

The Psychological impact of COVID-19 on individuals with and without mental health disorders

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Declaration of Conflicting Interests

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Abstract

Objective: To identify people with history of mental health disorders before the COVID-19 pandemic in the Brazilian population and estimate the prevalence of mood swings and the subjective distress of the pandemic among individuals with or without mental health disorders.

Methods: Through an online survey, participants were asked about presence or absence of mental health disorders. In addition, they answered the Brunel Mood Scale and the Impact of Event Scale. The mean percentile of mood swing indicators and psychological impact scores were estimated, and data were analyzed by logistic regression.

Results: 13,248 people participated (70.5% women, mean age 35.4 years, 31.2% with history of mental health disorder). Women and younger people were more likely to be diagnosed with mental health disorder. All participants had significant changes in mood due to the pandemic. Anger, depressed mood, mental confusion, and fatigue were higher among individuals with bipolar disorder or with combined disorders. Individuals with mental health disorders had a greater subjective distress, especially the group with bipolar disorder (OR = 4.89 [3.64-6.56]) and combined disorders (OR = 6.89 [5.21-9.10]).

Conclusion: Individuals previously diagnosed with mental health disorders at some point in life are more vulnerable to psychological impact from the pandemic.

Key words: Mental health; Mental Disorders; Pandemics; COVID-19

Introduction

Mental health disorders are major causes of disability (measured in years of life) in the world (Wang et al., 2007). The mental health of populations has been extensively studied, as shown by Steel et al. (2014) in a systematic review and meta-analysis that included surveys published from 1980 to 2013 in 63 countries. The authors found that 29.2% (95%CI = 25.9-32.6%) of the adult population has experienced a mental health disorder (mood, anxiety, and substance use disorders) at some point in their lifetime. In 2001, the World Health Organization (2001) indicated that mental health and behavioral disorders represent 12% of the global disease burden. In Brazil, Nunes et al. (2016) found that 26.8% [95%CI = 26.1-27.5%] of adults had at least one symptom of psychiatric morbidity (general anxiety, panic, social anxiety, phobia, obsessive-compulsive disorder, or combined anxiety-depressive disorder) in the previous month, and such symptoms have economic, social, and individual effects (such as well-being, quality of life, and physical and mental health problems) (Razzouk, 2016; World Health Organization, 2001).

Added to the above scenario, on March 11, 2020, the World Health Organization declared the new coronavirus (Sars-Cov-2) outbreak a pandemic, and due to the rapid spread of infection and increase in mortality, mandatory quarantine and social distancing measures were established. The high level of uncertainty and drastic routine changes have therefore increased the physical, social, and psychological vulnerability of populations.

The impact of pandemics and epidemics, such as SARS, Ebola, H1N1, and the current COVID-19, on mental health have been widely documented (Brooks et al., 2020; Huremovic, 2019; Talevi et al., 2020). A worldwide effort is

currently in place to understand the impact of the COVID-19 pandemic on mental health and promote strategies of support, management, and intervention. Due to the ongoing nature of the pandemic, scientific information is being produced daily and with little delay. Studies show that the most commonly reported mental health symptoms are anxiety, depression, mood swings, and post-traumatic stress (Salari et al., 2020; Xiong et al., 2020), which can occur during or after the quarantine period (Brooks et al., 2020) and affect all individuals to a greater or lesser extent. Women, young adults, and those with a mental health disorder are at greater risk (Alonzi et al., 2020; Brooks et al., 2020; Campos et al., 2020; Muruganandam et al., 2020; Salari et al., 2020; Talevi et al., 2020). Moreover, countries with great inequalities such as Brazil have further factors, such as social, economic, and political crises, that can aggravate the impact of the pandemic.

A previous study (Campos et al., 2020) in a Brazilian population sample (n = 12,196) showed a high prevalence of depression (61.3%), anxiety (44.2%), and stress (50.8%) symptoms and of subjective distress due to the pandemic (54.9%) (including mild, moderate, and severe levels). Young adults (95%CI = 1.58-3.58), women (OR = 1.35-1.65, except for depressive symptoms), and those who had a mental health disorder at some point in their life (95%CI= 1.72-2.64) had an increased risk of developing a new symptom. Different arguments have been used to explain the greater vulnerability of women to psychological impact, such as women tending to internalize distress more than men and behavioral differences between men and women (Freeman and Freeman, 2014; Almeida and Kessler, 1998).

However, studies about the psychological impact of the COVID-19 pandemic on people with previous mental health disorders are scarce (Rheenen et al., 2020; Talevi et al., 2020). It is well known that people with a history of mental health disorder are at greater risk of presenting these disorders when facing stressful situations than the general population (Alonzi et al., 2020; Campos et al., 2020; Grover et al., 2020; Huremovic, 2019; Rheenen et al., 2020). The effects of social isolation and quarantine due to a pandemic on these individuals are also clear in the literature (Balanza-Martinez et al., 2020; Brooks et al., 2020; Giallonardo et al., 2020; Muruganandam et al., 2020). The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association [APA], 2013) highlights the higher susceptibility to post-traumatic stress disorder of individuals with a previous mental illness, who might be hypersensitive to potential threats, be more reactive and irritable, present a bad mood, have trouble avoiding thoughts, feelings, and speaking about the traumatic event, present intrusive and recurring thoughts, and lose interest in previously enjoyable activities. In some cases, dissociative disorders such as derealization and depersonalization can occur. As Holmes et al. (2020) and Ornell et al. (2020) reported, such individuals are also at higher risk of suicidal ideation. Therefore, assessing the psychological impact of the pandemic on people with a history of mental health disorders and the strategies they applied throughout their lives may add new information on the mental health of the Brazilian population, providing parameters for the development of support, information and treatment actions aimed at minimizing the harmful effects of the pandemic on mental health.

