

Research perspectives

Future research requires follow-up studies to determine causality and long-term effects, greater sample sizes, and standardization.

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