Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Original article

Regulation strategies during COVID-19 quarantine: The mediating effect of worry on the links between coping strategies and anxiety

Stratégies de régulation pendant la quarantaine COVID-19 : l'effet médiateur de l'inquiétude sur les liens entre stratégies d'adaptation et anxiété

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ABSTRACT

Introduction. – The COVID-19 outbreak forced Italian citizens into a generalized quarantine from March to May 2020. The quarantine is a successful measure to reduce the virus's spread through physical and social distancing, but it can also have negative psychological consequences on the population. People experience high levels of worry and anxiety and have to cope with the consequences of the health emergency. The aim of this study was to preliminarily assess the causal relations among coping, worry and state anxiety at the time of COVID-19 first wave, and the mediation role of worry between coping and state anxiety.
Methods. – During March 2020, 1273 Italian citizens completed an ad hoc online survey composed of socio-demographic and preoccupation-related questions, and standardized self-report questionnaire (Brief COPE, Penn State Worry Questionnaire and State-Trait Anxiety Inventory-State form). Three separate mediation models were performed.
Results. – The relationship between coping strategies (i.e.: problem-focused coping, emotion-focused coping and dysfunctional coping) and state anxiety resulted to be mediated by worry. Dysfunctional and problem-focused coping had a negative effect on anxiety scores and this effect was amplified by high levels of worry. Emotion-focused coping reduced state anxiety scores through its effect on reducing the levels of worry, which in turn was related to a reduction in anxiety.
Conclusion. – The present study offers first evidence for the mediation role of worry in the relation between coping and anxiety during quarantine caused by COVID-19 pandemic. It supports the clinical importance of investigating people's coping strategies along with the levels of (cognitive) worry and their long-term effects on the psychological well-being during the outbreak, in order to deliver adequate personalized interventions. Psychological support should enhance emotion-focused coping strategies that have a protective effect on both worry and anxiety.

Keywords :
COVID-19
Quarantine
Coping
Worry
Anxiety

RÉSUMÉ

Introduction. – L'épidémie de COVID-19 a contraint les citoyens italiens à une quarantaine généralisée de mars à mai 2020. La quarantaine est une mesure efficace pour réduire la propagation du virus grâce à l'éloignement physique et social, mais elle peut également avoir des conséquences psychologiques négatives sur la population. Les gens éprouvent des niveaux élevés d'inquiétude et d'anxiété et doivent faire face aux conséquences de l'urgence sanitaire. Le but de cette étude a été d'évaluer de manière préliminaire les relations causales entre l'adaptation, l'inquiétude et l'anxiété d'état au moment de la première vague de COVID-19, et le rôle médiateur de l'inquiétude entre l'adaptation et l'anxiété d'état.

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Mots clés :
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Méthodes. – Au cours du mois de mars 2020, 1273 citoyens italiens ont rempli une enquête ad hoc en ligne composée de questions concernant des données socio-démographiques et liées aux préoccupations, et d'un questionnaire d'auto-évaluation standardisé (Brief COPE, Penn State Worry Questionnaire et State-Trait Anxiety Inventory, l'échelle d'anxiété – État). Trois modèles de médiation distincts ont été réalisés.
Résultats. – La relation entre les stratégies d'adaptation (c'est-à-dire l'adaptation centrée sur le problème, l'adaptation centrée sur les émotions et l'adaptation dysfonctionnelle) et l'anxiété liée à l'état a été influencée par l'inquiétude. L'adaptation dysfonctionnelle et axée sur les problèmes a eu un effet négatif sur les scores d'anxiété et cet effet a été amplifié par des niveaux élevés d'inquiétude. L'adaptation axée sur les émotions a réduit les scores d'anxiété d'état par son effet sur la réduction des niveaux d'inquiétude, qui à son tour était liée à une réduction de l'anxiété.
Conclusion. – La présente étude offre une première preuve du rôle médiateur de l'inquiétude dans la relation entre l'adaptation et l'anxiété pendant la quarantaine causée par la pandémie de COVID-19. Elle soutient l'importance clinique d'étudier les stratégies d'adaptation des personnes ainsi que les niveaux d'inquiétude (cognitive) et leurs effets à long terme sur le bien-être psychologique pendant l'épidémie, afin de fournir des interventions personnalisées adéquates. Le soutien psychologique devrait améliorer les stratégies d'adaptation axées sur les émotions qui ont un effet protecteur sur l'inquiétude et l'anxiété.

1. Introduction

COVID-19 is the most recent infectious disease, which is affecting people worldwide, spreading from a region of China, Wuhan, since December 2019 (Wang, Horby, Hayden, & Gao, 2020). It causes fever, cough and breathing difficulties and in more cases a severe acute respiratory syndrome, which could lead to death. Due to its severity and rapid spread around the world, the World Health Organization stated on March 11 that COVID-19 can be characterized as a pandemic (WHO, 2020). After this declaration of emergency, the Italian government issued a prime ministerial decree (DCPM) in which quarantine had been extended to all Italian citizens, launching the lockdown phase until May 2020, except for workers involved in fundamental activities such as food sales, pharmacies, pet shops, laundries, gas stations (DPCM. 11 March 2020, n. 64). Quarantine, a successful measure to reduce viruses' spread (Patel et al., 2020), is characterized by physical as well as social distances becoming a painful experience due to the separation from loved ones, the loss of freedom, the fear of contagiousness for themselves and others, economic difficulties, and the interruption of developmental tasks in emerging adults and of life plans, that has negative psychological consequences, such as psychological distress (anxiety, depression, general distress) on general population (Alkhamees et al., 2020; Brooks et al., 2020; Fernández et al., 2020; Fiorillo et al., 2020; Mucci et al., 2020; Smorti et al., 2020).