Moreover, as previously mentioned, Brazil has wide social and economic inequalities (Lopes, 2020), which worsened during the current political crisis.

Strong science and COVID-19 negationism have also added to the problem. Information related to the disease, the virus, and the preventive measures is often confusing and contradictory, generating a general feeling of insecurity and vulnerability in the population (Campos et al., 2020) and aggravating the impact of the pandemic.

Thus, this study aimed to assess the past and current mental health disorders in the Brazilian population and the association with psychological symptoms due to the pandemic. We hypothesized that the prevalence of psychological symptoms due to the pandemic is greater among those with a history of mental health disorders, that women and young adults are more likely to have a history of mental health disorder, and that people with different disorders have different mood swings and subjective distress due to the pandemic.

Methods

Study design and sampling

This was a cross-sectional study with a snowball non-probability sample selection. Data were collected online using Google Forms with the links to the form sent to participants by email, WhatsApp, or social networks. Brazilians aged 18 years or over were invited to participate. First, the staff from private and public Brazilian higher education institutions in all states were invited by e-mail, obtained in the official web site of the institutions. Invitations were also sent to the *Central Única das Favelas* (Slums Center) and to seven of the most important non-governmental organizations (NGOs) to obtain a socioeconomically diverse sample.

Potential participants were asked to share the survey link with their contacts via email, WhatsApp, or social media in order to expand the scope of the study. Data collection was carried out from May 18 to June 30, 2020. During the collection period, the number of COVID-19 cases rose from 254,220 to 1,402,041 and COVID-19-related deaths from 16,792 to 59,594 based on the Ministry of Health reports.

The minimum sample size was estimated using $\alpha=5\%$, $\epsilon=10\%$, and the size of the Brazilian population ($N = 210,147,125$) according to the Brazilian Institute of Geography and Statistics - IBGE. Because there is no representative well designed national survey on mental health in Brazil, the calculation of the minimum sample size considered the lowest prevalence ($p = 8.4\%$) of mental health disorders from the study of Viana and Andrade (2012) (anxiety disorders = 28.1%; mood disorders = 19.1%; impulsive-control disorders = 8.4%; substance use disorders = 11.0%) carried out in adults in the state of São Paulo. The minimum sample considering a 25% loss rate was 5,587 individuals. The sample was stratified by state, accounting for the population size of each state to achieve a representation of the 26 Brazilian states and the Federal District.

Information was collected on sex, age, monthly family income (1: 0 to R\$ 1,254; 2: R\$ 1,255 to R\$ 2,004; 3: R\$ 2,005 to R\$ 8,640; 4: R\$ 8,641 to R\$ 11,261; 5: above R\$ 11,262), and education (1: complete elementary I school (up to 4th grade / 5th grade), 2: complete elementary II school (up to 8th grade / 9th grade), 3: complete high school, 4: complete higher education, and 5: complete graduate school). Further information included being diagnosed with a mental health disorder ever in life before the pandemic (Before the pandemic, did you ever receive a medical diagnosis of a metal disorder? If so, which one?) and

changes in mental health status after the start of the pandemic perceived by the participant.

Those who had a previous mental health disorder were asked to provide the medical diagnosis, regardless of when it occurred, before the pandemic. Disorders were categorized according to DSM-5 (APA, 2013) (Table 1). Panic disorder was grouped separately from other anxiety disorders due to severity of signs and symptoms and due to its high prevalence in the sample. Those who reported more than one diagnostic category were included into a separate group. The 'Others' category included mental health disorders with a low prevalence. Participants were asked whether they received any type of mental health care (1: psychotherapy, 2: drug therapy, 3: psychotherapy and drug therapy, 4: complementary and alternative medicine, 5: physical activity, 6: religious / spirituality activities, 7: arts, 8: self-help, 9: leisure activities) being grouped as psychotherapy, drug therapy, and lifestyle activities (4 to 9). Each component was rated as 0 (absent) and 1 (present), resulting in 8 possible categories (000, 001, 010, etc).

The subjective distress of the pandemic and mood swings were assessed with the Impact of Event Scale - revised (IES-R) (Caiuby et al., 2012) and the Brunel Mood Scale (BRUMS) (Rohls et al., 2008), respectively. Respondents who answered the question regarding previous mental health disorder and who completed all items of the IES-R and BRUMS were included in the analysis. Data collection occurred after the consent of the participant to participate in the study (from May 18 to June 30, 2020).

