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Original Article

Efficacy of a program in increasing coping strategies in firefighters: randomized clinical trial*

Marli Aparecida Reis Coimbra[1]
https://orcid.org/0000-0001-6230-9351
Érica Midori Ikegami[1]
https://orcid.org/0000-0002-7262-5881
Lara Andrade Souza[1]
https://orcid.org/0000-0003-4235-1215
Vanderlei José Haas[1]
https://orcid.org/0000-0001-8743-0123
Maria Helena Barbosa[1]
https://orcid.org/0000-0003-2749-2802
Lúcia Aparecida Ferreira[1]
https://orcid.org/0000-0001-6469-5444

Highlights: (1) The intervention program increases coping strategies. **(2)** The study included military firefighters. **(3)** Social support was the main strategy of the study. **(4)** Intervention group presented better results than the control group. **(5)** The use of the Nursing Intervention Classification was effective.

Objective: to evaluate the effectiveness of a program in increasing coping strategies focused on military firefighters' problems and emotions. **Method**: randomized, parallel, single-masked clinical trial. The sample consisted of 51 participants in the intervention group and 49 in the control group. The intervention group received the intervention program including coping strategies based on the Nursing Interventions Classification, lasting six consecutive weeks, one day a week. The control group followed the Service Unit routine. Descriptive statistics, Student's T test with Welch's correction and the Mann-Whitney test were used for the analyses. The magnitude of the intervention effect was calculated using Cohen's d index. A p-value of ≤0.05% was considered. **Results**: in the analysis of the mean difference between the scores in the groups, the means of the intervention group increased significantly for the coping strategies: social support (p = 0.009), acceptance of responsibility (p = 0.03), problem solving (p = 0.05) and positive reappraisal (p = 0.05). The impact of the intervention was moderate in magnitude for social support (d = 0.54). **Conclusion**: the intervention program enabled the increase of coping strategies focused on military firefighters' problems and emotions. ReBEC: RBR-8dmbzc.

Descriptors: Occupational Stress; Adaptation Psychological; Nursing Process; Nursing; Firefighters; Randomized Controlled Trial.

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[1] Universidade Federal do Triângulo Mineiro, Uberaba, MG, Brazil.

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Introduction

Firefighters are public safety professionals, who carry out actions aimed at civil defense, preventing and fighting fires, search and rescue, with the aim of safeguarding people's lives and their property against any type of catastrophe[1]. Thus, they belong to a category exposed to many types of stressors at work[2-4].

The worsening of occupational stress has drawn the attention of researchers, due to the negative consequences on the physical and mental health of workers[5-6]. The repercussions of high levels of stress persist at the end of the work shift, impacting the well-being and general health of the worker, in addition to interfering with the assistance that professionals provide to society[5].

Firefighters are constantly exposed to traumatic[2], psychosocial[3] and physical[4] events. Concerning psychosocial issues, public scrutiny is felt negatively, especially when complications occur during victim care[3], in addition to the emotional demand due to increased turnover, which is associated with dissatisfaction[4]. Regarding physical impacts, one aspect to be mentioned is the thermal stress caused on days of intense heat[7].

One of the factors associated with the severity of occupational stress in firefighters is Burnout Syndrome (BS)[8]. Considered a public health problem, BS arises from the emotional demands of work[9] and is related to the stress as a chronic condition[10], which is accentuated by the accumulation of daily overloads[5].

The high level of occupational stress also contributes to the development of compassion fatigue (CF), present mainly among professionals who provide assistance to people[11]. In care services, self-sacrifice in assisting others contributes to self-forgetfulness[12]. The increase in CF is proportionally associated with the increase in BS among firefighters[13]. However, there are positive aspects that can contribute to reducing CF and SB, such as resilience and compassion satisfaction (CS)[14]. CS is directly related to the worker's feeling of motivation to carry out their activities with quality, even under the constant effect of stressors responsible for illness and unproductive work[5]. Resilience, in turn, is associated with the reduction of psychological damage[15].

Risk and protective factors for diseases related to occupational stress in firefighters are associated with the perception of stress and the choice of coping strategies[16]. The way the individual evaluates and faces each stressor interferes with the behavioral response[17], and stress control minimizes the negative impact on mental health[18].

In this sense, coping strategies, cognitive and behavioral interactions when evaluating a stressful event, are important measures in managing stressors, being considered intelligent tools in conducting this process[17,19]. There is the emotion-focused coping strategy, referring to cognitive management to reduce the emotional response, and problem-focused, which consists of strategies that act directly on the cause of the stressful situation[19].

A systematic review, carried out with public safety professionals, highlighted the urgency in identifying effective coping strategies to reduce the psychological effects arising from traumatic occupational exposures[20]. Furthermore, it highlighted the importance of standardizing future studies to ensure long-term coping results as a benefit to workers' mental health[20].

Report on occupational risk estimates, published jointly by international bodies, emphasized the need for policies to implement actions and prevent damage related to occupational exposure[21]. The development of intervention programs in fire departments becomes an important demand to be met, considering the repercussions of the work context[16].

In view of the above, it is worth highlighting that nurses are one of the professionals with skills to work in different environments, using the structure of stress theories to promote adaptive responses, in addition to favoring coping mechanisms and promoting new strategies to deal with situations[22]. To achieve this, such professionals can rely on the Nursing Intervention Classification (NIC), which provides the use of nurses' own interventions.

In this study, the use of NIC was considered as an intervention to promote coping strategies in firefighters. There are reports of few studies in Brazil on the mental health of firefighters[23]. A systematic review points out that many studies on stress were carried out with sectional designs and focused on the evaluation of parameters, such as heart rate, cortisol analysis, skin conductance, body temperature and blood volume at the wrist[5].

Interventions aimed at preventing, identifying and managing acute occupational stress among military firefighters, police officers and first responders have positive effects on return to work, absenteeism and distress[24]. Some studies used integrative and complementary therapies to reduce occupational stress[25-26], however, even if the interventions were similar to those of NIC, none of them mentioned the use of the taxonomy.

The increase in coping strategies is associated with the reduction and management of occupational stress[27-28]. In this sense, the Coping Strategies Program (CSP) intervention was developed and applied to military firefighters. The main hypothesis of the study

considers that CSP increases coping scores focused on problems and emotions, resilience and CS and reduces occupational stress, burnout and CF scores among military firefighters. Therefore, this study aimed to evaluate the effectiveness of a program in increasing coping strategies in military firefighters focused on their problems and emotions.

Method

Study design

This is a randomized, parallel clinical trial with simple masking (outcome assessors), and a 1:1 allocation rate. The study followed the guidelines of the Consolidated Standards of Reporting Trials (CONSORT) checklist – nonpharmacologic treatments (NPTs).

Population, setting and period

The research was carried out with firefighters who were members of a military fire battalion unit, in city located in the *Triângulo Sul* region, in the State of Minas Gerais, Brazil. The study took place from November 2021 to March 2022.