This pandemic represents a new and unexpected traumatic event, both for the socio-economic crisis and psychological impact (Chen et al., 2020; Pons et al., 2020), and have similarities and differences with other natural disasters, such as hurricanes, and previous epidemics, e.g., SARS, MERS and Ebola (Brooks et al., 2020; Ćosić et al., 2020; Fiorillo et al., 2020; Jungmann & Witthöft, 2020; Mathew et al., 2020; Serafini et al., 2020; Shah et al., 2021; Wang, Xia et al., 2020). This is the first time that a global pandemic has such disruptive effects on people's lives (i.e., national closures, travel bans, social distancing), which consequently cause long lasting psychological burdening (Fiorillo et al., 2020).

The World Health Organization officially stated that a considerable degree of fear, worry and concern overwhelmed people, and anxiety was one of the main psychological outcomes experienced by the worldwide population during the quarantine caused by COVID-19 pandemic (WHO, 2021). People could experience a predictable state of non-clinical anxiety in the face of uncertainty, as it is a natural reaction to stressful, challenging, and unknown situations (Oliveri et al., 2016). Nevertheless, during the first wave of COVID-19 outbreak, some studies already reported that severe levels of anxiety were associated to the social distancing and isolation imposed by the lockdown measures, and consequently to the pervasive sense of loneliness and low perceived social support (Brooks et al., 2020; Fiorillo et al., 2020; Khan et al., 2020; Mucci et al., 2020; Serafini et al., 2020; Shah et al., 2021; Xiong et al., 2020; Lee & You, 2020). In particular, emerging adults, female and people living alone experienced higher anxiety levels (Mazza et al., 2020; Sebri et al., 2021; Shah et al., 2021; Wang, Pan, Wan, Tan, Xu, Ho et al., 2020). Recent studies reported that people's psychological distress reached the threshold of clinical relevance (Cai et al., 2020; Li, 2020; McCracken et al., 2020; Xiong et al., 2020).

The unexpected intensity and severity of COVID-19 left many people physically and psychologically unprepared to cope with this situation (Fiorillo et al., 2020; Serafini et al., 2020), and individuals showed variability in interpreting, accepting and coping to the emergency context (Park et al., 2020; Vijayaraghavan & Singhal, 2020; Wang, Xia et al., 2020). Coping is defined as the cognitive and behavioral strategies that people use to manage external and/or internal needs perceived as burdensome, or exceeding their resources (Folkman & Lazarus, 1988; Martínez et al., 2020). In general, different coping strategies to face with stressful situations have a different impact on the quality of life (Wang, Xia et al., 2020). Coping strategies are infinite and have traditionally been classified into categories such as problem-focused versus emotion-focused, functional versus dysfunctional, approach versus avoidance, engagement versus disengagement, and primary versus secondary control coping (Fink, 2016; García et al., 2018). However, up to now there is not a unique classification of these strategies. Following the coping classification in emotion- and problem-focused coping and dysfunctional coping (Coolidge et al., 2000; Cooper et al., 2006, 2008; García et al., 2018), during COVID-19 pandemic recent studies showed that problem-focused coping and emotion-focused coping were the most common strategies used by people to deal with quarantine (Li, 2020; Park et al., 2020; Sebri et al., 2021). Instead, during previous epidemics, such as SARS outbreak, emotion-focused coping (e.g., acceptance, religion, seeking emotional support) was the predominant coping strategy, because they could not solve the problem directly, but they needed to overcome the crisis emotionally (Cava et al., 2005; Yeung & Fung, 2007). Preliminary studies reported that emotion-focused coping was associated with lower levels of worry and psychological distress both in previous crisis and during COVID-19 (Adams et al., 2011; Jin et al., 2016; Sebri et al., 2021; Yeung & Fung, 2007). In particular, people tended to "seek emotional support" by spending time with kids and partners or focusing on family members, making

phone calls to friends and loved ones (Fu et al., 2020; Park et al., 2020; Rahman et al., 2020; Sebri et al., 2021). The use of this strategy was a protective factor during COVID-19 quarantine (Serafini et al., 2020) and female and caregivers tended to use this strategy more often than other people (Park et al., 2020; Sebri et al., 2021). The "seeking emotion support" was one of the common strategies even during past epidemics (Chew et al., 2020).

The problem-focused coping was often associated with a reduction in anxiety levels during COVID-19 pandemic (Fu et al., 2020; Rogowska et al., 2020). Nevertheless, strategies such as active coping or planning were mostly used in patients with anxiety disorders (Pozzi et al., 2015) and was also indicated as a risk factor for many PTSD symptoms during the experience of Hurricane Katrina (Glass et al., 2009). Other studies did not find any relation between problem-focused coping and distress levels (Littleton et al., 2007; Main et al., 2011).

Dysfunctional coping strategies, such as substance use/abuse or self-distraction, were constantly associated with negative outcomes, anxiety and higher levels of worry, after traumatic events such as sexual abuse or assault, domestic violence, burn injury, etc. (Littleton et al., 2007), or during SARS outbreak (Main et al., 2011; Maunder et al., 2006), and after the exposure to Hurricanes (Scott et al., 2010). Even during the COVID-19 pandemic, people tended to use self-distraction and substance use/abuse as coping strategies to deal with the health emergency context. Such dysfunctional coping strategies were again related to high psychological distress and worry, especially in younger people, gender minorities and in people who were financially unstable (Chen et al., 2020; Park et al., 2020; Rahman et al., 2020; Wang, Xia et al., 2020).