Measuring Instruments

The Portuguese version of the IES-R (Caiuby et al., 2012) was used. The scale has 22 items distributed in 3 factors¹ (avoidance, intrusion, and hyperarousal) and rated on a 5-point Likert-type responses ranging from 0 to 4 (0: not at all, 1: slightly, 2: moderately, 3: very, and 4: extremely). To estimate the prevalence (%) of subjective distress and its severity, the general score was calculated by the sum of responses following the recommendation of Wang et al. (2020) (normal - 0 to 23; mild - 24 to 32; Moderate - 33 to 36; Severe - ≥ 37). The scores were also calculated for IES-R factors separately (avoidance and intrusion: normal - 0 to 8; mild - 9 to 11; moderate - 12 to 13; severe - ≥ 14 ; hyperarousal: normal - 0 to 6; mild - 7 to 8; moderate - 9 to 10; severe - ≥ 11). Although the IES-R assesses post-traumatic stress symptoms, we treated the data as symptoms of the pandemic psychological impact. Because the study was carried out at the beginning of the ongoing pandemic, its impact as a traumatic life event could not be established.

The BRUMS (Rohls et al., 2008) has 24 items rated on a 5-point Likert scale indicating the frequency of a certain mood related to a situation or context (0-no at all, 1-a little bit, 2-moderately, 3-quite a bit, and 4-extremely). The scale has 6 subscales (anger, confusion, depression, fatigue, tension, and vigor) with four items each. The cutoff points for assessing mood swings due to a situation were based on percentiles previously established in the reference population (Rohls et al., 2008). Values below the 50th percentile (P50) for Vigor and above P50 for the other factors warrant attention.

¹ The 3-factor proposal presented in the Portuguese version (Caiuby et al., 2012) aims to evaluate post-traumatic stress disorder as proposed in the DSM-IV. It was used in this study as it is the only tool available in Portuguese at the time of study design (March, 2020). As we aimed to provide real-time data to characterize the Brazilian population since the beginning of the pandemic, the construction of a new proposal for the IES-R based on the DSM-V at that time was unpracticable.

The IES-R and the BRUMS were applied in the present study as screening tools. The validity of data obtained with the instruments was assessed using confirmatory factor analysis (CFA) with weighted least squares means and variance adjusted (WLSMV). The fit of the IES-R and BRUMS models to the data was assessed using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). The fit of the models was found adequate for all subgroups of disorders (CFI and TLI ≥ 0.90 , and RMSEA ≤ 0.10 (Kline, 1998), factor loading (λ) $\lambda \geq 0.30$ and $\alpha \geq 0.70$) (Supplementary Material 1). The metric and scalar invariance of the instruments between samples were tested to assess the ability of the instruments to compare groups (Nolte & Elsworth, 2014). A CFI difference $|\Delta\text{CFI}|$ of < 0.01 was found for both IES-R and BRUMS models, indicating model invariance.

Ethical aspects

The study in was approved by the National Research Ethics Commission of the Ministry of Health (CONEP) (CAAE 30604220.4.0000.0008).

Statistical analysis

To verify the relationship between sociodemographic variables (sex, age, income, and education) and having had, or not, a previous diagnosis of mental health disorder, logistic regression was performed and odds ratios (OR) were calculated. General subjective distress (IES-R) was considered when the degree of involvement was moderate or high (dependent variable). The first model was estimated by sex and age group, with the independent variable being having had (or not) a diagnosis of mental health disorder previously. In the second model,

the type of disorder was the independent variable with the reference category being no previous disorder. The mean percentile (95%CI) of mood swings and mean scores [95% CI] of subjective distress according to type of disorder were also calculated.

Results

A total of 14,451 people answered the survey, but 388 were excluded from the analysis for not answering the item on previous mental health disorder and 815 (of which 81.4% had no previous disorder) were excluded for not filling out all the items of the IES-R and BRUMS. The final sample was 13,248 people (70.5% women; mean age 35.4 years (SD=13.0 [min = 18; max = 94]). The average monthly family income of 8.7% of the participants was less than R\$ 1,254, 11.7% was between R\$ 1,255 and R\$ 2,004, 38.6% between R\$ 2,005 and R\$ 8,640, 16.1% between R\$ 8,641 and R\$ 11,261, and 24.9% above R\$ 11,262. Regarding educational level, 0.9% had less than high school, 28.5% had completed high school, 20.7% had a college degree, and 49.9% had completed a graduate degree. Most participants (66.5%) reported perceiving changes in their mental health since the beginning of the pandemic.

Income and educational level were not significant predictors for prior mental health disorder (OR = 1.00; $p > 0.05$). Women (OR = 1.82, 95%CI = 1.67-1.99) and younger individuals (OR: <24 years old = 1.77 [95%CI = 1.52- 2.06]; 24 |33 years = 1.67 [95%CI = 1.44-1.93]; 33 |43 years = 1.70 [95%CI = 1.46-1.97; 43 |55 years = 1.36 [95%CI = 1.16-1.60]) were more likely to report a previous diagnosis of a mental health disorder.

Table 1 shows the distribution of the participants according to the diagnosis of mental health disorder before the pandemic, the DSM-5 classification, and study groups. Thirty one percent (n=4,137) of the participants reported a mental health disorder at some point in their life prior to the pandemic. Anxiety disorders were the most frequent, followed by combined disorders (anxiety and depression; anxiety, panic and depression). Table 2 shows the estimated parameters for subjective distress due to the pandemic in people with or without a prior diagnosis of mental health disorder according to sex and age group.

Having had a diagnosis of mental health disorder before the pandemic significantly increased the overall risk of subjective distress from the pandemic (95%CI: 18.16-28.02); a higher risk was also found in sex and age subgroups (OR [95%CI]> 1). Women and younger people were the most affected, irrespective of having had or not a previous mental health disorder.

