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# Medical rescuers' occupational health during COVID-19: Contribution of coping and emotion regulation on burnout, trauma and post-traumatic growth

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**Abstract:** The COVID-19 pandemic places unique challenges to medical rescuers' occupational health. Thus, it is crucial to assess its direct and indirect impacts on key psychological outcomes and adaptation strategies. This study aims to analyse the impact of this pandemic on medical rescuers' coping and emotion regulation strategies, and their levels of work-related psychological outcomes, such as burnout, trauma and post-traumatic growth. Additionally, it aims to analyse the contribution of coping and emotion regulation strategies, employed to manage the COVID-19 pandemic, on burnout, trauma and post-traumatic growth. A sample of 111 medical rescuers answered the Brief Cope, Emotion Regulation Questionnaire, Oldenburg Burnout Inventory, Impact of Event Scale-Revised and Post-Traumatic Growth Inventory. Medical rescuers resorted moderately to coping and emotion regulation strategies, since the beginning of COVID-19. They presented moderate burnout and post-traumatic growth and low trauma. Coping presented a higher weight on burnout, trauma and post-traumatic growth, than emotion regulation. Expressive suppression and dysfunctional coping predicted burnout and trauma, and problem and emotion-focused coping predicted post-traumatic growth. Dysfunctional coping mediated and, thus, exacerbated the effect of expressive suppression on burnout and on trauma. Practitioners should pay closer attention to professionals with higher burnout and trauma. Occupational practices should focus on reducing dysfunctional coping and expressive suppression and promoting problem-focused coping.

**Keywords:** COVID-19, Occupational health, Medical rescuers, Coping strategies, Emotion regulation strategies.

## Introduction

Medical rescuers are now facing new occupational hazards due to the novel severe acute respiratory syndrome or COVID-19 (Coronavirus Disease of 2019), which rapidly spread worldwide (World Health Organization [WHO], 2020). They are on the frontline of this pandemic and are the workforce of the national emergency medical system, attending to victims' needs in pre-hospital settings, transporting them to hospitals and collecting biological material for SARS-CoV-2 analysis. Recent research demonstrated that, during this pandemic, frontline workers presented poorer mental health than other workers (Cai et al., 2020; Sirois & Owen, 2021). Thus,

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the COVID-19 pandemic puts an added pressure on medical rescuers and can severely impact their occupational health (European Agency for Safety and Health at Work [EU-OSHA], 2020, 2021), as a result of inadequate strategies and resources to deal with work-related stressors and demands (Ross & Altmaier, 1994). However, it can also represent an opportunity to better understand how emergency organizations can efficiently prioritize occupational health, namely by promoting more adaptive strategies (Sinclair et al., 2020).

Medical rescuers have long been considered a population at risk for psychological and occupational problems, especially for burnout and trauma. Burnout was considered by the WHO an occupational phenomenon (WHO, 2019) and is conceptualized as a prolonged and inadequate response to chronic job stressors, characterized by high levels of emotional exhaustion and depersonalization/cynicism, and low levels of personal realization and efficacy (Maslach et al., 2001). Trauma is developed after exposure to acute potentially traumatic stressors, which result in psychological impairments characterized by intrusive thoughts and memories of the trauma stimuli, avoidance, negative changes in mood or cognitions, and reactivity or arousal (American Psychiatric Association [APA], 2014). Another indicator of occupational health is post-traumatic growth, which is conceptualized as a significant and a positive change, after exposure to the same acute traumatic stressors (Tedeschi & Calhoun, 1996). This implies a cognitive reappraisal of the situation, as well as behavioural changes (Hobfoll et al., 2007). Overall, literature prior to COVID-19 has shown the presence of moderate to high levels of burnout (e.g., Portero de la Cruz et al., 2020) and post-traumatic growth (e.g., Sun et al., 2020), and a low to moderate prevalence (11 to 20%) of trauma (Fonseca et al., 2019; Petrie et al., 2018; Soravia et al., 2021). Despite the still scarce literature, particularly with rescuers, this pandemic has also shown to increase the likelihood of developing and/or exacerbating these symptoms and disorders, namely for burnout and trauma (e.g., Busch et al., 2021; Sanghera et al., 2020; Serrão et al., 2021). For post-traumatic growth, Cui and colleagues (2020) found moderate to high levels in nurses, but Kalaitzaki and Rovithis (2021) found relatively low post-traumatic growth in healthcare workers, while facing the COVID-19.

To better understand these work-related psychological outcomes (even when their relation to COVID-19 is not always clear), as well as to better understand the psychological adjustment during the pandemic and how it can be promoted, it is important to analyse which strategies medical rescuers mostly resorted to, namely among coping and emotion regulation strategies. Coping implies cognitive and behavioural efforts and changes, as a process of managing various stressors (Folkman, 2013). These strategies are grouped into problem-focused strategies, mostly used to solve a problem or find a solution, emotion-focused strategies, mostly used when the situation cannot be solved and emotions need to be managed, and dysfunctional or avoidance strategies. Emotion regulation strategies are conceptualized as attempts to influence and modulate which emotion emerges, and how this emotion is experienced and expressed (Gross & John, 2003). Therefore, these strategies can be categorized into antecedent-focused strategies, as cognitive reappraisal, and response-focused strategies, as expressive suppression (Gross & Thompson, 2007). Prior to the COVID-19 pandemic, studies showed healthcare workers and rescuers employed more problem and emotion-focused coping, as well as more cognitive reappraisal (Fonseca et al., 2019; Huang et al., 2019; Martín-Brufau et al., 2020; Portero de la Cruz et al., 2020). During the COVID-19, studies have shown healthcare workers resorted more to problem-focused strategies (Jarego et al., 2021; Roslan et al., 2021) and cognitive reappraisal (García-Batista et al., 2021).

