# Why are emergency medical technicians' coping strategies dysfunctional? Direct and indirect effects of resilience and perceived stress

Sílvia M. Fonseca [a,b], Sónia Cunha [c,d], Sara Faria [a,b], Rui Campos [c,d], Cristina Queirós [a,b,*]

[a] Faculty of Psychology and Education Sciences, University of Porto, Portugal
[b] FPCEUP - Rua Alfredo Allen, 4200-135 Porto, Portugal
[c] National Institute of Medical Emergency, Portugal
[d] Rua Dr. Alfredo Magalhães, 62 – 5° Andar, 4000-063 Porto, Portugal

A B S T R A C T

*Background:* Emergency Medical Technicians (EMTs) are at high risk for traumatic disorders, and these disorders are more likely if they resort to dysfunctional coping. However, few studies have examined how dysfunctional coping can be decreased, specifically by comparing the impact of personal characteristics, such as resilience, and of occupational factors, such as stress. This study examines the contribution of resilience and perceived stress on EMTs' dysfunctional coping.
*Methods:* A total of 502 EMTs (66% men), with a job experience of approximately 8 years (SD = 3.84), answered the Resilience Scale (Self and Life Acceptance; Personal Competence; Total score), Brief Cope, and Anxiety Depression Stress Scales.
*Results:* EMTs reported high resilience, low stress and dysfunctional coping. Resilience dimensions, specifically self and life acceptance, and stress contributed to dysfunctional coping. Stress displayed the highest regression coefficient. The effect of self and life acceptance on dysfunctional coping was no longer significant when accounting for stress, revealing a full mediation effect.
*Conclusions:* How EMTs perceive stress can mitigate the protective role of acceptance on the use of dysfunctional coping. These findings suggest EMTs' occupational training may benefit from focusing on how to manage stressful and critical incidents, as well as on how to cope with stress.

## 1. Introduction

Emergency Medical Technicians (EMTs) are the first to provide care to victims in pre-hospital settings, directly (in the field) or indirectly (by phone). In Portugal, EMTs are the main workforce of the national emergency medical system and their job functions are equally divided into teleassistance and assistance in the field. These medical rescuers respond to victims' needs outside the hospital and transport them to hospitals to receive further care, receive emergency calls, give the first medical advice, and select the most adequate emergency responses. As such, EMTs are exposed to a wide range of stressors and are constantly exposed to potentially traumatic stimulus, making them more prone to acute distress and/or post-traumatic stress disorders [1–5]. When dealing with these symptoms and disorders, dysfunctional coping strategies play a crucial role [6–8]. Therefore, in order to decrease the

reliance on these strategies and to reduce their negative impact, programs and interventions ought to be developed (e.g., [4,9,10]), which calls for the need to deepen the knowledge on the variables than can contribute to dysfunctional coping. Specifically, research needs to compare the contribution of personal characteristics, such as resilience, and of occupational factors, such as perceived stress in potentially traumatic incidents.

### 1.1. Dysfunctional coping

Lazarus and Folkman [11] conceptualized coping strategies as the processes of managing stressful situations, which entail cognitive and behavioural efforts and changes, through actions, thoughts or feelings [12]. For rescuers, dysfunctional coping strategies better predicted traumatic disorders, when compared to strategies focused on solving the

problem or regulating emotional activation [7,8]. A study with 535 EMTs concluded that decreasing dysfunctional strategies was more important than increasing functional ones [6]. In this study, dysfunctional or avoidance strategies were the main predictors of trauma symptomatology. Ogińska-Bulik and Zadworna-Cieślak [10], with 80 male medical rescuers, also found that avoidance coping played a more important role on posttraumatic growth than active coping. These dysfunctional strategies are defined as actions, thoughts and feelings aimed at directly avoid confronting and dealing with various stressors, as are the examples of denial (e.g., "This isn't real"), self-blame (e.g., guilt, feeling responsible for), substance abuse (e.g., alcohol, drugs), behavioural disengagement (e.g., quitting on solving or dealing with stressors) and focusing on and venting of emotions (e.g., excessively expressing emotional distress; [13,14]). Studies showed moderate to low levels of dysfunctional strategies among rescuers [4,6,10].

### 1.2. Resilience

Resilience is the ability to face, adapt and effectively adjust to stressful, adverse and/or traumatic events [15–17]. It can also be considered as a dynamic and flexible process, influenced by internal and external factors and experiences [15,16,18,17]. According to Seery et al. [19], the relationship between adversity and resilience is curvilinear: highly challenging stressors may not lead to a positive and resilient adjustment to these adverse circumstances. Nevertheless, it is important to note the diverse conceptualizations of resilience across time [20], namely when it comes to defining adversity and positive adjustment, for example, which makes studying this construct a complex task [15]. Rescuers have shown moderate to high levels of resilience, despite frequent exposure to potentially traumatic stimulus [21,10]. A Portuguese study found 48%, 46% and 6% of 400 EMTs had high, moderate and low levels of resilience, respectively [22].