Worry resulted to be a common reaction to COVID-19 pandemic: it reduces the cognitive resources needed for emotional processing and drives the attention on the perceived threat (Zysberg & Zisberg, 2020). Borkovec et al. (1983) defined worry as a sequence of negative and relatively uncontrollable thoughts and images about future events with uncertain outcomes, that evoke negative emotions and strictly high levels of anxiety and distress (Kelly & Miller, 1999). On the basis of Borkovec' Cognitive Avoidance Theory of Worry (Sibrava & Borkovec, 2006), Gana et al. (2001) found a causal and unidirectional relationship between worry and anxiety that is worry causes anxiety, and a difference between the two constructs, that were shown to be separated, especially for the somatic aspects belonging to anxiety. There were some controversies about similarities and differences between worry and anxiety (Gana et al., 2001; Zebb & Beck, 1998). Worry has been conceptualized as a cognitive construct while anxiety was referred to an emotional arousal including unpleasant feeling of fear, dread or danger of something unknown, a visceral somatic activation (sympathetic and parasympathetic nervous system) and to behavioral responses such as avoidance and escape (Borkovec, 2002; Capobianco et al., 2018; Davey, 1994; Gana et al., 2001; Zebb & Beck, 1998). Worry and anxiety were highly correlated, being the two main constructs of Generalized Anxiety Disorder (GAD; American Psychiatric Association, 2013), but worry may work through different paths and processes than anxiety (Zysberg & Zisberg, 2020). When faced with a negative/uncertain event, people experience worry, which is characterized by repetitive thoughts focused on various aspects of a threat, which can help people to deal with and analyze the threats. This form of repetitive thinking was also considered part of a cognitive coping mechanism, in order to control intrusive thoughts about potentially aversive situations (Yook et al., 2010). The risk is that this aspect of worry might turn into rumination, a clinical symptom (Anniko et al., 2019; Donovan et al., 2017; Lewis et al., 2018). As mentioned before, COVID-19 has disrupted people's daily routine and caused high level of worry linked to the fear of contracting the virus, the risk of death of a loved one, the financial consequences, causing high levels of distress and anxiety, and a lower life satisfaction (Kivi et al., 2021; McKnight-Eily et al., 2021). Age and gender resulted to influence the levels of worry: older adults seemed to be less worried than younger people, and males were less worried than females (Barber and Kim, 2021; Zysberg & Zisberg, 2020). This finding was in line with previous research carried out in the field of natural disaster (Barber & Kim, 2021; Hunt et al., 2003). This doubtful situation and the overloaded information from social media enhanced the level of worry in the general population (Baiano et al., 2020; Lu et al., 2020), as also occurred during past epidemic and pandemic (Cowling et al., 2010; Ro et al., 2017). In particular, Ho et al. (2020) found that receiving information about COVID-19 from traditional media, internet media and friends enhanced the level of worry (Ho et al., 2020). Previous studies showed that worry positively correlates with Post-traumatic Stress Disorder (PTSD) (Arnaboldi et al., 2017; Bardeen et al., 2013; Oliveri et al., 2019; Tull et al., 2011) and anxiety disorders (Muris et al., 2005; Raes, 2010; Yook et al., 2010), and prior researchers investigated the mediation role of worry in causing neuroticism, intolerance of uncertainty (IU) and self-compassion, and anxiety disorders (Muris et al., 2005; Raes, 2010; Yook et al., 2010).

Despite the huge literature about the psychological impact of COVID-19, there are no studies that investigated in detail the causal relation among worry, coping strategies, and anxiety. The aim of this study was to explore the mediation role of worry between coping strategies and level of state anxiety during the first wave of COVID-19 pandemic in a sample of the Italian population. In particular, we formulated four hypotheses: (H1) the use of emotion- and problem-focused coping should reduce worry and anxiety; (H2) the use of dysfunctional coping should increase worry and anxiety; (H3) worry should have a positive correlation with anxiety; (H4) worry should mediate the relation between coping strategies (problem-, emotion-focused and dysfunctional coping) and anxiety.

2. Materials and methods

2.1. Participants

From 20 March to 27 March 2020, a total of 1273 Italian citizens from different regions voluntarily accepted to participate in this cross-sectional observational study, during their quarantine due to Coronavirus pandemic, and completed a series of *had hoc questions* and standardized questionnaires. All the participants signed an online informed consent and exclusion criteria were age < 18 years, incomplete answers, and the lack of signed informed consent. All the documents of the survey have been managed online because of the impossibility to meet people during quarantine. Nevertheless, contacts of authors have been provided to the participants in order to assist them for any query and issue.

2.2. Measures

A structured and self-administered ad hoc questionnaire (Appendix A) was created to assess the following domains.

2.2.1. Sociodemographic aspects and current status

The questionnaire included a set of specific questions to depict some personal information, such as gender, age, educational level, current employment, and current state of working ("What is your current working status?" Multiple choice: smart working, obligatory holidays, paid leave, unemployment insurance, closing my business as owner, currently at work, being unemployed), current region of residence ("In which region do you currently live?"), living arrangement ("With whom do you currently live?" Multiple choice: alone, with my family of origin, with my partner and/or children or

with roommates), participants' health status ("Did you test positive for COVID-19? Answer yes only in case of a proven positive test") and close family and friend's health status ("Has anyone very close to you (relatives/friends) tested positive for COVID-19? Answer yes only in case of proven positive test. If yes, please specify who").

In additions to this ad hoc questions, three self-report and standardized questionnaires had been administered, asking participants to refer to the imminent situation.