Regarding the contribution of coping to medical rescuers' occupational health, studies have shown dysfunctional coping can contribute to burnout and trauma (Bamonti et al., 2019; Fonseca et al., 2019), and problem and emotion-focused strategies can predict post-traumatic growth (Ogińska-Bulik & Kobylarczyk, 2015; Sattler et al., 2014). During the COVID-19, a study with

430 Portuguese adults found substance abuse (dysfunctional coping) predicted poorer mental health, and humour and positive reframing (emotion-focused coping) predicted better mental health (Jarego et al., 2021). Kalaitzaki and Rovithis (2021) in the era of the COVID-19, with 673 healthcare workers, found that both adaptive and maladaptive coping strategies predicted post-traumatic growth. These authors found that positive reframing, use of instrumental support, self-distraction, denial and religion were positive predictors, and that substance abuse was a negative predictor. For emotion regulation, higher expressive suppression and lower cognitive reappraisal contributed to higher burnout and trauma, as well as lower post-traumatic growth (Huang et al., 2019; Sun et al., 2017).

Thus, it is important to increase our understanding of how the pandemic is affecting medical rescuers' occupational health, as well as the strategies employed to manage the COVID-19 experience. Moreover, is crucial to analyse how these strategies can contribute to exacerbate or reduce previous symptoms, namely the ones that arise from the most traumatic incidents in their careers or from the exposure to chronic stressors, even if not related to the pandemic. However, it is important to consider the complexity of these relationships and how the pandemic might represent a turning point towards the worsening of symptoms that may signal the early stages of psychopathology. It is also important to contribute to the scarce literature focused on medical rescuers during the COVID-19.

As such, this study aims to first analyse the impact of the COVID-19 pandemic on medical rescuers' coping and emotion regulation strategies, as well as to analyse their levels of work-related psychological outcomes, such as burnout, trauma and post-traumatic growth. Secondly, this study aims to analyse the contribution of coping and emotion regulation strategies, employed to manage this pandemic, on burnout, trauma and post-traumatic growth. Literature allowed to hypothesize that both coping and emotion regulation strategies will contribute to burnout, trauma and post-traumatic growth. Dysfunctional coping will contribute to burnout and trauma, and problem and emotion-focused coping will contribute to post-traumatic growth. Low cognitive reappraisal and high expressive suppression will contribute to high burnout and trauma, and the contrary will happen for post-traumatic growth.

## Method

### *Participants*

A total of 111 Portuguese medical rescuers participated in this study: 89 (80%) pre-hospital emergency technicians and 22 (20%) pre-hospital emergency nurses. They worked as a medical rescuer for 10.55 years on average (*SD*=4.49, 0.10-25), most in the north of Portugal (*n*=56, 51%), followed by the centre (*n*=25, 22%) and South-Lisbon (*n*=25, 22%) and by the South-Faro (*n*=5, 5%). The majority was male (*n*=61, 55%), was married or in a domestic partnership (*n*=76, 69%) and was a mother or a father (*n*=73, 66%). On average, their age was 38.54 years (*SD*=5.37; 25-55).

### *Measures*

Coping strategies reported since the beginning of the pandemic, were measured with the Brief Cope (Carver et al., 1989; validated to Portuguese by Pais-Ribeiro & Rodrigues, 2004). This instrument has 28 items measured on a 4-point Likert scale (0=*I did not do this at all* to 3=*I did this a lot*) and grouped into three major dimensions: problem-focused (α=.77; 6 items), emotion-focused (α=.77; 10 items) and dysfunctional or avoidance coping (α=.80; 12 items).

Emotion regulation strategies reported since the beginning of the pandemic, were measured with the Emotion Regulation Questionnaire (Gross & John, 2003; adapted to Portuguese by Vaz et al., 2014). All of the 10 items, measured on a 7-point Likert scale (1=*strongly disagree* to 7=*strongly agree*), are grouped into two dimensions: cognitive reappraisal (α=.83; 6 items) and expressive suppression (α=.84; 4 items).

Burnout was measured with the Oldenburg Burnout Inventory (Halbesleben & Demerouti, 2005; validated to Portuguese by Sinval et al., 2019), with 16 items measured on a 5-point Likert scale (1=*strongly disagree* to 5=*strongly agree*). In addition to the global score (α=.92), items are grouped into two dimensions with 8 items each: exhaustion (α=.89) and disengagement (α=.84).

Trauma symptomatology developed after exposure to a stressful and traumatic incident was measured by the Impact of Event Scale – Revised (Weiss & Marmar, 1997; validated to Portuguese by Matos et al., 2011). First, this instrument asks participants to consider the most traumatic incident in their careers and then 22 items assess the frequency of each symptom since this incident, on a 5-point Likert scale (0=*not at all* to 4=*extremely*). Items are grouped into a total score (α=.98) and three dimensions: intrusion (α=.96; 8 items), avoidance (α=.91; 8 items) and hyperarousal (α=.93; 6 items). The total score can vary between 0-88 and according to McCabe (2019), scores <24 do not meet criteria for trauma, scores between 24-32 are of clinical concern for post-traumatic stress disorder, scores between 33-38 represent the best cut-off value for a probable diagnosis of post-traumatic stress disorder, and scores >39 represent extreme levels of trauma.

Post-traumatic growth, after exposure to the most traumatic incident, was measured with the Post-Traumatic Growth Inventory (Tedeschi & Calhoun, 1996; validated to Portuguese by Silva et al., 2009), which has 21 items measured on a 6-point Likert scale (0=*I did not experience this change as a result of my crisis* to 5=*I experienced this change to a very great degree as a result of my crisis*). Items are grouped into a total score (α=.97) and four dimensions, namely personal strength (α=.95; 6 items), new possibilities and appreciation of life (α=.90; 6 items), relation to others (α=.95; 6 items) and spiritual change (α=.81; 3 items).

*Procedures*

This study received the approval of the University's Ethics Committee and of the board of the Portuguese National Institute of Medical Emergency. All professionals were asked to participate in an online study, between August and September 2020. They received an invitation to their professional email address, with a link to the Google Forms questionnaires, from the Communication Department of the National Institute of Medical Emergency. Researchers did not have, at any time, the participants' emails. Informed consents were also presented online. At the time of data collection, there were 1196 eligible pre-hospital emergency technicians and nurses, but only 111 of them (9.3%) voluntarily participated in this study. All ethical standards were assured, and data was confidential and anonymous. The dimensions assessed, as well as the questionnaires chosen, resulted from a close collaboration between researchers and a group of professionals who worked in medical emergency organizations. It is important to note that the instructions of the instruments that assessed coping and emotion regulation strategies were changed, in order to reflect the time since the beginning of the COVID-19 pandemic and its impact on the variables measured.