Selection criteria

Inclusion criteria: members of the military fire battalion of both genders, in active status, that is, without leave during the collection period, who expressed availability for the study. Exclusion criteria: members who, when approached individually, reported being in psychological treatment, to avoid interference in the intervention that the participant would receive.

Study feasibility and sample definition

To verify the feasibility of the study and the usefulness of the methodological procedures, a pilot study was conducted, guided by the extension of the CONSORT 2010 statement to pilot randomized and feasibility trials[29]. From the total population (n=167), 20 firefighters were randomized with the help of the Statistical Package for the Social Sciences (SPSS), version 21 software. 10 participants were allocated to the Intervention Group (IG) who underwent the CSP and 10 to the Control Group (CG), who followed the Service Unit routine. However, as three participants in each group were lost during follow-ups, due to health leaves, refusals, retirements and city transfers, seven participants remained *per* group.

The pilot study allowed familiarization with the research setting and service routine, as well as access to information about active and non-active professionals. These aspects guided the verification of the selection criteria and directed some adjustments to the main study, as it was found that it was not possible to standardize the location and time for each session, due to the complexity and dynamics of the firefighter's activities.

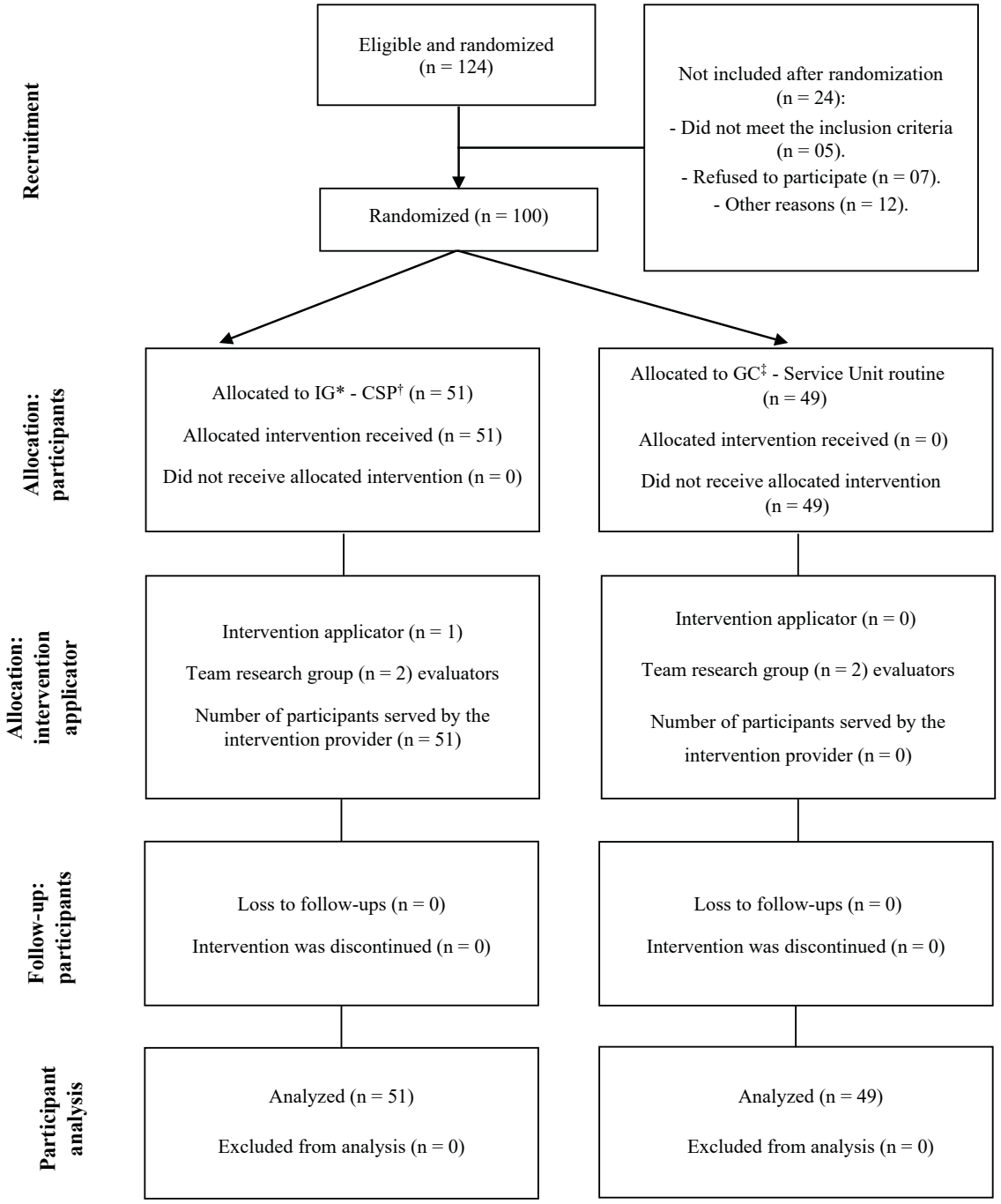
Regarding the application of the selected instruments, the interviewers asked the participants to report any types of difficulties in answering them, but nothing was signaled. When conducting the CSP, no complications were recorded that would justify modifications, other than those already suggested by the intervention expert judges.

Furthermore, although no coping factors showed statistical significance, there was an increase in the mean self-control factor score of 2.00±2.64 for the IG, with these values being adopted to calculate the sample size using the Power Analysis and Sample Size (PASS) application, 2013 version. Considering a type I error $\alpha=0.05$ and a type II error $\beta=0.2$, the minimum sample required for external validity was 98 participants (49 *per* group). However, the number of interview attempts was 124 (62 *per* group), taking into account a possible sample loss of 20% (refusal, loss of follow-ups due to moving to another city, accompanying a family member or being away for health treatment). Thus, from a population of 147 eligible military firefighters, 124 participants were randomized using SPSS, version 21, and allocated to IG and CG (n = 62, each). It should be noted that the members of the fire department who participated in the pilot study (n = 20) were not included in the main study.

Randomization and masking

After randomization using SPSS software, a sequentially numbered list was generated to allocate participants to research groups. Out of the 124 professionals randomized, 100 firefighters completed the study, 51 in the IG and 49 in the CG. The entire randomization process was carried out with the assistance of a statistician who was not involved in the study. Simple masking was ensured, as the outcome evaluators were unaware of the allocation of each member of the military fire battalion in the groups. However, it was not possible to mask the research participants and the researcher responsible for applying the intervention, who were aware of the allocation in the IG, which received the CSP. The study included a researcher, who applied the intervention, two outcome evaluators, who applied the research

instruments, a general coordinator, who organized the study and directed the timing of the evaluators and the intervention, and a statistician for the analyses, masked regarding group allocation. The same team from the pilot study remained. Next, Figure 1 shows the flow of the study sample according to IG and CG.