2.2.2. State-Trait Anxiety Inventory (STAI-Y1)

Is a self-report tool widely applied for assessing the state anxiety (Spielberger et al., 1983). Compared to the STAI-X original form, this version better discriminates anxiety from depression symptoms (Crawford et al., 2011). The state anxiety subscale is composed of 20 items, rated on a 4-points Likert scale ranging from 1 = "for nothing" to 4 = "very much" with the specific aim of assessing transitory emotional responses that include unpleasant feelings (worry, nervousness, and apprehension). Some examples of items are: "I feel secure", "I feel frightened", "I feel nervous". High total score indicates higher anxiety. The STAI-Y1 is a reliable and valid tool for assessing anxiety states, even in a sample of healthy subjects (Potvin et al., 2011). The reliability of the original STAI-Y1 scale was assessed on male and female samples categorized according to age group or job. Specifically, internal consistency coefficients for the scale have ranged from .86 to .93 in the male sample divided in working adults, college students, high school students and military recruits and from .93 to .95 in the female sample. Following the age group, Cronbach's alpha ranged from .92 to .93 in the male sample and from .90 to .94 in the female sample (Spielberger et al., 1983). Our study confirms the excellent internal consistency of the instrument ($\alpha = .94$). The Italian version was translated and validated by Pedrabissi and Santinello (1989), that also reported average scores of the validation sample were 36 ± 9.7 for men; 39.93 ± 11 for women (Pedrabissi & Santinello, 1989).

2.2.3. Brief–COPE

The shortened version of the COPE Inventory (Carver, 1997; Carver et al., 1989) consists in 28-items assessing 14 coping strategies that could be classified in to three domains: use of instrumental support, active coping, and planning as problem-focused coping; use of emotional support, acceptance, positive reframing, humor, and religion as emotion-focused coping; self-distraction, venting, behavioral disengagement, self-blame, denial, and substance use as dysfunctional coping (Coolidge et al., 2000; Cooper et al., 2006, 2008; García et al., 2018). This version has the advantage of measuring coping strategies both in normal situations, called trait coping, and in specific stressful situations, called state or situational coping (Sartori & Rappagliosi, 2011). Cooper et al. (2008) evaluated the internal consistencies of the Brief COPE and found a good internal consistency for emotion-focused ($\alpha = 0.72$), problem-focused ($\alpha = 0.84$), and dysfunctional subscales ($\alpha = 0.75$). Items of the situational version of the questionnaire are rated on a 4-point Likert Scale from 0 = "I did not do this absolutely" to 3 = "I am used to do this" in reference to how frequent is the application of such strategies to face this particular stressful event (Monzani et al., 2015). In the present study, people were asked to refer to the quarantine due to COVID-19 pandemic and some examples of the items were: "I've been taking action to try to make the situation better", "I've been learning to live with it", "I've been refusing to believe that it has happened". Higher scores on each subscale indicates a greater use of those particular strategies. This short form decreases the amount of response time requested without losing psychometric properties and its reliability and validity (Carver, 1997; Crisp et al., 2013), moreover, it was widely validated around the world, even in Italy (Kimemia et al., 2011; Monzani et al., 2015; Scardaccione, 2008). The reliability analysis was carried out by Carver (1997), who found a good internal reliability as the values were higher than .50, despite the scales being composed of only two items (Carver, 1997). Moreover, Monzani et al. (2015) reported the omega value for all the subscales of the Italian situational version of Brief COPE (Monzani et al., 2015). In our study, the internal consistency (Cronbach's alpha) for emotion-focused coping is $\alpha = .61$; for problem-focused coping is $\alpha = .70$; for dysfunctional coping is $\alpha = .61$.

2.2.4. Penn State Worry Questionnaire (PSWQ)

This scale assesses the intensity or inadequacy of worry and the tendency of worry to generalize to various situations. In particular, this instrument is used to identify pathological symptoms of concern that characterize generalized anxiety disorder (GAD), but without a diagnostic value (Dear et al., 2011). PSWQ is a short self-report questionnaire (16-items) rated on a 5-points Likert scale ranging from 1 = "not at all typical of me" to 5 = "very typical of me" (Meyer et al., 1990). The total score is calculated by summing the results of each item, with a reverse score of 5-items (item 1, 3, 8, 10 and 11). The total score can range from low (16–39), to moderate (40–59) or high (60–80) levels of worry. Meyer et al. (1990) tested PSWQ reliability and validity through different studies on samples of psychology college students and reported an internal consistency ranged from .91 to .95 (Meyer et al., 1990). This questionnaire was validated in an Italian version and showed high internal consistency ($\alpha = .85$) and good test-retest reliability (Morani et al., 1999). Some examples of the items are: "I know I should not worry about things, but I just cannot help it", "I have been a worrier all my life" and "I do not tend to worry about things". In our study, PSWQ has an excellent internal consistency ($\alpha = .91$).

2.3. Procedure

Since 20-Mar, 2020 a Qualtrics survey link (Qualtrics is an online management platform, designed to allow researchers to create surveys, gather and analyze data collected) has been shared through social media (Facebook, Linkedin, Researchgate, Twitter, Whatsapp). We choose to combine a self-selection online survey method of non-probability sampling with a snowball sampling technique, because it was the best method to invite a large number of people from all Italian regions during quarantine (Oliver et al., 2020). In the first sheet of the survey, the explanation of the study was presented, so that people could decide if they were interested to give their contribution. All the participants, that accepted to participate, were invited to sign an informed consent, and were informed that all the responses would remain strictly confidential and anonymous. The study was conducted according to the Declaration of Helsinki and the Ethical Committee of the European Institute of Oncology approved the study under the protocol nr R1423/21-IEO 1495.

