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Fear of COVID-19, Psychological Distress, and Insomnia Severity Among a Brazilian Psychiatric Sample at the Peak of the COVID-19 Pandemic

Felipe Alckmin-Carvalho [1,2,*], Suzilene Lapietra [3], Helder Lira [1], António Oliveira [2,4], Henrique Pereira [2,4] and Renatha El Rafihi-Ferreira [1,5]

1 Institute of Psychiatry, Faculty of Medicine, University of São Paulo, São Paulo 05403-903, Brazil; heldilira.nutri@gmail.com (H.L.); rerafihi@usp.br (R.E.R.-F.)
2 Department of Psychology and Education, Faculty of Social and Human Sciences, University of Beira Interior, Building IV, 6200-209 Covilhã, Portugal; antonio.oliveira@ubi.pt (A.O.); hpereira@ubi.pt (H.P.)
3 Faculty of the Americas, Medical School, São Paulo 01304-001, Brazil; suzilapietra@gmail.com
4 Research Center in Sports Sciences, Health Sciences and Human Development (CIDESD), 5001-801 Vila Real, Portugal
5 Department of Clinical Psychology, University of São Paulo, São Paulo 05508-030, Brazil
* Correspondence: felipealckminc@gmail.com

Abstract: Background: Evaluating associations between fear of COVID-19 and psychopathology in clinical samples can yield valuable insights for the formulation of public health policies and for the training of mental health professionals in future major health crises. The objectives of our study were to evaluate the following aspects among patients diagnosed with insomnia disorder during the most critical period of the COVID-19 pandemic in Brazil: (a) the frequency of symptoms of depression and anxiety, fear of COVID-19, and severity of insomnia; (b) possible gender differences in the variables analyzed; and (c) associations between fear of COVID-19, symptoms of depression and anxiety, severity of insomnia, and sociodemographic variables. Method: A total of 353 individuals who sought treatment at a psychiatric hospital in the Brazilian public health system and were diagnosed with insomnia disorder (DSM-5) participated. The following instruments were used: the Hospital Depression and Anxiety Scale, Insomnia Severity Index, Fear of COVID-19 Scale, and a sociodemographic questionnaire. The assessments were carried out via the REDCap platform between March and July 2021. Results: Mild to moderate levels of fear of COVID-19 were identified in the majority of participants. Symptoms of depression, anxiety, and insomnia were reported at a moderate level. Although all scores were higher among women, only the fear of COVID-19 reached significant differences between groups. Fear of COVID-19 was positively correlated with symptoms of depression and anxiety and with the severity of insomnia. Anxiety scores had a positive and statistically significant effect on insomnia severity and on fear of COVID-19. Being a man and performing physical activity had a negative and statistically significant effect on fear of COVID-19. Conclusions: Being a woman, being sedentary, and having symptoms of anxiety were predictors of fear of COVID-19 among participants with insomnia disorder. This finding highlights the importance of gender-sensitive public health policies for the care of patients with insomnia during future major health crises. The associations between anxiety symptoms and fear of COVID-19 and the severity of insomnia verified in our study suggest the relevance of addressing anxiety symptoms through encouraging physical activity to mitigate the severity of insomnia and fear of pathogens in patients with insomnia.

Keywords: fear of COVID-19; psychopathologies; insomnia; psychological distress

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1. Introduction

The COVID-19 pandemic began in December 2019, but the first cases only appeared in Brazil in February 2020 [1], and the first deaths occurred in March 2020 [1]. The epidemiological profile of the pandemic in Brazil was quite different, both in terms of the incidence of the infection and the number of daily deaths, which in many months were the highest in the world [2]. It is now known that the pandemic disproportionately affected Brazil, and among the factors that contributed to the severity of the crisis are the federal government's denial of the existence and severity of COVID-19 infection, the delay in acquiring vaccines, the dissemination of false information about vaccination, vaccine hesitancy, and the mismanagement of public resources in dealing with the pandemic, as well as the lack of coordination between the federal, state, and municipal governments in implementing policies to restrict social contact and enforce lockdowns during the most critical periods [1–5].

All these factors contributed to the emergence and spread of more infectious and more virulent variants of the coronavirus, resulting in a significant increase in the number of cases, exceeding the response capacity of the Brazilian health system, both public and private. This situation culminated in an alarming number of deaths [2,6]. In 2021, the year with the highest mortality from COVID-19 in the country, 423,470 people lost their lives, and the highest number of deaths occurred between the months of March and July [7].

