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COVID-19 fear and anxiety as mediators in the relationship between repetitive negative thinking and psychopathology: a community-based study during the 2nd confinement in Portugal

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Abstract
Repetitive negative thinking is a cognitive dimension of the onset and maintenance of psychopathology, and increased levels of psychopathology have been observed during COVID-19 lockdowns. The role of fear of COVID-19 and COVID-19 anxiety has been poorly explored in terms of psychopathology during lockdowns due to the pandemic crisis. This study examines the mediating role of fear of COVID-19 and COVID-19 anxiety in the relationship between repetitive negative thinking and psychopathology during the second lockdown in Portugal. Participants completed a web survey that included a sociodemographic questionnaire, the Fear of COVID-19 Scale, the COVID-19 Anxiety Scale, the Persistent and Intrusive Negative Thoughts Scale, and the Depression, Anxiety, and Stress Scale −21. The results showed a positive and significant correlation between all variables and identified fear of COVID-19 and COVID-19 anxiety as significant mediators in the relationship between repetitive negative thinking and psychopathology during the second lockdown in Portugal, after controlling for being isolated, being infected, and working in first line response of COVID-19. Overall, the current findings highlight the role of cognitive dimensions such as anxiety and fear in the context of COVID-19, nearly a year after the pandemic outbreak and after the release of a vaccine. Mental health programs should consider improving coping strategies for emotion regulation, particularly fear and anxiety, during major catastrophic health-related events.

Keywords Anxiety · COVID-19 · Fear · Psychopathology · Repetitive negative thinking

Introduction

Since January 2020, the world has faced significant challenges to individual and social functioning related to the COVID-19 pandemic, which have led to mental health problems (Canet-Juric et al., 2020; Passos et al., 2020). Several studies have examined the impact on mental health during the first official lockdowns worldwide due to the COVID-19 outbreak, finding higher prevalence rates for depressive and anxiety symptoms in the first months of lockdown compared to the pre-pandemic period, suggesting a significant mental health burden (e.g., Canet-Juric et al., 2020; Daly et al., 2022; Xiong et al., 2020). Over time, an increase in depressive symptomatology was observed, mainly due to mitigation strategies during the lockdown and strict social isolation and distancing instructions (Canet-Juric et al., 2020; Passos et al., 2020), while a slight decrease in anxiety was found, mainly due to the ability to tolerate and cope with uncertainty (Canet-Juric et al., 2020), after a sharp increase in symptoms during the first weeks of the lockdown in 2020 (Passos et al., 2020). Overall, rates of 8.1 to 81.9% for stress, 14.6 to 48.3% for depressive symptomatology, and 6.33 to 50.9% for symptoms of anxiety are reported in the general population during the COVID-19 outbreak in China, the United States, and European countries (Xiong et al., 2020), which are among the most important symptoms for emotional disorders.

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Data from studies, conducted in Portugal during the first lockdown due to the pandemic COVID-19, examining the impact on mental health found an increase in symptoms of depression, anxiety, and stress in the first weeks of the lockdown (Mendes-Santos et al., 2020) and the following weeks (Paulino et al., 2021; Silva-Moreira et al., 2021). Another study in Portugal compared the levels of psychological symptoms in the first and second confinement and found higher levels of depression and stress symptoms and lower levels of anxiety in the second lockdown than at the beginning of the pandemic (Costa et al., 2022). Repetitive Negative Thinking (RNT) is a transdiagnostic process that involves rumination and worry. It is closely associated with emotional disorders and functions as a dispositional feature for depression and anxiety disorders (Ehring & Watkins, 2008). During COVID-19, empirical evidence was found for RNT as a risk factor for anxiety symptoms, COVID-19 stress, and psychopathology (Racine et al., 2022).

