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Research Paper

The other side of COVID-19: Preliminary results of a descriptive study on the COVID-19-related psychological impact and social determinants in Portugal residents

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1. Introduction

The 2019 coronavirus disease (COVID-19) was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 (World Health Organization, 2020). To date, a total of 103,201.340 confirmed cases and 2237.636 deaths due to COVID-19 were reported to the WHO (World Health Organization, 2021), highlighting the tremendous burden of the disease.

All around the world, nationwide measures such as physical distancing, quarantine and lockdown were launched in the middle of March 2020. In January 2021, in response to the rising number of cases and deaths attributed to COVID-19, specifically in Portugal, more restrictive measures were once again applied. Although these measures may had potentially mitigate the spread of the SARS-CoV-2, they might have negatively affected the economy, employment and mental health status of the population (Brooks et al., 2020).

While the primary focus has been on preventing the transmission of the virus, finding vaccines and a possible cure, the public health workforce and local governments have reshaped their work in an effort to contain the infection and protect the most vulnerable. The measures to control the spread of the virus have reached deep into our lives, affecting people's income, job security and social contacts – factors that are essential to healthy lives. There is a realization that the effects and aftermath of this crisis, especially for mental health globally, could be unprecedented. With worries about future uncertainty, concern has been growing about the mental health sequelae of the COVID-19 pandemic (Holmes et al., 2020).

Studies of pandemics faced over time, such as SARS (Severe Acute Respiratory Syndrome), Ebola, H1N1 (Influenza A virus subtype H1N1), Equine Flu, and the current COVID-19, showed that the psychological effects of contagion and quarantine are not limited to fear of contracting the virus (Barbisch et al., 2015). Some other pandemic related factors have affected the population, namely separation from loved ones, loss of freedom, uncertainty about the disease progression, and the feeling of helplessness (Cao et al., 2020; Fong et al., 2020). The widespread outbreaks of infectious diseases, such as COVID-19, are associated with psychological distress and mental illness symptoms, besides the growing evidence of the direct mental and neurological sequels derived from the infection by SARS-CoV-2 (Xiong et al., 2020).

Depression and anxiety disorders pose a major challenge worldwide, with considerable morbidity and mortality associated with both. Portugal is the second European country with the highest rate of psychiatric disorders, mainly because of its high rate of anxiety disorders (Direção-Geral de Saúde, 2014). It was estimated that 16.5% of the Portuguese population was suffering from an anxiety disorder, with a tendency to affect individuals at younger ages (30.5% between 18 and 34 years versus 20.0% up to 65 years) (Direção-Geral de Saúde, 2014; Almeida et al., 2013).

A study conducted in China during the initial outbreak of COVID-19 found that 53.8% of the study participants rated the psychological impact of the outbreak, 16.5% reported moderate to severe depression, 28.8% reported mild to severe anxiety, 8.1% reported moderate to severe stress (Wang et al., 2021). A literature review revealed that symptoms of anxiety and depression (16 to 28%) and self-reported stress

(8%) are common psychological reactions to the COVID-19 pandemic (Rajkumar, 2020). In Portugal 29 April 2020, less than 2 months after the first confirmed cases, a large study conducted with about 10, 000 participants, with an average age of 31.3 years and mostly women, classified the psychological impact of the COVID-19 pandemic as "moderate to severe" - in total, 11.7%, 16.9% and 5.6% of the respondents reported having "moderate to severe" symptoms of depression, anxiety and stress, respectively (Bento, 2020).

Equally relevant, food insecurity is a very well known risk factors for poor mental health, including depression and anxiety (Bruening et al., 2017; Nagata et al., 2019). Food insecurity can further exacerbate mental health status as it alone is an important contributor to poor mental health.

Despite the rapidly building evidence on the impact of COVID 19, there are significant gaps due to the pandemic's unprecedented nature and the resultant changes across the globe. Therefore, this study aimed to evaluate anxiety and depression symptoms in a Portugal resident sample to assess the psychological impact of the COVID-19 pandemic on the general population.

2. Methods

2.1. Study design and participants

A cross-sectional study using data from an online survey based on the snowball sampling method was performed. A virtual snowball sampling survey was disseminated, firstly through social networking channels, namely Facebook, Instagram, Linkedin, Whatsapp, and Twitter, and secondly, through the researcher's mailing lists to work colleagues and friends. The inclusion criteria were age >=18 and Portugal residency. More detailed information on study procedures and data collection can be accessed elsewhere (Aguiar et al., 2021).