IBM SPSS Statistics, version 26.0, was used to analyse data. Univariate normality was confirmed with skewness and kurtosis (Kline, 2011), extreme outliers were not found, and missing data was not observed. Statistical procedures were the following: descriptive statistics, Pearson's bivariate correlations, multiple linear regressions, and simple mediation analyses. Partial correlations were conducted to control for the time lag between the most traumatic incident and data collection, as well as for the influence of sociodemographic and professional characteristics. All assumptions

of the multiple linear regressions (enter method) were assured: normal distribution, non-multicollinearity, errors independence and homogeneity, and linearity (Field, 2009). Simple mediation analyses were conducted with PROCESS Macro with the model 4 (Hayes, 2018).

## Results

Regarding the levels of strategies employed to manage the COVID-19 pandemic and medical rescuers' work-related psychological outcomes (Table 1), findings showed medical rescuers reported moderate levels of emotion regulation strategies and low to moderate levels of coping strategies. They also reported moderate levels of burnout and posttraumatic growth and low levels of trauma. For trauma, 71 (64%) medical rescuers did not meet criteria, 14 (13%) presented levels of clinical concern, 5 (4%) presented the best cut-off value for a probable diagnosis of post-traumatic stress disorder, and 21 (19%) presented extreme levels of trauma (McCabe, 2019). It is important to note that, on average, the most stressful and traumatic incident occurred 5.94 years (*SD*=4.62, range 0.10-22) prior to data collection.

Table 1

*Descriptive statistics of the variables in study*

| Variables | α | *M* | *SD* | Min | Max. |
|---|---|---|---|---|---|
| Cognitive reappraisal (1-7) | .83 | 4.30 | 1.17 | 1.00 | 6.33 |
| Expressive suppression (1-7) | .84 | 3.63 | 1.39 | 1.00 | 6.75 |
| Problem-focused coping (0-3) | .77 | 1.40 | 0.58 | 0 | 3.00 |
| Emotion-focused coping (0-3) | .77 | 1.27 | 0.46 | 0 | 2.60 |
| Dysfunctional coping (0-3) | .80 | 0.65 | 0.42 | 0 | 2.08 |
| Exhaustion (1-5) | .89 | 3.08 | 0.87 | 1.13 | 5.00 |
| Disengagement (1-5) | .84 | 3.01 | 0.83 | 1.25 | 5.00 |
| Burnout (1-5) | .92 | 3.04 | 0.80 | 1.44 | 5.00 |
| Intrusion (0-4) | .96 | 1.24 | 1.07 | 0 | 4.00 |
| Avoidance (0-4) | .91 | 0.98 | 0.94 | 0 | 3.50 |
| Hyperarousal (0-4) | .93 | 0.96 | 1.08 | 0 | 4.00 |
| Trauma (0-88) | .98 | 22.97 | 21.30 | 0 | 84.00 |
| Personal strength (0-5) | .95 | 2.59 | 1.44 | 0 | 5.00 |
| New possibilities and appreciation of life (0-5) | .90 | 2.31 | 1.26 | 0 | 5.00 |
| Relation to others (0-5) | .95 | 2.18 | 1.38 | 0 | 5.00 |
| Spiritual change (0-5) | .81 | 1.76 | 1.33 | 0 | 5.00 |
| Post-traumatic growth (0-5) | .97 | 2.21 | 1.23 | 0 | 4.67 |

Overall, correlations showed all dimensions of each variable correlated significantly and positively with each other (Table 2). Emotion regulation and coping strategies correlated significantly: cognitive reappraisal correlated positively with problem, emotion, and dysfunctional coping; and expressive suppression correlated positively with dysfunctional coping (with a higher coefficient than reappraisal). Moreover, emotion regulation and coping strategies correlated with burnout, trauma, and post-traumatic growth. For emotion regulation, only expressive suppression correlated positively with burnout and trauma. For coping, problem and emotion-focused correlated positively with post-traumatic growth, and only emotion-focused correlated negatively with disengagement. Dysfunctional coping correlated positively with burnout, trauma and post-traumatic growth. Moreover, when controlling for years of experience, medical rescuers' age,

being/not being a parent and how long ago the most traumatic incident took place, some correlations changed their significance (Table 2).

Table 2

*Correlations matrix*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Cognitive reappraisal | | | | | | | | | | | | | | | | |
| 2. Expressive suppression | .50*** | | | | | | | | | | | | | | | |
| 3. Problem-focused coping | .31** | .09 | | | | | | | | | | | | | | |
| 4. Emotion-focused coping | .38*** | -.02 | .66*** | | | | | | | | | | | | | |
| 5. Dysfunctional coping | .23* | .43*** | .24* | .17 | | | | | | | | | | | | |
| 6. Exhaustion | .18(.19*)[b] | .44*** | -.03 | -.11 | .57*** | | | | | | | | | | | |
| 7. Disengagement | .04 | .32** | -.18 | -.20* | .45*** | .79*** | | | | | | | | | | |
| 8. Burnout | .12 | .40*** | -.11 | -.16 | .54*** | .95*** | .94*** | | | | | | | | | |
| 9. Intrusion | .14 | .41*** | .14 | .06 | .67*** | .49*** | .31** | .43*** | | | | | | | | |
| 10. Avoidance | .18(.19*)[b,c] | .48*** | .10 | .04 | .69*** | .51*** | .39*** | .47*** | .90*** | | | | | | | |
| 11. Hyperarousal | .10 | .41*** | .10 | .01 | .67*** | .48*** | .35*** | .44*** | .91*** | .87*** | | | | | | |
| 12. Trauma | .16 | .44*** | .13 | .05 | .71*** | .50*** | .33*** | .44*** | .98*** | .96*** | .96*** | | | | | |
| 13. Personal strength | .10 | .01 | .57*** | .44*** | .12 | -.18(-.20*)[b,c,d] | -.24* | -.22* | .08 | .05 | .04 | .04 | | | | |
| 14. Possibilities/Appreciation | .05 | .06 | .53*** | .40*** | .33*** | .05 | -.06 | -.00 | .29** | .24* | .28** | .26** | .83*** | | | |
| 15. Relation to others | .08 | -.05 | .55*** | .43*** | .10 | -.17 | -.29** | -.24* | .08 | .05 | .06 | .05 | .87*** | .81*** | | |
| 16. Spiritual change | .03 | .02 | .41*** | .44*** | .18 | -.01 | -.14 | -.08 | .18(.19*)[b,c] | .19*(.18)[a] | .13 | .18(.19*)[b,c] | .68*** | .70*** | .77*** | |
| 17. Post-traumatic growth | .07 | .01 | .57*** | .47*** | .19*(.19)[b,c] | -.09 | -.20* | -.15 | .17 | .14 | .13 | .14 | .93*** | .91*** | .95*** | .86*** |