2.4. Data analysis

All the analyses have been performed with SPSS version 26. The snowball sampling strategy is associated to the risk of collecting incomplete data, falsified answers, low-quality answers (Contandriopoulos et al., 2019). To ensure data quality, we tried to maximize the engagement of participants by stressing the relevance of this study as also a way to raise their voice reporting their psychological well-being status; we did not consider the incomplete questionnaires in the analysis; finally we checked the trend in participants' responses in both PSWQ and STAI-Y1 to verify the overall coherence of participant's reported anxiety and worry levels. Descriptive statistics were employed to describe the characteristics of the sample and of the overall questionnaires total scores, while correlations (Pearson r and Spearman ρ) were performed to preliminary test the relationship between our variables of interest. Moreover, we performed U Mann–Whitney analysis as the

Table 1
Mean scores of psychological variables.

Psychological variables	Mean (SD)	Range	Mean male (SD)	Mean female (SD)
Worry	44.17 (12.11)	16–80	42.5 (11.1)	47.4 (12.9)
Problem-focused coping	16.88 (3.29)	6–24	15.9 (3.2)	17.2 (3.2)
Emotion-focused coping	24.45 (4.20)	10–40	23.6 (4)	24.7 (4.2)
Dysfunctional coping	22.75 (4.03)	12–48	22 (4.4)	22.9 (3.9)
Anxiety	51.19 (11.45)	20–80	46.3 (11.3)	52.8 (11)

Table 2
Correlation coefficients for the main variables in the study.

	Variable	1	2	3	4	5	6	7
1	Age	–						
2	Educational level[a]	.03	–					
3	Worry	−.10**	−.06*	–				
4	Dysfunctional coping	−.09**	.00	.37**	–			
5	Problem-focused coping	−.00	.18**	.07*	.30**	–		
6	Emotion-focused coping	.03	.16**	−.11**	.23**	.56**	–	
7	Anxiety	.02	−.04	.66**	.33**	.11**	−.17**	–

[a]Spearman's correlation coefficients.
*$p \leq .05$.; **$p \leq .01$; ***$p \leq .001$.

variables do not follow a normal distribution to explore differences in the questionnaires between male and female. Cronbach alpha was computed to assess the reliability of questionnaires. Finally, to assess if the relationship between state anxiety and coping strategies were mediated by worry, we performed mediation analysis with PROCESS macro, using model 4 (Hayes & Rockwood, 2017). The mediation was tested using path analysis technique. Unstandardized indirect effects were computed for 5000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. As reported by Fairchild and McDaniel (2017), the mediation analysis with cross-sectional data brings with it some fair prejudices, and the percentage of the variance that is shared among constructs is not considered. Longitudinal mediation models may provide a better representation of the mechanisms behind psychological processes. Nevertheless the current study has an explanatory aim and it is part of a longitudinal study, with a follow-up at the end of the lockdown (T1 = mid-May 2020) and three months after the end of the first lockdown (T2 = mid-September 2020), and this preliminary mediation analysis helps to identify a causal model among coping strategies, anxiety and worry that will be further investigated/confirmed at a long-term.

3. Results

3.1. Descriptive statistics and levels of worry, anxiety and coping

Participants were from all Italian regions, though most were from Northern Italy ($n = 903$; 70.9%). The age of participants ranged from 18 to 80 (M = 35.12 years; SD = 11.52), 24.5% were males ($n = 312$) and 75.5% were females ($n = 961$). Most participants had a high educational level, degree or over ($n = 824$; 64.7%). The sample included mostly workers, particularly 44.3% of participants ($n = 560$) were blue-collar workers and 411 (32.5%) were white-collar workers. Only 61 participants were health care professionals (4.8%). The rest of the sample was composed of students and 71 were unemployed. Regarding the working status, half of workers continued working during this period, 412 of them were forced to work at home in smart working (32.5%). Almost all lived with family, 423 of them lived with the family of origin (33.2%) and 627 were living with a partner and/or child (49.2%).

Total scores of the questionnaires are reported in Table 1. Considering PSWQ scores, the mean of our sample was in a range of moderate level of worry (44.17 ± 12.107), while the mean of State Anxiety scores was higher than the cut off for both in men and women (males: 46.31 ± 11.31; females: 52.78 ± 11.04), indicating a significant level of anxiety in our population. Moreover, our sample mainly used problem- and emotion-focused coping to deal with COVID-19 quarantine than dysfunctional coping. We performed Mann–Whitney U test to explore gender differences in psychological variables. Results showed that the levels of worry (U = 109757, $p = .000$), state anxiety (U = 101148, $p = .000$), problem-focused coping (U = 119903, $p = .000$), emotion-focused coping (U = 127618, $p = .000$) and dysfunctional coping (U = 127024, $p = .000$) in the female group were significantly higher than in the male group.

Table 2 shows the correlations between sociodemographic variables and psychological aspects. However, we only reported in the text correlations with a score greater than .20, deeming it the recommended minimum to represent a significant effect for social science data (Ferguson, 2009). In particular, the use of dysfunctional coping strategies was related to higher levels of both anxiety ($r = .33$, $p < .01$, 95% CI) and worry ($r = .37$, $p < .01$, 95% CI). As expected, higher levels of worry were correlated with higher levels of anxiety ($r = .66$, $p < .01$, 95% CI).

3.2. Mediational analysis

3.2.1. State anxiety and coping strategies

Three separate mediation models were performed.

In all the models, we tested the significance of the indirect effect of the mediator (PSWQ) on the dependent variable (STAI Y1) using a bootstrapping procedure.