### 1.3. Perceived stress

When facing potentially traumatic incidents, coping resources can be insufficient or inadequate [23]. In these situations, stress is experienced as a negative psychological state and is conceptualized as distress [24]. Distress can arise from stressful and traumatic stimulus but also from organizational demands, such as specific procedures/tasks or even interpersonal conflicts [25,1,4,26]. Lazarus and Folkman [11] developed a model of stress which considers coping a close construct. In their view, stress arises from transactional relationships between the environment and the individual, when coping resources are no longer helpful and threaten psychological well-being.

Normally, when encountering critical incidents, every person – and every rescuer (to a different degree) – should exhibit acute stress reactions [27]. However, this normative symptomatology can persist and originate acute or posttraumatic stress disorders [27], with significant impairments physically, psychologically and behaviourally, at an individual and at an organizational level (e.g., [25,7,28]). With a *meta*-analysis, Petrie and colleagues (2018) found a prevalence of 27% for distress and 11% for posttraumatic stress disorder, amongst ambulance personnel.

### 1.4. Why are EMTs' coping strategies dysfunctional? Resilience and perceived stress

Most studies have analysed the impact of coping strategies on rescuers' occupational and psychological health (e.g., [6,7,10,8]) and only a few focused on the predictors of coping. Specifically, only a few aimed to understand the underlying processes and not only the consequences of coping. Nevertheless, dysfunctional coping has shown to be related to resilience [10,14] and to perceived stress [29,14]: higher levels of dysfunctional coping related to lower resilience and higher stress. Arble and collaborators (2018) found that perceived stress predicted

dysfunctional strategies. Moreover, rescuers' resilience predicted perceived stress [7] and resilience also interacted with firefighters' perceived stress in predicting posttraumatic stress disorder (moderation; [30]). Ogińska-Bulik and Zadworna-Cieślak [10] found that resilience predicted the use of coping strategies, which in turn predicted posttraumatic growth.

When it comes to exploring the relationships and effects of resilience, perceived stress and dysfunctional coping in conjunction, only three studies were found. Li and collaborators (2018) found that resilience did not interact with perceived stress to predict avoidance coping (moderation), with 220 college students. Bartone and collaborators (2017) found that avoidance coping mediated the resilience effect on alcohol consumption, with 357 soldiers. This mediation was stronger in the presence of high levels of stress exposure. Park and collaborators (2018), with 172 caregivers, found that resilience and dysfunctional coping predicted perceived stress.

Considering this literature review, EMTs' levels of resilience and perceived stress, have shown to be especially relevant for the development of dysfunctional coping [31,10,14]. However, studies that analyse the predictors of dysfunctional coping are scarce, particularly in pre-hospital medical emergency services. Even more scarce is the study of resilience, perceived stress and dysfunctional coping in conjunction. Thus, this study aims to analyse the contribution of resilience and its dimensions and of perceived stress on EMTs' dysfunctional coping. Previous studies allowed to hypothesize that (low) resilience and (high) perceived stress will contribute to dysfunctional coping. The results can potentially add knowledge to dysfunctional coping literature and occupational practices, namely on how EMTs can decrease dysfunctional coping. However, only longitudinal, randomized, and experimental studies can firmly inform research and practices on the predictors of dysfunctional coping.

## 2. Methods

### 2.1. Design, setting and sample

This study used a cross-sectional and quasi-experimental/correlational design, where self-reported questionnaires were used to measure EMTs' dysfunctional coping, resilience and perceived stress. It is part of a broader project and is conducted with EMTs from the Portuguese National Institute of Medical Emergency. They receive, on a regular basis, training on psychological topics and abilities, provided by the psychologists of this Institute.

A convenience sampling was used. The criteria for inclusion of participants was based on profession (working as an EMT), employment/emergency organization (working in the Portuguese National Institute of Medical Emergency), and willingness to participate. EMTs excluded were on sick or paternal leave or on vacation. At the time of data collections there were 958 eligible EMTs.

### 2.2. Instruments

Dysfunctional coping was measured with the Portuguese version [32] of Brief Cope [13]. Brief Cope has 28 items that assess the frequency of 14 coping strategies when dealing with stressful incidents, on a 4-point Likert scale ($0 = $ *I did not do this at all* to $3 = $ *I did this a lot*). Items are grouped into three subscales: problem-focused, emotion-focused and dysfunctional or avoidance coping. High scores represent a higher frequency of each coping strategy. This study only considered dysfunctional strategies ($\alpha = .79$, 10 items).

Resilience was measured with the Portuguese version [33] of Resilience Scale [17], that assesses the degree of psychological resilience when facing stressful and adverse life events. The 25 items, measured on a 7-point Likert Scale ($1 = $ *totally disagree* to $7 = $ *totally agree*), result in an overall scale ($\alpha = .90$, 25 items) and two subscales/dimensions – personal competence ($\alpha = .88$, 16 items) and acceptance of self and life ($\alpha = $

.75, 9 items). The overall scores can vary between 25 and 275: scores below 121 represent low levels of resilience, scores between 121 and 145 represent moderate resilience and scores above 145 represent high resilience.

Perceived Stress was measured with the Portuguese version [34] of Anxiety Depression Stress Scales [35]. It has 21 items assessed on a 4-point Likert scale (0 = *did not apply to me at all* to 3 = *applied to me very much or most of the time*). This scale aims to measure the frequency and severity of anxiety, depression and perceived stress. High scores represent higher levels of symptomatology. In this study, only the stress scale was used (α = .88, 7 items).

