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CRediT author statement

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COVID-19 and mental health in Brazil: psychiatric symptoms in the general population

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Abstract

Public health interventions at general population level are imperative in order to decrease the spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), but they may contribute to widespread emotional distress and increased risk for psychiatric illnesses. We report on the results of an investigation into the occurrence and determinants of psychiatric symptoms among the Brazilian general population (N=1996). We assessed sociodemographic variables and general mental health (DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure), depression (PROMIS depression v.8a), anxiety (PROMIS anxiety v.8a), and post-traumatic stress symptoms (Impact of Event Scale-IES-R scale) using an online web-based survey. Anxiety (81.9%), depression (68%), anger (64.5%), somatic symptoms (62.6%) and sleep problems (55.3%) were the most common psychiatric symptoms. Younger age, female gender, low income, lower level of education, longer period of social distancing, and self-reported history of previous psychiatric illness were strongly associated with higher severity of symptoms. Our results support the negative impact of the COVID-19 pandemic on the mental health of the Brazilian population. The high prevalence of psychiatric symptoms observed in our sample indicates that the mental health impact of the COVID-19 pandemic should be considered a public health problem in Brazil. The health systems and individual clinicians must be prepared to offer and implement specific interventions in order to identify and treat psychiatric issues.

Keywords: COVID-19; mental health; depression; anxiety; post-traumatic stress disorder; Brazil

Introduction

In December 2019, coronavirus disease (COVID-19) was first recognized as a disease caused by the severe acute respiratory syndrome coronavirus (SARS-CoV-2) with the main infection site in Wuhan, Hubei Province, China (Zhu et al., 2020). Initially, the disease was believed to be confined only to this initial area, but it quickly spread worldwide and there have been now 15,232,830 confirmed cases of COVID-19, and 623,507 people had died around the world from COVID-19 (until 23rd July 2020) (Dong et al., 2020). In Brazil, the government declared a state of emergency on 3rd of February 2020 (Ministry of Health, 2020a), with the first case of COVID-19 reported on 26th of February 2020 (Dong et al., 2020). By 19th of May, COVID-19 had spread to every region in Brazil (Ministry of Health, 2020b), with a total of 125,502 deaths by 5th of September (Dong et al., 2020).

Public health interventions that require social distancing, community control, and business and school closures, have been implemented in Brazil and other countries around the world in order to decrease transmission of the virus. However, experience from previous disease showed that social distancing and other interventions that disrupt day-to-day normal activities are associated with the development of acute stress disorder symptoms (Brooks et al., 2020). Indeed, individuals in quarantine reported higher prevalence of psychological symptoms such as emotional disturbance, depression, stress, low mood, irritability, insomnia, and post-traumatic stress symptoms than those who had not been in quarantine (Brooks et al., 2020). Furthermore, fear of infection, frustration and boredom, insufficient supplies and financial losses are among the major contributors to the widespread emotional distress and increased risk for psychiatric illnesses associated with COVID-19 (Brooks et al., 2020). Therefore, mental health burden and an increase in use of mental health services are expected as a consequence of this pandemic (Druss, 2020; Torjesen, 2020).

Several studies have investigated the mental health of the general population during the ongoing pandemic (Xiong et al., 2020); for instance, Wang et al. showed a higher prevalence of depression, anxiety, and perceived stress in a Chinese population during the COVID outbreak (Wang et al., 2020). Similarly, another Chinese study reported that one quarter of subjects had acute stress, and more than one quarter had depression, anxiety, and insomnia, suggesting the COVID-19 pandemic has a negative impact on mental health (Shi et al., 2020). However, most of the studies in this field have been conducted in China (Lu et al., 2020; Shi et al., 2020; Zhu et al., 2020) and Italy (Rossi et al., 2020), and there is no research data assessing the psychological impact of the COVID-19 outbreak in Brazil (Xiong et al., 2020). Therefore, the present study investigates the prevalence and determinants of psychiatric symptoms among the Brazilian general population during the peak of the pandemic.

Material and methods

We used a cross-sectional web-based survey, using an anonymous online questionnaire spread via social networks using a convenience sampling strategy. The data were collected between 20th of May and 14th of July, 2020, a peak period of COVID-19 contagion in Brazil. Approval for this study was obtained from the local institutional review board at Hospital de Clínicas de Porto Alegre. Online informed consent was obtained from the participants. The investigation was carried out in accordance with the latest version of the Declaration of Helsinki. The online questionnaire consisted of sociodemographic variables, questions to assess knowledge regarding COVID-19, and physical and mental health status, and history of previous psychiatric disorder including anxiety and mood disorders and psychosis based on a yes/no question.