*IG = Intervention Group; †CSP = Coping Strategies Program; ‡CG = Control Group

Figure 1 - Data collection flowchart according to CONSORT-NPT

Instruments

In the first approach to the groups, a sociodemographic/economic and labour questionnaire prepared by the researchers was applied, which included the following data: gender, age group, marital status, family income, academic background, rank in the fire department, type of activity currently carried out, weekly workload and length of service in the battalion. Such variables are common in the topic, including for the target audience of this study[8]. The instrument was evaluated by two expert nurses, with experience in quantitative methods, responsible for evaluating the content (appropriate question or not) and indicating suggestions, which did not occur. Furthermore,

in the first approach and at the end of six weeks of intervention, the following instruments were used, validated and widely used among the general public[30] or workers[31-32]: Coping Strategies Inventory[30], Work Stress Scale (WSS)[31], Professional Quality of Life Scale (ProQol-BR)[32] and Brief Resilience Scale (BRS)[33].

The Coping Strategies Inventory presented a Cronbach's alpha coefficient value between 0.81 and 0.84 in the adaptation study, which indicates good homogeneity and consistency of the items[30]. The inventory classifies the extent to which the person uses coping strategies[30]. It contains 66 items referring to thoughts and actions adopted to deal with internal or external demands resulting from a specific stressful event, in addition to distracting issues, which are not scored on the conversion scale[30]. There are eight different factors suggested by factor analysis: confrontation; remoteness; self-control; social support; acceptance of responsibility; escape-avoidance; Problem solving; positive re-evaluation[30].

Before completing the instrument, the participant must report a situation that occurred in the last month of work that they consider stressful and, subsequently, indicate the strategy most used to deal with the problem, marking on the instrument 0 (I did not use this strategy), 1 (I used a little), 2 (I used a lot) or 3 (I used a lot)[30].

The WSS was constructed and validated with a Cronbach's alpha coefficient equivalent to 0.91 (excellent reliability) and factor analysis indicated the existence of a single factor composed of 23 items[31]. This version was validated considering its general factor, counting all its items, with a score that varies from 23 to 115 points[31]. Each of the 23 items presents a type of stressor and a type of reaction to this stressor, which are analyzed using a Likert-type agreement scale from 1 to 5 points (1 – completely disagree; 2 – disagree; 3 – agree in part; 4 – agree; 5 – completely agree)[31].

The ProQol-BR scale used has 28 items[32]. Validation was successful in maintaining the meaning of the sentences and the psychometric properties from the original instrument[32]. Factor consistency analysis using Cronbach's alpha showed indices of 0.81, 0.83 and 0.76 for the first, second and third factors, respectively[32]. The scale has a negative aspect, CF, composed of the subscales of secondary traumatic stress (STS) (10 items) and burnout (3 items); and a positive aspect, CS (15 items)[32]. The questions are answered on a Likert scale ranging from 1 (rarely) to 5 (almost always)[32].

The BRS measures resilience and showed good adequacy and Cronbach's alpha of 0.84[33]. It consists of six items, with response formats ranging from 1 (strongly disagree) to 5 (strongly agree)[33]. Three of its questions are positive and the other three were constructed with phrases in a negative sense, with the aim of controlling the effect of social desire when responding[33]. It is noteworthy that items 2, 4 and 5 must be recoded as 1 = 5; 2 = 4; 3 = 3; 4 = 2; 5 = 1[33]. After this recoding, the points on the scale are summed and higher values indicate greater resilience[33].

Intervention

The intervention is based on the NIC taxonomy[34], specifically the "Emotional Support" and "Improvement of Coping" interventions, the Stress and Coping Theory[17,19] and the Adult Learning Theory[35], and was submitted to evaluation of evidence of content and face validity by four doctors and nurses. The expert judges were selected through their Curriculums considering the ones who had extensive knowledge of the nursing process, continuing education in nursing, nursing care strategies and standardized language systems, in addition to working in teaching, nursing management, in a scientific didactic department and in workers' health. The judges had more than 10 years of experience in Nursing research.

The four judges received an instrument to evaluate the intervention regarding the content of the activities on each of the six days of the CSP. They should judge it as appropriate or not appropriate and provide suggestions. All expert judges recorded suggestions only in activity 1 and suggested applying them to the other days, as it was a program. Only one judge marked the activities as not appropriate. In this way, the research team paid attention to the suggestions that were qualitatively evaluated. The suggestions were accepted in their entirety, considering the convergence among expert judges. These are: I) using the verb "dialogue" instead of "discuss", in the 1st stage; II) focusing on coping strategies and treat associated factors as secondary; III) dividing CSP activities into two parts; IV) coping strategy focused on emotion and problem, rather than being educational, as it allows the participant to be proactive and point out the solution to the stressful situation experienced; V) revisiting the topic from the previous day, including coping. Once the suggestions were incorporated, the proposal was sent back to the judges who judged the script to be appropriate (Figure 2), allowing it to be applied in the pilot study, which indicated the need for some adjustments already mentioned.

To describe the intervention, The Template for Intervention Description and Replication (TIDieR) was used, an extension of CONSORT 2010 (item 5) and the statement Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) 2013 (item 11),

prepared with the purpose of ensuring the completeness of the intervention[36].

The intervention is a program, the CSP, which was designed to enable reflections on the strategies necessary to deal with stressors and their consequences in daily work. The CSP consisted of six activities, one meeting per week with an average duration of 35 minutes, totaling six weeks.

Each intervention activity was applied in person and individually, respecting the standard precautionary rules for the new coronavirus pandemic[37], in the morning, afternoon or evening, from Monday to Sunday, according to the participant's availability. The CSP was applied in private rooms or environments at each participant's workplace, according to the reality and dynamics identified in the pilot study.

The intervention was carried out by a nurse, specialist in occupational nursing, with a master's degree in health care and experience in conducting nursing consultations with workers for 10 years. The researcher carried out courses and training on the subject to acquire the necessary knowledge and training with the research group before carrying out the study.

During the implementation of the intervention, the exposure time to the program was modified for some professionals, according to the adjustment identified in the pilot study. Therefore, instead of six weeks, some completed the CSP in an average of 5.7 weeks, depending on the availability of the participant, who experienced the same six sessions, however, with an interval shorter or longer than seven days between one and the other. This condition occurred because some professionals were in the process of transfer or retirement, on vacation or on extended medical leave and showed interest in completing their participation in the research, therefore, the intervention was adjusted in terms of the execution interval.

Each day of the CSP was divided into two stages, in the first there was a prior dialogue, using the brainstorming technique, about stress and coping or topics related to stress and coping (days: 1st stress, 2nd occupational stress, 3rd burnout, 4th CF, 5th CS and 6th resilience), and referring to the participant's experiences. At this stage, the activities of the NIC Emotional Support intervention[34] were included, represented by: discussion of emotional experiences, recognition of responses and strategies in the face of stress, encouragement to reduce demands when in a situation of illness or fatigue. This stage also considered the Adult Learning Theory by considering the experiences brought by the participant[35].