Despite the scarce literature, this study used different measures than most of previous studies, except for Brief Cope (e.g., [7,10,36]). This study was part of a broader research project with Portuguese EMTs, and the Resilience Scale and Anxiety Depression Stress Scales were chosen to allow for the comparison of results with other ongoing studies with Portuguese rescuers (firefighters, police officers, emergency nurses). Moreover, these instruments were favoured for being open-access and non-clinical, as well as for being relatively short and allowing to measure different variables and dimensions in the same instrument. Therefore, in this study only specific subscales were considered to better focus on this study's aims.

### 2.3. Data collection

The board of the National Institute of Medical Emergency – which has a specific department for analysing research and ethical implications – approved this national study. All EMTs from this Institute were invited to participate in this study at meetings or monthly training sessions by managers from each department, who were contacted and briefed by the research team. Every single EMT received a closed and anonymous envelope, which included the informed consent with the study's aims and the questionnaires. Every participant returned the envelope, so as to not discriminate those who chose/did not choose to participate. Participants and researchers did not have any contact and rescuers answered the questionnaires without the presence of co-workers and/or supervisors. So, procedures ensured rescuers were free to participate or not to participate, as well as ensured confidentiality and anonymity.

### 2.4. Statistical procedures

Data were analysed with IBM SPSS Statistics for Windows, version 26.0. Kline's criteria (2011) of skewness and kurtosis allowed to confirm univariate normality and extreme outliers were not found. The amount of missing data for all items of each questionnaire fell between 0 and 2.8%, which is acceptable in a large sample [37]. However, we also explored findings with and without missings and the results did not differ [37]. Statistical procedures included descriptive analyses, Pearson's bivariate correlations, multiple linear regression and mediation. Multiple linear regression was performed using the enter method and all assumptions were assured [38]: normal distribution, non-multicollinearity, errors independence and homogeneity, and linearity. Mediation was tested with PROCESS macro, using Model 4 for simple mediations [39], which tests the indirect effect through bootstrap confidence intervals and estimates ordinary least squares regression coefficients.

### 3. Results

Five-hundred and two EMTs participated in this study, representing 52.4% of EMTs at the national level, at the time of data collection ($N = 958$). As such, 174 EMTs (34.7%) were from the north of Portugal, 131 (26.1%) from the centre and 197 (39.2%) from the south. Participants had 1 to 28 years of experience as an EMT in the National Institute of Medical Emergency ($M = 7.63$, $SD = 3.84$) and worked from 8 to 86 h per week ($M = 41.44$, $SD = 6.24$). They were aged 34.86 years on average ($SD = 5.24$, range: 22–52) and the majority was male ($n = 326$, 65.7%), had children ($n = 234$, 50.8%) and was married or in a domestic partnership ($n = 260$, 52.2%).

Table 1 presents descriptive statistics and correlations among resilience and its dimensions, perceived stress and dysfunctional coping. Participants showed moderate to high levels of personal competence and acceptance of self and life (Table 1). They had an overall resilience of 142.56 on average, but the highest score was only 175. Moreover, 47.4% ($n = 238$) showed high scores of resilience, 46.2% ($n = 232$) moderate scores and only 6.4% ($n = 32$) presented low resilience. EMTs also had low perceived stress and dysfunctional coping. Dysfunctional coping was negatively correlated with resilience and positively correlated with perceived stress (Table 1): the higher the use of dysfunctional strategies, the lower the levels of resilience and the higher the levels of perceived stress. Resilience also correlated negatively with perceived stress. All dimensions of resilience and overall score were positively correlated. Is important to note that the influence of sociodemographic and professional characteristics was controlled with partial correlations. Only women presented higher perceived stress ($r[495] = .11$, $p = .015$) and dysfunctional coping ($r[496] = .09$, $p = .045$), than men.

A multiple linear regression was performed to examine the contribution of resilience dimensions and perceived stress on EMTs' dysfunctional coping. Dimensions of resilience entered the first block of the regression analysis and perceived stress entered the second block. Two regression models are presented in Table 2.

In the first model, dimensions of resilience significantly explained 5.1% of the variance of dysfunctional coping ($F[2,498] = 14.39$, $p < .001$). However, only acceptance of self and life negatively explained dysfunctional coping ($β = -.24$, $p < .001$). In the second model, when adding perceived stress, the explained variance of dysfunctional coping increased to 25.7% ($F[3,497] = 58.54$, $p < .001$). Here, only perceived stress positively explained dysfunctional coping ($β = .49$, $p < .001$). The value of acceptance of self and life did not last in this model.

**Table 1**
Descriptive statistics and correlations among resilience and its dimensions, perceived stress and dysfunctional coping.

|  | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Personal competence (1–7) | 1 |  |  |  |  |
| 2. Acceptance of self and life (1–7) | .73*** | 1 |  |  |  |
| 3. Resilience (25–275) | .94*** | .88*** | 1 |  |  |
| 4. Perceived stress (0–3) | −.26*** | −.38*** | −.32*** | 1 |  |
| 5. Dysfunctional coping (0–3) | −.17*** | −.23*** | −.19*** | .51*** | 1 |
| *M* | 5.90 | 5.46 | 142.56 | 0.73 | 0.72 |
| *SD* | 0.59 | 0.72 | 15.08 | 0.53 | 0.38 |
| Minimum | 1.50 | 1.11 | 34 | 0 | 0 |
| Maximum | 7.00 | 7.00 | 175 | 2.71 | 2.75 |

Notes. ***p < .001.