The knowledge questionnaire consisted of 10 questions regarding the clinical characteristics and prevention of COVID-19. A correct answer was assigned 1 point and an incorrect/unknown answer was assigned 0 points. The total knowledge score

ranged from 0 to 10, with a higher score denoting a better knowledge of COVID-19 (Zhong et al., 2020).

For a general assessment of mental health, we used the DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure, which assesses 13 psychiatric domains (depression, anger, mania, anxiety, somatic symptoms, sleep problems, memory, repetitive thoughts and behaviors, dissociation, personality function, suicidal ideation, psychosis, and substance use) over the previous 2 weeks. Each item is rated on a 5-point Likert scale (0= none or not at all; 1= slight rare, less than a day or two; 2= mild or several days; 3= moderate or more than half the days; and 4= severe or nearly every day). A rating of mild (i.e, 2) or greater on any item within a domain, or in the case of substance use, suicidal ideation, and psychosis, a rating of slight (i.e. 1) or greater, indicates symptomatology in this domain requiring further assessment.

The severity of stress, anxiety, and depression was measured as follows:

- a) The Impact of Event Scale-Revised (IES-R) is a self-rated, 22-item questionnaire divided in three domains (avoidance, intrusion, and hyperarousal), which evaluates the distress caused by a traumatic event (Caiuby et al., 2012). Each item is rated on a 5-point scale (0=not at all; 1=a little bit; 2=moderately; 3=quite a bit; 4=extremely). The IES-R total score is the sum of the average of each domain. A total score greater than 5.6 indicates psychological stress.
- b) The Patient-Reported Outcomes Measurement Information System (PROMIS) for depression (PROMIS Short Form v1.0 - Depression 8a) assesses negative mood (sadness, guilt), views of self (self-criticism, worthlessness), and social cognition (loneliness, interpersonal alienation), as well as decreased positive affect and engagement (loss of interest, meaning, and purpose).

- c) The PROMIS anxiety assesses self-reported fear (fearfulness, panic), anxious misery (worry, dread), hyperarousal (tension, nervousness, restlessness), and somatic symptoms related to arousal (racing heart, dizziness).

Both PROMIS instruments used consist of an 8-item questionnaire that assesses symptoms over the previous seven days, with items rated on a 5-point scale (1=never; 2=rarely; 3=sometimes; 4=often; 5=always). All PROMIS scores were presented as T-scores calculated by the Health Measures Scoring Service (https://www.assessmentcenter.net/ac_scoring-service) from the raw sum score, using T-scores from United States general population. The T-score is the standardized score, with a mean of 50 and standard deviation of 10. For depression and anxiety, a T-score lower or equal to 55 indicate no significant symptoms, higher than 55 to 60 indicate mild symptoms, higher than 60 to 70 indicate moderate symptoms, and higher than 70 to 84.1 indicate severe symptoms.

Statistical analysis

Descriptive statistics (number and %) were used to present sociodemographic characteristics, chronic medical diseases, and previous psychiatric disorders. Days of social distancing, age, score of Knowledge COVID-19 Scale, score of IES-R, PROMIS Depression T-Score, and PROMIS Anxiety T-Score were reported as mean and standard deviation. The psychiatric symptoms according to the DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure were reported as percentages of cases with a positive screening. We used linear regression to identify potential associations of sex, age, marital status, household income, days of social distancing, previous psychiatric disorders, and education level with depression, anxiety, and stress.

Analyses were conducted in SPSS version 18. Statistical significance was set at $P < .05$, and all tests were 2-tailed.

Results

Demographic characteristics

A total of 1996 individuals completed the survey. Of the total sample, 1676 (84.5%) were female, the mean (SD) age was 34.22 (12.57) years. Of the total respondents, 1167 (58.5%) had a university degree or higher, 1630 (81.7%) were employed, 877 (43.9%) were married, and 36 (1.8 %) had a diagnosis of COVID-19. Other sample characteristics are reported in Table 1.