The health crisis, with its restrictions and risks, combined with the ineffectiveness of the federal government in combating it and the underlying economic crisis, had a profound impact on the mental health of Brazilians, with a considerable part of the population presenting some level of psychological distress, a condition characterized by a state of emotional suffering, with the presence of depressive (e.g., loss of interest; unhappiness; desperateness) and anxiety symptoms (e.g., restlessness; feeling tense) [8]. The COVID-19 pandemic affected people of all ages, from children and adolescents, deprived of attending school and face-to-face social interactions, which are essential for their neurological and psychomotor development, to adults and the elderly, particularly those belonging to COVID-19 risk groups [9–11]. National studies have shown an increase in the incidence of mental health problems in previously healthy individuals, as well as a worsening of the signs and symptoms of psychopathologies and psychological distress in individuals who had already been diagnosed with a mental health condition [9–11]. Among the most frequently observed mental disorders are anxiety disorders, alcohol and other substance abuse, depression, and sleep problems [12], with insomnia disorder being the most prevalent [11,13–15]. Insomnia can be defined as difficulty falling asleep, maintaining sleep throughout the night, or waking up earlier than desired, given the opportunity and adequate sleep environment [16]. A study carried out by Bacelar et al. [17], conducted in Brazil in the cities of São Paulo and Rio de Janeiro between November 2020 and April 2021, with 634 participants aged between 18 and 79, revealed that 25% of the participants had complaints of insomnia, which were more frequent among older people, those with lower schooling, and the unemployed population. Analysis of the data also indicated that a sleep duration of less than six hours, frequent feelings of sadness, age over 40, living in large cities, precarious employment, and low education were predictive factors for insomnia during the COVID-19 pandemic.

Several studies suggest the existence of a bidirectional association between insomnia and other mental health problems, especially anxiety and depression, since sleep is essential for emotional regulation. For example, a study that evaluated 48,932 individuals estimated that 62.9% of patients with insomnia presented complaints of anxiety and 38.1% complaints of depression [18]. On the other hand, anxiety and depression are often accompanied by sleep difficulties and may precede it or occur simultaneously or subsequently [19–24].

During the pandemic, not only the disease itself but also the fear of it could make mental disorders even worse. In this regard, a growing body of research has focused on the mental health effects associated with fear of COVID-19. In a recent meta-analysis [25], researchers analyzed the results of 33 articles from studies using the Fear of COVID-19 Scale [26], a scale validated in 15 languages, which investigates fear of COVID-19 and the emergence or worsening of signs and symptoms of psychopathologies. The authors found positive and strong associations between fear of COVID-19 and depression and anxiety, as well as moderate associations between fear of COVID-19 and sleep problems [25].

In this context, it is crucial to recognize that, on the one hand, some level of fear of COVID-19 infection plays an adaptive role, protecting the individual and being associated with a greater likelihood of adopting self-protection behaviors, such as wearing a mask, hand hygiene, and social distancing [27]. On the other hand, as highlighted by Şimşir, Koç, Seki, and Griffiths [25], adverse conditions such as social isolation, uncertainty, financial problems, and the loss of loved ones have intensified this fear, resulting in a level of anxiety that can compromise individuals' mental health and their ability to respond rationally. This excessive fear of COVID-19, observed in part of the population, has contributed to the emergence and worsening of cases of anxiety, depression, and insomnia disorder, exacerbating suffering during the pandemic, particularly in its most critical periods [25,27].

Understanding the characteristics of patients with insomnia disorder who are more vulnerable to the adverse effects of major health crises such as COVID-19 helps to design interventions that consider their specific needs. Several studies suggest that non-modifiable variables, such as the female gender, are associated with a greater vulnerability to mental health problems, such as insomnia, anxiety, and depression, which were already more prevalent in women before the COVID-19 pandemic [28] and are more likely to be exacerbated in this potentially adverse context [29–31]. Women appear to be more vulnerable to the psychopathological effects of the pandemic; this is mediated by biological variables, including the role of female hormones, such as estrogen and progesterone, which increase the response to stress and anxiety [32,33].

In addition, socio-cultural aspects, such as income inequalities and a greater burden of domestic responsibilities and family care—typically associated with women and driven by gender stereotypes in Latin America [31,34]—are associated with a greater vulnerability to psychological distress and psychopathology among women, as well as a greater risk of worsening mental health problems during the COVID-19 pandemic [29,30]. Evidence shows Brazilian women were disproportionately affected by the impact of the pandemic, an effect that increased gender inequality in Brazil. For example, a Brazilian study by Silva et al. (2024) [30] found that women reported higher levels of fear of COVID-19 and that being a woman and reporting higher levels of fear of COVID-19 were predictors of poorer quality of life at work and general well-being, explaining 24.6% of the variance.

Furthermore, research suggests that behavioral aspects, such as engaging in regular physical activity, may be a protective factor against the negative mental health effects of the COVID-19 pandemic, with the potential to alleviate symptoms of anxiety, excessive fear, and insomnia, regardless of an individual's gender and age. In a recent systematic review [35] which assessed the results of 31 studies, the authors found that higher levels of physical activity were associated with greater well-being and quality of life, as well as lower levels of depressive symptoms, anxiety, stress, and fear. They also reported that the women assessed in these studies were more vulnerable to the adverse mental health effects of the pandemic and benefited from regular physical activity. Although the aforementioned systematic review is highly relevant, it did not include studies conducted in the Brazilian population, nor did it assess the frequency of physical activity sufficient to have a protective effect on mental health during the COVID-19 pandemic.