**Table 2**
Dysfunctional coping predictors: Resilience dimensions and perceived stress.

|  | B | SE B | β | p |
|---|---|---|---|---|
| **Model 1** |  |  |  |  |
| Personal competence | 0.00 | 0.04 | .00 | .977 |
| Acceptance of self and life | −0.13 | 0.03 | −.24*** | <.001 |
| F(2, 498) | 14.39*** |  |  |  |
| $R^2a$ | .051 |  |  |  |
| **Model 2** |  |  |  |  |
| Personal competence | −0.01 | 0.04 | −.01 | .827 |
| Acceptance of self and life | −0.02 | 0.03 | −.04 | .527 |
| Perceived Stress | 0.36 | 0.03 | .49*** | <.001 |
| F(3,497) | 58.54*** |  |  |  |
| $R^2a$ | .257 |  |  |  |

Note.***p < .001.

Considering that acceptance of self and life lost the explanatory role on dysfunctional coping after adding perceived stress to the regression model, possible indirect effects were tested [39]. With PROCESS model for simple mediation, acceptance of self and life was introduced as an independent variable, dysfunctional coping as a dependent variable and perceived stress as a mediator. Table 3 and Fig. 1 present the unstandardized and standardized coefficients as well as the direct, indirect and total effects.

The effect of acceptance of self and life on perceived stress (path a) was negatively significant ($\beta = -.38, p < .001$): acceptance of self and life decreased perceived stress in potentially traumatic incidents. The effect of perceived stress on dysfunctional coping (path b) was positively significant ($\beta = .49, p < .001$): perceived stress exacerbated the use of dysfunctional strategies to deal with stressful incidents. In the absence of the mediator (perceived stress), acceptance of self and life decreased the use of dysfunctional coping (path c – total effect; $\beta = -.23, p < .001$). After including the mediator, acceptance of self and life no longer had a direct effect on dysfunctional coping (path c' – direct effect; $\beta = -.05, p = .270$). Furthermore, the indirect effect (path ab) was significant, given the absence of zero in the 95% bootstrap confidence intervals ($\beta_{Bootstrap} = -.19$, 95%CI [-0.26, −0.12]). Thus, given the non-significant effect of acceptance of self and life on dysfunctional coping after adding perceived stress, results allowed to verify a full mediation effect ($F [2,498] = 87.95, p < .001, R^2 = .261$).

## 4. Discussion

This study aimed to analyse the contribution of perceived stress, and resilience and its dimensions on EMTs' dysfunctional coping. Overall, results showed that both resilience dimensions, specifically acceptance of self and life, and perceived stress contributed to the use of dysfunctional strategies when facing critical incidents. Dysfunctional coping was mostly explained by perceived stress, which nullified the protective role of acceptance of self and life on dysfunctional coping (full mediation effect).

Descriptive statistics add to the knowledge on the psychological/ occupational health of these professionals. In this study, EMTs presented good levels of resilience, conceptualized as an ability to effectively adjust to stressful incidents and as a dynamic and flexible process [2,15,16,17]. Most presented high (47.4%) and moderate (46.2%) scores of resilience, showing they can manage their daily hazards on the job. These findings are consistent with previous studies in Portugal [22]

and with international studies [21,10]. However, in this study rescuers only achieved a score of 175 out of 275, highlighting that more work can be done to enhance this characteristic [9,10]. Furthermore, is important to note that the instrument used to measure resilience [33,17] conceptualizes it as a positive psychological trait and as beliefs of personal competence and of self and life acceptance, which may or may not promote a positive adjustment. Thus, in this case resilience is perceived as a characteristic that professionals have or don't have, and as more stable and intrinsic, which limits findings and conclusions. Other instruments with different conceptualizations of resilience will inevitably bring forth new information, with different perspectives on how to perceive adjustment to stressors and with different resilience dimensions [20]. This may have an influence on the resilience levels found, but also on further statistical analyses. Additionally, it is important to note that the assessment of resilience is only inferential and it is not being directly assessed [33].

Levels of perceived stress as a negative psychological state [24] were low, which can indicate the presence of individual and/or organizational coping resources suitable to deal with potentially traumatic stimulus [25,4,23,26]. However, it is important to note that participants in this study worked between 8 and 86 h per week, which may have had an influence on findings and conclusions, namely by reducing levels of perceived stress. Nevertheless, only 5 participants worked <35 h per week. Janka and Duschek [29] also found low levels of self-reported stress. Additionally, EMTs did not resort frequently to dysfunctional coping, conceptualized as cognitive and behavioural efforts to avoid stressors [13,12,14]. Thus, they seem to mobilize less dysfunctional strategies to deal with stressful incidents. Low levels of dysfunctional coping were also found in other studies [4,6,10]. These findings may show EMTs rely less on dysfunctional coping because they perceive less stress and believe they have the necessary abilities to deal with expected stressful incidents, namely good levels of resilience.