Prevalence of psychiatric symptoms

According to the screening assessment by the DSM-5 self-rated level 1 cross-cutting symptom measure, a total of 1634 (81.9%) endorsed symptoms of anxiety, 1358 (68%) symptoms of depression, 1287 (64.5%) anger, 1250 (62.6%) somatic symptoms, and 1104 (55.3%) sleep problems. The prevalence of other psychiatric symptoms is shown in Figure 1. The psychological impact of COVID-19, assessed by means of the IES-R scale, revealed a sample mean score of 4.56 (SD = 2.82) (Figure 1), and 683 (34.2%) had symptoms of post-traumatic stress disorder (PTSD) (Figure 2). Respondents' anxiety and depression levels, assessed using the PROMIS anxiety and depression instruments, showed a mean T-score of 64.20 (SD=9.21) and 58.9 (SD=9.44) respectively. Among all the participants, 1690 (84.7%) and 1352 (67.7%) had moderate/severe symptoms of anxiety and depression, respectively (Figure 2).

Variables associated with Anxiety, Depression and PTSD

Female gender was significantly associated with higher scores in the IES-R ($B=1.21$, 95% CI 0.88 to 1.53, $p<0.001$), PROMIS depression ($B=3.12$, 95% CI 2.10 to

4.13, $p < 0.001$), and PROMIS anxiety ($B = 3.49$, 95% CI 2.49 to 4.50, $p < 0.001$). Age was negatively associated with scores in IES-R ($B = -0.03$, 95% CI -0.04 to -0.02, $p < 0.001$), PROMIS depression ($B = -0.20$, 95% CI -0.23 to -0.17, $p < 0.001$), and PROMIS anxiety ($B = -0.18$, 95% CI -0.21 to -0.14, $p < 0.001$). Education level was negatively associated with scores in IES-R ($B = -0.44$, 95% CI -0.70 to -0.18, $p < 0.01$), PROMIS depression ($B = -1.74$, 95% CI -2.56 to -0.92, $p < 0.001$), and PROMIS anxiety ($B = -1.59$, 95% CI -2.41 to -0.78, $p < 0.001$). Household income level was negatively associated with scores in IES-R ($B = -0.80$, 95% CI -0.98 to -0.62, $p < 0.001$), PROMIS depression ($B = -2.39$, 95% CI -2.95 to -1.83, $p < 0.001$), and PROMIS anxiety ($B = -2.31$, 95% CI -2.87 to -1.76, $p < 0.001$). Longer duration of social distancing measures was significantly associated with higher scores in IES-R ($B = 0.01$, 95% CI 0.00 to 0.01, $p < 0.01$), PROMIS depression ($B = 0.04$, 95% CI 0.02 to 0.06, $p < 0.001$), and PROMIS anxiety ($B = 0.03$, 95% CI 0.01 to 0.04, $p < 0.01$). A self-reported history of psychiatric illness was associated with higher scores in IES-R ($B = 0.85$, 95% CI 0.61 to 1.09, $p < 0.001$), PROMIS depression ($B = 3.97$, 95% CI 3.23 to 4.71, $p < 0.001$), and PROMIS anxiety ($B = 3.91$, 95% CI 3.18 to 4.65, $p < 0.001$). Being single was only associated with higher PROMIS depression ($B = 1.26$, 95% CI 0.47 to 2.03, $p < 0.01$) (Table 2).

Discussion

The present study investigated the occurrence of mental health problems in the Brazilian general population during the ongoing COVID-19 pandemic. We also assessed factors associated with mental health problems in order to further understand the phenomena and identify higher risk individuals. A remarkably high prevalence of psychiatric symptoms was observed in our sample. More than three-quarters of the subjects endorsed anxiety with moderate-to-severe symptoms, approximately two-thirds had symptoms of depression with moderate-to-severe symptoms, and one-third exhibited symptoms of post-traumatic stress. Among the determinants of mental health outcomes, female gender, younger age, lower educational level, low income and

longer period of social distancing were strongly associated with anxiety, depression, and PTSD levels. Brazil is the country with the second highest number of COVID-19 cases in the world after the USA and, as far as we aware, this is the first report about mental health in the Brazilian general population during the outbreak of COVID-19.