A refusal questionnaire was also available for those who, after accessing the link, decided not participate. Nevertheless, everyone who followed the link accepted to participate. Since the survey did not have information on where the participants were recruited (e.g.: Facebook or mailing list), due to confidentiality means, we cannot calculate the proportion of participants that come from each networking channel.

For the present article, data from November 2020 until February 2021 were taken, corresponding to a total of 929 individuals.

2.2. Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Committee of the Institute of Public Health of the University of Porto (CE20166).

According to the Ethical Principles for Medical Research involving human subjects expressed in the Declaration of Helsinki and the current national legislation, all participants were asked to give their informed consent. Since this was an online survey, participants must select between two options: to accept or to decline to participate in the study. The questionnaire was confidential, and no data that allow for the identification of the participants was collected.

2.3. Data collection

Data collection was performed through a structured questionnaire, specifically developed for this study, in the Portuguese language, including general demographic (age, gender, region, educational level, and marital status) as well as socioeconomic variables (household income perception, employment status and food security status). Information related with consumption of tobacco, illicit drugs, drinks containing alcohol and the use of anxiolytics and antidepressants were collected. Also, COVID-19 history and symptoms, history of chronic diseases, anxiety and depression symptoms, grief and mourning and domestic violence were asked.

Since this study took place during the COVID-19 pandemic, it was

also of our interest to collect information related to COVID-19, such as whether the individual had the disease symptoms and duration of the disease. Furthermore, individuals were asked if they had been previously diagnosed with some chronic disease (arterial hypertension, diabetes, hipercolesterolemia, asthma, chronic bronchitis, COPD, cancer, autoimmune disease, epilepsy). Moreover, data on employment status, dependent persons at home, including those with less than 18 years of age and with more than 18 years of age and, if some of the dependents have had online school; food security status (United States Department of Agriculture, 2012; Blumberg et al., 1999); SARS-CoV-2 previous infection; mental health, anxiety and depression symptoms (portuguese validated version) (Pais-Ribeiro et al., 2007), grief and mourning (portuguese validated version) (Prigerson et al., 2009), and domestic violence (Associação Portuguesa de Apoio à Vítima, 2012) were also taken. For the present study we considered only the following variables: general demographic charactrics, socioeconomic variables, consumption of tobacco, illicit drugs, drinks containing alcohol and the use of anxiolytics and antidepressants and COVID-19 history. Moreover, data on anxiety and depression symptoms and food insecurity were considered.

2.3.1. Measurements, assessment, and instrument for anxiety and depression symptoms

2.3.1.1. Anxiety and depression.
To evaluate symptoms of anxiety and depression in the study, the Hospital Anxiety and Depression Scale (HADS) Portuguese validated version was applied (Pais-Ribeiro et al., 2007). The HADS was originally developed by Zigmond and Snaith (1983) as a screening tool to apprehend clinically significant states of anxiety and depression in a non-psychiatric hospital setting. Although this scale was originally created to evaluate symptoms in hospitalized patients, other studies have shown its applicability to the general community (Bjelland et al., 2002; Bocéréan and Dupret, 2014).

The HADS consists of 14 items, seven for the anxiety subscale (HADS Anxiety) and seven for the depression subscale (HADS Depression). Each item is scored on a response-scale with four alternatives ranging between zero and three. After adjusting for six reversely scored items, all responses are summed to obtain the two subscales. A sum between zero and seven was classified as "normal", between eight and ten as "borderline" and from 11 to 21 as "case". The presence of anxiety and depression symptoms is considered when HADS scale was ≥11, as suggested by Snaith, as indicative of "caseness" to a mood disorder (Snaith, 2003). The HADS scale is a screening tool (not allowing a formal diagnostic) that helps identifying general patients who need further psychiatric evaluation and assistance.

As this is a cross-sectional study, it does not include comparative data for anxiety and depression symptoms pre and post COVID-19. To overcome that, one question was added to the questionnaire: "Relationship of the statement(s) with the COVID-19 pandemic" – in a five-point Likert scale from nothing related to very much related.

2.4. Statistical analysis

Characteristics of participants are described by absolute and relative frequencies and compared through the Chi-square test or Fisher's exact test, as appropriate, in categorical variables. Medians and percentiles, 25 and 75 (P25-P75), were used to describe continuous variables compared using the Mann-Whitney test. Also, we assessed the internal consistency of the HADS scale using Cronbach's alpha.

Data analysis was performed using the SPSS Statistic 26.0 (IBM SPSS, New York, USA). A significance level of 0.05 was used.

3. Results

3.1. Study participant's characteristics and habits

The sample characteristics are summarized in Table 1. Most participants were female (70.9%), 75.4% had a university degree, 43.6% were married/in a civil partnership and 56% were not married. More than half were aged between 18 and 39 years (61.3%), most were employed and remained after COVID-19 emerged (70.5%) and 21.1% had at least one comorbidity.