*Note.* [a]Controlling for how long ago the most traumatic incident took place; [b]Controlling for years of experience; [c]Controlling for medical rescuers' age; [d]Controlling for being or not being a parent. *$p$<.05; **$p$<.01; ***$p$<.001.

The predictive value of coping and emotion regulation strategies on burnout, trauma and post-traumatic growth was analysed (Table 3). Findings showed a higher weight of coping strategies on all variables, when compared to emotion regulation. For burnout and trauma, only expressive suppression and dysfunctional coping were positive predictors. For post-traumatic growth, emotion regulation strategies were not significant predictors and only problem and emotion-focused coping were positive predictors, especially problem-focused.

Table 3

*Predictors of burnout, trauma and post-traumatic growth: Coping and emotion regulation strategies*

| | Burnout | | | | Trauma | | | | Post-traumatic growth | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *B* | *SE B* | β | *p* | *B* | *SE B* | β | *p* | *B* | *SE B* | β | *p* |
| Model 1 | | | | | | | | | | | | |
| Cognitive reappraisal | -0.07 | 0.07 | -.10 | .305 | -1.57 | 1.81 | -.09 | .387 | 0.09 | 0.12 | .09 | .422 |
| Expressive suppression | 0.26 | 0.06 | .45*** | <.001 | 7.40 | 1.53 | .49*** | <.001 | -0.03 | 0.10 | -.04 | .754 |
| *F*(*df1, df2*) | *F*(2,107)=10.86*** | | | | *F*(2,107)=13.42*** | | | | *F*(2,108)=0.33 | | | |
| *p* | <.001 | | | | <.001 | | | | .720 | | | |
| $R^2a$ | .153 | | | | .186 | | | | -.012 | | | |
| Model 2 | | | | | | | | | | | | |
| Cognitive reappraisal | 0.01 | 0.07 | .02 | .843 | -1.65 | 1.58 | -.09 | .300 | -0.20 | 0.11 | -.19 | .059 |
| Expressive suppression | 0.11 | 0.06 | .19 | .065 | 3.27 | 1.34 | .22* | .017 | 0.03 | 0.09 | .04 | .703 |
| Problem-focused coping | -0.25 | 0.15 | -.17 | .096 | 0.13 | 3.32 | .00 | .969 | 0.96 | 0.22 | .45*** | <.001 |
| Emotion-focused coping | -0.24 | 0.19 | -.14 | .202 | -1.21 | 4.41 | -.03 | .785 | 0.62 | 0.30 | .23* | .041 |
| Dysfunctional coping | 1.00 | 0.17 | .52*** | <.001 | 35.55 | 3.90 | .64*** | <.001 | 0.22 | 0.26 | .07 | .405 |
| *F*(*df1, df2*) | *F*(5,104)=13.81*** | | | | *F*(5,104)=23.49*** | | | | *F*(5,105)=12.11*** | | | |
| *p* | <.001 | | | | <.001 | | | | <.001 | | | |
| $R^2a$ | .370 | | | | .508 | | | | .336 | | | |

*Note.* *$p$<.05; ***$p$<.001.

However, suppression significantly predicted burnout in the Model 1, but lost its predictive value when adding coping strategies in the Model 2, namely dysfunctional coping. For trauma,

expressive suppression also reduced its predictive value when coping strategies were added. Thus, possible indirect effects and simple mediation analysis were explored. Only partial mediations were found, and they are presented in Table 4 (for standardized values) and Figures 1 and 2 (for unstandardized values). Overall, findings showed dysfunctional coping mediated the effect of expressive suppression on burnout and on trauma. Therefore, dysfunctional coping had an indirect effect on how the use of expressive suppression strategies can promote burnout and trauma (Table 4). High levels of burnout and trauma were predicted by a higher use of expressive suppression strategies, which were further aggravated by a higher use of dysfunctional coping strategies.

Table 4

*Simple mediation models for burnout and trauma: Standardized coefficients and effects*

| Direct and total effects | β | *F* | *df1, df2* | *p* | $R^2a$ |
|---|---|---|---|---|---|
| Burnout (DV); Expressive suppression (IV); Dysfunctional coping (M) | | | | | |
| Path a (Expressive suppression – Dysfunctional coping) | .44*** | 26.45 | 1,108 | <.001 | .197 |
| Path b (Dysfunctional coping – Burnout) | .45*** | 25.79 | 2,107 | <.001 | .325 |
| Path c – Total Effect (Expressive suppression – Burnout; without Dysfunctional coping) | .40*** | 20.64 | 1,108 | <.001 | .160 |
| Path c'- Direct Effect (Expressive suppression – Burnout; controlling for Dysfunctional coping) | .20*** | 25.79 | 2,107 | <.001 | .325 |
| Trauma (DV); Expressive suppression (IV); Dysfunctional coping (M) | | | | | |
| Path a (Expressive suppression – Dysfunctional coping) | .43*** | 23.88 | 1,108 | <.001 | .181 |
| Path b (Dysfunctional coping – Trauma) | .63*** | 58.41 | 2,107 | <.001 | .522 |
| Path c – Total Effect (Expressive suppression – Trauma; without Dysfunctional coping) | .44*** | 26.14 | 1,108 | <.001 | .195 |
| Path c' – Direct Effect (Expressive suppression –Trauma; controlling for Dysfunctional coping) | .17*** | 58.41 | 2,107 | <.001 | .522 |

| Indirect Effects (5000 Bootstrap) | β | *SE B* | LLCI | ULCI |
|---|---|---|---|---|
| Burnout – Path ab | .20 | .05 | 0.10 | 0.31 |
| Trauma – Path ab | .27 | .06 | 0.14 | 0.39 |

*Note.* DV=Dependent Variable; IV=Independent Variable; M=Mediator; LLCI=Lower Limit Confidence Interval 95%; ULCI=Upper Limit Confidence Interval 95%.***$p$<.001. Only standardized coefficients and effects are presented.

