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EMERGENCY MEDICAL TECHNICIANS OCCUPATIONAL STRESS SCALE: DEVELOPMENT AND VALIDATION

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ABSTRACT

INTRODUCTION: Several stress factors are experienced by emergency medical technicians (EMTs), the identification and management of which may be a major challenge due to the lack of valid and reliable instruments. This study aimed to develop a relevant and easy-to-use occupational stress scale (OSS) for EMTs with adequate psychometric properties.

MATERIAL AND METHODS: A mixed method with an exploratory sequential design was used in this research. Items were generated based on the existing literature and a qualitative study, followed by testing the content and face validity of the items. Exploratory factor analysis (EFA) was done with a random sample of 247 EMTs. Also, internal consistency and stability reliability were investigated.

RESULTS: From the initial 74 items, 20 with content validity ratio and content validity index were removed. In EFA, the item set resolved to a 50-item scale in the six dimensions include: Patient and family conditions, Environmental and occupational conditions, Traumatic consequences, Supportive management problems, Lack of support, and Interpersonal and individual tension. Cronbach's alpha and Intra-class correlation coefficient (ICC) showed excellent reliability.

CONCLUSIONS: The OSS-EMT represents a psychometrically derived instrument that identified important stressors for EMTs., and is probably among the first studies in Iran. While explaining the methodology precisely, this study evaluated the validity and reliability of the OSS in EMTs based on principles of survey instrument development and validation.

KEYWORDS: occupational stress scale; emergency medical technician; psychometric; validity; reliability; measurement

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INTRODUCTION

Pre-hospital emergency care (PHEC) is one of the fundamental and decisive areas of the healthcare system [1] and EMTs are among the few forces that are at the frontline of emergency response. EMTs work day and night, responding to a variety of critical situations in towns and roads in the shortest possible time during incidents and unstable environmental conditions [2]. The daily responsibilities of these forces are very extensive [3] and include basic supportive care, treatment of life-threatening injuries, management of traumatic patients, presence in the crime, accidents, death, murder, and suicide scenes. In addition, common stressors, such as increased call rates, working shifts, program changes, and lack of flexibility in work schedules, are also experienced by EMTs [4].

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According to the literature, the emergency medical career is intrinsically dangerous and stressful [5], and the increasing complexity of emergency services in pre-hospital emergency (PHE) environments has exacerbated the stress in this occupation [6]. Exposure to acute and chronic stressors has a negative impact on the safety and health of EMTs [7], posttraumatic stress symptomatology [8], and even greater risk for suicide compared to the general public [9].The amount of exposure to stress is different among people, depending on factors such as the situation and the working conditions, the duration of exposure, and the amount of stress inflicted on the individual [10]. The stress level in a PHEC is high due to unusual stresses in society, such as death, high risk of infectious diseases, violence, and rape. In general, these forces are exposed to human suffering and specific tragedies [11] and if these stresses are not successfully managed, they will have a negative effect on patient care [7]. A study by Nucera et al. [12] showed improving working conditions and fostering a culture that values self-care and work-life balance is needed, too. This will improve the well-being of paramedics and emergency medical workers and enhance the quality of care they provide [12].

Studies have shown that stress is high in PHEC and occupational injuries are serious among EMTs [13]. The results of a systematic review showed that the prevalence of anxiety in EMTs was high [14]. Carvahlo et al. stated that 24-hour work and increasing number of night shift missions would cause fatigue and increased stress for EMTs. Researchers have recently been trying to identify stress-related factors in emergency personnel to increase the awareness and understanding of the stressors in the PHE environment [15] and their role in the quality of work life [9] as well as the mental health status of PHE staff [16]. A study by Chirico et al. [17] showed to improve the prevention and management of work-related mental disorders, it is better health surveillance in the workplace can be activated.