Given the disruptive nature and unpredictability of the COVID-19 pandemic, further aggravated by a highly inadequate response from the Brazilian federal government, we believe that fear of COVID-19 may hinder the relaxation process necessary for sleep and aggravate the symptoms of sleep problems of those with subclinical or mild complaints of insomnia, especially when these people also experience anxiety and depression. Although some studies have already evaluated the associations between fear of COVID-19 and signs and symptoms of psychopathologies in community and clinical samples [25,27,36], to date, few have aimed to investigate these associations among patients diagnosed with insomnia disorder. To the best of our knowledge, none of them have specifically circumscribed their analyses to the most critical epidemiological period of the pandemic in Brazil.

By evaluating the associations between fear of COVID-19 and depression, anxiety, and insomnia symptoms in a Brazilian clinical sample diagnosed with insomnia disorder in the most critical period of the pandemic in Brazil, considering specificities such as gender and physical exercise practice, among other sociodemographic variables, this study can produce insights that will support public health policies and mental health providers in the most acute moments of new major health crises that are expected to happen in the future [37].

The objectives of our study were to evaluate the following aspects among patients diagnosed with insomnia disorder during the most critical period of the COVID-19 pandemic in Brazil: (a) the frequency of the symptoms of depression and anxiety, fear of COVID-19, and the severity of insomnia; (b) possible gender differences in the variables analyzed; and (c) associations between fear of COVID-19, symptoms of depression and anxiety, severity of insomnia, and sociodemographic variables.

Our hypotheses were as follows: (a) that we would find high scores for depression and anxiety symptoms and fear of COVID-19, in addition to a high proportion of individuals with a severe level of insomnia; (b) that symptoms of depression and anxiety, fear of COVID-19, and the severity of insomnia would all be higher among women; and (c) that sociodemographic variables such as age, gender, having children, educational level, marital status, physical activity, and occupation, as well as symptoms of depression and anxiety, would predict both the severity of insomnia and fear of COVID-19.

2. Materials and Methods

This was a cross-sectional study in which data were derived from a study evaluating the efficacy of Acceptance–Commitment Therapy versus Cognitive–Behavioral Therapy for insomnia [38]. Detailed study procedures have been published previously [38]. All data were obtained from research approved by the ethics committee of the University of São Paulo (Certificate of Presentation of Ethical Review: 65743917.2.0000.0068/Approval No. 4.582.587) and all participants had provided informed consent before their inclusion.

2.1. Setting and Participants

The sample consisted of 353 individuals diagnosed with insomnia disorder (DSM-5) [39] who sought treatment at the Outpatient Sleep Program (ASONO) of the Institute of Psychiatry of the Faculty of Medicine of the University of São Paulo (IPq-HC-FMUSP), a Brazilian public psychiatric hospital associated with a public medical school located in the city of São Paulo, Brazil.

Recruitment was carried out through social media of IPq-HC-FMUSP. The following inclusion criteria were adopted for patients with insomnia disorder: (a) 18–59 years of age; (b) meeting the following criteria for insomnia disorder according to the DSM-5 [39]: (i) difficulty initiating and/or maintaining sleep and/or awakening in the early morning with an inability to return to sleep, defined as sleep onset latency and/or awakening

after sleep onset ≥30 min; (ii) presence of insomnia for more than 3 nights per week for >3 months; (iii) sleep disturbance (or associated daytime fatigue) causing significant distress or impairment in social, occupational, or other functional areas; (iv) the sleep difficulty occurs despite adequate opportunity for sleep; (v) the insomnia is not better explained by another sleep, medical, or mental disorder or substance/medication.

The following exclusion criteria were applied: (a) presence of a progressive or unstable physical illness (e.g., cancer and acute pain) or a degenerative neurological disease (e.g., dementia); (b) unstable psychiatric comorbidities (e.g., lifetime diagnosis of a psychotic disorder or bipolar disorder, more than two lifetime episodes of major depressive disorder, or any other decompensated psychiatric disorder such as psychotic break, states of mania and hypomania, and non-adequately treated anxiety disorders and depression); (c) clinical presentation suggestive of sleep apnea (moderate or severe risk for apnea based on Berlin Questionnaire), restless legs syndrome (obtained by subjective perception of restless sleep), or circadian rhythm sleep disorder (e.g., delayed or advanced sleep phase syndrome); (d) current problem of alcohol and/or substance misuse; (e) illiteracy.

To evaluate the exclusion criteria related to neurological conditions or psychiatric comorbidities, the participants underwent a medical and neuropsychiatric assessment by an experienced clinician. The interviews were conducted via the Zoom platform. The neuropsychiatric assessment was based on Brazilian version the Mini International Neuropsychiatric Interview (MINI) [40].