In the second stage of the CSP, the study themes were addressed: stress and coping, occupational stress and coping, burnout and coping, CF and coping, CS and coping, and resilience and coping. For each theme, the concept, associated symptoms and relationship with stress and coping were presented. Coping strategies focused on how emotions and problems[17,19] were worked on their every day routines, through six PowerPoint slide presentations and the use of a notebook. The emotion-focused coping strategy is represented by the factors: acceptance of responsibility, positive reappraisal, self-control, escape-avoidance and withdrawal[19]. Problem-focused coping is confrontation and problem solving, with only the social support factor being part of both[19].

Still, in the second stage, a script was used containing 12 items focused on the theme of the day: 1) Identify what causes(or) or harmed the situation of one of the themes of the day (general stress, occupational stress, burnout, CF, CS or resilience), recognition of the participant's primary/cognitive assessment; 2) Assess the resources available to solve the problem (secondary/behavioral assessment of the participant); 3) Identify appropriate short- and long-term goals; 4) Discuss the changes they would like to make to solve the problem; 5) Evaluate realistic solutions (recognition of coping mechanisms for dealing with emotions and problem); 6) Recognize which changes are possible and which are not; 7) Identify feelings about what can be changed and alternative ways of coping; 8) Recognize the benefits and consequences of each alternative; 9) Encourage choosing an alternative; 10) Identify gains and losses regarding personal coping style; 11) Provide positive feedback for change attempts; 12) Jointly evaluate the results.

The script for the second stage was based on the NIC intervention for Improving Coping[34] represented by the activities: assistance in identifying appropriate goals, available resources, assessment of stress events, skills, realistic options and limitations. It was also based on the Theory of Stress and Coping by encouraging the participant to perform a cognitive and behavioural assessment of the requested situation[17,19]. Each participant can evaluate and understand the resources and skills available to deal with stress by writing them down on post-it® notes. The intervention discussed the participant's emotional experiences according to the theme of the day, presented new information and coping strategies focused on emotions and problems and also led the participant to reflect on how to deal with the stress experienced.

The general presentation of the CSP with the division of the two stages on each day of the activity is shown in Figure 2 below:

Weeks/ Days	Presentation of the CSP activity stages*	
First	**1st Stage**: Dialogue stress and coping. Dialogue about emotional experiences and use of NIC† Emotional Support intervention activities.	**2nd Stage**: Address stress (theme concept, associated symptoms, and the stress/coping relationship). Approach coping focused on emotions and problems. Use of the CSP* script (12 items) based on the intervention activities of the NIC† for Improving Coping.
Second	**1st Stage**: Dialogue about occupational stress. Dialogue about emotional experiences and use of NIC† Emotional Support intervention activities.	**2nd Stage**: Return to the previous topic, including coping mechanisms focused on emotions and problems. Address occupational stress (theme concept, associated symptoms and occupational stress/coping relationship). Use of the CSP* script (12 items) based on the intervention activities of the NIC† for Improving Coping.
Third	**1st Stage**: Dialogue about burnout. Dialogue about emotional experiences and use of NIC† Emotional Support intervention activities.	**2nd Stage**: Return to the previous topic, including coping focused on emotions and problems. Discuss burnout (theme concept, associated symptoms and the relationship between burnout/occupational stress/coping). Use of the CSP* script (12 items) based on the intervention activities of the NIC† for Improving Coping.
Fourth	**1st Stage**: Dialogue about CF‡. Dialogue about emotional experiences and use of NIC† Emotional Support intervention activities.	**2nd Stage**: Return to the previous topic, including coping focused on emotions and problems. Discuss CF‡ (concept of the topic, associated symptoms and the relationship CF‡/occupational stress/coping). Use of the CSP* script (12 items) based on the intervention activities of the NIC† for Improving Coping.
Fifth	**1st Stage**: Dialogue about CS§. Dialogue about emotional experiences and use of NIC† Emotional Support intervention activities.	**2nd Stage**: Return to the previous topic, including coping focused on emotions and problems. Discuss SC§ (concept of the topic, associated symptoms and the relationship SC§/occupational stress/coping). Use of the CSP* script (12 items) based on the intervention activities of the NIC† for Improving Coping.
Sixth	**1st Stage**: Dialogue about resilience. Dialogue about emotional experiences and use of NIC† Emotional Support intervention activities.	**2nd Stage**: Return to the previous topic, including coping focused on the emotion and the problem. Address resilience (theme concept, associated symptoms and the relationship between resilience/occupational stress/coping). Use of the CSP* script (12 items) based on the NIC† Coping Improvement intervention activities.

*CSP = Coping Strategy Program; †NIC = Nursing Interventions Classification; ‡CF = Compassion Fatigue; §CS = Compassion Satisfaction

Figure 2 – Presentation of the CSP* applied to military firefighters, according to each stage on the day of the activity. Uberaba, MG, Brazil, 2022

The CG members followed the routine of the Military Fire Service Unit for six weeks. They responded to the research instruments in the first contact with the evaluators and after six weeks. However, some ended their participation in the study after an average period of nine weeks, due to the participant's unavailability on the day and time the evaluator attended, in addition to issues related to vacations, business trips and prolonged health certificates.

Data analysis

The data were analyzed using SPSS software, version 21, using descriptive statistics, using absolute and relative frequencies, and measures of central tendency (mean, median, mean rank) and variability (amplitudes, standard deviation, minimum value and maximum).

In the primary outcome, to analyze the mean difference between the IG (CSP) and CG (Service Unit routine) scores, the mean scores of each of the eight coping factors were subtracted, pre- and post-intervention or routine of the Service Unit, in both groups. The Student's t test with Welch's correction was used for independent samples in seven factors, except for the positive reassessment which adopted the Mann-Whitney test for independent samples.

For the secondary outcomes, in the comparison between the means of the IG and CG for occupational stress, CF, CS, burnout and resilience, the means of the difference scores were calculated, obtained after subtraction, pre and post-intervention or Service Unit routine, in both groups. Analysis of the mean difference was performed using the Mann-Whitney test for independent samples.

All necessary assumptions for the use of parametric tests (Student's t with Welch correction) were considered, such as homoscedasticity. When the recommended assumptions were not met, the Mann-Whitney rank-based test was used. The Shapiro-Wilk test was used to assess data normality. Pearson and Spearman correlations were used to evaluate the quantitative variables regarding the variation in time between intervention sessions in the IG. The analysis of the magnitude of the intervention effect was evaluated using Cohen's d coefficient. For all tests, a significance level of $\alpha \leq 5\%$ was considered.