Although the item about receiving mental health care was directed to those who reported a previous disorder, 3,170 individuals without a previous disorder reported receiving mental health care and were included in the subsequent analysis. Interestingly, those without a previous disorder had a high prevalence of lifestyle-related care and psychotherapy and those with a disorder had a low prevalence of reported care (Table 3). Within those with a previous diagnosis, having a healthier lifestyle was a protective factor for subjective distress of the pandemic (OR = 0.72, [95%CI = 0.57- 0.90]).

Regarding the BRUMS results, all participants reported having significant changes in mood due to the pandemic ($P > .50$ for Anger, Mental Confusion, Depressed Humor, Fatigue and tension, and $P < .50$ for Vigor) (Table 4). Anger,

depressed mood, mental confusion, and fatigue were more common among individuals with bipolar disorder and with combined diagnoses. Tension was more common among those with combined diagnoses and lack of vigor was more common among those without reported mental health disorders.

Regarding the subjective distress of the pandemic, individuals without a previous mental health disorder had lower IES-R scores for all subscales, and higher scores were found for the groups with bipolar disorder and combined disorders. The confidence intervals indicated a moderate subjective distress (IES-R \geq 33, Avoidance and Intrusion \geq 12, and Hyperarousal \geq 9) in most groups (Supplemental Material 2). The prevalence of moderate or severe subjective distress among those without mental health disorders (IES-R = 26.8%; Avoidance = 36.0%; Intrusion = 24.6%; Hyperarousal = 29.1%) was significantly lower than that among individuals with some mental health disorders (IES-R = 53.7%; Avoidance = 54.6%; Intrusion = 50.0%; Hyperarousal = 56.4%).

A significantly increased probability of presenting a subjective distress due to the pandemic was found among subjects who reported a previous mental health disorder (Figure 1), especially for those with bipolar disorder or with more than one disorder (anxiety and depression; anxiety, panic and depression).

Discussion

The evidence presented in this study supports our hypotheses and indicates that people with a previous mental health disorder are more affected psychologically by the pandemic, especially those with bipolar disorder or with combined disorders. Women and young adults had a higher prevalence of previous disorders. Moreover, people without a disorder received more mental

health care than those with a previous diagnosis. These results are somewhat expected in the normal life context, as previously reported (APA, 2013; North & Pfefferbaum, 2013; Rheenen et al., 2020; Van Rheenen et al., 2020). However, their confirmation and the identification of the subjective distress and mood swings of the COVID-19 pandemic is new information that may support not only the immediate management of cases but also the monitoring of mental health in the Brazilian population. Moreover, the study allows the comparison of prior and current prevalence of mental health disorders in order to better understand the dimension of the pandemic impact and its implications in people's lives. Importantly, because these data are exploratory and self-reported by participants without diagnostic confirmation, the data should be analyzed with caution and be used only as a starting point for monitoring the situation. Nevertheless, this study provides real-time data from a large sample that can be used for the development of public policies and by psychiatrists and professionals in the field of behavioral medicine (Balanza-Martinez et al., 2020).

The higher risk of psychological impact of the pandemic in younger people and women found in this study corroborates previous findings (Campos et al., 2020; Davis et al., 1999; Freeman & Freeman, 2014; Qiu et al., 2020; Wang et al., 2020). The uncertainty about the future, the interruption of relationships due to isolation and quarantine, and the fewer mental and behavioral skills of young people may explain their increased risk of impact. With regard to the sex factor, Almeida and Kessler (1998) mention that women more commonly internalize problems and present ruminative responses that can prolong distress and increase the effects of stressors, making it difficult to find a solution while men in general externalize stress more easily. Freeman and Freeman (2014) state that

not only are women more vulnerable to mental health disorders but their symptoms are more disruptive and disturbing than those in men with similar disorders. According to Davis et al. (1999), the higher vulnerability of women may be related to them facing greater levels of daily stress than men, due to the demands of their social role (managing job, housework, and child care, difficulties with career advancement, lower pay, multiple functions, body image concerns, etc.). Freeman and Freeman (2014), in counterintuitive, mention that perhaps women are just more willing to recognize and report symptoms than men, or have better memory of mental problems than men, or that men are more reluctant to admit there is a problem.

When facing a pandemic, the health care priorities include learning the mechanisms of action of the infecting agent, controlling the spread, and finding an effective treatment, while the psychological implications are considered secondary. However, previous epidemics have shown that mental health disorders related to the event can have both individual and collective impact if neglected (Brooks et al., 2020; Huremovic, 2019; Ornell et al., 2020). This issue is aggravated in vulnerable populations, such as individuals with a history of a mental health disorder who may be emotionally unstable and present greater difficulty in adapting to routine changes. Additionally, their routine mental health care might be interrupted and social support greatly reduced due to social distancing requirements (Muruganandam et al., 2020; Rheenen et al., 2020). As shown in Table 2, people with previous mental health disorders had a 20% higher chance of a psychological impact of the pandemic. The same was observed in all age groups and in both sexes.