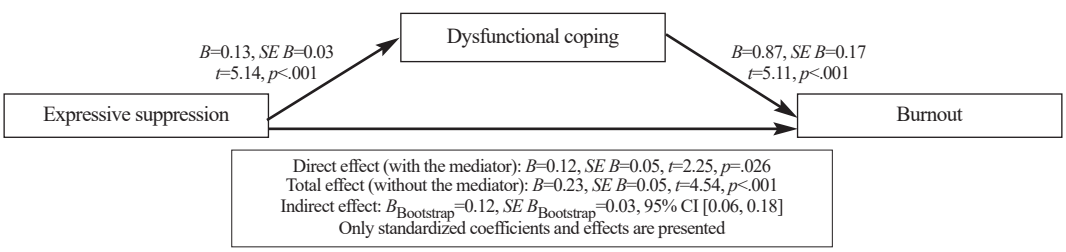


*Figure 1.* Simple mediation model for burnout: Unstandardized coefficients and effects

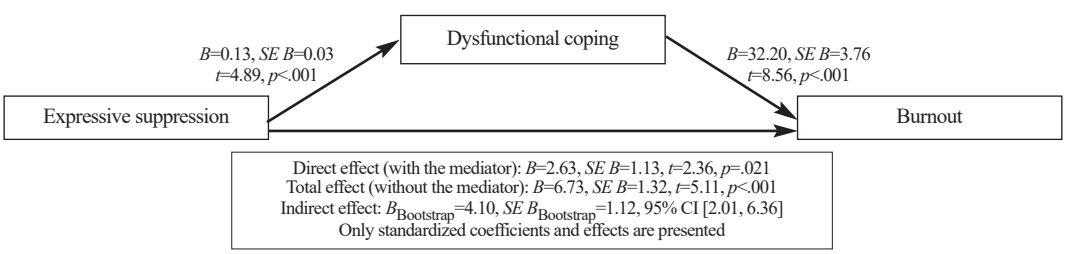


*Figure 2.* Simple mediation model for trauma: Unstandardized coefficients and effects

For burnout (Table 4 and Figure 1) and for trauma (Table 4 and Figure 2), the effect of expressive suppression on dysfunctional coping, as well as the effect of dysfunctional coping on burnout and trauma, were positively significant. When dysfunctional coping, the mediator, is not considered in the model (total effect), expressive suppression positively predicted burnout and trauma. The same happened when dysfunctional coping was included (direct effect), but with a weaker coefficient. The indirect effects were also significant.

## Discussion

Overall, regarding the impact of the COVID-19 pandemic on the strategies medical rescuers resorted to, and regarding their levels of work-related psychological outcomes, findings showed moderate and adequate levels for both, although there is some degree of concern for burnout and trauma. Findings revealed medical rescuers moderately employed coping and emotion regulation strategies to manage the COVID-19 pandemic. They resorted more to adaptative strategies, such as problem and emotion-focused coping and cognitive reappraisal, and resorted less to non-adaptative strategies, such as dysfunctional coping and expressive suppression. These results are in line with studies conducted prior to this pandemic (Fonseca et al., 2019; Huang et al., 2019; Jarego et al., 2021; Martín-Brufau et al., 2020; Portero de la Cruz et al., 2020) and fill in the gap of knowledge related to medical rescuers' COVID-19 experience. Moreover, it is important to note that medical rescuers who resorted more to problem and emotion-focused coping also resorted more to cognitive reappraisal strategies. Medical rescuers who resorted more to dysfunctional coping, also resorted more to expressive suppression (with a higher Pearson's coefficient than for cognitive reappraisal).

For medical rescuers' work-related psychological outcomes, low levels for trauma and moderate levels for burnout and post-traumatic growth were found. These outcomes resulted from exposure to acute or chronic stressors, related or not to the COVID-19. In future studies, these stressors ought to be directly addressed so to undoubtedly understand if they are related to this pandemic. Furthermore, for medical rescuers who reported trauma symptoms, 19% presented extreme levels of trauma and 13% presented levels that are of clinical concern, even if the most traumatic incident happened, on average, about six years ago. Thus, the most traumatic incident does not seem to be related to the COVID-19, for most of medical rescuers. However, for a few the incident might be related to this pandemic, since the range of time for the occurrence of the critical incident was between 1 month and 22 years, and for 8 rescuers the incident occurred within the 6 months prior to data collection (which coincided with the beginning of the COVID-19 pandemic). However, only 1 medical rescuer mentioned a critical incident related to the COVID-19 on the open-ended questions of the Impact of Event Scale-Revised. These results are in line with previous studies conducted prior to and during the COVID-19 pandemic (Cui et al., 2020; Fonseca et al., 2019; Petrie et al., 2018; Sanghera et al., 2020; Serrão et al., 2021; Soravia et al., 2021; Sun et al., 2020), although higher levels of burnout were found with nurses, who might be more exposed to emotional labour than medical rescuers (Portero de la Cruz et al., 2020). Therefore, a closer attention to burnout and trauma symptoms ought to be a concern for researchers and practitioners, during and after the COVID-19.

The strategies medical rescuers resorted to and the work-related psychological outcomes correlated with each other. The results from the regression analyses are in line with these findings and showed a greater weight of coping strategies on burnout, trauma and post-traumatic growth, when compared to emotion regulation strategies. For post-traumatic growth, emotion regulation strategies were not even significant predictors. The scientific literature is lacking in studies which

explore these two strategies during the COVID-19 pandemic, as well as in studies which explore how strategies employed to manage the COVID-19 can have an impact on work-related psychological outcomes, that may or may not be related to this pandemic.