Ethical aspects

The present investigation was approved by the Human Research Ethics Committee from the *Hospital de Clínicas* of the Federal University of Triângulo Mineiro (HC-UFTM), under number: 5.121.639/2021, CAAE (Certificate of Presentation for Ethical Appreciation): 31313420.9.0000.8667. The ethical precepts of research involving human beings of Resolution 466/12 were

maintained. The signing of the Free and Informed Consent Form by the participants occurred in two copies, there were clarifications regarding the objectives of the study and the participants' rights to withdraw or continue the study. Registered in the Brazilian Clinical Trials Registry (REBEC), code: RBR-8dmbzc

Results

Out of the 124 eligible and randomized firefighters, 24 did not begin participating in the research, as five did not meet the inclusion criteria, seven refused to participate in the study, three were transferred from headquarters, six retired, one was dismissed and two had sick leave. In this way, 51 military firefighters participated in the IG and 49 in the CG. The homogeneity of the groups was investigated regarding gender (Person's Chi-Square test, p = 0.936), academic background (Mann-Whitney test, p = 0.221) and length of service in the battalion (Student's t test, p = 0.709). The groups were homogeneous for these variables, that is, no differences were found in sociodemographic/economic and work characteristics (Table 1).

Table 1 – Characterization of firefighters according to sociodemographic/economic and work variables. Uberaba, MG, Brazil, 2022

Variable	IG* (n=51) n (%)	CG† (n=49) n (%)	Total (n=100) n (%)
Gender			
Male	44 (86,30)	42 (85,70)	86 (86,00)
Female	7 (13,70)	7 (14,30)	14 (14,00)
Age			
20-29 years old	5 (9,80)	4 (8,20)	9 (9,00)
30-39 years old	32 (62,70)	33 (67,30)	65 (65,00)
40-49 years old	13 (25,50)	12 (24,50)	25 (25,00)
50-59 years old	1 (2,00)	0 (0,00)	1 (1,00)
Marital Status			
Single	4 (7,80)	8 (16,30)	12 (12,00)
Married	38 (74,50)	30 (61,20)	68 (68,00)
Stable Union	7 (13,70)	8 (16,30)	15 (15,00)
Separted/Divorced	2 (3,90)	3 (6,10)	5 (5,00)
Family Income‡			
Up to 5 minimum wages	10 (19,60)	9 (18,40)	19 (19,00)
6 – 9 minimum wages	26 (51,00)	30 (61,20)	56 (56,00)
More than 10 minimum wages	15 (29,40)	10 (20,40)	25 (25,00)
Academic background			
High School	17 (33,30)	24 (49,00)	41 (41,00)
Undergradute level	28 (54,90)	18 (38,80)	47 (47,00)
Graduate level	61 (11,80)	6 (12,20)	12 (12,00)
Post in the fire department			
Captain	3 (5,90)	0 (0,00)	3 (3,00)
Lieutenant	5 (9,80)	3 (6,10)	8 (8,00)
Sergeant	18 (35,30)	20 (40,80)	38 (38,00)
Cable	15 (29,40)	17 (34,70)	32 (32,00)
Soldier	10 (19,60)	9 (18,40)	19 (19,00)

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Variable	IG* (n=51) n (%)	CG† (n=49) n (%)	Total (n=100) n (%)
Type of activity currently carried out			
Operational	28 (54,90)	32 (65,30)	60 (60,00)
Administrative	16 (31,40)	9 (18,40)	25 (25,00)
Prevention and inspection	4 (7,80)	7 (14,30)	11 (11,00)
Teleservice	3 (5,90)	1 (2,00)	4 (4,00)
Weekly workload			
24 to 32 hours	3 (5,90)	3 (6,10)	6 (6,00)
Up to 48 hours	34 (66,70)	40 (81,60)	74 (74,00)
From 48 to 72 hours	13 (25,50)	6 (12,20)	19 (19,00)
More than 72 hours	1 (2,00)	0 (0,00)	1 (1,00)
Length of service in the battalion			
Up to 5 years	5 (9,80)	4 (8,20)	9 (9,00)
6 to 10 years	10 (19,60)	11 (22,4)	21 (21,00)
11 to 15 years	24 (47,10)	23 (46,90)	47 (47,00)
16 to 20 years	5 (9,80)	8 (16,30)	13 (13,00)
Over 21 years	7 (13,70)	3 (6,10)	10 (10,00)

*IG = Intervention Group; †CG = Control Group; ‡Minimum wage, Brazil, 2022, R$ 1,212.00

The statistically significant coping factors were social support (p = 0.009), acceptance of responsibility (p = 0.03), problem solving (p = 0.05) and positive reappraisal (p = 0.05). The factors of confrontation (p = 0.73), withdrawal (p = 0.77), self-control (p = 0.06) and escape-avoidance (p = 0.24) were not statistically significant. Cohen's d showed a moderate magnitude of the intervention effect for the social support factor score (d = 0.54) (Table 2).

The CSP was not statistically significant in the secondary outcomes, that is, it did not reduce the scores of occupational stress (p = 0.42), CF (p = 0.57), burnout (p = 0.67), SC (p = 0.52) and resilience (p = 0.68) (Table 3).

The correlational analysis indicated that the coping scores and the number of days did not interfere in the conduct of the intervention, showing correlations that were not statistically significant, with social support being: r = 0.001; p = 0.99 (Pearson) and r = 0.03; p = 0.83 (Spearman).

Table 2 – Measures of central tendency and variability for IG* and CG†, according to the difference scores (pre and post) of the Coping Strategies Inventory factors. Uberaba, MG, Brazil, 2022

Coping factors	Mean SD‡	Median	IR§	p	d‖
Confrontation					
IG*	1,14±2,63	1,00	3,00	0,73¶	0,07
CG†	1,35±3,28	1,00	6,00		
Withdrawal					
IG*	0,41±3,85	0,00	4,00	0,77¶	0,06
CG†	0,20±3,31	0,00	3,00		
Self-control					
IG*	1,82±3,33	2,00	5,00	0,06¶	0,39
CG†	0,43±3,85	1,00	5,00		

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Coping factors	Mean SD‡	Median	IR§	p	d‖
Social support					
IG*	2,12±3,10	2,00	4,00	0,009¶	0,54
CG†	0,53±2,79	0,00	3,00		
Acceptance of responsibility					
IG*	1,27±2,33	1,00	2,00	0,03¶	0,44
CG†	0,22±2,40	0,00	3,00		
Escape-avoidance					
IG*	-0,04±2,82	0,00	2,00	0,24¶	0,24
CG†	-0,78±3,37	-1,00	4,00		
Problem solving					
IG*	2,20±3,82	1,00	4,00	0,05¶	0,40
CG†	0,73±3,50	1,00	5,00		
Positive reassessment					
IG*	2,69±3,06	3,00	3,00	0,05**	0,36
CG†	1,45±3,93	1,00	4,00		

*IG = Intervention Group; †CG = Control Group; ‡SD = Standard Deviation; §IR = Interquartile Range; ‖d = Cohen's d; ¶T test; **Mann-Whitney test

Table 3 – Difference in occupational stress, CF*, SC†, burnout and resilience scores (pre and post), between IG‡ and CG§. Uberaba, MG, Brazil, 2022

Secondary outcomes	Median	Medium rank	SD‖	IR¶	p**
Occupational stress					
IG‡	0,00	52,81	13,90	12,00	0,42
CG§	-1,00	48,09	10,02	10,00	
Compassion fatigue					
IG‡	0,00	52,13	6,64	6,00	0,57
CG§	0,00	48,81	5,36	5,00	
Compassion satisfaction					
IG‡	0,00	52,33	5,88	7,00	0,52
CG§	-1,00	48,59	8,90	10,00	
Burnout					
IG‡	0,00	49,31	2,22	3,00	0,67
CG§	0,00	51,73	2,16	2,00	
Resilience					
IG‡	0,00	49,33	3,31	2,00	0,68
CG§	0,00	51,71	3,80	4,00	

*CF = Compassion Fatigue; †SC = Compassion Satisfaction; ‡GI = Intervention Group; §GC = Control Group; ‖SD = Standard Deviation; ¶IR = Interquartile Range; **p = Mann-Whitney test

Discussion

CSP showed an increase in both problem-focused coping strategies, such as problem solving, and emotion-focused strategies, such as acceptance of responsibility and positive reappraisal, and the social support that is part of both approaches. Such confrontations stand out as important in managing a stressful event[19].