Regarding household size, more than half of participants belonged to a household composed of three or more persons and 36% had dependent children.

Regarding behaviours and habits (Table 2), 22.2% of individuals were current smokers and, of those, 33.5% referred an increase in the number of smoked cigarettes since the beginning of the pandemic. In

Table 1
Sociodemographic characteristics of the participants (*n* = 929).

	n (%)
Gender	
Female	659 (70.9)
Male	265 (28.5)
Education	
≤12 years	217 (23.4)
Bachelor degree	321 (34.6)
Master degree or superior	379 (40.8)
Marital status	
Married/in a civil partnership	405 (43.6)
Not married	520 (56.0)
Age, Y	
18-30	322 (34.7)
31-39	247 (26.6)
40-49	202 (21.7)
≥ 50	127 (13.7)
Missing	31 (3.3)
Professional situation after COVID-19 emerged	
Continued employed	655 (70.5)
Become unemployed	73 (7.9)
Continued unemployed	45 (4.8)
Other	67 (4.8)
Household income perception	
Insufficient	40 (4.3)
Need to be careful about expenses	235 (25.3)
Enough to meet needs	354 (38.1)
Comfortable	287 (30.9)
Household size	
1 person	144 (15.5)
2 persons	280 (30.1)
≥ 3 persons	487 (52.4)
Dependent children in the household	
Yes	334 (36.0)
No	586 (63.1)
Do not want to answer	9 (1.0)
Comorbidities	
Yes	196 (21.1)
No	719 (77.4)
Comorbid conditions*	
Arterial hypertension	38 (19.4)
Diabetes	15 (7.7)
Hipercolesterolemia	28 (14.3)
Asthma	36 (18.4)
Chronic bronchitis	14 (7.1)
COPD	8 (4.1)
Cancer	10 (5.1)
Autoimmune disease	39 (19.9)
Epilepsy	5 (2.6)
Others	89 (45.4)
Positive diagnose of COVID-19	
Yes	41 (4.4)
No	878 (94.5)

* not mutually exclusive; % of those that answered each question on yes or no for each disease.

COPD: Chronic obstructive pulmonary disease

Table 2
Behaviors and habits – substance use.

	n (%)
Smoke	
Do you smoke, or have you ever smoked?	
Yes, currently smoke	206 (22.2)
Has already smoked, but not anymore	203 (21.9)
Never smoked	506 (54.5)
Does not want to answer	12 (1.3)
Did you smoke before the pandemic? (n = 206)	
Yes	203 (98.5)
No	3 (1.5)
Since the beginning of the pandemic (n = 206)	
Increased the number of smoked cigarettes	69 (33.5)
Decreased the number of smoked cigarettes	38 (18.4)
Kept the same number	98 (47.6)
Does not want to answer	1 (0.5)
Drink	
Do you drink or have you ever drank alcoholic beverages?	
Yes, currently drink	505 (54.4)
Already drank, but not now	130 (14.0)
Don't drink	283 (30.5)
Does not want to answer	7 (0.8)
In the past month, how often did you drink alcohol-containing drinks? (n = 505)	
Never or less than once a month	58 (11.5)
1 to 3 times a month	150 (29.7)
Once a week	125 (24.8)
2 to 4 times a week	97 (19.2)
5 to 6 times a week	18 (3.6)
Once a day	37 (7.3)
2 to 3 times a day	19 (3.8)
6 or more times a day	1 (0.2)
Since the beginning of the pandemic (n = 505)	
Increased frequency of consumption	56 (11.1)
Decreased frequency of consumption	122 (24.2)
Kept the same frequency	322 (63.8)
Illicit drugs	
Have you ever used illicit drugs? (including cannabis)	
Yes	250 (26.9)
No	660 (71.0)
Missing/ Does not want to answer	19 (2.0)
When was the last time you used them? (n = 250)	
In the past 30 days	51 (20.4)
In the last 6 months	20 (8.0)
In the last 12 months	9 (3.6)
More than 12 months ago	169 (67.6)
Does not want to answer	1 (0.4)
Since the beginning of the pandemic (n = 80)	
Increased frequency of consumption	17 (21.2)
Decreased frequency of consumption	25 (31.2)
Kept the same frequency	36 (45)
Does not want to answer	1 (1.2)
Anxiolytics and antidepressants	
Usual use of anxiolytics and antidepressants	
Yes	149 (16.0)
No	763 (82.1)
Missing/Doesn't want to answer	17 (2.0)
Use of anxiolytics and antidepressants before COVID-19 (n = 149)	
Yes	123 (82.6)
No	23 (15.4)
Does not want to answer	3 (2.0)

what concerns drinking habits, more than half of our sample referred to currently drinking (54.4%), and 24.2% decreased the frequency of consumption since the beginning of the COVID-19 pandemic. Lifetime consumption of illicit drugs was reported by 26.9% of participants, of whom 20.4% used drugs in the last 30 days (Table 2). Regarding the use of anxiolytics and antidepressants, 16% reported it, and 15.4% only began to use them after the pandemic.