The psychological risk varies depending on the type and severity of the disorder and the treatment provided. As Rheenen et al. (2020) report, the lifestyle changes imposed by COVID-19 can have alarming effects on mood stability, primarily in those with a history of bipolar disorder. With a sudden situational change as the pandemic, patients' vulnerability can increase due to the development of comorbid disorders that can aggravate the condition and compromise treatments that could otherwise be effective (Frank, 2005; Dowd & Janicak, 2009). Therefore, with the pandemic and the increased risk of subjective distress of individuals diagnosed with bipolar disorder (Figure 1), the immediate implementation of mental care measures in this population is highly recommended. The findings of this study indicate a greater risk of psychological impact of the pandemic among individuals with combined disorders, also suggesting the need for support, information, and early treatment.

Health promotion strategies should take into account a healthy lifestyle even during social distancing measures, and people with mental health disorders, especially mood disorders, should be closely monitored either by health professionals or family members (Rheenen et al., 2020). According to our data, individuals with a prior diagnosis of a mental health disorder have difficulties maintaining a healthy lifestyle and receiving mental health care (16.9% were not receiving any mental health care). On the other hand, those with healthier lifestyles were less affected by the pandemic, confirming the benefits of healthy habits, which should receive greater incentives, be promoted in the population (Balanza-Martinez et al., 2020), and implemented in psychoeducation, corroborating data reported by Bowen et al. (2013), who state that mood instability can be modified by lifestyle factors. On the other hand, the majority

(85.3%) of people without a history of mental health disorders reported a high concern with a healthy lifestyle. Although a cause-and-effect direction, i.e., that a healthy life leads to mental health or mental health disorders hinders a healthy lifestyle, cannot be established, it can be speculated that healthy lifestyle choices are a protective factor for mental health, especially in a pandemic scenario. Lifestyle choices reported by participants found to be protective behaviors included practicing physical activity (Stubbs et al., 2017), engaging in religious and spiritual activities (Garssen et al., 2020), and meditation (Sharma & Rush, 2014). These activities can mitigate or neutralize the impact of stressful events or situations, such as the present pandemic, on well-being. However, due to intrinsic difficulties of some people, these activities might not be effective for coping with stressors, and in such cases, psychotherapy can help patients understand their personal abilities and difficulties and develop healthy and efficient ways to deal with negative events, promoting contexts that are mental health promoters. The effectiveness of psychotherapy in promoting people's psychological and general well-being is well-established in the literature (Bowen et al., 2013; Sousa, 2017).

Some limitations of this study should be reported. First, the diagnosis of mental health disorders was self-reported and had no clinical verification. However, the item used asked specifically about being medically diagnosed with a mental health disorder, and for the exploratory aim of this study, this information was considered sufficient. Other important clinical variables, such as the age of onset of mental health disorders, whether the problem was ongoing, and COVID-19 infection were not included in the questionnaire. Additionally, the study design (non-probability sampling and online data collection) may have restricted the

inclusion of participants from lower educational and socioeconomic levels, hindering the generalization of results. As observed in a previous study (Campos et al., 2020), people with a lower socioeconomic level are more likely to have a psychological impact from the pandemic, thus the actual prevalence of the pandemic impact could be even higher than found. Moreover, the impact was self-reported, so the subjectivity of the participants must be accounted for. Also, it is well known that people with mental health problems or in vulnerable positions are less likely to participate in surveys (Pierce et al., 2020), affecting the study representativeness. Nevertheless, not knowing if the sample is representative of the population reinforces the importance of screening studies as a starting point for more thorough random sampling studies on mental health. The online data collection, although a limitation, is a feasible method for an exceptional situation such as the COVID-19 pandemic that allows obtaining immediate information on the psychological impact of the population. Finally, with no pre-pandemic mental health information of the participants, the level of psychological distress due solely to the Sars-Cov-2 pandemic cannot be quantified.

As strengths, this study produced valid and reliable data from a large sample stratified by population size of all Brazilian states. More importantly, it provides an unprecedented overview of the early psychological impact, mood changes, and mental health care of the Brazilian population with and without previous mental health disorders. As already encouraged by Balanza-Martinez et al. (2020), the collection of information, in real time, in extended samples, during the pandemic period, can be especially relevant for the area of psychiatry, both for knowledge of the mental health status of the population and for informing and supporting the development of public policies. The implementation of support,

guidance, intervention, and follow-up measures with the participation of specialized health care workers is suggested to protect the psychological well-being of the entire population, primarily of those with a history of mental health disorders.

The authors strongly suggest a systematic mental health screening of the Brazilian population be carried out allowing the identification of symptoms and risk factors in samples from the different social and economic strata of the country's population. Certainly, studies carried out by competent federal agencies could result in better coverage of the population. Finally, future studies should address the pandemic potential to be perceived as a traumatic event and a factor for triggering post-traumatic stress.

Conclusion

Individuals diagnosed with mental health disorders at some point in life are more vulnerable to psychological impact from the pandemic and, therefore, should receive greater attention and care from the health system. Individuals with bipolar disorders and those with combined disorders (such as anxiety and depression) are at significantly higher risk of developing mood swings and avoidance, intrusive, and hyperarousal behaviors. The psychological impact was more common in women and young people.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

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Tables and Figure Legend

Table 1. Distribution of participants according to the diagnosis of mental health disorder received before the pandemic, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) classification, and the study groups (n = 13,248).