Fear of COVID-19 and SARS-CoV-2 infection is described as the psychophysiological emotional response of fear to the new coronavirus (Ahorsu et al., 2022) and has been associated with psychological maladjustment (Candeias et al., 2021; Duong, 2021), as well as anxiety, depression, and stress symptoms (Satici et al., 2021). Fear of COVID-19 has been related to increased perceptions of infection risk and has been described as a dimension that may promote safety and protective behaviors, such as adherence to health guidelines like frequent hand washing, wearing masks, and practicing social distancing (Luo et al., 2021; Nguyen et al., 2020). In a systematic review and meta-analysis on fear of COVID-19, Luo et al. (2021) found that moderate levels of fear of COVID-19 helped control and prevent the spread of the virus by motivating people to engage in safety behaviors, while severe or excessive fear of COVID-19 had negative effects on mental health by promoting psychopathological symptoms such as stress, anxiety, and depression. Thus, fear of COVID-19 can be a relevant dimension when examining mental health indicators and psychopathology during the outbreak.

COVID-19 anxiety includes cognitive, emotional, physiological, and behavioral anxiety symptomatology exclusively associated with the new coronavirus (Lee, 2020). Although fear and anxiety are highly correlated constructs, they represent different emotional experiences, with fear being conceptualised as an unconscious emotional response of survival and anxiety, including a cognitive appraisal related to future events, including attentional and more conscious mechanisms (Öhman, 2008). Similarly, COVID-19 anxiety has been observed and associated with negative and catastrophic health outcomes, particularly in women and concerning significant others (Maaravi & Heller, 2020). Moreover, COVID-19 anxiety is a significant negative predictor of coping strategies to deal with COVID-19 challenges (Yıldırım et al., 2022), which is a significant risk factor for psychopathology (Kołodziejczyk et al., 2021; Mushquash & Grassia, 2022). Although COVID-19 anxiety occurs worldwide, first-line workers appear to experience more severe COVID-19 anxiety (Labrague & de los Santos, 2020; Mattila et a., 2021) due to increased fear of contracting the new coronavirus at work and increased workload associated with COVID-19 adversity (Mattila et al., 2021).

Given the dispositional role of RNT on psychopathology (Ehring & Watkins, 2008), including during the pandemic crisis (Racine et al., 2022), and the elevated levels of stress, depression, and anxiety during the COVID-19 outbreak, as well as the levels of COVID-19 anxiety and fear of COVID-19, this study intends to examine the mediating role of COVID-19 anxiety and fear of COVID-19 in the relationship between RNT and psychopathology during the second lockdown in Portugal.

Methods

Participants and procedures

The study received ethical approval from the Ethics Committee from the Lusófona University, and a web survey was developed with authorized Portuguese versions of self-reports using Qualtrics software. Portuguese adults living in Portugal during the second lockdown period (January 15 to March 15, 2021) were invited to complete a web survey that took approximately 15 min between April and July 2021 and was advertised on social media websites and through university mailing lists. No incentives were offered. Participants were fully informed about the purpose of the study. They completed the self-report forms only after informed consent, including acknowledging that they were living in Portugal during the second lockdown period (January 15 to March 15, 2021). Data were collected and stored on the university's server, and no IP address was recorded to maintain the privacy and anonymity of the data. The original sample consisted of 338 participants. Two participants were removed (under the age of 18). The final sample consists of 336 Portuguese adults with a mean age of 35.02 (SD = 11.67), ranging from 18 to 68. Table 1 describes the sociodemographic characteristics of the sample.

Measures

The Persistent and Intrusive Negative Thoughts Scale (PINTS; Magson et al., 2019) is a self-report instrument with five statements assessing RNT answered on a 5-point Likert scale. The PINTS measures three central attributes of

Table 1 Sociodemographic characteristics of the sample (N = 336)