A review of the literature showed that EMT personnel may be at the risk of developing work-related health problems [18], suggesting that part of this risk is attributable to stress [19]. Despite our best efforts, we did not manage to find a to assess stress among pre-hospital emergency medical technicians. However, measuring these stressors in different contexts and developing measuring instruments is important and can be effective for planning effective interventions to modify them but as far as we know; there is no published instrument to measure the occupational burden of stress in PHE settings in EMTs. In addition, the concepts of (occupational stress) OS in relation to the duties and professional role of EMTs in emergency operations are not well explained, nor has the burden of stress, which is the result of the severity and prevalence of stressors [20], received adequate attention in PHEC studies. We believe that the nature of what happens and those present on the scene can affect the perceived stress and response to some accidents [21]. Therefore, this research aimed to design a valid and reliable instrument for assessing the severity and extent of exposure to the stress burden among EMTs.

MATERIAL AND METHODS

This mixed-method study was conducted between December 2015 and June 2016 and followed the steps in the scale development, including 1) generating initial pool of items, 2) assessing content and face validity, and 3) testing factor structure and reliability of the new scale.

The study was conducted in the East Azerbaijan Province of Iran. The East Azerbaijan Province is in the North West of Iran covering approximately 45 km^2 with an estimated population of 3.9 million. The Tabriz University of Medical Sciences affiliated with Iran Health Ministry provides pre-hospital emergency care (PHEC) services for the province. At the time of the study, there were one air, 41 urban, and 61 interurban, emergency stations with 450 male staff (EMTs = 310, anesthetic technicians = 60, and nurses = 80). Annually, about 100,000 emergency missions are performed by PHEC services.

Step 1: Generating initial pool of items

To develop the conceptual framework of the occupational stressors in EMTs, informants were selected in the context of the concerned phenomenon. For this purpose, a purposeful sampling method was used in the qualitative section, and 9 faculty members (Emergency Medicine = 3, Nursing = 4, General Practitioner = 2); 3 experts of Emergency Medical Dispatch (EMD), and 5 EMTs were selected to obtain a wider range of data. In this stage, face-to-face interviews were done using a deep semi-structured method. The place of the interview was determined by the participants, who usually chose their workplace, and after the presentation of the information

and the explanation of the objectives, the interview began. The length of each interview varied from 30 to 75 minutes. The interview was conducted in a private room and contained two general questions:

— What are the occupational stressors for an EMT in pre-hospital emergency?
— In which situations, are EMTs more likely to experience occupational stressors?

In the next step, based on the answers of the participants, probing questions were raised to explore various attributes of the concept, and the sampling continued until reaching saturation in the data, codes, and categories. After receiving permission from the participants, all the interviews were recorded and then transcribed.

A conventional content analysis was used to analyze the transcribed interview data based on methods described by Graneheim and Lundman [22]. The interviews were transcribed and verified for accuracy prior to analysis. All transcripts were read several times for the first author to appreciate the meaning of the data as a whole. The codes were extracted and categorized and the main categories were identified. The collection process continued until no new codes were extracted from the last two interviews. To confirm the conformability of the qualitative data, the coded interviews were shown to the collaborators, and during the research, the researcher continually communicated with the team members to confirm the extracted code.

At the end of the first phase of the study, a pool of 130 items was created. The initial item pool was read and revised several times and 56 items were excluded due to their overlap with other items. Finally, 74 items entered the psychometric assessment stage.

The qualitative phase was followed by a systematic review of the existing literature on occupational stressors in PHEC, with a specific interest in identifying dimensions of occupational stress in PHEC. We expanded our search by examining international research published in English between 2000 and 2016 at CINAHL (EBSCO), the full business source (EBSCO), Google Scholar, MEDLINE, and PubMed databases. Keywords used included "occupational stressors" OR "occupational stress" AND "pre-hospital emergency care" OR "PHEC" AND "emergency medical technicians" OR "EMT". The search yielded about 1657 articles, of which 25 articles were closely reviewed for occupational stressors domains. The domains of occupational stressors in PHEC that emerged from the systematic review were also plotted onto this specification. This review confirmed the findings of the qualitative phase, not revealing any new dimension.