Table 2. Logistic regression models for overall psychological impact (IES-R) from the pandemic for people with or without a previous diagnosis of mental health disorder throughout life, with sex and age group as independent variables.

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Table 4. Mean percentile [95% CI] of mood swing indicators due to the pandemic according to mental health disorder diagnosed prior to the pandemic.

Figure 1. Odds ratio (OR [95% CI]) of psychological impact due to the pandemic according to previous mental health disorder in relation to participants without reported mental health disorder.

Supplementary Material

Supplementary Material 1. Psychometric parameters of the Impact of Event Scale - revised (IES-R) and Brunel Mood Scale (BRUMS) models.

Supplementary Material 2. Mean [95% CI] scores for psychological impact due to the pandemic according to the diagnosis of a previous mental health disorder.

Table 1. Distribution of participants according to the diagnosis of mental health disorder received before the pandemic, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) classification, and the study groups (n = 13,248).

Study group	DSM-5 classification	
Anxiety Disorder (n = 1,650) Panic Disorder (n = 275)	Anxiety Disorder (n = 1,925)	Unspecified Anxiety Disorder n = 1,616 Panic Disorder n = 275 Specific Phobia n = 34
Bipolar disorder	Bipolar Disorder n = 198	
Depressive Disorders	Depressive Disorders (n = 789)	Unspecified Depressive Disorder n = 779 Persistent Depressive Disorder (Dysthymia) n = 2 Premenstrual Dysphoric Disorder n = 2 Disruptive Mood Disruption Disorder n = 6
Others (n = 55)	Schizophrenia Spectrum n = 13	
	Substance-related disorders n = 3	
	Gender Dysphoria n = 3	
	Eating Disorders n = 3	
	Neurodevelopmental Disorders	Attention Deficit / Hyperactivity Disorder n = 10 Autistic Spectrum Disorder n = 1
	Trauma and Stress Disorders	Posttraumatic Stress Disorder n = 8 Adaptation Disorder n = 1
More than one diagnosis (each category was considered a group)	Obsessive-Compulsive Disorder n = 14	Unspecified Anxiety Disorder n = 1,616
	Personality Disorders (Borderline) n = 1	Panic Disorder n = 275
	Anxiety Disorders and Depressive Disorders n = 920	Specific Phobia n = 34
	Anxiety Disorders, Panic Disorder and Depressive Disorders n = 250	

Table 2. Logistic regression models for overall psychological impact (IES-R) from the pandemic for people with or without a previous diagnosis of mental health disorder throughout life, with sex and age group as independent variables.

Sex	Age group (years)	n		B	constant	OR	95%CI	p%	
		No MD	Prior MD					No MD	Prior MD
Men	< 24	158	166	1.165	-0.800	3.21	2.03-5.07	31.01	59.04
	24 33	233	230	1.070	-1.104	2.91	1.97-4.32	24.89	49.13
	33 43	227	240	0.955	-1.343	2.60	1.72-3.92	20.70	40.42
	43 55	148	142	1.506	-2.340	4.51	2.30-8.84	8.78	30.28
	≥ 55	85	78	2.371	-3.726	10.71	2.38-48.30	2.35	20.51
Women	< 24	422	810	1.065	-0.028	2.90	2.27-3.72	49.29	79.83
	24 33	655	920	0.863	-0.038	2.37	1.93-2.91	40.61	61.85
	33 43	549	769	1.188	-1.180	3.28	2.57-4.18	23.50	50.20
	43 55	412	462	1.143	-1.675	3.14	2.27-4.31	15.78	37.01
	≥ 55	240	228	1.218	-1.872	3.38	2.13-5.36	13.33	34.21

MD: mental health disorder (0 = no, 1 = yes); OR: odds ratio, 95%CI: 95% confidence interval, p: probability of psychological impact ($p=1/1+e^{-\text{logit}p}$).