Concerning the food security status, in the studied sample, 5.0% of participants belong to a low food secure household and 1.8% to a very low food secure household, corresponding to a prevalence of food insecurity of 6.38%.

3.2. Anxiety and depression symptoms

3.2.1. Reliability and internal consistency of HADS

A Cronbach alpha of 0.87 and 0.80 was found in the anxiety and depression symptoms subscales, respectively. None of the items was eliminated based on the item scales, and all the corresponding items have shown their relevance.

Regarding anxiety and depression symptoms, we observed 49.7% of non-anxiety symptoms, 23.1% of moderate anxiety symptoms and 26.9% of anxiety symptoms; 70.4% non-depression symptoms, 17.0% of moderate depression symptoms, and 7.0% of depression symptoms among the studied participants. Moreover, the overlap between anxiety symptoms prevalence and depression symptoms prevalence is 20.4%.

3.3. Anxiety symptoms

Table 3 shows the distribution of participants' anxiety symptoms according to the sociodemographic characteristics. Anxiety was significantly higher among females than males (77.9% vs 22.1%, respectively; $p = 0.001$) and among those with a master degree or superior ($p = 0.015$). Moreover, younger respondents (between 18 and 30 years) were significantly more anxious than older ones ($\geq$50 years) (40.0% vs. 14.2%; $p = 0.005$). Individuals who remained employed after the pandemic started ($p = 0.045$) and those who reported the perception of an insufficient and need to be careful about expenses income perception, were more often characterized as having anxiety symptoms ($p < 0.001$). Additionally, among participants classified as food insecure the presence of anxiety symptoms was higher compared to the non presence of symptoms (16.1% vs. 3.1%; $p < 0.001$). A higher frequency of anxiety was observed among those healthy than those suffering from chronic health problems (70.9% vs. 29.1%; $p < 0.001$). Non-current drinkers were more often classified as having anxiety ($p = 0.001$). Also, anxiety was observed among 29.1% of participants that already take anxiolytics or antidepressants ($p < 0.001$).

Regarding anxiety symptoms, other variables such as marital status, household size, have had a confirmed diagnosis of COVID-19, smoking and use of illicit drugs were not significantly associated with the presence of anxiety symptoms.

3.4. Depression symptoms

Depression symptoms showed to be more frequent among those without higher education (37.5% vs 34.4, respectively; $p = 0.069$), although not statically significant (Table 4). Regarding working status during COVID-19 pandemic, participants classified as employed were less likely to be characterized as having depression symptoms ($p = 0.097$). Individuals that report need to be careful about expenses at household income perception were more likely to be characterized as having depression symptoms than those who perceived their household income as comfortable (33.8% vs 20.0% respectively; $p < 0.001$). Of those suffering from chronic health problems, 32.8% had depression symptoms and 67.2% did not report health problems ($p = 0.002$) but are at a higher risk of having depression symptoms. Depression symptoms was also observed among 67.7% of participants that don't take anxiolytics or antidepressants ($p < 0.001$).

3.5. Perceived changes in anxiety and depression symptoms since COVID-19

To further understand which participants could already be experiencing anxiety and depression symptoms before the pandemic, we looked at the answers given to the following question: "Relationship of the statement(s) with the COVID-19 pandemic". Of those who answered (76.5%), 26.7% referred nothing related, and the sum of the four remaining options - little related, related, very related and very much related with the pandemic - composed a new answer corresponding to a

Table 3

Prevalence of anxiety symptoms in participants during COVID-19 outbreak in a sample from Portuguese residents.