For burnout and trauma, expressive suppression and dysfunctional coping were significant predictors, with higher coefficients for dysfunctional coping. These findings, which are in line with other studies (Bamonti et al., 2019; Fonseca et al., 2019; Huang et al., 2019; Sun et al., 2017), showed that dysfunctionally dealing with and avoiding acute or chronic stressors, as well as suppressing the expression of emotions can lead to burnout and trauma. Furthermore, resorting to dysfunctional coping exacerbated the impact of expressive suppression on burnout and trauma. Thus, actively suppress the expression of emotions, leads to a higher use of dysfunctional or avoidance coping, which in turn leads to and worsens burnout and trauma symptoms. Therefore, to prevent both burnout and trauma it is important for medical rescuers to reduce the use of dysfunctional coping and of expressive suppression, which are closely related and reinforce each other. The analysis of these indirect effects is lacking in the scientific literature and this study shows similar paths for the development and/or exacerbation of burnout and trauma in medical rescuers. For this population, it may be that acute/traumatic and chronic stressors share common origins, namely their daily critical incidents, and therefore have a similar impact on how rescuers employ coping strategies, which in turn lead to burnout and trauma.

For post-traumatic growth, emotion regulation strategies were not significant predictors, and only problem and emotion-focused coping were. Problem-focused presented a higher coefficient and therefore showed to have a greater impact on this work-related psychological outcome. Focusing on solving the problem and the situation at hand, more than dealing with the emotions that arise from this situation, appear to have a greater contribution to personal growth after a traumatic incident. Thus, problem-focused strategies, and emotion-focused at some degree, contribute to the process of cognitive reappraisal of stressors and behavioural changes, which are characteristic of post-traumatic growth (Hobfoll et al., 2007; Tedeschi & Calhoun, 1996) and are in line with other studies (Kalaitzaki & Rovithis, 2021; Ogińska-Bulik & Kobylarczyk, 2015; Sattler et al., 2014). Therefore, the regulation of emotion and of emotional responses may not have an important role on post-traumatic growth, highlighting the importance of cognitive mechanisms on positively changing and transforming after a traumatic incident (Hobfoll et al., 2007; Tedeschi & Calhoun, 1996).

### *Limitations, research and practical implications*

This study presented some limitations that should be considered when analysing findings and conclusions, namely a cross-sectional design, self-reported data, retrospective assessment, only considering rescuers' perspective and a small sample size. Not collecting data for analysing if the most traumatic incident was related to the COVID-19 pandemic was also a limitation, as well as not explicitly having a multiple-choice option for a traumatic event related to the pandemic on the Impact of Event Scale-Revised. Additionally, data collection occurred at a time span with lower expression of infections by SARS-CoV-2 and future studies need to analyse data collected at times of more pressure and vulnerability, as it was the case of the third wave of the COVID-19 pandemic in Portugal (between December/January and February/March of 2021). Longitudinal and comparative (pre and post COVID-19) studies ought to be conducted. The influence of sociodemographic and professional characteristics also needs to be explored.

For practice, this study highlights the need to pay closer attention to medical rescuers with higher burnout and trauma, especially during COVID-19. Additionally, this study points to the need of developing occupational training focused on reducing dysfunctional coping and expressive suppression, and focused on promoting problem-focused coping, to reduce burnout and trauma

and to promote post-traumatic growth. It can inform occupational practices and training on how to support, protect, and promote medical rescuers' occupational health, by focusing on coping and emotion regulation strategies, during this pandemic or other outbreaks.


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## Author contributions

Conceptualization: SMF, SC, RC, MS, MJR, GA, ARB, CQ; Methodology: SMF, SC, CQ; Data curation: SMF, CQ; Funding acquisition: SMF, SC, CQ; Investigation: SMF, SC, RC, SF, MS, MJR, GA, ARB, CQ; Formal analysis: SMF, CQ; Writing – Original draft: SMF, CQ; Writing – Review and edit: SMF, SC, RC, SF, MS, MJR, GA, CQ; Validation: SF, CQ; Project administration: SF, SC, CQ; Supervision: SC, CQ.

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## References


American Psychiatric Association [APA]. (2014). *DSM-V: Diagnostic and statistical manual of mental disorders* (5th ed.). Climepsi Editores.

Bamonti, P., Conti, E., Cavanagh, C., Gerolimatos, L., Gregg, J., Goulet, C., Pifer, M., & Edelstein, B. (2019). Coping, cognitive emotion regulation, and burnout in long-term care nursing staff: A preliminary study. *Journal of Applied Gerontology, 38*, 92-111. https://doi.org/10.1177/0733464817716970

Busch, I. M., Moretti, F., Mazzi, M., Wu, A. W., & Rimondini, M. (2021). What we have learned from two decades of epidemics and pandemics: A systematic review and meta-analysis of the psychological burden of frontline healthcare workers. *Psychotherapy and Psychosomatics, 11,* Article e58954. https://doi.org/10.1159/000513733

Cai, Q., Feng, H., Huang, J., Wang, M., Wang, Q., Lu, X., Xie, Y., Wang, X., Liu, Z., Hou, B., Ouyang, K., Pan, J., Li, Q., Fu, B., Deng, Y., & Liu, Y. (2020). The mental health of frontline and non-frontline medical workers during the coronavirus disease 2019 (COVID-19) outbreak in China: A case-control study. *Journal of Affective Disorders, 275*, 210-215. https://doi.org/10.1016/j.jad.2020.06.031

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology, 56,* 267-283. https://doi.org/10.1037/0022-3514.56.2.267

Cui, P. P., Wang, P. P., Wang, K., Ping, Z., Wang, P., & Chen, C. (2020). Post-traumatic growth and influencing factors among frontline nurses fighting against COVID-19. *Occupational and Environmental Medicine*. Advance online publication. https://doi.org/10.1136/oemed-2020-106540

European Agency for Safety and Health at Work [EU-OSHA]. (2020). *COVID-19: Back to the workplace – Adapting workplaces and protecting workers.* https://osha.europa.eu/en/publications/covid-19-back-workplace-adapting-workplaces-and-protecting-workers/view

European Agency for Safety and Health at Work [EU-OSHA]. (2021). *EU-OSHA – Single programming document 2021-2023.* https://osha.europa.eu/en/publications/single-programming-document-2021-2023/view

Field, A. (2009). *Discovering statistics using SPSS* (2nd ed.). Artmed Editora.