Variables	n	%
Sex		
Men	52	15.5
Women	280	83.3
Other	4	1.2
Educational level		
0–12 years	32	9.5
13 + years	304	90.5
Civil status		
Single	164	48.8
Married/Civil union	156	46.4
Divorced/Separated/Widowed	16	4.8
Sexual Orientation		
Heterosexual	288	85.7
Gay/Lesbian	18	5.4
Bisexual	18	5.4
Asexual	4	1.2
Other	8	2.4
Vaccination COVID-19		
No, I refused	2	0.6
No, waiting for availability according to age	266	79.2
Yes, first dose	36	10.7
Yes, two doses	32	9.5
Isolation during 2nd confinement		
Yes	52	15.5
No	284	84.5
COVID-19 infection		
Yes	20	6.0
No	316	94.0
Working in first line or risk for COVID-19 (health care centres, residential for elderly, security forces and fire workers)		
Yes	70	20.8
No	266	79.2

RNT, according to Ehring et al. (2011): (i) being repetitive; (ii) having an intrusive ability; and (iii) being extremely difficult to disengage from, being classified as a disorder-neutral construct. The total score was computed by summing all items, and higher levels indicated greater levels of RNT, stable over time. The original version (Magson et al., 2019) and the Portuguese version (Peixoto & Cunha, 2021) showed good to excellent psychometric properties. The internal consistency for the current study was 0.90.

The Depression, Anxiety and Stress Scale −21 (DASS-21; Henry & Crawford 2005) is a self-report instrument with 21 statements assessing symptoms of depression, anxiety, and stress answered on a 4-point Likert scale. The total and subscales scores were obtained by summing the items, with higher levels revealing greater levels of symptoms. The DASS-21 allows for differentiation between individuals with and without depressive, anxiety, and stress symptoms, according to cut-off scores for each subscale (Lovibond & Lovibond, 1995). Both the original version (Henry & Crawford, 2005) and the Portuguese version (Pais-Ribeiro et al., 2004) have good to excellent psychometric properties, and the internal consistency for the present study was 0.94 for the total scale, 0.87 for the depression subscale, and 0.90 for both anxiety and stress subscales.

The Coronavirus Anxiety Scale (CAS; Lee 2020) is a five-item self-report measure of physiological responses to COVID-19 anxiety on a 5-point Likert scale. The total score was obtained by summing the items, with higher scores revealing greater levels of COVID-19 anxiety. The original version (Lee, 2020) and the Portuguese version (Magano et al., 2021) showed good to excellent psychometric properties. The internal consistency for the current study was 0.79.

The Fear of COVID-19 Scale (FCV-19 S; Ahorsu et al., 2022) is a self-report instrument with seven items assessing fears related to COVID-19 in the general population, answered on a 5-point Likert scale. The total score was obtained by summing up the items, with higher scores revealing greater levels of fear of COVID-19. The original version (Ahorsu et al., 2022) and the Portuguese version (Magano et al., 2021) showed good to excellent psychometric properties. The internal consistency for the current study was 0.79.

Statistical analytical plan

Statistical analyses were performed using IBM SPSS version 28.0 software. Descriptive statistics were performed to characterize the sample and mean, standard deviations, ranges, and frequencies were calculated for the main variables. Pearson's correlation coefficients were calculated to examine the correlation between all variables in the study.

To assess the predictive effect of RNT on psychopathology mediated by COVID-19 anxiety and fear of COVID-19, a mediation analysis was conducted using Model 4 of PROCESS macro 4.2 for the software IBM SPSS 28.0 (Hayes, 2022) with bootstrapping confidence intervals. Statistical assumptions and correlation coefficients between all variables were justified. Indirect effects were assessed with 5000 bootstrap samples based on 95% Bias-Corrected Bootstrap Confidence Intervals (95% BCBCI; Preacher & Hayes 2008). Criteria for interpreting the size of the mediation effect using standardized values were set as 0.00, 0.14, 0.39, and 0.59, as recommended by Cohen (1988), to consider null, small, medium, and large effect size in magnitude (cf. Farichild et al., 2009). The percentage of the total mediation effect was calculated (Shrout & Bolger, 2002), which is a preferable interpretation according to Wen and Fan (2015).