n (%)	Non-anxiety (462 [49.7])	Moderate-anxiety (215 [23.1])	Anxiety (250 [26.9])	p-value
Gender				
Female	302 (65.8)	162 (75.7)	194 (77.9)	**0.001***
Male	157 (34.2)	52 (24.3)	55 (22.1)	
Education				
$\leq$ 12 years	89 (19.6)	58 (27.0)	70 (28.5)	**0.015**
Bachelor degree	180 (39.6)	67 (31.2)	73 (29.7)	
Master degree or superior	185 (40.7)	90 (41.9)	103 (41.9)	
Marital status				
Married/ in a civil partnership	207 (45.0)	93 (43.5)	104 (41.8)	0.706
Not married	253 (55.0)	121 (56.5)	145 (58.2)	
Age. Y				
18-30	143 (31.7)	82 (40.0)	96 (40.0)	**0.005***
31-39	121 (26.8)	51 (24.9)	75(31.3)	
40-49	110 (24.4)	40 (19.5)	51 (21.3)	
$\geq$ 50	77 (17.1)	32 (15.6)	18 (14.2)	
Working status after COVID-19 started				
Continued employed	332 (80.4)	159 (78.3)	163 (73.4)	**0.045**
Become unemployed	24 (5.8)	24 (11.8)	25 (11.3)	
Continued unemployed	20 (4.8)	10 (4.9)	15 (6.8)	
Other	37 (9.0)	10 (4.9)	19 (8.6)	
Household income perception				
Insufficient	13 (2.9)	10 (4.7)	17 (6.9)	**<0.001**
Need to be careful about expenses	93 (20.4)	63 (29.9)	79 (31.9)	*
Enough to meet needs	183 (40.1)	76 (36.0)	94 (37.9)	
Comfortable	167 (36.6)	62 (29.4)	58 (23.4)	
Household size				
1 person	70 (15.5)	27 (12.9)	47 (19.1)	0.427
2 persons	140 (30.9)	64 (30.5)	76 (30.9)	
$\geq$ *3 persons*	243 (53.6)	119 (56.7)	123 (50.0)	
Food security status (n = 882)				
Food security	432 (96.9)	196 (95.6)	193 (83.9)	**<0.001**
Food insecurity	14 (3.1)	9 (4.4)	37 (16.1)	*
The situation regarding food has changed				
Yes	39 (34.5)	26 (23.0)	48 (42.5)	**<0.001**
No	227 (57.3)	92 (23.2)	77 (19.4)	*
Use of anxiolytics or antidepressants				
Yes	38 (8.4)	40 (18.8)	71 (29.1)	**<0.001**
No	415 (91.6)	173 (81.2)	173 (70.9)	*
Have any illness diagnosed by the doctor that requires regular health care				
Yes	69 (15.1)	56 (26.5)	71 (29.1)	**<0.001**
No	389 (84.9)	155 (73.5)	173 (70.9)	*
Positive diagnose of COVID-19				
Yes	21 (4.6)	8 (3.8)	12 (4.8)	0.847
No	435 (95.4)	204 (96.2)	237 (95.2)	
Drinking habits				
Yes	278 (61.0)	106 (50.0)	120 (48.4)	**0.001***
No	178 (39.0)	106 (50.0)	128 (51.6)	
Smoking habits				
Yes	109 (23.9)	45 (21.2)	52 (21.3)	0.647
No	348 (76.1)	167 (78.8)	192 (78.7)	
Illicit drug use				
$\leq$ *last 12 months*	39 (33.6)	16 (30.2)	25 (31.6)	0.898
> 12 months	77 (66.4)	37 (69.8)	54 (68.4)	

* $p < 0.05$

total of 73.3%.

Furthermore, it was important to understand the overlaps in participants' non-reporting and reporting the presence of anxiety and depression symptoms in relation with the statements of the HADS scale. It was verified that from those not related the symptoms felt in the last week to the HADS scale statements with the pandemic, 16.3% have anxiety symptoms, 4.5% have depression symptoms, and 9.8% has both. Regarding those who related those two variables, 33.5% have anxiety

Table 4

Prevalence of depressive symptoms in participants during COVID-19 outbreak in a sample from Portugal