Correlation coefficients showed higher levels of perceived stress and lower levels of resilience correlated to a higher use of dysfunctional coping. Furthermore, regression analysis allowed to understand the contribution of resilience dimensions and perceived stress on dysfunctional coping. Resilience dimensions explained 5.1% of dysfunctional strategies, and when adding perceived stress the explained variance increased to 25.7%. Thus, the first hypothesis which stated that (low) resilience and (high) perceived stress will contribute to dysfunctional coping was confirmed. This is the first study that allowed to compare, simultaneously, the weight of resilience dimensions and perceived stress on dysfunctional coping. Some studies analysed these contributions separately [31,40,10]. Moreover, perceived stress presented the highest weight and better explained the variance of dysfunctional coping than resilience dimensions.

When it comes to resilience dimensions, only acceptance of self and life significantly contributed to dysfunctional strategies, showing acceptance of self and life – and consequently of these incidents – may be more relevant than personal competence. As such, this study brings forth new information on the importance of the acceptance of self and life for EMTs. Most studies only focused on resilience as a global score [40,30,41,10,36,14]. These findings suggest that if EMTs accept who they are, what they do and what they experience daily, they are less prone to avoid adjusting to stressful incidents [13,12,11]. In future studies, it may be relevant to examine which dimension of acceptance is more important for EMTs, the acceptance of the self or the acceptance of daily and traumatic critical incidents.

When exploring the regression coefficients, especially direct and indirect effects of acceptance of self and life and perceived stress on dysfunctional strategies, further conclusions can be taken. Results allowed to explain how acceptance of self and life can contribute to the use of dysfunctional coping, namely through perception and degree of stress after exposure to critical incidents. When perceived stress is not considered, high levels of acceptance of self and life contribute to high levels of dysfunctional coping. When perceived stress is considered in
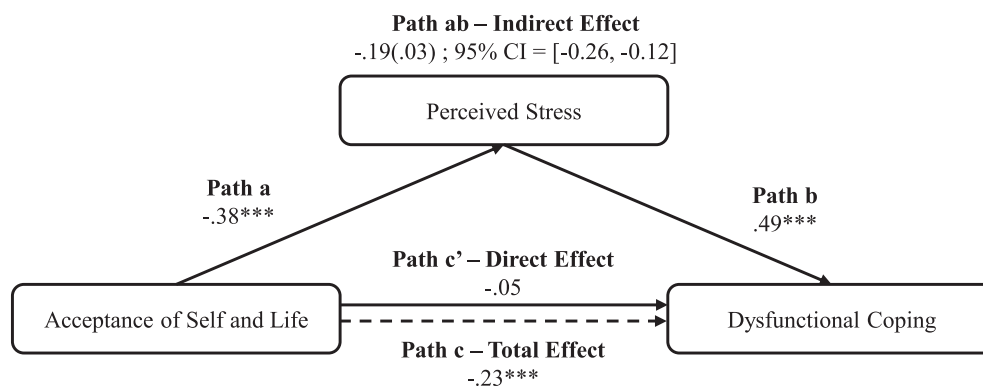
**Table 3**
Simple mediation model: Direct, indirect and total effects.

| Direct and Total Effects | B | SE B | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| Path a | | | | | | |
| Acceptance self and life → Perceived stress | −0.28 | 0.03 | −9.23 | <.001 | −0.34 | −0.22 |
| Path b | | | | | | |
| Perceived stress → Dysfunctional coping | 0.36 | 0.03 | 11.79 | <.001 | 0.30 | 0.42 |
| Path c – Total Effect | | | | | | |
| Acceptance self and life → Dysfunctional coping | −0.13 | 0.02 | −5.37 | <.001 | −0.17 | −0.08 |
| Path c'– Direct Effect (controlling for the mediator) | | | | | | |
| Acceptance self and life → Dysfunctional coping (controlling for Perceived stress) | −0.02 | 0.02 | −1.10 | .270 | −0.07 | 0.02 |
| Indirect Effect (5000 Bootstrap) | B | SE B | LLCI | | | ULCI |
| Path ab | −0.10 | 0.02 | −0.14 | | | −0.06 |

*Notes.* LLCI = Lower Limit Confidence Interval 95%; ULCI = Upper Limit Confidence Interval 95%.
Only unstandardized coefficients and effects are presented.

**Path ab − Indirect Effect**
-.19(.03) ; 95% CI = [-0.26, -0.12]

Perceived Stress

**Path a**
-.38***

**Path b**
.49***

**Path c' − Direct Effect**
-.05

Acceptance of Self and Life

Dysfunctional Coping

**Path c − Total Effect**
-.23***

**Fig. 1.** Simple mediation model: Full mediating effect of perceived stress on the relationship between acceptance of self and life and dysfunctional coping (only standardized coefficients and effects are presented). Dotted line (path c − total effect) represents the model without the mediator.

the model this effect disappeared, revealing perceived stress nullified the protective role of acceptance of self and life on dysfunctional coping. Thus, data showed a full mediation and an indirect effect of perceived stress, as no other study has before: lower levels of EMTs' acceptance of self and life can lead to higher levels of perceived stress, which in turn leads to higher levels of dysfunctional coping. Further studies should consider other possible mediators, namely with multiple mediator models [39].