2.2. Instruments and Proceedings

The sociodemographic questionnaire included the following information: age, gender, ethnicity, schooling, paid occupation, marital status, whether the participant had children, and level of physical activity per week.

The Fear of COVID-19 Scale is an instrument developed by Ahorsu et al. [26] and validated for Brazil by Faro et al. [41]. The scale is one-dimensional, made up of seven questions answered on a Likert-format scale, with response possibilities ranging from 1 (totally disagree) to 5 (totally agree). It is a self-report instrument that can be applied quickly. The total sum of the scores ranges from 7 to 35 points. Fear of COVID-19 was classified as low fear for individuals with scores between 7 and 19 points; moderate fear for scores between 20 and 26 points; and high fear for scores above 27 points. The original scale and its Portuguese translation showed excellent indicators of internal validity, with Cronbach's indices of 0.82 and 0.86%, respectively.

The Insomnia Severity Index (ISI) is an instrument developed by Bastien, Vallières, and Morin [42] and validated in Brazilian Portuguese by Castro et al. [43] in a representative sample of 1101 adults from the city of São Paulo. It is a retrospective scale, referring to the last month, which assesses the nature, intensity, and impact of insomnia through seven items related to sleep: difficulties initiating or maintaining sleep, early morning awakening, degree of satisfaction with sleep, daytime impairment, perception of sleep problems by other people, and degree of worry about the sleep problem. These questions are answered using a Likert scale ranging from 0 (no severity) to 4 (high severity), resulting in a total score ranging from 0 to 28, classified as follows: no insomnia (0–7); mild insomnia (8–14); moderate insomnia (15–21); and severe insomnia (22–28). The ISI showed good internal consistency (Cronbach's $\alpha = 0.865$) and good convergent validity, with a strong correlation ($r = 0.75$, $p < 0.05$) with the Pittsburgh Sleep Quality Index.

The Hospital Anxiety and Depression Scale (HAD) is a questionnaire made up of 14 items divided into two sub-scales, one designed to assess anxiety and the other to assess depression. All the items refer exclusively to the emotional state and do not reflect somatic symptoms. The overall score on each subscale ranges from 0 to 21, with the most commonly

used cut-off point, as recommended by Zigmond and Snaith [44], being 0 to 8 (absence of anxiety/depression) and equal to or greater than 9 (presence of anxiety/depression). The Brazilian version was initially translated and validated by Botega, Bio, Zomignani, Garcia-Jr, and Pereira [45], with Cronbach's alphas of 0.68 for anxiety and 0.77 for depression.

The diagnosis of insomnia disorder and the evaluation of the inclusion and exclusion criteria were carried out through online clinical interview, via the Zoom platform, lasting approximately one hour. The instruments were applied online, through the REDCap (Research Electronic Data Capture) platform, a secure web platform for building and managing databases and online surveys. The time to complete the instruments was approximately 30 min.

2.3. Data Analysis

Statistical analyses were conducted in SPSS, version 29. Descriptive analyses included the classification of means, standard deviation, and maximum and minimum scores relating to fear of COVID-19, depression and anxiety symptoms, and insomnia severity. Analyses of the proportion of participants in each outcome stratification of insomnia (mild, moderate, or severe) and fear of COVID-19 (little, medium, or very much) were carried out. Regarding the depression and anxiety symptoms, the proportion of participants who were above and below the cut-off point of the instruments used was verified. The normality of the data was assessed using the Shapiro–Wilk test and the homogeneity of variance was checked using the Levene test. We also assessed normality, heteroscedasticity, autocorrelation, and collinearity for predictors of fear of COVID-19 and insomnia severity multicollinearity. Please find this analysis in the Supplementary Material S1.

Once the data distribution of the 353 participants was classified as normal, correlation analyses (Pearson's r) were carried out between fear of COVID-19, depression and anxiety symptoms, and insomnia severity. The following intervals were used to classify the intensity of the correlation between the variables analyzed: from 0 to 0.30: slight correlation; from 0.30 to 0.70: moderate correlation; and from 0.70 to 1: strong correlation between variables.

The chi-square test was used to compare the proportion of individuals in each rating range of the instruments when comparing men and women. The t-test for independent samples was used to compare the mean scores of men and women on fear of COVID-19, depression and anxiety symptoms, and insomnia severity. Finally, linear regressions were carried out, with one model designed to assess the predictive degree of fear of COVID-19 on insomnia severity, controlling for psychological and social factors, and another model adjusted to assess the variables related to fear of COVID-19. For all analyses, a significance level of 0.05 was assumed in the inferential analyses.

3. Results

Sample Characteristics

The sample consisted of 353 individuals diagnosed with insomnia disorder based on the DSM-5 criteria [39]. The mean age of the participants was 39.65 years (SD = 10.59), with a minimum age of 18 and a maximum of 59. The majority of the participants were women (n = 273; 78%), single (n = 172; 53%), white (n = 348; 76.3%), and childless (n = 179; 55%). Most of the participants were in paid employment (n = 240; 74%) and had completed higher education (n = 245; 75%). Table 1 shows the descriptive analyses of the scores found on the scales used.