Variables n (%)	Non depression [654 (70.4)]	Moderate depression [160 (17.0)]	Depression [65 (7.0)]	p Value
Gender (n = 766)				
Female	452 (69.4)	124 (78.0)	50 (76.9)	0.061
MMale	199 (30.6)	35 (22.0)	15 (23.1)	
Education (years)				
≤ 12 years	141 (21.8)	42 (26.4)	24 (37.5)	0.069
Bachelor degree	230 (35.6)	55 (34.6)	18 (28.1)	
Master degree or superior	275 (42.6)	62 (39.0)	22 (34.4)	
Marital status				
Married/ in a civil partnership	287 (44.0)	66 (41.3)	35 53.8)	0.220
Not married	365 (56.0)	94 (58.8)	30 (46.2)	
Age (years)				
18-30	231 (36.6)	54 (35.3)	22 (34.9)	0.830
31-39	168 (26.6)	48 (31.4)	21 (33.3)	
40-49	143 (22.6)	31 (20.3)	11 (17.5)	
≥ 50	90 (14.2)	20 (13.1)	9 (14.3)	
Working status during COVID-19 pandemic				
Continued employed	473 (79.5)	107 (73.8)	43 (75.4)	0.097
Become unemployed	48 (8.1)	16 (11.0)	7 (12.3)	
Continued unemployed	25 (4.2)	14 (9.7)	2 (3.5)	
Other	49 (8.2)	8 (5.5)	5 (8.8)	
Household income perception				
- Insufficient	23 (3.6)	5 (3.2)	7 (10.8)	**<0.001**
- Need to be careful about expenses	135 (21.0)	61 (38.6)	22 (33.8)	*
- Enough to meet needs	258 (40.1)	54 (34.2)	23 (35.4)	
- Comfortable	228 (35.4)	38 (24.1)	13 (20.0)	
Household size				
1 person	100 (15.6)	25 (15.7)	12 (18.8)	0.928
2 persons	197 (30.8)	51 (32.1)	17 (26.6)	
≥ 3 persons	342 (53.5)	82 (52.2)	35 (54.7)	
Food security status (n = 882)				
Food security	601 (96.0)	137 (89.0)	45 (78.9)	**<0.001**
Insecurity	25 (4.0)	17 (11.0)	12 (21.1)	*
The situation regarding food has changed				
Yes	88 (20.2)	42 (36.2)	19 (36.5)	**<0.001**
No	347 (79.8)	74 (63.8)	33 (63.5)	*
Use of anxiolytics and antidepressants				
Yes	76 (11.9)	36 (22.9)	21 (32.3)	**<0.001**
No	565 (88.1)	121 (77.1)	44 (67.7)	*
Have any illness diagnosed by the doctor that requires regular health care				
Yes	118 (18.3)	44 (27.8)	21 (32.8)	**0.002***
No	527 (81.7)	114 (72.2)	43 (67.2)	
Diagnose of COVID-19				
Yes	32 (5.0)	5 (3.1)	2 (3.1)	0.529
No	614 (95.0)	154 (96.9)	62 (96.9)	
Drinking habits				
Yes	360 (44.2)	84 (52.8)	29 (45.3)	0.246
No	285 (44.2)	75 (47.2)	35 (54.7)	
Smoking habits				
Yes	151 (23.4)	35 (22.0)	13 (20.3)	0.810
No	493 (76.6)	124 (78.0)	51 (79.7)	
Illicit drug use				
≤ last 12 months	55 (32.0)	11 (28.2)	7 (28.0)	0.850
> 12 months	117 (68.0)	28 (71.8)	18 (72.0)	

* p < 0.05

symptoms, 5 persons have depression symptoms and 33 have both.

4. Discussion

This study assessed the psychological impact of the COVID-19 pandemic, namely anxiety and depression symptoms, on a sample of Portuguese residents. Both anxiety and depression subscales showed good internal consistency. A Cronbach alpha of 0.87 and 0.80 was found, respectively and, accordingly, the psychometric analysis has demonstrated good internal consistency, and none of the items was dropped. These results are similar to those from the original study that validated the scale for the Portuguese population. For anxiety, a Cronbach alpha of 0.76 and 0.81 was found for anxiety and depression, respectively (Pais-Ribeiro et al., 2007).

Regarding the HADS scale, it must be noted that this scale only refers to anxiety and depression symptoms 'in the past week'. A diagnosis of an anxiety disorder or depression cannot be made based on these scores only. At last, this scale is only meant to measure the intensity or frequency of present symptoms, not to diagnose an actual mood or anxiety and depression disorder. For that, further evaluation of each case would be necessary to establish the true intensity, duration and impact of the symptoms in the population.

Our preliminary results showed a prevalence of 26.9% of anxiety symptoms and 7.0% of depressive symptoms. As presented in a recent review that included 16 research studies on this topic, the prevalence of depression ranged from 8.3% to 48.3% in respondents from China; of 15.4% to 17% in Italy, and, in Spain, the variation was found between 1.7% for extreme depression to 8.7% for mild depression (Salari et al., 2020). The same review presents data from China reporting a prevalence of anxiety that varies from 2 to 37%. In Italy, ranging from 7.2% to 11.5% and Spain, it ranged from 1.2% to 4% (Salari et al., 2020). Our sample shows a worst scenario concerning anxiety symptoms since a higher prevalence was observed.

Nonetheless, it is important to highlight that our results concerning the overlapping in participants non-reporting and reporting relationship of the sentences of the HADS scale with anxiety and depression symptoms shows that from the 26.9% of the participants with anxiety symptoms only 12.4% do not relate the symptoms with the pandemic. This result shows that the pandemic can have exacerbated anxiety and depressive symptoms in the majority of the participants in our sample that presented positive results in the HADS scale, which led us to a broader scenario.