The high prevalence of psychiatric symptoms present in our sample indicates that the mental health impact of the pandemic should be considered a public health crisis. The prevalence of anxiety and depression in our sample was much higher than the results from other countries (Xiong et al., 2020) and the Chinese studies, which showed about 30% of their responders experienced anxiety and depressive symptoms (Shi et al., 2020; Wang et al., 2020). However, the prevalence of stress in our study was close to that found in the work of Shi. et. al., who reported 24.4% with acute stress, but higher than in the study of Tee et. al., who reported 16.8% with moderate to severe stress (Tee et al., 2020), and lower than in the study of Wang et. al., who reported moderate/severe psychological stress in 53.8% of respondents (Wang et al., 2020). These discrepancies in terms of prevalence of anxiety and depression may be explained, to some extent, by the socioeconomic and cultural differences between the samples. For instance, approximately 36% of our sample reported an income up to \$ 569, while in the Shi's study 77% of their responders reported an income greater than \$ 700. Impact of income inequality on mental health status has been suggested in a meta-analysis involving middle low income countries (Ribeiro et al., 2017).

Another key finding of the present study was the strong association between lower educational level and susceptibility for symptoms of depression, anxiety, and stress. In this regard, a recent study conducted in five different countries in Latin America found that more highly educated neighborhoods were associated with lower odds of internalizing and externalizing disorders (Sampson et al., 2019). Taken together, the economic and educational disparities and characteristics of our sample, in

addition to the COVID-19 pandemic, may have triggered a burden of poor mental health outcomes in Brazil.

In our sample, young people were more susceptible to depression, anxiety, and stress caused by the COVID-19 pandemic. An adverse environment plays a critical role on mental health at a young age, as showed by increased rates of suicide in young people in Brazil caused by unemployment and social inequality (Jaen-Varas et al., 2019). It is possible that pre-pandemic distress, such as educational, professional, social, or romantic difficulties typically experienced by young adults, compounded by lifestyle disruptions and feelings hopelessness during the pandemic (Shanahan et al., 2020), may have contributed to the negative impact on mental health in this subgroup of the sample. Also, older age may be protective because adaptive mechanisms, developed to deal with previous crises, can be used to manage the stress associated with the current pandemic.

Finally, a negative impact of social distancing on mental health was also found, which corroborates a previous report from during the COVID-19 pandemic in China (Shi et al., 2020; Wang et al., 2020). Social support is a strong protective factor against mental health problems and has been suggested as a valid coping strategy in this pandemic (Brooks et al., 2020). In Brazil, the social distancing period has lasted more than 4 months, which may explain, in part, the higher levels of stress and psychiatric symptoms observed in the current study. Furthermore, the longer duration of social distancing and social isolation practices seem to have deleterious effects, in particular, on individuals with psychiatric disorders. In this sense, 40% of our responders had a self-reported history of psychiatric illness which was strongly associated with the severity of current levels of stress, anxiety, and depression. These results are not surprising considering that subjects with a previous history of psychiatric illness are more susceptible to a high risk of recurrence (Batelaan et al., 2017; Rush et al., 2012), and new episodes may be triggered by stressors.

To the best of our knowledge study, this is the first study to report data on mental health status among the Brazilian general population during the ongoing COVID-19 pandemic. Interpretation of our results should consider some limitations of the study. First, we used an online survey with a convenience sample method, what may not be representative sample of the total Brazilian general population. Second, all outcomes were self-reported instead of evaluated by a clinician. Beyond the associated factors explored in this study, aspects related to the economic impact of the pandemic (e.g., job loss, reduction of economic income), or even fear of infection and death in relatives or friends, may have influenced the increased levels of anxiety or depression (Xiong et al., 2020). Third, the absence of a pre-pandemic comparison group does not allow us to estimate how much did the pandemic resulted in an increase in the prevalence of psychiatric symptoms compared to the usual prevalence of these symptoms in the Brazilian population. Finally, this is a cross-sectional study and did not provide causal evidence of risk factors and mental health outcomes found in our study.

Conclusion

In conclusion, we found a considerable prevalence of mental health problems, in particular, symptoms of depression, anxiety and stress in a sample of the Brazilian general population during the COVID-19 pandemic. Despite the limitations of the convenience method and the cross-sectional study design, the large sample size allowed us to identify factors associated with a higher severity of psychiatric symptoms. The levels of psychiatric symptoms observed in our sample suggest that Brazilian health systems and individual clinicians must be prepared to offer and implement specific interventions such as cognitive behavior therapy and mindfulness based therapy (Ho et al., 2020) in order to treat psychiatric issues. According to our results, these interventions should focus particularly on those with a previous psychiatric diagnosis, lower socio-educational level, younger age and women.