Table 1. Results of the average severity scores for insomnia, depression and anxiety symptoms, and fear of COVID-19 in the overall sample (n = 353).

Variable	Mean (SD)	Possible Score Theoretical Median	Instrument Cut-Off Point	Minimum Score	Maximum Score
Insomnia symptoms	19.02 (4.04)	0–32	>7	9.00	28.00
Depression symptoms	9.49 (4.23)	0–21	≥9	0.00	20.00
Anxiety symptoms	11.60 (4.23)	0–21	≥9	1.00	21.00
Fear of COVID-19	19.63 (6.32)	7–35	15	7.00	35.00

In the overall sample, the average scores of the participants exceeded the cut-off point for the fear of COVID-19 and depression and anxiety symptom assessment instruments. Table 2 shows the mean scores of insomnia, depression and anxiety symptoms, and fear of COVID-19 among the men and women who comprised the sample.

Table 2. Results for the average severity scores for insomnia, depression and anxiety symptoms, and fear of COVID-19, between genders.

	Men (n = 80)	Women (n = 273)	t	p-Value
Insomnia symptoms	18.33 (4.38)	19.21 (3.93)	2.34	0.129
Depression symptoms score	9.28 (4.23)	9.56 (4.26)	0.24	0.662
Anxiety symptoms score	11.14 (4.29)	11.68 (4.22)	0.90	0.346
Fear of COVID-19	17.52 (6.40)	20.28 (6.25)	10.67	0.001

When comparing the scores according to the gender of the participants, it was found that women had slightly higher scores in all the variables analyzed, with statistically significant differences only in the mean scores for fear of COVID-19. Table 3 shows the proportions of men and women participants classified as having mild, moderate, and severe insomnia, depression, and anxiety (clinical versus non-clinical) and fear of COVID-19 (a little, moderate, or a lot).

Table 3. Proportions of male and female participants based on the cut-off scores of the instruments for insomnia severity, fear of COVID-19, and depression and anxiety symptoms.

	Women (n = 273)	Men (n = 80)	χ^2	p-Value
Insomnia Severity			2.07	0.412
Mild	37 (14%)	16 (20%)		
Moderate	151 (55%)	42 (53%)		
Severe	85 (31%)	22 (28%)		
Depression symptoms			0.14	0.721
Non-Clinical	88 (32%)	24 (30%)		
Clinical	185 (68%)	56 (70%)		
Anxiety symptoms			2.20	0.147
Non-Clinical	45 (16%)	19 (24%)		
Clinical	228 (84%)	61 (76%)		
Fear of COVID-19			6.91	0.032
Low Fear	129 (47%)	51 (64%)		
Moderate Fear	98 (36%)	21 (26%)		
High Fear	46 (17%)	8 (10%)		

Table 4 shows the correlation analyses between insomnia severity scores, fear of COVID-19, and depression and anxiety symptoms in the general sample. Specifically, regarding the correlation between fear of COVID-19 and insomnia severity, we carried out an additional analysis to assess the possible effects of the overlap between item 6 of the COVID-19 fear instrument ("I can't sleep because I'm worried about contracting the coronavirus") and insomnia severity scores. This additional analysis was carried out to assess the extent to which this item would explain the severity of insomnia. The results indicated that no significant differences were found with the elimination of item 6 from the COVID-19 fear instrument (please find this additional analysis in the Supplementary Material S2.

Table 4. Correlational matrix between insomnia severity, depression and anxiety symptoms, and fear of COVID-19 (n = 353).

	Insomnia Severity	Depression Symptoms	Anxiety Symptoms	Fear of COVID-19
Insomnia severity	—			
Depression symptoms	0.380 *	—		
Anxiety symptoms	0.370 *	0.630 *	—	
Fear of COVID-19	0.200 *	0.250 *	0.330 *	—

* $p < 0.001$.

All correlations observed were statistically significant and positive, indicating that, although it is not possible to establish a causal relationship between the variables analyzed, the higher the COVID-19 fear scores, the higher the insomnia severity and depression and anxiety symptoms. A stepwise linear regression analysis was then carried out to assess the predictive power of various sociodemographic and clinical variables on insomnia severity. The variables considered included gender, age, presence of children, ethnicity, marital status, occupation, level of education, level of physical activity, fear of COVID-19, and anxiety and depression symptoms.

Model 1 included only sociodemographic variables (sex, age, race, marital status, formal employment, presence of children, level of education, and level of physical activity). These variables were selected based on previous studies [46,47] about sociodemographic variables predictive for the presence and severity of insomnia in adults, including a recent large Brazilian study [48]. Model 2 incorporated the effect of fear of COVID-19, and finally, model 3 added psychological variables, namely anxiety and depression, as well as their interactions.