Folkman, S. (2013). Stress: Appraisal and coping. In M. D. Gellman & J. R. Turner (Eds.), *Encyclopedia of behavioral medicine* (pp. 1913-1915). Springer.

Fonseca, S. M., Cunha, S., Campos, R., Gonçalves, S. P., & Queirós, C. (2019). Saúde ocupacional dos profissionais de emergência pré-hospitalar: Contributo do trauma e coping. *International Journal of Working Conditions, 17*, 69-88. http://ricot.com.pt/artigos/1/IJWC.17_Fonseca.et.al._p.69.88.pdf

García-Batista, Z. E., Guerra-Peña, K., Kandany, V. N., Marte, M. I., Garrido, L. E., Cantisano-Guzmán, L. M., Moretti, L., & Medrano, L. A. (2021). COVID-19 pandemic and health worker stress: The mediating effect of emotional regulation. *MedRxiv*. https://doi.org/10.1101/2020.06.19.20135574

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348-362. https://doi.org/10.1037/0022-3514.85.2.348

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3-24). Guilford Press.

Halbesleben, J. R. B., & Demerouti, E. (2005). The construct validity of an alternative measure of burnout: Investigating the English translation of the Oldenburg Burnout Inventory. *Work & Stress, 19,* 208-220. https://doi.org/10.1080/02678370500340728

Hayes, A. F. (2018). *Introduction to mediation, moderation and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.

Hobfoll, S. E., Hall, B. J., Canetti-Nisim, D., Galea, S., Johnson, R. L., & Palmieri, P. A. (2007). Refining our understanding of traumatic growth in the face of terrorism: Moving from meaning cognitions to doing what is meaningful. *Applied Psychology: An International Review, 56,* 345-366. https://doi.org/10.1111/j.1464-0597.2007.00292.x

Huang, Q., Zhang, Q., An, Y., & Xu, W. (2019). The relationship between dispositional mindfulness and PTSD/PTG among firefighters: The mediating role of emotion regulation. *Personality and Individual Differences, 151*, Article e109492. https://doi.org/10.1016/j.paid.2019.07.002

Jarego, M., Pimenta, F., Pais-Ribeiro, J., Costa, R. M., Patrão, I., Coelho, L., & Ferreira-Valente, A. (2021). Do coping responses predict better/poorer mental health in Portuguese adults during Portugal's national lockdown associated with the COVID-19?. *Personality and Individual Differences, 175*, Article e110698. https://doi.org/10.1016/j.paid.2021.110698

Kalaitzaki, A., & Rovithis, M. (2021). Secondary traumatic stress and vicarious posttraumatic growth in healthcare workers during the first COVID-19 lockdown in Greece: The role of resilience and coping strategies. *Psychiatriki, 32*, 19-25. https://doi.org/10.22365/jpsych.2021.001

Kline, B. (2011). *Principles and practice of structural equation modeling* (2nd ed.). Guilford Press.

Martín-Brufau, R., Martin-Gorgojo, A., Suso-Ribera, C., Estrada, E., Capriles-Ovalles, M. E., & Romero-Brufau, S. (2020). Emotion regulation strategies, workload conditions, and burnout in healthcare residents. *International Journal of Environmental Research and Public Health, 17*(21), Article e7816. https://doi.org/10.3390/ijerph17217816

Maslach, C., Schaufeli, W., & Leiter, M. (2001). Job burnout. *Annual Review of Psychology, 52*, 397-422. https://doi.org/10.1146/annurev.psych.52.1.397

Matos, M., Pinto-Gouveia, J., & Martins, S. (2011). O impacto traumático de experiências de vergonha: Estudo das propriedades psicométricas da versão portuguesa da Impact of Event Scale – Revised. *Psychologica, 54*, 413-438. https://doi.org/10.14195/1647-8606_54_16

McCabe, D. (2019). *The impact of event scale – Revised (Try this: General assessment series)*. The Hartford Institute for Geriatric Nursing, New York University Rory Meyers College of Nursing. https://consultgeri.org/try-this/general-assessment/issue-19

Ogińska-Bulik, N., & Kobylarczyk, M. (2015). Relation between resiliency and post-traumatic growth in a group of paramedics: The mediating role of coping strategies. *International Journal of Occupational Medicine and Environmental Health, 28*(4), 707-719. https://doi.org/10.13075/ijomeh.1896.00323

Pais-Ribeiro, J. L., & Rodrigues, A. P. (2004). Questões acerca do coping: A propósito do estudo de adaptação do Brief COPE. *Psicologia, Saúde & Doenças, 5*, 3-15.

Petrie, K., Milligan-Saville, J., Gayed, A., Deady, M., Phelps, A., Dell, L., Forbes, D., Bryant, R. A., Calvo, R. A., Glozier, N., & Harvey, S. B. (2018). Prevalence of PTSD and common mental disorders amongst ambulance personnel: A systematic review and meta-analysis. *Social Psychiatry and Psychiatric Epidemiology, 53*, 897-909. https://doi.org/10.1007/s00127-018-1539-5

Portero de la Cruz, S., Cebrino, J., Herruzo, J., & Vaquero-Abellán, M. (2020). A multicenter study into burnout, perceived stress, job satisfaction, coping strategies, and general health among emergency department nursing staff. *Journal of Clinical Medicine, 9*(4), Article e1007. https://doi.org/10.3390/jcm9041007

Roslan, N. S., Yusoff, M. S. B., Asrenee, A. R., & Morgan, K. (2021). Burnout prevalence and its associated factors among Malaysian healthcare workers during COVID-19 pandemic: An embedded mixed-method study. *Healthcare, 9*(1), Article e90. https://doi.org/10.3390/healthcare9010090

Ross, R. R., & Altmaier, E. M. (1994). *Intervention in occupational stress: A handbook of counselling for stress at work*. Sage Publications, Inc.