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Table 1 Demographic characteristics of the study participants

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Table 1 Demographic characteristics of the study participants (continued)

Characteristic	N	%
Chronic disease	1996	
Female Diabetes	1677	83.5
Social distancing (Yes)	1228	96.2
Essential Cardiovascular disease	568	28.4
Marital status		
Married	192	9.6
Married to use	370	49.9
Single	957	27.9
Divorced	1186	59.3
Any previous psychiatric disorder	828	41.3
Household income (\$)	Mean	SD
Social distancing (days) ^a	72.20	224.25
Age (years)	34.22	12.57
Knowledge of COVID-19 Scale (score)	8.40	1.23
IES-R ^b , (score)	4.56	2.32
PROMIS Depression ^c (score) ^d	58.00	9.12
PROMIS Anxiety ^e (score) ^d	64.20	9.25
< 136	82	4.1
Occupation		
Employed	833	41.7
Self-employed	355	16.8
Unemployed	214	10.7
Homemaker	111	5.6
Student	545	27.3
Retired/retired on disability	85	4.3
Education level		
Primary school	829	41.5
Graduate, postgraduate	1167	58.5

^aData of social distancing based on “yes” response; ^bIES-R: The Impact of Event Scale-Revised. PTSD symptoms if score > 5.60; ^cPROMIS: The Patient-Reported Outcomes Measurement Information System. Short Form v1.0 - Depression 8a. ^dModerate/severe symptoms if T-Score >55. ^ePROMIS Short Form v1.0 - Anxiety 8a.

Table 2 Association of PTSD, depression and anxiety symptoms and sex, age, marital status, income, social distancing, psychiatric disorder, and education level.

Variable	IES-R ^a			PROMIS depression ^b			PROMIS anxiety ^b		
	B	CI 95%	P value	B	CI 95%	P value	B	CI 95%	P value
Intercept	4.54	3.89 - 5.19	<.001	60.69	58.65 - 62.73	<.001	66.38	64.36 – 68.41	<.001
Sex	1.21	0.88 - 1.53	<.001	3.12	2.10 - 4.13	<.001	3.49	2.49 – 4.50	<.001
Age	-0.03	-0.04, -0.02	<.001	-0.20	-0.23, -0.17	<.001	-0.18	-0.21, -0.14	<.001
Marital status	0.06	-0.19 - 0.31	.616	1.26	0.47 - 2.03	<.01	0.34	-0.44 - 1.11	.396
Income	-0.80	-0.98, -0.62	<.001	-2.39	-2.95, - 1.83	<.001	-2.31	-2.87, - 1.76	<.001
Social distancing	0.01	0.00 - 0.01	<.01	0.04	0.02 - 0.06	<.001	0.03	0.01 - 0.04	<.01
Psychiatric disorders	0.85	0.61 - 1.09	<.001	3.97	3.23 - 4.71	<.001	3.91	3.18 - 4.65	<.001
Education level	-0.44	-0.70, -0.18	<.01	-1.74	-2.56, -0.92	<.001	-1.59	-2.41, -0.78	<.001