These analyses allow to understand the importance of how EMTs experience their daily critical incidents to their psychological/occupational health. In fact, the use of dysfunctional strategies appears to have a fundamental contribution to trauma symptomatology [6–8]. In turn, trauma symptomatology is accompanied with significant impairments in EMTs' personal and occupational life [2,3,5], endangering the rescue itself [7]. Therefore, despite the degree of resilience and its dimensions, perceived stress can potentially and ultimately have a negative impact on different levels: the victims' safety, the quality of job-related tasks and rescuers' psychological/occupational health.

### 5. Limitations and future directions

This study presented some shortcomings: a cross-sectional design that limited the statistical analyses performed, findings and conclusions; a retrospective assessment of resilience, perceived stress and dysfunctional coping; and only considering the EMTs' perspective. Moreover, it is important to note EMTs with sick leave were not assessed in this study and they may be critical to characterize levels of resilience, dysfunctional coping and perceived stress. In this study, choosing to consider only parts of the instruments for dysfunctional coping and perceived stress was to better focus and respond to this study's aims. Despite good internal consistency values ($\alpha$ = .79 and .88), some influences and covariates may not be controlled for.

Further studies need to analyse these relationships with different rescue workers, in different emergency organizations. Longitudinal, randomized, and experimental studies need to be conducted to better clarify and strengthen results. Other sources for which coping strategies EMTs employ, as well for stress experienced in each critical incident should be considered. These results also need to be explored with other instruments and conceptualizations for resilience.

To better understand the scope of this study's findings, some considerations on external and internal validity, as well as threats and bias need to be carefully considered. These threats and bias can occur during the research design/data collection, data analysis and/or data interpretation [42], and limit the conclusions taken. Regarding internal validity, it is important to note that this study only adds knowledge to the literature and does not perceive dysfunctional coping as solely dependent of resilience and stress. Moreover, this study cannot make any causal conclusions. Regarding external validity, findings also do not

allow for a generalization of results to different groups and contexts and not even for the targeted population. Thus, among potential bias and threats, we highlight: the non-randomized sample (population validity); the cross-sectional nature (ecological and temporal validity); only considering one measure and thus one conceptualization for each variable, as well as only using part of instruments (specificity of variables and method bias); not being able to totally control how participants received the questionnaires (implementation and research bias) and how they perceived it (reactive arrangements); and being unable to control all possible covariates in data analysis [43,42].

### 6. Implications for practice

For practice, these findings suggest the need to intervene on how EMTs perceive stress when facing critical incidents rather than considering or shaping personal characteristics, such as resilience dimensions. Training may benefit from being focused on how EMTs experience and cope with stressful and potentially traumatic stimuli. Studies suggested this training can include psychoeducation and practical exercises (through roleplaying or virtual reality), focused on psychological first aid and stress management (e.g., [1,44,9,10,45]). These topics can be explored individually and when interacting with victims, family members and/or colleagues. Furthermore, after being exposed to potentially traumatic stimuli it is recommended to examine the impact of these incidents on each EMT [3]. In Portugal, the psychologists of the National Institute of Medical Emergency are responsible for this task. However, in 2019 there were only 25 psychologists to assist all 1384 EMTs [46], as well the civilian population. This highlights the need to hire more psychologists and to develop computerized systems that can regularly monitor the psychological health of each EMT, so as to better inform the psychologists' practices [47,48].

### 7. Conclusions

In summary, this study contributes to emergency care. Findings add knowledge to literature focused on variables that can contribute to EMTs' dysfunctional coping, which are crucial to better cope with occupational stressors and to prevent traumatic disorders (e.g., [6–8]). Moreover, results highlight the importance of work stress for the mobilization of dysfunctional coping strategies. When EMTs perceived stress, acceptance of self and life no longer had a protective role on the use of dysfunctional coping. Finally, this study provides additional information to emergency organizations on how they can reduce EMTs' dysfunctional coping, a need highlighted in the scientific literature (e.g., [25,4,9,10]). Findings suggest practices may benefit from focusing more on how to manage perceive stress when facing critical incidents, and less on strengthening personal characteristics such as some resilience dimensions, namely self and life acceptance. However, these conclusions

need to take into consideration the limitations of this study, especially its cross-sectional nature, convenience sampling and only considering specific subscales of some instruments. Limitations only allow for a cautious understanding of the contribution of resilience dimensions and perceived stress on dysfunctional coping.

## Ethical statement

All participants received a written informed consent. This study was approved by the research department of the National Institute of Medical Emergency. All procedures ensured confidentiality and anonymity.

## CRediT authorship contribution statement

**Sílvia M. Fonseca:** Funding acquisition, Conceptualization, Methodology, Data curation, Formal analysis, Writing - original draft, Writing - review & editing. **Sónia Cunha:** Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing - original draft. **Sara Faria:** Formal analysis, Validation, Writing - original draft, Writing - review & editing. **Rui Campos:** Conceptualization, Investigation, Methodology, Writing - original draft. **Cristina Queirós:** Funding acquisition, Conceptualization, Investigation, Methodology, Data curation, Formal analysis, Validation, Supervision, Writing - original draft, Writing - review & editing.