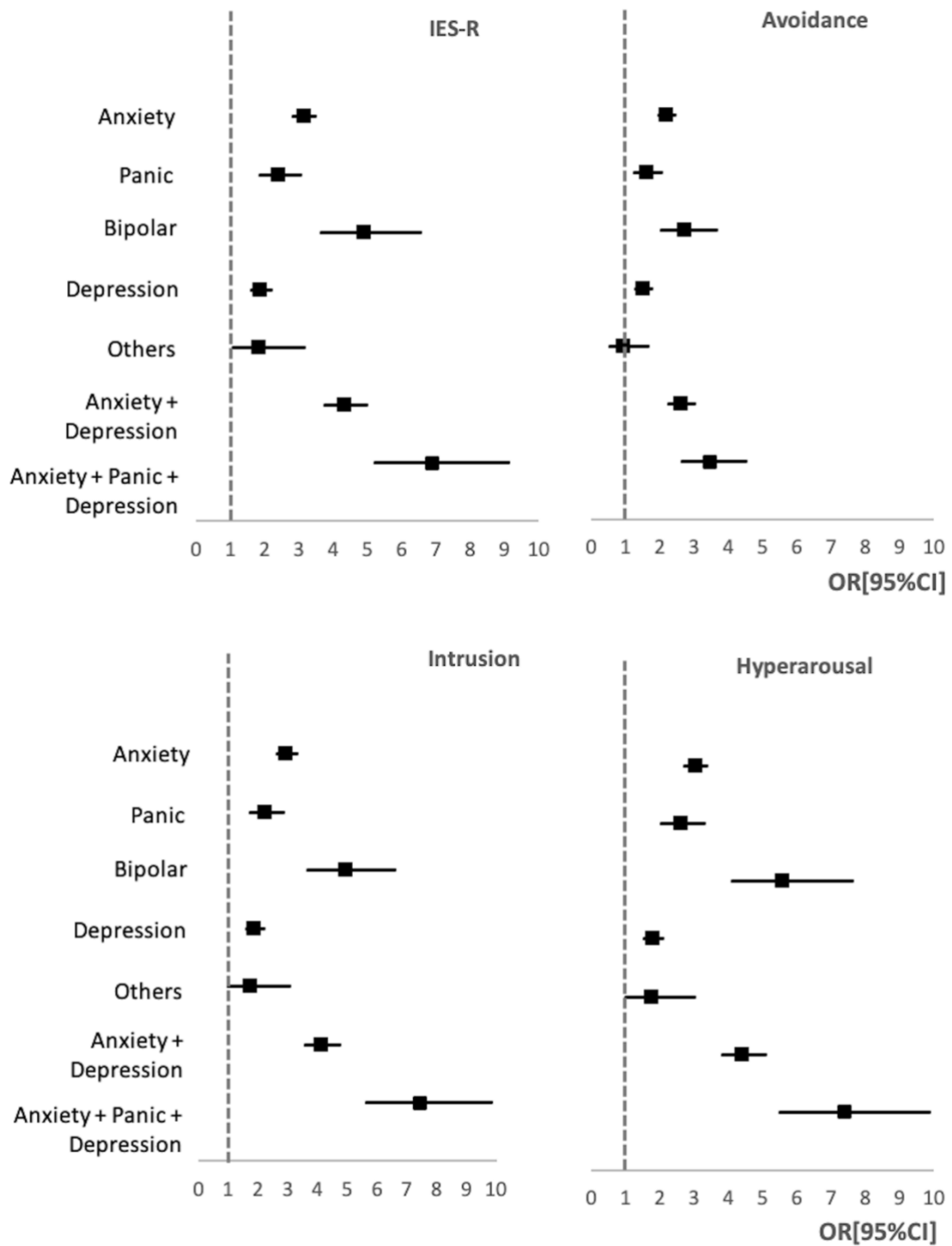
Table 3. Distribution of participants according to the reported mental health disorder and the type of care received (without disorder: n = 3,170; with disorder: 4,130).

Treatment component	Reported disorder, n						Disorder, n (%)		Total	
	Anxiety	Panic	Bipolar	Depression	Other	Anxiety and depression	Anxiety, panic and depression	No		Yes
None	382	39	17	145	6	94	13	18 (0.6)	696 (16.9)	714
Lifestyle	228	42	17	99	8	58	10	1.745 (55.0)	462 (11.2)	2.207
Psychotherapy	376	55	16	154	14	142	31	929 (10.3)	788 (19.1)	1.717
Medication	257	40	41	143	7	194	51	98 (3.1)	733 (17.7)	831
Lifestyle, Psychotherapy	119	24	9	42	4	42	12	327 (29.3)	252 (6.1)	579
Lifestyle and Medication	42	13	7	33	4	44	8	19 (0.6)	151 (3.7)	170
Psychotherapy and Medication	173	43	56	131	10	247	87	21 (0.7)	747 (18.1)	768
Lifestyle, psychotherapy and medication	72	19	35	39	2	96	38	13 (0.4)	301 (7.3)	314

Table 4. Mean percentile [95% CI] of mood swing indicators due to the pandemic according to mental health disorder diagnosed prior to the pandemic.

Disorder	n	Depressed					
		Anger	Confusion	Humor	Fatigue	Tension	Vigor
None	9.111	60.13 [59.85-60.42]	59.55 [59.28-59.81]	60.83 [60.54-61.11]	51.99 [51.78-52.19]	67.36 [67.05-67.67]	49.13 [48.97-49.29]
Anxiety	1.650	65.80 [65.10-66.51]	66.30 [65.67-66.93]	68.05 [67.35-68.75]	56.66 [56.19-57.12]	77.84 [77.14-78.53]	47.63 [47.30-47.97]
Panic	275	63.98 [62.34-65.62]	64.21 [62.60-65.83]	65.70 [63.88-67.52]	55.32 [54.11-56.52]	75.39 [73.49-77.29]	48.81 [47.93-49.68]
Bipolar	198	72.86 [70.58-75.14]	69.60 [67.67-71.52]	75.28 [73.03-77.52]	60.20 [58.86-61.53]	78.81 [76.70-80.92]	45.86 [44.85-46.88]
Depression	789	63.82 [62.84-64.80]	63.91 [63.01-64.80]	69.14 [68.09-70.19]	55.85 [55.16-56.55]	72.17 [71.12-73.21]	47.10 [46.57-47.62]
Others	55	64.42 [60.06-68.77]	63.78 [60.57-66.99]	67.96 [64.13-71.80]	53.42 [50.75-56.09]	71.51 [67.36-75.65]	47.78 [46.03-49.54]
Anxiety and depression	920	68.77 [67.84-69.71]	69.22 [68.35-70.10]	74.22 [73.26-75.18]	59.52 [58.92-60.11]	79.75 [78.83-80.68]	45.91 [45.45-46.36]
Anxiety, panic and depression	250	71.07 [69.21-72.94]	71.72 [70.08-73.36]	77.85 [76.27-79.43]	61.08 [59.99-62.18]	83.98 [82.28-85.68]	44.98 [44.23-45.73]
Total	13.248	62.15 [61.91-62.40]	61.82 [61.59-62.04]	63.82 [63.56-64.07]	53.69 [53.52-53.86]	70.48 [70.21-70.75]	48.46 [48.33-48.59]

Figure 1. Odds ratio (OR [95% CI]) of psychological impact due to the pandemic according to previous mental health disorder in relation to participants without reported mental health disorder.