Worldwide, researchers have expressed concerns about an increase in mental health issues around the world. The latest global estimated prevalence of depression is from 2017 and shows a proportion of 3.4% (ranging between 2 and 6%) (Ritchie, 2018). Based on the Global Burden of Disease data (Spencer et al., 2018), this estimation includes both dysthymia and major depressive disorder. It is based on studies reporting depression prevalence rates grounded on medical, epidemiological data, surveys and meta-regression modeling. Our study showed a very worrying scenario, indicating the dramatic impact of COVID-19 on depression compared to this estimate.

Also, and according to the Eurostat Statistics (Eurostat, 2020) on mental health and related issues, the prevalence for depressive disorders, in 2014, was of 6.9% for the EU-27, with 12.1%, Ireland topped the ranking for the share of its population reporting chronic depression followed by Portugal with 11.5%. The share of women reporting chronic depression peaked in Portugal at 17.2%, which contributed towards Portugal recording the largest gender gap: the share of Portuguese women reporting chronic depression was 11.3 percentage points higher than the corresponding share for Portuguese men. In our sample, this difference between gender was not visible.

Looking across the age groups from youngest to oldest, within the EU-27 the share of people reporting depression generally increased with age; that said, there was a relatively low prevalence of chronic depression among the young (Eurostat, 2020). In Portugal, more than one in

every five people between the ages of 65 and 74 years reported having chronic depression (Eurostat, 2020). Comparing to our data, the prevalence of depression symptoms, although not statistically significant, did not increased with age being equal in those participants between 18 and 30 years of age and people with more than 50 years of age, with a prevalence of symptoms of 7.7%.

The reported rates of depression in the general population during the previous epidemic outbreaks (SARS and Ebola) were between 3% and 73.1% (Chew et al., 2020). Most of them are above the rate of depression during the COVID-19 outbreak we have identified here. These past epidemics were contained faster, and despite a higher mortality rate, infection rates were lower, which may explain the prevalence of lower rates of depressive symptoms (Huremović, 2019).

Aging increases the risk of COVID-19 infection and mortality. However, the results of existing studies show that during the pandemic, the levels of anxiety and depression are significantly higher in the age group of 21–40 years (Salari et al., 2020). Our study found that younger participants had greater anxiety levels, but no statistically significant result was found for depression. The main reason for this could be that this age group was more concerned over the future consequences and economic challenges caused by the pandemic. They are key active working forces in society and are, therefore, mostly affected by redundancies business closures (Ahmed et al., 2020; Huang and Zhao, 2020; Moghanibashi-Mansourieh, 2020). Some researchers have argued that greater anxiety among young people may be due to their greater access to information through social media (Cheng and Baoyong, 2014).

According to a study conducted in China in 2014, the higher prevalence of mental symptoms among people with higher education levels is probably due to this group's heightened self-awareness concerning their health (Zhang and Ma, 2020). Another study conducted during the COVID-19 pandemic also showed that there is an association between people with higher education levels had greater levels of anxiety and depression levels (Wang et al., 2021) as we saw in our sample.

The present study did not found that history of chronic medical problems was related to increased anxiety and depression symptoms. Although this, among those with medical problems, participants with presence of anxiety and depression symptoms were higher when compared within the group with those without symptoms (15.1% non-anxiety symptoms vs 29.1% with anxiety symptoms; 18.3% non-depression symptoms vs 32.8 depression symptoms). This finding echoes previous studies indicating that chronic illness or self-evaluation of poor health is associated with increased psychological distress (Ho et al., 2019; Wang et al., 2020). A possible interpretation for this finding is that persons with a history of medical problems who also perceive their health as weak might feel more vulnerable to contracting a new disease (Hatch et al., 2018).

Recent studies have revealed an association between chronic diseases medical history and increased anxiety and depression caused by the COVID-19 spread (Mazza et al., 2020). Previous research had shown that medical history and chronic illnesses are associated with increased psychiatric distress levels (Holmes et al., 2020; Wang et al., 2020), which does not go in line with our data for both anxiety and depression - having any disease diagnosed requiring regular health care was not correlated with anxiety and depression as presented in other studies (Aquin et al., 2017). Furthermore, the severity and implications of anxiety symptoms may be greater in some general medical conditions than in others (Aquin et al., 2017) Since we didn't make the analysis with each disease independently, a possible explanation for the difference in the results that we found, can be applied. A cross-sectional study done in 2011 (Bayat et al., 2011), that utilized the HADS scale also, found that among the conditions examined, anxiety symptoms were most severe for those with rheumatoid arthritis and viral hepatitis.