## Declaration of Competing Interest

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

## References

[1] Bohström D, Carlström E, Sjöström N. Managing stress in prehospital care: Strategies used by ambulance nurses. Int Emerg Nurs 2017;32:28–33. https://doi.org/10.1016/j.ienj.2016.08.004.

[2] Carleton RN, Afifi T, Taillieu T, Turner S, Krakauer R, Anderson G, et al. Exposures to potentially traumatic events among public safety personnel in Canada. Can J Behav Sci 2019;51:37–52. https://doi.org/10.1037/cbs0000115.

[3] Davis K, MacBeth A, Warwick R, Chan S. Posttraumatic stress symptom severity, prevalence and impact in ambulance clinicians: The hidden extent of distress in the emergency services. Traumatology 2019;25:282–8. https://doi.org/10.1037/trm0000191.

[4] Elder E, Johnston ANB, Wallis M, Greenslade JH, Crilly J. Emergency clinician perceptions of occupational stressors and coping strategies: A multi-site study. Inter Emerg Nurs 2019;45:17–24. https://doi.org/10.1016/j.ienj.2019.03.006.

[5] Petrie K, Milligan-Saville J, Gayed A, Deady M, Phelps A, Dell L, et al. Prevalence of ptsd and common mental disorders amongst ambulance personnel: A systematic review and meta-analysis. Soc Psychiatry Psychiatr Epidemiol 2018;53:897–909. https://doi.org/10.1007/s00127-018-1539-5.

[6] Fonseca SM, Cunha S, Campos R, Gonçalves SP, Queirós C. Pre-hospital emergency professionals' occupational health: The contribution of trauma and coping. Int J Work Condit 2019;17:69–88. https://doi.org/10.25762/ndmt-0c23.

[7] Jamal Y, Zahra S, Yaseen F, Nasreen M. Coping strategies and hardiness as predictors of stress among rescue workers. Pakistan J Psychol Res 2017;32:141–54. https://doi.org/10.1080/09735070.2017.1356033.

[8] Skeffington PM, Rees CS, Mazzucchelli T. Trauma exposure and post-traumatic stress disorder within fire and emergency services in Western Australia. Austr J Psychol 2017;69:20–8. https://doi.org/10.1111/ajpy.12120.

[9] Lanza A, Roysircar G, Rodgers S. First responder mental healthcare:Evidence-based prevention, postvention, and treatment. Profess Psychol Res Practice 2018;49:193–204. https://doi.org/10.1037/pro0000192.

[10] Ogińska-Bulik N, Zadworna-Cieślak M. The role of resiliency and coping strategies in occurrence of positive changes in medical rescue workers. Int Emerg Nurs 2018;39:40–5. https://doi.org/10.1016/j.ienj.2018.02.004.

[11] Lazarus RS, Folkman S. Stress, appraisal and coping. Springer; 1984.

[12] Folkman S. Stress: Appraisal and coping. In: Gellman MD, Turner JR, editors. Encyclopedia of behavioral medicine. Springer; 2013. p. 1913–5.

[13] Carver CS, Scheier M, Weintraub J. Assessing coping strategies: A theoretically based approach. J Pers Soc Psychol 1989;56:267–83. https://doi.org/10.1037//0022-3514.56.2.267.

[14] Thompson NJ, Fiorillo D, Rothbaum BO, Ressler KJ, Michopoulos V. Coping strategies as mediators in relation to resilience and posttraumatic stress disorder. J Affect Disord 2018;225:153–9. https://doi.org/10.1016/j.jad.2017.08.049.

[15] Fletcher D, Sarkar M. Psychological resilience a review and critique of definitions, concepts, and theory. Eur Psychol 2013;18:12–23. https://doi.org/10.1027/1016-9040/a000124.

[16] Richardson GE. The metatheory of resilience and resiliency. J Clin Psychol 2002;58:307–21. https://doi.org/10.1002/jclp.10020.

[17] Wagnild GM, Young HM. Development and psychometric evaluation of the resilience scale. J Nurs Meas 1993;1:165–78. https://sapibg.org/download/1054-wagnild_1993_resilience_scale_2.pdf.

[18] Rushton C, Batcheller J, Schroeder K, Donohue P. Burnout and resilience among nurses practicing in high-intensity settings. Am J Crit Care 2015;24:412–21. https://doi.org/10.4037/ajcc2015291.

[19] Seery MD, Holman EA, Silver RC. Whatever does not kill us: Cumulative lifetime adversity, vulnerability, and resilience. J Pers Soc Psychol 2010;99:1025–41. https://doi.org/10.1037/a0021344.

[20] Davydov DM, Stewart R, Ritchie K, Chaudieu I. Resilience and mental health. Clin Psychol Rev 2010;30:479–95. https://doi.org/10.1016/j.cpr.2010.03.003.

[21] Gayton S, Lovell G. Resilience in ambulance service paramedics and its relationships with well-being and general health. Traumatology 2012;18:58–64. https://doi.org/10.1177/1534765610396727.

[22] Cunha S, Queirós C, Fonseca S, Campos R. Resilience as a predictor of trauma in pre-hospital medical emergency technicians. Int J Work Condit 2017;13:51–67. https://doi.org/10.25762/ndmt-0c23.