We highlight that the unadjusted analysis would be the same as presented in Table 4, which is the correlation between the main variables of interest: fear of COVID-19 and insomnia severity (r = 0.200, $p < 0.001$). The first model includes only the sociodemographic factors known from previous studies to have an effect on insomnia severity (sex, age, having children, marital status), and since we wanted to see the effect of fear of COVID-19 without the effect of these other variables, we chose to include them in the first model and move on to model 2 (adding the main variable) and model 3 (to see whether the effect still holds after the strongest predictors of insomnia in our univariate correlation analysis, namely anxiety and depression). Model 3, the most comprehensive one, explained a moderate proportion of the variance, with statistical significance (R^2 = 0.20, F (13.339) = 6.56, $p < 0.001$; adjusted R^2 = 0.17). The detailed results of the stepwise linear regression for the three models can be found in Table 5. The main results of model 3, which includes all the variables, indicate that the anxiety score had a positive and statistically significant effect on insomnia severity (β = 0.45; 95% CI [0.08, 0.82]; t(339) = 2.40; p = 0.017). This finding suggests that individuals with high anxiety symptom scores tend to have more severe insomnia, showing

a positive association between anxiety and insomnia severity. In addition, a positive and statistically significant interaction was identified between fear of COVID-19 and depression score (β = 0.02; 95% CI [0.003, 0.04]; t(339) = 2.28; $p = 0.023$). This result indicates that the impact of depression symptoms on insomnia symptoms is exacerbated by an increased fear of COVID-19, i.e., individuals with high depression symptom scores and a high fear of COVID-19 tend to have more severe insomnia.

Table 5. Linear regression analysis to assess the predictive power of sociodemographic and psychopathological variables on insomnia symptoms.

	Model 1 B (CI 95%)	**Model 2 B (CI 95%)**	**Model 3 B (CI 95%)**
Gender (men)	−0.65 [−1.66, 0.35]	−0.42 [−1.44, 0.59]	−0.50 [−1.46, 0.45]
Age	−0.01 [−0.06, 0.04]	−0.01 [−0.06, 0.04]	0.00 [−0.05, 0.05]
Children (yes)	−0.33 [−1.41, 0.74]	−0.22 [−1.29, 0.84]	−0.33 [−1.33, 0.68]
Education (higher education)	−1.42 ** [−2.47, −0.37]	−1.33 * [−2.38, −0.29]	−0.81 [−1.81, 0.18]
Ethnicity (non-White)	0.67 [−0.25, 1.60]	0.63 [−0.29, 1.55]	0.46 [−0.41, 1.33]
Marital status (not married)	−0.08 [−0.99, 0.83]	−0.02 [−0.92, 0.89]	−0.12 [−0.97, 0.73]
Physical activity (>2 times per week)	−1.22 ** [−2.08, −0.36]	−0.92 * [−1.80, −0.04]	−0.09 [−0.96, 0.77]
Occupation (unpaid)	−0.08 [−1.13, 0.98]	−0.21 [−1.27, 0.84]	−0.51 [−1.51, 0.48]
Fear of COVID-19		0.09 ** [0.02, 0.16]	0.02 [−0.18, 0.22]
Anxiety (HADS-A)			0.45 * [0.08, 0.82]
Depression (HADS-D)			−0.17 [−0.52, 0.18]
Fear of COVID-19 versus Depression			0.02 * [0.00, 0.04]
Fear of COVID-19 versus Anxiety			−0.01 [−0.03, 0.00]
Participants	353	353	353
R^2	0.065	0.084	0.201
Adjusted R^2	0.043	0.060	0.170
AIC	1982.21	1976.92	1936.51
BIC	2020.82	2019.43	1994.52
F	2.972	3.485	6.560

* $p < 0.05$, ** $p < 0.01$, Hospital Anxiety Scale (HADS-A), Hospital Depression Scale (HADS-D); B = unstandardized estimate; CI = confidence interval.

We conducted a second linear regression analysis with the aim of assessing the sociodemographic variables that predict fear of COVID-19 reported by previous national [41,49,50] and international [51–53] studies in the area. The following variables were investigated: gender, age, presence of children, ethnicity, marital status, occupation, education, level of physical activity, anxiety, depression, and insomnia symptoms. This model explained a moderate and statistically significant proportion of the variance ($R^2 = 0.18$; F(11, 341) = 6.87; $p < 0.001$; adjusted $R^2 = 0.16$). All the parameters of this analysis are shown in Table 6.