Sanghera, J., Pattani, N., Hashmi, Y., Varley, K. F., Cheruvu, M. S., Bradley, A., & Burke, J. R. (2020). The impact of SARS-CoV-2 on the mental health of healthcare workers in a hospital setting – A systematic review. *Journal of Occupational Health, 62*(1), Article e12175. https://doi.org/10.1002/1348-9585.12175

Sattler, D. N., Boyd, B., & Kirsch, J. (2014). Trauma-exposed firefighters: Relationships among post-traumatic growth, post-traumatic stress, resource availability, coping and critical incident stress debriefing experience. *Stress and Health, 30*(5), 356-365. https://doi.org/10.1002/smi.2608

Serrão, C., Duarte, I., Castro, L., & Teixeira, A. (2021). Burnout and depression in Portuguese healthcare workers during the COVID-19 pandemic – The mediating role of psychological resilience. *International Journal of Environmental Research and Public Health, 18*(2), Article e636. https://doi.org/10.3390/ijerph18020636

Silva, S., Moreira, H., Pinto, S., & Canavarro, M. (2009). Cancro do mama e desenvolvimento pessoal e relacional: Estudo das características psicométricas do Inventário de Desenvolvimento Pós-Traumático (Post-Traumatic Growth Inventory) numa amostra de mulheres da população portuguesa. *Revista Iberoamericana de Diagnostico y Evaluacion Psicologica, 28*, 105-133. https://www.redalyc.org/articulo.oa?id=459645444007

Sinclair, R. R., Allen, T., Barber, L., Bergman, M., Britt, T., Butler, A., Ford, M., Hammer, L., Kath, L., Probst, T., & Yuan, Z. (2020). Occupational health science in the time of COVID-19: Now more than ever [Editorial]. *Occupational Health Science, 4*(1-2), 1-22. https://doi.org/10.1007/s41542-020-00064-3

Sinval, J., Queirós, C., Pasian, S., & Marôco, J. (2019). Transcultural adaptation of the Oldenburg Burnout Inventory (OLBI) for Brazil and Portugal. *Frontiers in Psychology, 10,* Article e338. https://doi.org/10.3389/fpsyg.2019.00338

Sirois, F. M., & Owens, J. (2021). Factors associated with psychological distress in health-care workers during an infectious disease outbreak: A rapid systematic review of the evidence. *Frontiers in Psychiatry, 11,* Article e589545. https://doi.org/10.3389/fpsyt.2020.589545

Soravia, L. M., Schwab, S., Walther, S., & Müller, T. (2021). Rescuers at risk: Posttraumatic stress symptoms among police officers, firefighters, ambulance personnel, and emergency and psychiatric nurses. *Frontiers in Psychiatry, 11*, Article e602064. https://doi.org/10.3389/fpsyt.2020.602064

Sun, J. W., Lin, P. Z., Zhang, H. H., Li, J. H., & Cao, F. L. (2017). A non-linear relationship between the cumulative exposure to occupational stressors and nurses' burnout and the potentially emotion regulation factors. *Journal of Mental Health, 27*(5), 409-415. https://doi.org/10.1080/09638237.2017.1385740

Sun, X., Li, X., Huang, J., & An, Y. (2020). Prevalence and predictors of PTSD, depression and posttraumatic growth among Chinese firefighters. *Archives of Psychiatric Nursing, 34*(1), 14-18. https://doi.org/10.1016/j.apnu.2019.12.007

Tedeschi, R. G., & Calhoun, L. G. (1996). The post-traumatic growth inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9,* 455-471. https://doi.org/10.1002/jts.2490090305

Vaz, F. M., Martins, C., & Martins, E. C. (2014). Diferenciação emocional e regulação emocional em adultos portugueses. *Psicologia, 22*(2), 123-135. https://doi.org/10.17575/rpsicol.v22i2.350

Weiss, D. S., & Marmar, C. R. (1997). The impact of event scale – Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399-411). Guilford Press.

World Health Organization [WHO]. (2019, May 19). *Burn-out an "occupational phenomenon": International Classification of Diseases*. https://www.who.int/mental_health/evidence/burn-out/en

World Health Organization [WHO]. (2020, March 11). *WHO director-general's opening remarks at the media briefing on COVID-19 – 11 march 2020*. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—-11-march-2020

**A saúde ocupacional dos profissionais do pré-hospitalar na COVID-19: Contributo do *coping* e regulação emocional no *burnout*, trauma e crescimento pós-traumático**

**Resumo:** A pandemia COVID-19 coloca desafios únicos à saúde ocupacional dos profissionais do pré-hospitalar. Assim, é fundamental avaliar o seu impacto psicológico, para sintomatologia direta ou indiretamente relacionada com a COVID-19. Pretende-se analisar o impacto desta pandemia nos *outcomes* psicológicos laborais, como *burnout*, trauma e crescimento pós-traumático, e nas estratégias de *coping* e regulação emocional. Pretende-se também analisar o contributo do *coping* e regulação emocional para estes *outcomes*. Uma amostra de 111 profissionais de emergência médica pré-hospitalar responderam ao *Brief Cope*, *Emotion Regulation Questionnaire*, *Oldenburg Burnout Inventory, Impact of Event Scale-Revised* e *Post-Traumatic Growth Inventory*. Os profissionais recorreram moderadamente a estratégias de *coping* e regulação emocional, desde o início da pandemia. Reportaram moderado *burnout* e crescimento pós-traumático e baixo trauma. O *coping* apresentou maior peso para os *outcomes*. A supressão emocional e o *coping* disfuncional contribuíram para o *burnout* e trauma, e o *coping* problema e emoção contribuíram para o crescimento pós-traumático. O *coping* disfuncional mediou e exarcebou o efeito da supressão emocional no *burnout* e trauma. Assim, poderá ser dada especial atenção a profissionais com elevado *burnout* e trauma e as práticas poderão ser focadas na redução do *coping* disfuncional e supressão emocional, bem como na promoção do *coping* problema.

**Palavras-chave:** COVID-19, Saúde ocupacional, Profissionais de emergência médica pré-hospitalar, Estratégias de *coping*, Estratégias de regulação emocional.

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