[23] Everly GS, Mitchell JT. Critical Incident Stress Management (CISM): A new era and standard of care in crisis intervention. Chevron Publishing; 1997.

[24] Selye H. Selye's guide to stress research. New York: Van Nostrand Reinhold; 1980.

[25] Ângelo, R.P. (2016). Psicologia da saúde ocupacional em organizações de emergência [Occupational health psychology in emergency organizations]. In M.J. Chambel (Ed.), Psicologia da saúde ocupacional [Occupational health psychology] (pp.113-133). PACTOR.

[26] Stranks J. Stress at work: Management and prevention. Elsevier Butterworth; 2005.

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

[28] Schick, M.R., Weiss, N.H., Contractor, A.A., Suazo, N.C., & Spillane, N.S. (2020). Posttraumatic stress disorder's relation with positive and negative emotional avoidance:The moderating role of gender. Stress and Health. Advance online publication. https://doi.org/10.1002/smi.2920.

[29] Janka A, Duschek S. Self-reported stress and psychophysiological reactivity in paramedics. Anxiety Stress Coping Int J 2018;31:402–17. https://doi.org/10.1080/10615806.2018.1454739.

[30] Lee J, Ahn Y, Jeong K, Chae J, Choi K. Resilience buffers the impact of traumatic events on the development of ptsd symptoms in firefighters. J Affect Disord 2014;162:128–33. https://doi.org/10.1016/j.jad.2014.02.031.

[31] Arble E, Daugherty AM, Arnetz B. Models of first responder coping: Police officers as a unique population. Stress Health 2018;34:612–21. https://doi.org/10.1002/smi.2821.

[32] Pais-Ribeiro JL, Rodrigues AP. Questions about coping: The adaptation study of brief cope. Psicologia, Saúde & Doenças 2004;5:3–15. http://repositorio.ispa.pt/handle/10400.12/1054.

[33] Oliveira MF, Machado TS. Resilience scale translation and validation for college students. Análise Psicológica 2011;29:579–91. https://doi.org/10.14417/ap.105.

[34] Pais-Ribeiro JL, Honrado A, Leal I. Contribution for the portuguese adaptation study of Anxiety Depression Stress Scale, with 21 items, from Lovibond and Lovibond. Psicologia Saúde & Doenças 2004;5:229–39. http://www.scielo.mec.pt/scielo.php?script=sci_abstract&pid=S1645-00862004000200007&lng=pt&nrm=iso.

[35] Lovibond P, Lovibond S. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck depression and anxiety inventories. Behav Res Ther 1995;33:335–43. https://doi.org/10.1016/0005-7967(94)00075-U.

[36] Park J, Chun J, Park HC, Lee EJ, Ivins-Lukse M. Factors affecting perceived stress among Korean Caregivers of transition-age youth with intellectual and developmental disabilities using the double ABCX model. J Rehabil 2018;84:5–12. https://www.questia.com/library/journal/1G1-537853428/factors-affecting-perceived-stress-among-korean-caregivers.

[37] Kline B. Principles and practice of structural equation modeling. second ed. Guilford Press; 2011.

[38] Field, A. (2009). Discovering statistics using spss (2nded.). Artmed Editora.

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

[40] Bartone P, Johnsen B, Eid J, Hystad S, Laberg JC. Hardiness, avoidance coping, and alcohol consumption in war veterans: A moderated-mediation study. Stress Health 2017;33:498–507. https://doi.org/10.1002/smi.2734.

[41] Li M, Eschenauer R, Persaud V. Between avoidance and problem solving: Resilience, self-efficacy, and social support seeking. J Counsel Dev 2018;96: 132–43. https://doi.org/10.1002/jcad.12187.

[42] Onwuegbuzie AJ, McLean JE. Expanding the framework of internal and external validity in quantitative research. Res Schools 2003;10:71–89.

[43] McDermott MS, Sharma R. Evaluating the impact of method bias in health behaviour research: A meta-analytic examination of studies utilising the theories of reasoned action and planned behaviour. Health Psychol Rev 2017;11(4):358–73. https://doi.org/10.1080/17437199.2017.1339568.

[44] Brymer, M., Jacobs, A., Layne, C., Pynoos, R., Ruzek, J., Steinberg, A., Vernberg, E., & Watson, P. (2006). Psychological first aid:Field operations guide (2nd ed.). National Child Traumatic Stress Network & National Center for PTSD.

[45] Richardson KM, Rothstein HR. Effects of occupational stress management intervention programs: A meta-analysis. J Occup Health Psychol 2008;13:69–93. https://doi.org/10.1037/1076-8998.13.1.69.

[46] Instituto Nacional de Emergência Médica, INEM (2019). Mapa de pessoal 2019 [Personnel Map 2019]. https://www.inem.pt/wp-content/uploads/2019/05/Mapa-de-Pessoal-2019.pdf.

[47] Broek EL. Monitoring technology: The 21st century's pursuit of well-being? Publications Office of the European Union; 2017.

[48] Wind TR, Rijkeboer M, Andersson G, Riper H. The COVID-19 pandemic: The "black swan" for mental health care and a turning point for e-health. Internet Interventions 2020;20:100317. https://doi.org/10.1016/j.invent.2020.100317.