The results indicate that being a man had a negative and statistically significant effect on fear of COVID-19 (β = −2.24; 95% CI [−3.72, −0.75]; t(341) = −2.96; $p = 0.003$), suggesting that men, after controlling for other factors, score, on average, 2.24 points lower on the COVID-19 fear scale compared to women. In addition, a higher weekly frequency of physical activity (>2 times a week) was found to have a negative and statistically significant effect on fear of COVID-19 (β = −2.35; 95% CI [−3.68, −1.02]; t(341) = −3.46; $p < 0.001$), suggesting that individuals who practice physical activity more than twice a week tend to score an average of 2.35 points lower on the COVID-19 fear scale. Finally, anxiety revealed a positive and statistically significant effect on fear of COVID-19 (β = 0.39; 95% CI [0.20, 0.59]; t(341) = 3.95; $p < 0.001$), indicating that for each additional point on the anxiety scale, there is an average increase of 0.39 points on the fear of COVID-19 scale. In short, among the individuals diagnosed with insomnia assessed, women, those with a higher level of anxiety, and those who performed physical activity twice a week or less tended to report a greater fear of COVID-19.

Table 6. Linear regression analysis to assess the predictive power of sociodemographic and psychopathological variables on fear of COVID-19.

	Fear of COVID-19 (B [95% CI])
Gender (man)	−2.24 ** [−3.72, −0.75]
Age	0.06 [−0.02, 0.13]
Children (yes)	−1.26 [−2.84, 0.32]
Education (higher education)	−0.20 [−1.77, 1.36]
Ethnicity (non-white)	0.16 [−1.21, 1.53]
Marital Status (not married)	−0.79 [−2.13, 0.55]
Physical activity (>2 times per week)	−2.35 ** [−3.68, −1.02]
Occupation (unpaid)	1.13 [−0.44, 2.69]
Anxiety (HADS-A)	0.39 ** [0.20, 0.59]
Depression (HADS-D)	−0.01 [−0.21, 0.18]
Participants	353
R^2	0.182
Adjusted R^2	0.155
AIC	2257.41
BIC	2307.72
F	6.874

** $p < 0.001$, Hospital Anxiety Scale (HADS-A), Hospital Depression Scale (HADS-D); B = unstandardized estimate; CI = confidence interval.

4. Discussion

The results of this study provide a comprehensive overview of the associations between fear of COVID-19, depression and anxiety symptoms, and insomnia severity in patients diagnosed with insomnia disorder during the most critical period of the COVID-19 pandemic in Brazil. In addition to verifying associations between the study variables, we sought to understand possible differences in fear of COVID-19 and psychological distress between men and women. In this section, we discuss the main findings of the research, as well as its clinical and public health policy implications.

In our evaluation, we found an overall average fear of COVID-19 score of 19.63 (SD = 6.32). This average is lower than that observed in the most comprehensive study on fear of COVID-19 in Brazil, conducted in the first months of the pandemic [41]. In that study, which assessed 1000 individuals using the COVID-19 Fear Scale in June 2020, the average was 22.2 (SD = 5.78). This result contradicts our initial hypothesis, according to which, in the most critical months of the health crisis, characterized by higher morbidity and mortality and overload of health systems, fear of COVID-19 would be higher compared to less severe periods. The discrepancy observed in the scores may be related to several variables, such as the population's greater knowledge of health protection measures and the dynamics of virus transmission [54]. In addition, the immunization campaign against COVID-19 in Brazil, which began in January 2021 with the CoronaVac vaccine, may have generated a reassuring effect among part of the population more aligned with the medical–scientific discourse [55]. Additionally, throughout 2020, messages broadcast by the federal government, represented by the former president Jair Bolsonaro, openly underestimating the severity of the pandemic, may have contributed to a false sense of security on part of the population, especially among individuals with ultra-right political views [1,56,57]. In this sense, we believe that the lack of fear of COVID-19 and its consequences, verified in part of the Brazilian population, even in the face of the most aggressive variation of coronavirus and the collapse of the public and private health systems and in the face of more than 4000 deaths per day, may have contributed to an unjustified reduction in fear of COVID-19, and consequently in the adherence to individual and collective protection measures, leading to a worsening of the health crisis in the country. Finally, the prolongation of the

crisis may also have negatively impacted the perception of fear due to a cognitive process of accommodation and normalization of the situation, as a defense mechanism against chronic psychological distress associated with the pandemic and its medical, social, and economic repercussions [58].

Our results revealed that women presented significantly higher scores on all variables analyzed, including fear of COVID-19. This finding corroborates our second hypothesis and is in line with the results of previous studies. For example, Broché-Pérez et al. [59], in a study with 772 Cuban participants, showed that women experienced significantly more fear of COVID-19 than men. This pattern was also observed by other authors, such as Wang et al. [60], who identified being a woman as a predictor of negative psychological impact during the COVID-19 outbreak. Women appear to be more vulnerable to the psychopathological effects of the pandemic, mediated by biological and social variables. Bear, Connors, and Paradiso [32] highlight the role of sex hormones, such as estrogen and progesterone, which increase the response to stress and fear. Estrogen is associated with the activation of the amygdala, involved in fear processing. Bauer [33] also points out neurobiological differences between men and women which influence the response to fear and anxiety. In addition to biological factors, socioeconomic aspects also influenced fear scores. Bertelli et al. [29] highlight the disproportionate impact on women, especially those with low income, who faced the burden of double work shifts. It is also worth mentioning the higher prevalence of insomnia disorder in women, almost twice as high as that in men [61], which is influenced by hormonal, social, and psychological factors, such as cognitions about sleep and psychological flexibility [62].