^a IES-R: The Impact of Event Scale-Revised

^b PROMIS: The Patient-Reported Outcomes Measurement Information System

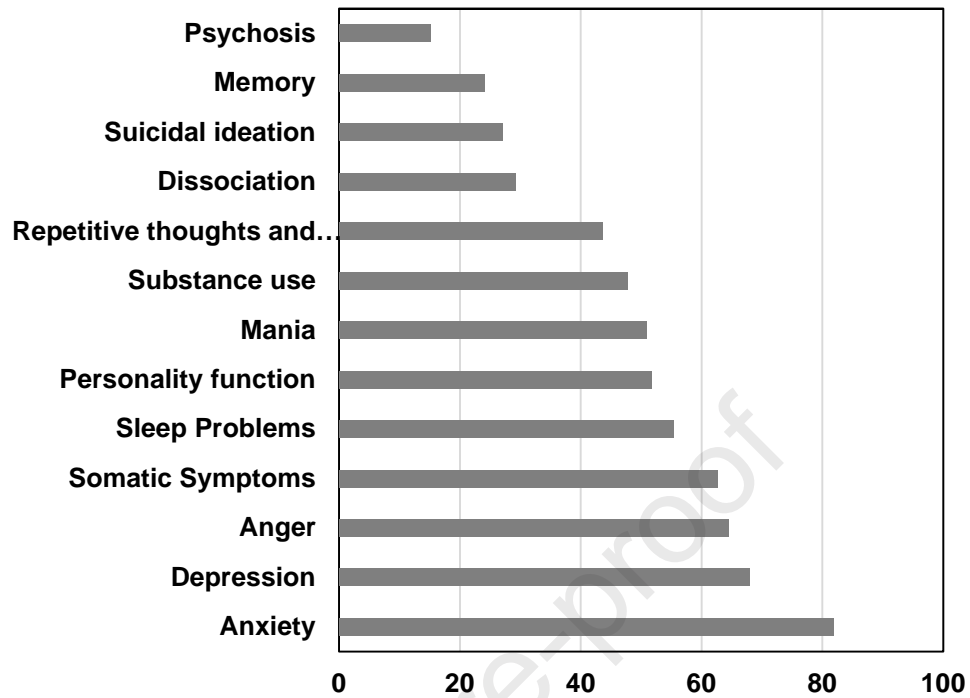


Figure 1. Frequency of symptoms according to DSM-5 self-rated level 1 cross-cutting symptom measure in the general population. Data are the percentage of positive screening in each domain. Positive screening (score ≥ 2): Depression; Anger; Mania; Anxiety; Somatic Symptoms; Sleep problems ; Memory; Repetitive thoughts and behaviors; Dissociation; Personality function. Positive screening (score ≥ 1): Suicidal Ideation; Psychosis; Substance Use.

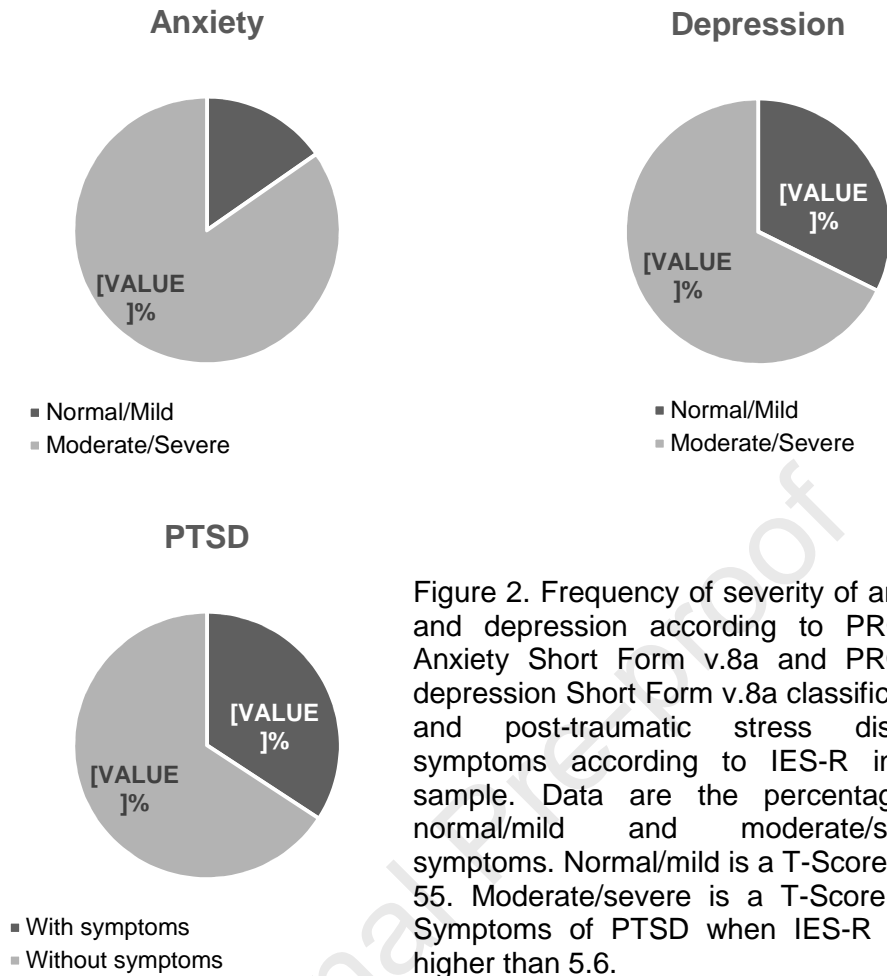


Figure 2. Frequency of severity of anxiety and depression according to PROMIS Anxiety Short Form v.8a and PROMIS depression Short Form v.8a classification, and post-traumatic stress disorder symptoms according to IES-R in the sample. Data are the percentage of normal/mild and moderate/severe symptoms. Normal/mild is a T-Score up to 55. Moderate/severe is a T-Score >55. Symptoms of PTSD when IES-R score higher than 5.6.

The authors declare no conflict of interest.

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