As Fig. 1 illustrates, in a mediation model including problem-focused coping as a predictor of state anxiety, there was a significant indirect effect of this coping strategies on state anxiety through worry. Testing the significance of the indirect effect with bootstrapping methods, we obtained an unstandardized indirect effect = .15, 95% CI [0.02, 0.28], with a standardized indirect effect of .04, 95% CI [0.005, 0.08]. Specifically, the effect of problem-focused coping strategies on state anxiety when worry is held constant (called the direct effect of problem-focused coping) was smaller than the total effect of this coping strategies on state anxiety without controlling for worry (direct effect of X: $b = .22$, $p < .003$; total effect of X on Y: $b = .37$, $p < .001$).

Summarizing, higher use of problem-focused coping strategies predicted higher levels of both anxiety and worry. The relationship between this coping style and anxiety was also mediated by worry levels: increasing levels of worry were associated with enhanced anxiety symptoms.

As reported in Fig. 2 the relationship between emotion-focused coping on state anxiety, mediated by worry, yielded to a significant indirect effect of worry on state anxiety. The bootstrapped unstandardized indirect effect was −2, and the 95% CI [−0.3, −0.1]. Thus, the indirect effect was statistically significant. The standardized indirect effect was −07, 95% CI [−0.11, −0.04]. In particular, the total effect of emotion-focused coping on state anxiety, without controlling the mediator, was significant ($b = -.45$, $p < .001$) and greater than the direct effect of this coping strategies on anxiety symptoms, when the mediator is held constant ($b = -.25$, $p < .001$), so a greater use of this coping strategy decreased the level of both anxiety and worry. As Fig. 2 shows, the use of emotion-focused coping strategies lead to a decrease of anxiety symptoms, as well as a reduction of levels of worry. On the contrary, higher levels of worry predicted higher anxiety scores. Even in this model, worry

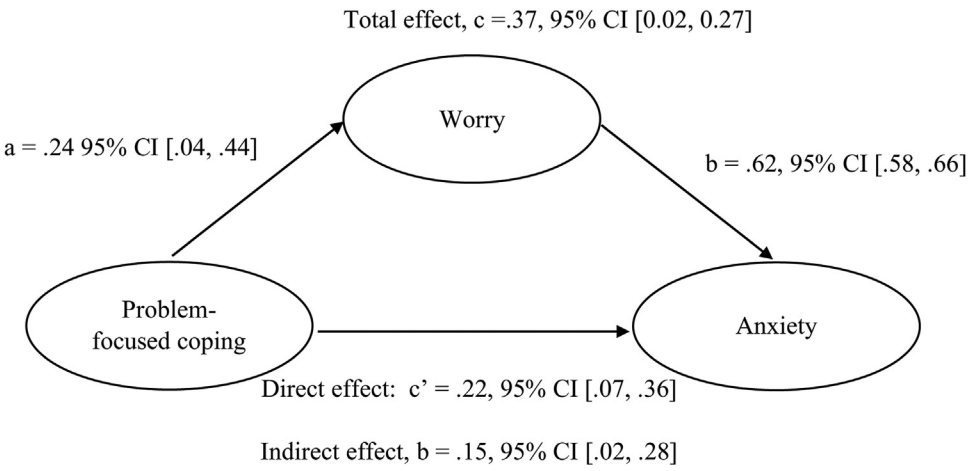

Fig. 1. Model of problem-focused coping as a predictor of State Anxiety, mediated by worry. The confidence interval for the indirect effect is a BCa bootstrapped CI based on 5000 samples. Total effect, c = .37, 95% CI [0.02, 0.27]. Note. The regression coefficient between coping and state anxiety, after controlling for worry, is reported in parenthesis.

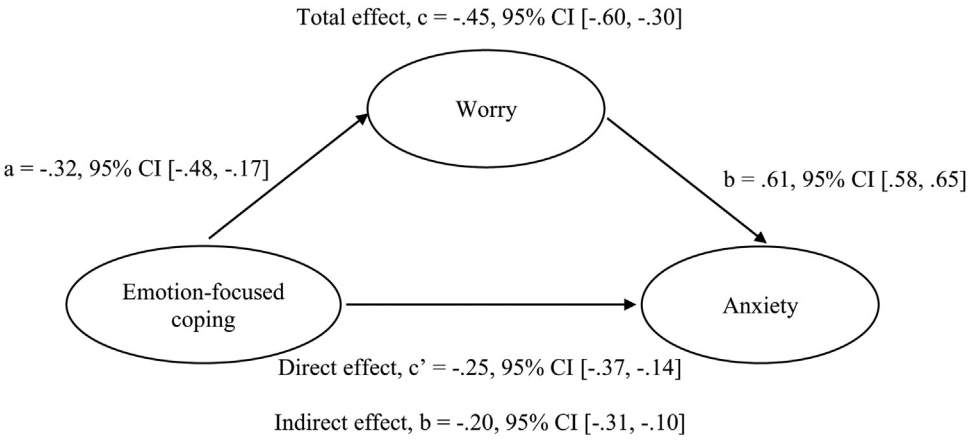

Fig. 2. Model of emotion-focused coping as a predictor of State Anxiety, mediated by worry. The confidence interval for the indirect effect is a BCa bootstrapped CI based on 5000 samples. Total effect, c = −.45, 95% CI [−.60, −30]. Note. The regression coefficient between coping and state anxiety, after controlling for worry, is reported in parenthesis.

could be considered a mediator of the effect of emotion-focused coping and anxiety.