Therefore, our results suggest that gender-sensitive public health policies that consider the particularities of Brazilian women with insomnia during future major health crises should address not only the neurophysiological aspects that increase their vulnerability to fear and anxiety [29,32,33,59,60], but also the social roles culturally attributed to the female gender in Brazil [11,29], associated with formal work and caring for the home and children, a double burden that can result in overload and stress, especially during major health crises in which daycare centers and schools and health services are closed.

The association between psychiatric disorders, such as anxiety, depression, and post-traumatic stress disorder, and insomnia disorder is well established in the literature [63–66]. During the pandemic, these aspects become even more evident, as observed by Bacelar et al. [16], who identified depression and other factors as predictors of insomnia in a Brazilian study. Other study found moderate-to-severe insomnia symptoms in 21.6% of the participants, and a significant positive correlation was observed between the severity of insomnia symptoms and post-traumatic stress disorder. These findings suggest that the worsening of mental health problems in the population during the pandemic may have produced worsening sleep patterns and an increased incidence of insomnia disorder, which in turn tends to worsen comorbid mental health problems because of sleep deprivation. This indicates a possible bidirectional relationship between insomnia and other mental health problems [21].

Furthermore, our results showed positive and significant correlations between fear of COVID-19, depression and anxiety symptoms, and insomnia severity, suggesting that increased fear of infection was associated with worsening of these symptoms. An Iranian study with 1223 participants corroborated this relationship, indicating that fear of COVID-19 contributed to an increase in the prevalence of insomnia, depression and anxiety symptoms [67]. Our regression analyses indicated that being a woman, engaging in physical activity less than twice a week, and experiencing clinical-level anxiety symptoms predicted higher COVID-19 fear scores among individuals diagnosed with insomnia disorder. This result is in line with what has been previously reported. The effects of physical

activity on improving anxiety symptoms [68,69] and regulating fear responses during the pandemic [70] are already well documented in the literature, as are the effects of physical activity in improving insomnia symptoms, both through its direct effect on neurophysiological mechanisms regulating sleep and wake cycles [71] and by reducing symptoms of depression and anxiety, which tend to be associated with sleep problems [12,63].

However, during the most critical periods of the pandemic, lockdown measures made it impossible, especially for residents of large Brazilian urban centers with a lack of green areas [70], to carry out physical activity in open spaces, associated with a lower risk of transmission of the virus. Interestingly, no other sociodemographic variable was able to predict COVID-19 fear scores, which suggests that other variables, not investigated in this study, may have been responsible for this outcome, including political position and level of alignment with scientific–medical discourse.

Although we believe we have achieved our objectives, we acknowledge the limitations of this study. The first limitation of this study is related to its cross-sectional design. Although this design makes it possible to assess associations between the variables analyzed (fear of COVID-19, symptoms of depression and anxiety, severity of insomnia, and sociodemographic variables), it does not enable the assessment of causal relationships between them, which would only be possible in longitudinal studies. The second limitation is related to sampling, predominantly composed of white and highly educated women with insomnia disorder. Future Brazilian studies with more diverse samples, including more men and participants with low and medium socioeconomic status, could provide results that are more representative of the Brazilian population.

Furthermore, new studies with a longitudinal design are needed in new situations of major health crises to evaluate whether fear of pathogens together with symptoms of depression and anxiety may affect the severity of insomnia and whether fear of pathogens may increase symptoms of depression and anxiety, which, in turn, negatively influence the severity of insomnia.

5. Conclusions

Our results indicated a mild-to-moderate level of fear of COVID-19 and moderate levels of depression and anxiety symptoms in our participants diagnosed with insomnia disorder during the most critical period of the COVID-19 pandemic in Brazil. All scores were higher among women, but only fear of COVID-19 reached significant differences between groups. Fear of COVID-19 was positively correlated with symptoms of depression and anxiety and the severity of insomnia. Being a woman, being sedentary, and having symptoms of anxiety were predictors of fear of COVID-19 among participants with insomnia disorder. This finding highlights the importance of gender-sensitive public health policies for the care of patients with insomnia during future major health crises. The associations between anxiety symptoms and fear of COVID-19 and the severity of insomnia verified in our study suggest the relevance of addressing anxiety symptoms through encouraging physical activity to mitigate the severity of insomnia and fear of pathogens in patients with insomnia.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/psychiatryint6020037/s1, Supplementary Material S1: Normality, Heteroscedasticity, Autocorrelation and Collinearity Check for Predictors of Fear of COVID-19 and Insomnia Severity. Supplementary Material S2: Reanalyzes without item 6 of the COVID-19 fear instrument.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

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