Table 2 Mean, standard deviation, and Pearson coefficient correlations between all variables in study (N = 336)

	M(SD)	1.	2.	3.	4.
1. PINTS	15.88 (4.28)	-			
2. DASS-21	12.95 (10.40)		-		
3. CAS	1.07 (2.10)			-	
4. FCV-19 S	16.33 (4.57)				-

Note. PINTS: Persistent and Intrusive Negative Thoughts Scale, score range between 5 and 25; DASS-21: Depression, Anxiety and Stress Scale − 21, score range between 0 and 63; CAS: COVID-19 Anxiety Scale, score range between 0 and 20; FCV-19 S: Fear of COVID-19 Scale, score range between 7 and 35; *** p < .001

Results

According to Lovibond and Lovibond's (1995) cut-off scores for the DASS, 108 individuals (32.1%) scored above 5 on the depression subscale, which describes the presence of depressive symptomatology, 88 individuals (26.2%) scored above 4 on the anxiety subscale, which refers to the presence of anxiety symptoms, and 106 individuals (31.5%) scored above 8 on the stress subscale, which describes the presence of stress symptoms. In addition, 52 individuals (15.5%) with anxiety symptoms had comorbid depressive symptoms, while 66 individuals (19.6%) had comorbid stress symptoms, and 72 individuals (21.4%) with depressive symptoms had comorbid stress symptoms. Moreover, 44 individuals (13.1%) had comorbid depression, anxiety, and stress symptoms.

Table 2 shows the mean and standard deviation for RNT, psychopathology, fear of COVID-, and COVID-19 anxiety, and Pearson coefficient correlations between all variables.

The mediation model explained 42.9% of the variance in psychopathology, which was significant, $R^2 = 0.429$, $F(6,329) = 41.24$, $p < .001$, after controlling for being isolated ($\beta = -0.05$, $SE = 1.34$, $t = -1.12$, $p = .264$; 95% BCBCI −4.14–1.14), being infected with SARS-CoV-2 ($\beta = -0.05$, $SE = 2.09$, $t = -1.15$, $p = .251$; 95% BCBCI −6.50–1.71), and for working in the first line response for COVID-19 ($\beta = -0.00$, $SE = 1.11$, $t = -0.03$, $p = .979$; 95% BCBCI −2.21–2.15. The regression of RNT on psychopathology was statistically significant, $\beta = 0.58$, $SE = 0.11$, $t = 12.70$, $p < .001$; 95% BCBCI 1.20–1.64. The regression of RNT on COVID-19 anxiety (mediator) was statistically significant, $\beta = 0.28$, $SE = 0.03$, $t = 5.23$, $p < .001$; 95% BCBCI 0.09–0.19, and on fear of COVID-19 (mediator) was also statistically significant, $\beta = 0.23$, $SE = 0.06$, $t = 4.23$, $p < .001$; 95% BCBCI 0.13–0.36. The regression of fear of COVID-19 (mediator) on psychopathology was statistically significant, $\beta = 0.21$., $SE = 0.24$, $t = 4.33$, $p < .001$; 95% BCBCI 0.56–1.49, and of fear of COVID-19 (mediator) on psychopathology was also statistically significant, $\beta = 0.16$., $SE = 0.11$, $t = 3.26$, $p = .001$; 95% BCBCI 0.14–0.57. Finally, the regression of RNT on psychopathology was significant after controlling for mediators, $\beta = 0.48$; $SE = 0.11$, $t = 10.85$, $p < .001$; 95% BCBCI 0.97–1.41 (Fig. 1). The mediation effect size for COVID-19 anxiety was 0.06 and for fear of COVID-19 was 0.04 (null to small effect; Cohen, 1988; Fairchild et al., 2009), and 6.4% of the total effect of RNT on psychopathology was mediated by COVID-19 anxiety and fear of COVID-19.