Finally, as Fig. 3 shows, there was a significant indirect effect of worry as a mediator of the impact of dysfunctional coping on perceived state anxiety. Through bootstrapping methods, we obtained an unstandardized indirect effect = .65, 95% CI [0.56, 0.76], and a standardized indirect effect of .23, 95% CI [0.19, 0.26]. Precisely, the effect of dysfunctional coping on state anxiety, without controlling worry, was significant ($b = .94$, $p < .001$), so a greater use of this coping strategy enhanced anxiety symptoms. Moreover, the direct effect of dysfunctional coping on anxiety scores, when worry is held constant, was smaller than the total effect ($b = .28$, $p < .001$).

Specifically, for what concern the relationship between dysfunctional coping and state anxiety, results showed that higher levels of dysfunctional coping were associated with both enhanced worry levels and anxiety symptoms. The relationship was also mediated by worry. Similar to the other mediation models, worry and state anxiety had a positive relationship, with more anxiety symptoms predicted by enhanced worry.

4. Discussion

The aim of this study was to investigate the effect of coping strategies on anxiety levels in the Italian population, approximately three weeks after the beginning of the quarantine due to COVID-19, and to explore worry as a potential mediator in such a relationship. COVID-19 pandemic represented a new and unexpected traumatic event that unfortunately is still ongoing (Chen et al., 2020; Pons et al., 2020). Data used in our secondary analysis on existing data was collected during the initial phase of COVID-19 pandemic, when all Italian citizens were in quarantine for the first time. Globally, our results showed a negative impact of COVID-19 quarantine on this sample, reporting moderate level of worry and high level of state anxiety and these findings were consistent with previous studies on COVID-19 pandemic (Brooks et al., 2020; Fiorillo et al., 2020; Khan et al., 2020; Mucci et al., 2020; Serafini et al., 2020; Shah et al., 2021; WHO, 2021; Xiong et al., 2020). Moreover, even in our sample, females experienced higher levels of anxiety than males (Mazza et al., 2020; Shah et al., 2021; Wang, Pan, Wan, Tan, Xu, Ho et al., 2020).

Coping strategies are necessary for the individual resilience and adaptation process, indeed, when people experience a critical event, they start an appraisal process that ends with the identification of a coping method. In a situation without precedent, Brooks et al. (2020) suggested spreading out practical advice on coping strategies and stress management techniques to help people mitigate quarantine negative consequences. In line with previous studies, our sample tended to use both problem-focused coping and emotion-focused coping (Li, 2020; Park et al., 2020; Sebri et al., 2021).

Mediation analysis results showed that the use of different coping strategies, on a case-by-case basis, reduced or enhanced

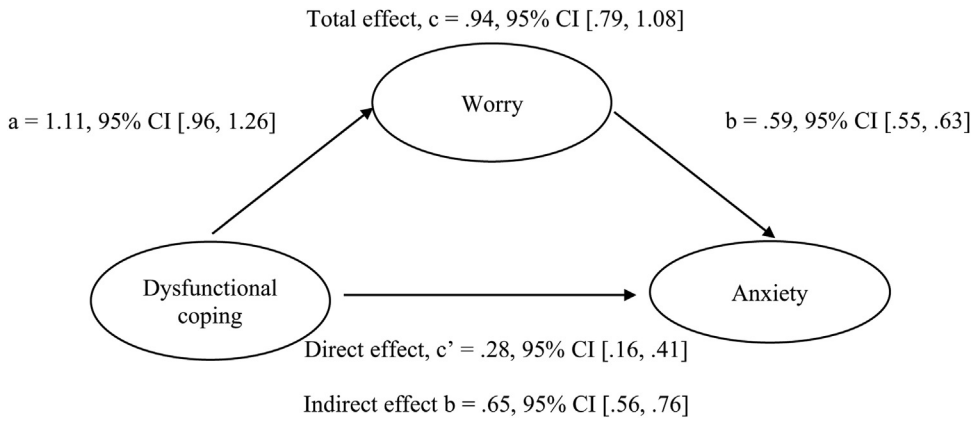

Fig. 3. Model of dysfunctional coping as a predictor of State Anxiety, mediated by worry. The confidence interval for the indirect effect is a BCa bootstrapped CI based on 5000 samples. Total effect, c = .94, 95% CI [.79, 1.08]. Note. The regression coefficient between coping and state anxiety, after controlling for worry, is reported in parenthesis.

state anxiety scores, and such effects were exacerbated by the reduction or increase of worry levels, the mediator variable, which in turns provoked a further reduction or enhance in anxiety. Specifically, problem-focused and dysfunctional coping predicted higher level of state anxiety, and such relationships were mediated by worry, on which these coping strategies had an increasing effect, and which in turn caused an increase in anxiety. Thus, the effect on anxiety scores of dysfunctional and problem-focused coping were amplified by the presence of high levels of worry. Previous studies both on past epidemics and on COVID-19 pandemic (Chen et al., 2020; Littleton et al., 2007; Main et al., 2011; Maunder et al., 2006; Park et al., 2020; Rahman et al., 2020; Scott et al., 2010; Wang, Xia et al., 2020) confirmed that the use of dysfunctional coping is maladaptive, enhancing the levels of both anxiety and worry during quarantine. On the contrary, we found that also the problem-focused coping have a negative effect on anxiety and this result is in contrast with what has been observed in previous studies (Fu et al., 2020; Rogowska et al., 2020). This could be also due to the different tools administered to evaluate the coping strategies.