There was no statistical significance for: confrontation, self-control, withdrawal and escape-avoidance. It was expected that the intervention would not achieve significant results in emotion-focused coping strategies, such as those

associated with the avoidant behaviour of withdrawal and escape-avoidance[19], as they are related to Post-Traumatic Stress Disorder (PTSD) and BS[38].

The intervention was not effective on occupational stress, CF, burnout, CS, and resilience, refuting the initial research hypothesis. The non-significant results for the secondary outcomes were not predicted, as the increase in coping strategies is considered favorable for reducing stress at work[27-28], even in a public that routinely experiences traumatic and differentiated events.

Among the factors that had a positive effect from CSP, acceptance of responsibility is a strategy in which the individual accepts the reality of the problem and believes in their responsibility for the event; Problem solving involves planning to resolve issues based on plans and actions[19]. Positive reappraisal is a cognitive strategy to restructure the event and alleviate emotional damage and the search for resolution[19].

The adoption of positive coping styles and the resolution of stressful situations among firefighters, as well as the promotion of social support, contribute to reducing avoidant attitudes generally related to PTSD and BS[38].

Research carried out with 987 first responders in states in North and South America, the Virgin Islands and Puerto Rico showed that emotional regulation strategies are effective tools in the adaptive process and reduce the risk of symptoms of PTSD, anxiety and depression[39]. Cognitive reassessment, expression of emotions and adequate communication contributed to the development of resilience[39].

It was found that the social support factor, characterized by seeking support from people close to us to solve the problem, such as family and friends[19], was the most significant in this study. The magnitude of the intervention effect for this factor was moderate, that is, the IG firefighters increased the use of coping strategies in the stressful situations they experienced. As it represents the most effective study strategy and the importance of this tool in international scientific literature[40], emphasis will be placed on social support.

Coping strategies focused on the problem and emotion are positively related, and when combined they play an effective role in emotion behaviour, so that one complements the other in the general coping process[41]. Thus, they contribute to alleviating the negative effects of stressors on mental health[41].

Strengthening social support is a protective measure against the harm caused by psychosocial stressors among firefighters, which affect health and well-being[40]. Organizational support and, especially, social support can even contribute to reducing symptoms of suicidal ideation[16]. Among firefighters, strengthening quality interpersonal relationships at home and at work reduces the effects of work stress[42], benefiting them.

A study carried out with 828 public safety professionals in Canada, which aimed to identify adaptive coping strategies in response to repeated exposure to occupational stressors, showed that the most emphasized strategies were those involving education, self-confidence, evidence-based treatment and support from colleagues and managers[18]. Participants expressed that they would like their employers' support and interest in mental health issues before, during and after traumatic exposures[18], which demonstrates the need to intervene in this factor, which was the most used in the present research.

Research carried out in Canada with 4,820 public security professionals showed that occupational stressors are related to mental disorders, and that psychologically traumatic career events are inevitable, which is why they call for political support[43]. Organizational and operational stressors such as leadership support, reducing stigma, improving sleep and the social environment are modifiable[43]. Therefore, it is necessary to propose changes with the aim of reducing their repercussions and promoting the worker's mental health[43]. Once again, social support appears as a functional strategy in stress management, when it refers to support from leadership and improvement of the social environment.

Increased social support is associated with a lower propensity for PTSD and depressive symptoms[44]. In Canada, a study involving 4,238 public safety professionals, of which 592 were firefighters, showed that for each increase in the social support score, there was a reduction of 7% to 10% in the probability of PTSD and 11% to 15% for depression[44]. Therefore, this strategy influences workers' mental health in a positive way.

However, in another study, the effect of social support was considered stable in the long term, as adequate support from family and friends is recognized as beneficial among public security professionals[45]. It should be added that, as they carry out collective work activities, the cooperation of colleagues and supervisors also contributes to alleviating mental exhaustion at work[45]. The findings indicate that social support provides motivation for the individual to face the stress experienced in a more adaptive way[45].

The implementation of psychological interventions aimed at developing social support in fire brigades to minimize burnout is seen as crucial[45]. Furthermore, group counselling is an effective strategy to reduce occupational stressors[45].

In short, social support, the most effective CSP strategy, has been identified in the scientific literature as a mediator of occupational stress[39,45] and a protective

factor for psychosocial stressors in firefighters[40], related to the reduction of mental disorders arising from stress[16], such as burnout[45-46], avoidant attitudes generally related to PTSD and BS[38] and reduction of suicidal thoughts[16].

Social support mitigates the emergence of mental disorders and its implementation in institutions can promote resilience, in addition to being a health promotion proposal that can establish real support[44] and facilitate connections between families and friends[44,47]. Such evidence indicates that this strategy may have applicability for the audience of this study.

Although burnout was not the main outcome of this research and CSP did not have a direct significant impact, the literature shows that the basis of social support has an effect on BS, and is also associated with the reduction of occupational stress[43]. Thus, it can favor the development of resilience and the regulation of psychological suffering[41].

Actions to manage occupational stress, such as coping strategies, need to be continued, since traumatic events are variable and frequent. Social support needs to be better understood and worked on among public security teams.

The limitation of the study refers to the impossibility of standardizing the intervention time, as it depended on the availability of the participant and the absence of occurrences at work, as the research was carried out in the work environment. Even so, IG participants received all CSP activities. Furthermore, the location of this investigation depended on the resources available in the work units, being adapted when appropriate to maintain adequate confidentiality and convenience. Another aspect concerns the collection time and the difficulty in controlling situations that could have occurred during this period, which could interfere with the participants' coping response. However, despite the limitations identified, these aspects did not affect participant adherence or the continuity of the research.

As implications for the advancement of scientific knowledge around health and nursing, this is a study on coping strategies in the context of occupational health, especially military firefighters. Occupational stress is negatively associated with mental and physical health, and the need for methods for its management is highlighted in the scientific literature. This investigation contributes to the advancement of Nursing as it is an intervention based on the NIC that includes interventions specific to nurses.