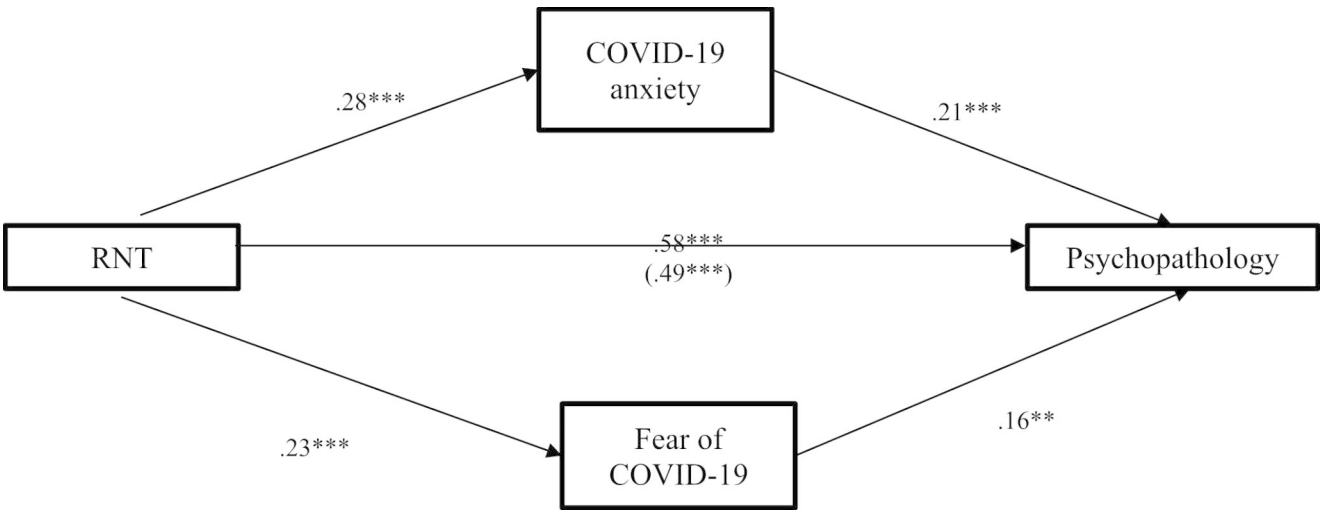

Fig. 1 Mediation model of CAS and FCV-19 S in the relationship between PINTS and DASS-21, controlling for being isolated due to COVID-19, being infected by SARS-CoV-2, and working in the first line response (N = 336). Footnote: ** $p < .01$; *** $p < .001$; controlling for SARS-CoV-2 infection, isolation due to COVID-19, and working in first line response for COVID-19. Legend: RNT - Repetitive Negative Thinking

Discussion

Psychological distress has been described in the literature as a negative consequence of the COVID-19 pandemic, with a focus on stress symptoms, anxiety, and depression (e.g., Canet-Juric et al., 2020; Daly et al., 2022; Xiong et al., 2020), but little is known about the role of COVID-19 anxiety and fear of COVID-19 in predicting psychopathology. Therefore, the current study aimed to investigate the mediating role of COVID-19 anxiety and fear of COVID-19 in the predictive relationship between RNT and psychopathology during the second lockdown in Portugal. The main results showed that COVID-19 anxiety and fear of COVID-19 were significant mediators explaining 6.4% of the predictive relationship between RNT and psychopathology during the second lockdown in Portugal.

According to empirical studies, rates for stress clinically significant symptoms during the first lockdown ranged from 8.1 to 81.9%, for clinically significant depressive symptomatology from 14.6 to 48.3%, and anxiety clinically significant symptoms from 6.33 to 50.9% (Xiong et al., 2020). Our results during the second lockdown revealed rates for clinically significant stress symptoms of 31.5%, clinically significant depressive symptoms of 32.1%, and clinically significant anxiety symptoms of 26.2%, consistent with the results of the first wave of COVID-19. Anxiety symptoms were lower compared with stress and depressive symptoms, which may be due to a greater ability to cope with uncertainty (Canet-Juric et al., 2020; Costa et al., 2022). Also, according to Khan et al. (2021), applied mitigation strategies such as social distancing and requiring the use of masks to limit the spread of the virus may be associated with slightly decreasing anxiety symptomatology. In addition, scores for COVID-19 anxiety and fear of COVID-19 were also low in the current sample. These results could be explained by the current knowledge of the new coronavirus, its spread, and its consequences, as well as by the ongoing vaccination process in Portugal during the second lockdown.