The emotion-focused coping proved to be an excellent coping strategy even during this health emergency, by reducing the state anxiety scores through its effect on the levels of worry, which mediates the effects on anxiety as observed in our results. Our findings showed that emotion-focused coping strategies might be the most efficient modality to react toward a scaring/threatening event such as this pandemic, and to deal with a quarantine, by reducing the "disturbing" mediation effect of worry. This finding was also in line with evidence coming from past epidemics (Adams et al., 2011; Jin et al., 2016; Yeung & Fung, 2007). Emotion-focused coping is referred to the ability to regulate negative emotions caused by the stressful event, making an attempt to control the suffering, the inner arousal, the intrusive thoughts, by adopting active strategies such as talking or writing about emotions through therapy or journaling, accepting the situation and the related emotions, practicing mindful meditation or seeking for emotional social support. This could be important especially when people realize that they cannot do anything directly to figure out the problem or avoid it, but they can just follow the government rules, stay at home and adapt to the situation. All the information from mass media and social media reinforced these guidelines, and therefore people could only try to manage and regulate the negative emotional responses caused by the situation (Brivio et al., 2020).

These results further highlight the importance to act immediately on negative and relatively uncontrollable thoughts generated by a situation that risks to become a psychological emergency as well as an health emergency: worst-case images about future events with uncertain outcomes can foster the cognitive component of emotional arousal (worry), along with maladaptive coping strategies (dysfunctional coping). Being aware of coping strategies that people put in place most frequently and the relevance that worry could have at clinical level might be the first step to plan personalized intervention based on people's characteristics and personal tendencies (Cutica et al., 2014; Oliveri et al., 2020). People feelings of anxiety and worry during quarantine are normal until they become unmanageable; in this case they could lead to PTSD symptoms with the prolongation of the quarantine or after it is over, and people can gradually return to their lives (Liu, Yang et al., 2020; Wang, Pan, Wan, Tan, Xu, McIntyre et al., 2020; Brivio et al., 2021). Our findings provide some guidance, such as that clinical and psychological support should be based on the emotion-focused coping strategies, more than problem-focused strategies: people could try to accept and not to avoid negative feelings, and learn new ways to express them. Some strategies that people could use are talking with friends several times in a day (emotional support), shifting the way they see the problem (positive reframing), following yoga, meditation or training lessons on the computer. Psychologist could consider providing a sort of psychoeducation tools or interventions for the general population in order to explain the emotion-focused coping strategies that people could use to deal with worry and anxiety, underlying that in this emergency situation it is normal to experience repetitive negative thoughts caused by the fear of contracting the virus, the distress for the economic consequences, the grief for a loved one and the loss of freedom. Based on our findings that showed differences in the effect of coping strategies on emotions, the content of psychoeducational interventions must be focused on the needs of people. Clinically relevant levels of worry and anxiety could be tackled with evidence-based treatments (e.g., cognitive-behavioral therapy) aiming at improving adaptive coping strategies and personal resources, acquire some awareness and sense of self-efficacy. The recent literature emphasized the utility of eHealth or the use of new technologies in cancer management, to empower people, to promote the personal health and quality of life (Monzani & Pizzoli, 2020; Renzi et al., 2017): we believe the same idea could be used in this emergency context to help people in modulating worry and anxiety and prevent the risk of virus transmission due to in-person intervention. In China online mental health services or tele mental health were used to facilitate the development of Chinese public emergency interventions (Liu, Zhang et al., 2020; Zhou et al., 2020). In Italy, the Ministry of Health and Civil Protection, with the technological support offered free of charge by TIM, activated an emergency number active every day, from 8 to 24, in which specialized professionals, psychologists, psychotherapists and psychoanalysts respond to help people coping with COVID-19. Overall, the current literature

confirms the efficacy of videoconferencing psychotherapy during the pandemic (Fernández-Álvarez & Fernández-Álvarez, 2021).

This study has some limitations. A first limitation is the cross-sectional nature of the study that limits the degree to which causal relationships can be inferred. Indeed, also the use of the STAI questionnaire that included two items related to worry could be a bias. However, the presence of previous studies that use worry as a mediator on anxiety, using PSWQ and STAI-Y, provides a sufficiently compelling case for the mediational modeling that was conducted. Moreover, to overcome this limitation, this study was implemented in a longitudinal design to verify that the direction of causation, as preliminarily hypothesized and tested in this study could be confirmed. Future research could change the tool for evaluating anxiety with a tool that includes item on the somatic characteristics of anxiety.

Second, the massive sampling strategy through social media, even if it was the only way to collect responses due to the social distancing, was associated with some biases and certain risks in data quality. In particular, some participants might have falsified the answers or might have responded superficially. Anyway, we opted for some expedients described in the methods to minimize these risks.

Finally, participants were laypeople not positive to COVID-19, mainly females and young. Further research should examine to what extent the relationship among variables reported here could also be generalized to older people, to people who are positive to COVID-19 and to healthcare workers.

5. Conclusion

In conclusion, and notwithstanding the above limitations, the present study expands the previous knowledge about the psychological impact of COVID-19 pandemic by providing the first evidence for the mediation role of repetitive thinking (worry) in the relation between coping strategies and anxiety during quarantine caused by COVID-19 pandemic. This study potentially contributes to understand the aspects where a psychological support should be focused in order to improve resilience during the COVID-19 epidemic.

Disclosure of interest

The authors declare that they have no competing interest.

Data availability statement

The data that support the findings of this study are available from the corresponding author, C.C., upon reasonable request.

Author contribution statement

CC conceived the design of the present study and was in charge of overall direction and planning under the supervision of GP. SFMP analyzed data. CC, SFP and SO discussed the results and commented on the manuscript. All the authors wrote the final version of the manuscript.

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Clizia Cincidda and Silvia F.M. Pizzoli are PhD student in the European School of Molecular Medicine (SEMM).

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.erap.2021.100671.

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