Conclusion

The CSP intervention was effective in increasing problem-focused coping strategies (social support and problem solving) and emotion-focused strategies (acceptance of responsibility and positive reappraisal). Social support, belonging to both strategies, deserves to be highlighted as a perspective in stress management, as it presented a moderate magnitude of effect and represents an alternative in the management of work stressors.

Considering the importance of social support in scientific literature as a promoter of mental health, this study recommends investment in this strategy by fire departments. However, more studies are needed in areas and with professionals different from that of the present study, so that we can understand the scope of coping strategies for reducing and managing occupational stress, especially in workers who experience constant and inevitable traumatic events, such as firefighters.

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References

1. Corpo de Bombeiros Militar de Minas Gerais. Institucional [Homepage]. c2020 [cited 2023 Mar 05]. Available from: https://www.bombeiros.mg.gov.br

2. Obuobi-Donkor G, Oluwasina F, Nkire N, Agyapong VIO. A scoping review on the prevalence and determinants of post-traumatic stress disorder among military personnel and firefighters: implications for public policy and practice. Int J Environ Res Public Health. 2022;19(3):1565. https://doi.org/10.3390/ijerph19031565

3. Ricciardelli R, Czarnuch S, Carleton RN, Gacek J, Shewmake J. Canadian public safety personnel and occupational stressors: how PSP interpret stressors on duty. Int J Environ Res Public Health. 2020;17(13):4736. https://doi.org/10.3390/ijerph17134736

4. Ryu HY, Hyun DS, Jeung DY, Kim CS, Chang SJ. Organizational climate effects on the relationship between emotional labor and turnover intention in Korean firefighters. Saf Health Work. 2020;11(4):479-84. https://doi.org/10.1016/j.shaw.2020.08.007

5. Morales A, Barbosa M, Morás L, Cazella SC, Sgobbi LF, Sene I, et al. Occupational stress monitoring using biomarkers and smartwatches: a systematic review. Sensors. 2022;22(17):6633. https://doi.org/10.3390/s22176633

6. Salazar de Pablo G, Vaquerizo-Serrano J, Catalan A, Arango C, Moreno C, Ferre F, et al. Impact of coronavirus syndromes on physical and mental health of health care workers: Systematic review and meta-analysis. J Affect Disord. 2020;275:48-57. https://doi.org/10.1016/j.jad.2020.06.022

7. Williams A, McDonogh-Wong L, Spengler JD. The influence of extreme heat on police and fire department services in 23 U.S. cities. GeoHealth. 2020;4(11):e2020GH000282. https://doi.org/10.1029/2020GH000282

8. Makara-Studzińska M, Wajda Z, Lizińczyk S. Years of service, self-efficacy, stress and burnout among Polish firefighters. Int J Occup Med Environ Health. 2020;33(3):283-97. https://doi.org/10.13075/ijomeh.1896.01483

9. Jeung DY, Chang SJ. Moderating effects of organizational climate on the relationship between emotional labor and burnout among Korean firefighters. Int J Environ Res Public Health. 2021;18(3):914. https://doi.org/10.3390/ijerph18030914

10. MacDermid JC, Lomotan M, Hu MA. Canadian career firefighters' mental health impacts and priorities. Int J Environ Res Public Health. 2021;18(23):12666. https://doi.org/10.3390/ijerph182312666

11. Aslan H, Erci B, Pekince H. Relationship between compassion fatigue in nurses, and work-related stress and the meaning of life. J Relig Health. 2022;61(3):1848-60. https://doi.org/10.1007/s10943-020-01142-0

12. Bansal P, Bingemann TA, Greenhawt M, Mosnaim G, Nanda A, Oppenheimer J, et al. Clinician wellness during the Covid-19 pandemic: extraordinary times and unusual challenges for the allergist/immunologist. J Allergy Clin Immunol Pract. 2020;8(6):1781-90.e3. https://doi.org/10.1016/j.jaip.2020.04.001

13. Kim R, Ha JH, Jue J. The moderating effect of compassion fatigue in the relationship between firefighters' burnout and risk factors in working environment. J Risk Res. 2020;23(11):1491-503. https://doi.org/10.1080/13669877.2020.1738529

14. Sukut O, Sahin-Bayindir G, Ayhan-Balik CH, Albal E. Professional quality of life and psychological resilience among psychiatric nurses. Perspect Psychiatr Care. 2022;58(1):330-8. https://doi.org/10.1111/ppc.12791

15. Manchia M, Gathier AW, Yapici-Eser H, Schmidt MV, de Quervain D, van Amelsvoort T, et al. The impact of the prolonged COVID-19 pandemic on stress resilience and mental health: A critical review across waves. Eur Neuropsychopharmacol. 2022;55:22-83. https://doi.org/10.1016/j.euroneuro.2021.10.864

16. Becker JP, Paixão R, Quartilho MJ. A relational model for stress: a systematic review of the risk and protective factors for stress-related diseases in firefighters. Psych. 2020;2(1):74-84. https://doi.org/10.3390/psych2010008

17. Lazarus RS, Folkman S. Stress, Appraisal, and Coping. New York, NY: Springer Publishing Company; 1984.

18. Anderson GS, Ricciardelli R, Tam-Seto L, Giwa S, Carleton RN. Self-reported coping strategies for managing work-related stress among public safety personnel. Int J Environ Res Public Health. 2022;19(4):2355. https://doi.org/10.3390/ijerph19042355

19. Folkman S, Lazarus RS. If it changes it must be a process: study of emotion and coping during three stages of a college examination. J Pers Soc Psychol. 1985;48(1):150-70. https://doi.org/10.1037//0022-3514.48.1.150

20. Di Nota PM, Kasurak E, Bahji A, Groll D, Anderson GS. Coping among public safety personnel: a systematic review and meta–analysis. Stress Health. 2021;37(4):613-30. https://doi.org/10.1002/smi.3039

21. World Health Organization; International Labour Organization. WHO/ILO joint estimates of the work-related burden of disease and injury, 2000-2016 [Internet]. Geneva: WHO; 2021 [cited 2023 Mar 05]. Available from: https://apps.who.int/iris/bitstream/handle/10665/345242/9789240034945-eng.pdf?sequence=1&isAllowed=y

22. Garner DB. Teorias das ciências comportamentais. In: McEwen M, Wills EM. Bases Teóricas de Enfermagem. 4. ed. Porto Alegre: Artmed; 2015.