Further on, the association between food insecurity and depressive symptoms is especially well studied, with longitudinal studies specifically suggesting a bidirectional relationship (Bruening et al., 2017; Isaura et al., 2019; Kolovos et al., 2020). Food insecurity may lead to

poor mental health through chronic stress, stigmatization, and perceived powerlessness (Nagata et al., 2019; Palar et al., 2018). Personal or community resources that help mitigate the mental health impacts of food insecurity may be disrupted during the pandemic, and some individuals may be newly exposed to food insecurity (Bergmans and Wegryn-Jones, 2020). In this respect, it is plausible that food insecurity drives the poor mental health outcomes seen in this study and contributes to rising depression and anxiety rates during the pandemic.

Since the COVID-19 is a health and humanitarian crisis, the threat to food security and nutrition of millions of people worldwide is compromised. Hundreds of millions of people were already suffering from hunger and malnutrition before the virus hit and, unless immediate action is taken, we could see a global food emergency (Ritchie, 2018; UNICEF, 2020; International Development Association, 2020).

That said, it should be emphasized that these findings are preliminary and portray a moment still being faced by many people. Therefore, we understand that the magnitude of the impacts felt about the restrictive measures, the lockdown, the unemployment, the work from home with children having online school and the overall changes in the population day to day life on mental health will only be more specifically understood in greater depth with studies after the pandemic or even longitudinal studies.

4.1. Limitations and strengths

This study has some limitations, which should be mentioned. Given the limited resources available and time-sensitivity of the COVID-19 outbreak, we adopted the snowball sampling strategy. The snowballing sampling strategy was not based on a random selection of the sample, and the study population could not reflect the actual pattern of the general population. Additionally, we must consider that virtual snowball sampling techniques imply a semi-random selection procedure, which means that we cannot generalize our results to all population.

Furthermore, it would be ideal for conducting a prospective study on the same group of participants, but. Due to ethical requirements on anonymity and confidentiality, we could not collect contact details and personal information from the respondents and conduct a prospective study that would provide a concrete finding to support the need for a focused public health initiative. There was an oversampling of a particular network of peers (e.g., with academic degree), leading to selection bias. As a result, the conclusion was less generalizable to the entire population, particularly people with lower educational levels and men. Nevertheless, this paper has described an efficient method that can extend the sample size, improving response rate and recruitment effectiveness.

Also, psychological impact levels, namely, anxiety and depression symptoms, may not always be aligned with assessment by mental health professionals. Similarly, respondents might have provided socially desirable responses regarding satisfaction with the health information received and preventive measures. Nevertheless, we believe that this method, even though its limitations, is still very useful nowadays due to the governments' social physical distance measures.

As a strength, the instrument used to evaluate anxiety and depression have previously been validated for the Portuguese population and has demonstrated to have a good internal consistency (Pais-Ribeiro et al., 2007). Despite the scale used for food security status assessment not being fully validated for the Portuguese population, previous Portuguese studies have reported good internal consistency (Maia et al., 2019a, 2019a).

It is expected that the structure and information derived from this survey could also contribute to develop and consolidate reliable infrastructures for epidemiological and public health research by building a future national functioning surveillance system that can be reproducible over time.

5. Conclusions

The findings of this study have several implications for health policy and reinforce the need for investment in mental health. In terms of public health agenda, particular attention should be given to the burden of disability associated with anxiety disorders in Portugal. Despite being highly prevalent and disabling, these conditions are often less visible and under-prioritized in comparison to mood disorders, specifically depression.

From the present study, it can be concluded that the COVID-19 pandemic can affect mental health in different subpopulations, such as those aged between 18 and 39 years old and those with higher education levels. Therefore, it is vital to identify individuals more prone to psychological disorders from other groups and to varying layers of populations in the current crisis. Appropriate psychological strategies, techniques and public health interventions should be developed to preserved and improved the general population's mental health.

Data availability statement

The data that support the findings of this study are not openly available due to the data presented in this article represents preliminary results and further discussion and analysis will be conducted; and also because the data presented in this article are part of the PhD project of Ana Aguiar, that is a doctoral fellow with a scholarship funded by the Foundation for Science in Technology, Portugal. The data can be made available from the corresponding author (AA) upon reasonable request after the finishing of the doctoral program.

CRediT authorship contribution statement

Ana Aguiar: Investigation, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Isabel Maia:** Methodology, Writing – review & editing. **Raquel Duarte:** Investigation, Methodology, Writing – review & editing. **Marta Pinto:** Investigation, Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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