RNT, as a transdiagnostic process, has been reported in the literature as a dispositional feature for emotional disorders and psychopathology (Ehring & Watkins, 2008) and as a risk factor for psychopathological symptoms associated with COVID-19 stress (Racine et al., 2022). Our data confirmed the significant predictive role of RNT for psychopathology and COVID-19 anxiety and fear. Moreover, both COVID-19 anxiety and fear of COVID-19 were mediators of the predictive role of RNT on psychopathology, suggesting that RNT may predict psychopathology via the indirect pathway of COVID-19 anxiety and fear of COVID-19 when factors such as infection, isolation, and first-line work during the second lockdown were introduced as covariables, as previous research suggests that first-line workers experience increased levels of COVID-19 anxiety (Labrague & de los Santos, 2020; Mattila et al., 2021). However, only 6.4% of the total effect of RNT on psychopathology was mediated by COVID-19 anxiety and fear of COVID-19, suggesting that other variables are likely involved. It is possible that other cognitive dimensions, such as specific worries and rumination (Taylor & Snyder, 2021), coping and emotional regulation strategies to deal with RNT (Nolen-Hoeksema, 2012), attentional control (e.g., Mills et al., 2016), or attentional processing (e.g., Mills et al., 2014) may increase (or decrease) the risk for the occurrence of psychopathology.

Despite the current findings highlighting the role of RNT, COVID-19 anxiety, and fear of COVID-19 on psychopathology during the second lockdown in Portugal, some limitations should be noted and generalizations made with caution. First, women are overrepresented in the study compared to men, which has also been observed in previous Portuguese studies (Costa et al., 2022; Morgado et al., 2021; Paulino et al., 2021). Considering that previous research suggested gender differences in psychopathological dimensions, with women reporting higher rates of psychopathology and transdiagnostic features (e.g., Nolen-Hoeksema 2012), the overrepresentation of women in the current sample may interfere with the findings. Specifically, women are more likely to experience clinical symptoms of depression, anxiety, and stress (e.g., Nolen-Hoeksema 2012; Rubinow & Schmidt, 2019), which may influence the rates of clinical symptoms of depression, anxiety, and stress in the current sample and data. In addition, the sample survey was conducted through a web survey, which affects the accessibility of individuals without internet access or individuals who are uncomfortable with internet surveys. In addition, the sample surveyed was well-educated, which could also affect the results. Individuals with higher schooling levels may have different experiences when compared to less schooled ones, for instance, due to more easily transferring office work to remote work or even having more information or access to accurate information about the new coronavirus, which could interfere with the current findings, particularly the COVID-19 related fear and anxiety scores. Finally, considering that some of the items for assessing fear of COVID-19 appear to be related to anxiety physiological responses, which is a dimension measured for coronavirus anxiety, it is possible that overlap in item content between both measures may constitute a bias to the current results.

Overall, the current study examines the prevalence rates of clinically significant symptoms of depression, anxiety, and stress and researched fear and anxiety COVID-19-related dimensions as mediators between a transdiagnostic construct and psychopathology during the second lockdown in the Portuguese context, contributing to an extended comprehension of the negative impact of the COVID-19

pandemic on mental health. Although mitigation strategies were used to contain the viral transmission, strategies to promote mental health should also be considered, especially among individuals with dispositional characteristics for psychopathology, such as RNT. Future lockdowns may occur due to a COVID-19 pandemic or other pandemic crises. Particular attention should be paid to mental health and increased levels of psychopathology to promote adaptive strategies to manage the fear and anxiety associated with viruses and other biological threat agents, to improve mental health.

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Data availability The data that support the findings of this study are available from the corresponding author, Maria Manuela Peixoto, upon reasonable request.

Declarations

Conflict of interest The authors report there is no conflict of interest to declare.

Disclosure statement The authors report there are no competing interests to declare.

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