23. Oliveira MA, Oliveira SS. The hero's human face: analyzing firemen's health-disease process based on virtual communities. Interface. 2020;24:e190252. https://doi.org/10.1590/Interface.190252

24. Maglione MA, Chen C, Bialas A, Motala A, Chang J, Akinniranye G, et al. Stress Control for Military, Law Enforcement, and First Responders: A Systematic Review. Rand Health Q [Internet]. 2022 [cited 2023 Apr 11];9(3):20. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9242555/

25. Santos CMR, Crispim MO, Silva TTM, Souza RCR, Frazão CMFQ, Frazão IS. Reiki as nursing care to people in mental suffering: an integrative review. Rev Bras Enferm. 2021;74(suppl 3):e20200458. https://doi.org/10.1590/0034-7167-2020-0458

26. Damasceno KSM, Oliveira GM, Beltrame M, Coelho JMF, Pimentel RFW, Merces MC. Effectiveness of auriculotherapy on stress reduction in health workers: a controlled randomized clinical trial. Rev. Latino-Am. Enfermagem. 2023;30:e3771. https://doi.org/10.1590/1518-8345.5992.3771

27. Ornek OK, Esin MN. Effects of a work-related stress model based mental health promotion program on job stress, stress reactions and coping profiles of women workers: a control groups study. BMC Public Health. 2020;20(1):1658. https://doi.org/10.1186/s12889-020-09769-0

28. Kaveh MH, Mehrazin F, Cousins R, Mokarami H. Effectiveness of a transactional model-based education programme for enhancing stress-coping skills in industrial workers: a randomized controlled trial. Sci Rep. 2023;13(1):5076. https://doi.org/10.1038/s41598-023-32230-2

29. Eldridge SM, Chan CL, Campbell MJ, Bond CM, Hopewell S, Thabane L, et al. CONSORT 2010 statement: extension to randomised pilot and feasibility trials. BMJ. 2016;355:i5239. https://doi.org/10.1136/bmj.i5239

30. Savóia MG, Santana PR, Mejias NP. The adaptation of Coping Strategies Inventory by Folkman and Lazarus into Portuguese. Psicol USP [Internet]. 1996 [cited 2023 Apr 11];7(1-2):183-201. Available from: http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1678-51771996000100009&lng=pt&nrm=iso

31. Paschoal T, Tamayo A. Validation of the work stress scale. Estud Psicol (Natal). 2004;9(1):45-52. https://doi.org/10.1590/S1413-294X2004000100006

32. Lago K, Codo W. Compassion fatigue: evidence of internal consistency and factorial validity in ProQol-BR. Estud Psicol (Natal) [Internet]. 2013 [cited 2023 Apr 11];18(2):213-21. Available from: https://www.scielo.br/j/epsic/a/vyz5Lg35SHqNZc83ZM39BPz/abstract/?lang=pt

33. Barroso SM. Evidences of validity of the Brief Resilience Scale for Brazil. Rev Latinoam Psicol. 2021;53:172-9. https://doi.org/10.14349/rlp.2021.v53.19

34. Butcher HK, Bulechek GM, Dochterman JM, Wagner CM. NIC - Classificação das Intervenções de Enfermagem. 7. ed. Rio de Janeiro: GEN Guanabara Koogan; 2020.

35. Knowles MS, Holton EF, Swanson RA. Aprendizagem de resultados: uma abordagem prática para aumentar a efetividade da educação corporativa. 6. ed. Rio de Janeiro: Elsevier; 2011.

36. Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ. 2014;348:g1687. https://doi.org/10.1136/bmj.g1687

37. Ministério da Saúde (BR). Como se proteger? [Internet]. Brasília: Ministério da Saúde; 2021 [cited 2023 Mar 05]. Available from: https://www.gov.br/saude/pt-br/coronavirus/como-se-proteger

38. Chen Y, Li X, Chen C, An Y, Shi J, Huang J, et al. Influence of avoidant coping on posttraumatic stress symptoms and job burnout among firefighters: the mediating role of perceived social support. Disaster Med Public Health Prep. 2022;16(4):1476-81. https://doi.org/10.1017/dmp.2021.155

39. Kshtriya S, Lawrence J, Kobezak HM, Popok PJ, Lowe S. Investigating strategies of emotion regulation as mediators of occupational stressors and mental health outcomes in first responders. Int J Environ Res Public Health. 2022;19(12):7009. https://doi.org/10.3390/ijerph19127009

40. Igboanugo S, Bigelow PL, Mielke JG. Health outcomes of psychosocial stress within firefighters: a systematic review of the research landscape. J Occup Health. 2021;63(1):e12219. https://doi.org/10.1002/1348-9585.12219

41. Lorente L, Vera M, Peiró T. Nurses´ stressors and psychological distress during the COVID-19 pandemic: the mediating role of coping and resilience. J Adv Nurs. 2021;77(3):1335-44. https://doi.org/10.1111/jan.14695

42. Morman MT, Schrodt P, Adamson A. Firefighters' job stress and the (un)intended consequences of relational quality with spouses and firefighter friends. J Soc Pers Relat. 2020;37(4):1092-113. https://doi.org/10.1177/0265407519886355

43. Carleton RN, Afifi TO, Taillieu T, Turner S, Mason JE, Ricciardelli R, et al. Assessing the relative impact of diverse stressors among public safety personnel. Int J Environ Res Public Health. 2020;17(4):1234. https://doi.org/10.3390/ijerph17041234

44. Vig KD, Mason JE, Carleton RN, Asmundson GJG, Anderson GS, Groll D. Mental health and social support among public safety personnel. Occup Med Oxf Engl. 2020;70(6):427-33. https://doi.org/10.1093/occmed/kqaa129

45. Huang Q, An Y, Li X. Coping strategies as mediators in the relation between perceived social support and job burnout among Chinese firefighters. J Health Psychol. 2022;27(2):363-73. https://doi.org/10.1177/1359105320953475

46. Ma H, Qiao H, Qu H, Wang H, Huang Y, Cheng H, et al. Role stress, social support and occupational burnout among physicians in China: a path analysis approach. Int Health. 2020;12(3):157-63. https://doi.org/10.1093/inthealth/ihz054

47. Valenti GD, Faraci P, Magnano P. Emotional intelligence and social support: two key factors in preventing occupational stress during Covid-19. Int J Environ Res Public Health. 2021;18(13):6918. https://doi.org/10.3390/ijerph18136918

Authors' contribution

Study concept and design: Marli Aparecida Reis Coimbra, Érica Midori Ikegami, Lara Andrade Souza, Vanderlei José Haas, Maria Helena Barbosa, Lúcia Aparecida Ferreira. **Obtaining data:** Marli Aparecida Reis Coimbra, Érica Midori Ikegami, Lara Andrade Souza. **Data analysis and interpretation:** Marli Aparecida Reis Coimbra, Érica Midori Ikegami, Lara Andrade Souza, Vanderlei José Haas, Maria Helena Barbosa, Lúcia Aparecida Ferreira. **Statistical analysis:** Marli Aparecida Reis Coimbra, Vanderlei José Haas. **Drafting the manuscript:** Marli Aparecida Reis Coimbra, Érica Midori Ikegami, Lara Andrade Souza, Vanderlei José Haas, Maria Helena Barbosa, Lúcia Aparecida Ferreira.

Critical review of the manuscript as to its relevant intellectual content: Marli Aparecida Reis Coimbra, Érica Midori Ikegami, Lara Andrade Souza, Vanderlei José Haas, Maria Helena Barbosa, Lúcia Aparecida Ferreira.

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Corresponding author:
Marli Aparecida Reis Coimbra
E-mail: marli.coimbra@uftm.edu.br
https://orcid.org/0000-0001-6230-9351