Supplementary Material 1. Psychometric parameters of the Impact of Event Scale - revised (IES-R) and Brunel Mood Scale (BRUMS) models.

Instrument	Disorder	n	CFA [#]			α	
			λ	CFI	TLI		RMSEA [IC90%]
IES-R [*]	Without disorder	9.111	0.54-0.88	0.962	0.958	0.070[0.069-0.072]	0.87-0.92
	Anxiety	1.650	0.40-0.86	0.956	0.951	0.073[0.070-0.076]	0.85-0.91
	Panic	275	0.48-0.89	0.955	0.949	0.080[0.072-0.088]	0.87-0.92
	Bipolar	198	0.30-0.90	0.954	0.948	0.078[0.068-0.088]	0.84-0.92
	Depressive	789	0.37-0.87	0.950	0.944	0.076[0.072-0.081]	0.85-0.91
	Others	55	0.49-0.90	0.949	0.943	0.085[0.059-0.100]	0.82-0.94
	Anxiety and Depression	920	0.34-0.85	0.956	0.950	0.072[0.067-0.076]	0.84-0.91
	Anxiety, Panic and Depression	250	0.36-0.90	0.962	0.957	0.067[0.057-0.076]	0.84-0.91
Invariance (CFI)	M0:Configuracional=0.935; M1:Metric=0.936; M2:Scalar=0.943 $\therefore \Delta CFI < 0,01$ (M1-M0; M2-M1)						
BRUMS [‡]	Without disorder	9.111	0.65-0.94	0.982	0.978	0.069[0.068-0.070]	0.85-0.94
	Anxiety	1.650	0.52-0.93	0.977	0.973	0.070[0.067-0.073]	0.83-0.94
	Panic	275	0.57-0.96	0.987	0.985	0.064[0.056-0.072]	0.88-0.94
	Bipolar	198	0.56-0.99	0.974	0.970	0.074[0.065-0.084]	0.84-0.95
	Depressive	789	0.52-0.94	0.979	0.975	0.068[0.064-0.072]	0.85-0.93
	Others	55	0.41-0.98	0.969	0.964	0.082[0.057-0.100]	0.79-0.96
	Anxiety and depression	920	0.47-0.93	0.980	0.977	0.066[0.062-0.070]	0.86-0.94
	Anxiety, panic and depression	250	0.38-0.90	0.984	0.981	0.050[0.040-0.060]	0.83-0.94
Invariance (CFI)	M0:Configuracional=0.943; M1:Metric=0.941; M2:Scalar=0.937 $\therefore \Delta CFI < 0,01$ (M1-M0; M2-M1)						

CFA: Confirmatory factor analysis using Weighted Least Squares Mean and Variance Adjusted (WLSMV), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA) with 90%CI. Adequate fit was considered when CFI and TLI \geq 0.90, RMSEA \leq 0.10 and $\alpha > 0.70$.

*IES-R: refined model without item 2; [‡]BRUMS: refined model without item 23.

Supplementary Material 2. Mean [95% CI] scores for psychological impact due to the pandemic according to the diagnosis of a previous mental health disorder.

Disorder	n	Psychological impact	Avoidance	Intrusion	Hyperarousal
None	9.111	24.16 [23.85-24.47]	9.75 [9.63-9.88]	8.00 [7.87-8.12]	6.41 [6.31-6.51]
Anxiety	1.650	34.33 [33.57-35.09]	12.63 [12.34-12.92]	11.97 [11.63-12.30]	9.74 [9.47-10.00]
Panic	275	32.98 [30.99-34.7]	12.33 [11.55-13.11]	11.12 [10.28-11.95]	9.54 [8.85-10.22]
Bipolar	198	40.45 [38.15-42.76]	13.74 [12.82-14.66]	14.79 [13.75-15.83]	11.93 [11.14-12.72]
Depression	789	30.28 [29.20-31.35]	11.36 [10.94-11.78]	10.59 [10.11-11.06]	8.33 [7.97-8.70]
Others	55	28.55 [24.35-32.74]	9.76 [8.01-11.52]	10.35 [8.41-12.24]	8.44 [7.02-9.85]
Anxiety and Depression	920	37.83 [36.80-38.86]	13.17 [12.78-13.56]	13.38 [12.92-13.83]	11.28 [10.92-11.64]
Anxiety, Panic and Depression	250	43.34 [41.37-45.37]	14.37 [13.8-15.15]	16.03 [15.13-16.93]	12.94 [12.24-13.65]
Total	13.248	27.55 [27.27-27.82]	10.64 [10.54-10.75]	9.35 [9.23-9.46]	7.56 [7.46-7.65]