Answers to all of the items were set in Likert scale in two dimensions. The first one measured the severity of the stressor and was designed as a 6-degree Likert scale (no stress = 0, very low stress = 1, low stress = 2, average stress = 3, high stress = 4, very high stress= 5). The second dimension measured the amount of exposure to stressors which was designed as a 6-degree Likert scale (no exposure = 0, very low exposure = 1, low exposure = 2, average exposure = 3, high exposure = 4, very high exposure = 5). Because the designed instrument measured both the severity and the exposure to stressors in EMTs, this tool can be used as a scale for measuring the stress burden in EMTs.

Step 2: Assessing content and face validity

We invited 15 experienced experts to conduct the research and help us with developing psychometric tools, as well as to review nursing and emergency items (n = 74) for their content. To determine the ratio of content validity (CVR), the experts were asked to evaluate whether each item was "necessary" for operating the construct on a 3-point Likert-type scale: 1 = not necessary, 2 = useful, but not essential, and 3 = essential. Then, the content validity ratio for each item was calculated with the formula: content validity ratio = $(N_e–N/2)/N/2$, where N is the number of panelists in the content validity evaluation and N_e is the number of panelists who rated the item as essential. Items with a content validity ratio value less than 0.59 (the critical value in the Lawshe table for 15 panelists) were excluded [23].

They also rated how "relevant" each item was for a given domain on a 4-point Likert-type scale from 1 = not very relevant to 4 = highly relevant. Content Validity Index (CVI) was calculated for each item, based on the number of experts rating an item as 3 or 4 divided by the number of experts. Items with CVI values more than 0.79 were preserved without changing, between 0.70 and 0.79 were corrected, and less than 0.70 were eliminated. In addition, we computed the Scale CVIs with the average approach (S-CVI-Ave) for the scale by summing all I-CVIs divided by the number of items [24].

Finally, the experts and an additional eight EMTs selected purposefully were asked to evaluate each

item and the scale as a whole to assure face validity and to check for clarity, readability, item structure, instructions, and a response format [25]. The cognitive interviewing was conducted with these eight members of the target population. Think-aloud technique, verbal probing, and observation were used to assess how the respondents understood and answered the items [26], so that the items were corrected and finally, 54 items were finalized into a construct validity study.

Step 3: Testing factor structure and reliability of items

Next, we combined a list of the remaining 54 items with demographic variables assembled from occupational Stress studies into a pen-and-paper scale, and administered it to a large sample of EMTs with the aim of determining the underlying structure of the scale and identifying items for deletion [27]. In order to investigate the construct validity through exploratory factor analysis (EFA), 247 EMTs working in the Disaster and Emergency Medical Management Center (DEMMC) of East Azerbaijan province with a minimum of 6 months' work experience were included in our study sample through systematic random sampling method after they signed informed consent forms (Tab. 1).

Table 1. Demographic characteristics of the participants

Characteristics	n (%)	Mean (SD)
Gender		
Male	247 (100)	
Age		33 (6.57)
Degree of education		
Bachelor of nursing	66 (26.72)	
EMTs	115 (46.57)	
Anesthetic technician	39 (15.78)	
Diploma	27 (10.93)	
Employment status		
Official	123 (49.8)	
Contractual	124 (50.2)	
Job experience (year)		4.82 (5.46)
1–5	174 (70.4)	
6–10	36 (14.6)	
11–15	15 (6.1)	
29–28	21 (8.9)	
Number of missions per week		12.28 (9.51)
1–20	198 (80.2)	
21–40	40 (16.2)	
41–60	9 (3.60)	

The EFA was used, applying the Kaiser–Meyer–Olkin test for sampling adequacy, the Bartlett test of sphericity, principal component analysis, scree plot, and Varimax rotation with a cut-off point of 0.4 for factor loading to extract the dimensions of the scale or for the simplification of interrelated measures to discover patterns in a set of variables [28]. To achieve an appropriate sample size for an EFA, we aimed to recruit at least four participants per item (n = = 216); a sample size of at least 260 participants (plus accounting for a 20% attrition rate), was deemed enough [29]. The participants were asked to read an information sheet and sign a consent form before completing the scale. After frequent visits to the research environment to collect completed scales, we finally analyzed the data for 247 completed scales (response rate = 95%).

Finally, we assessed the internal consistency of the final scale using Cronbach's alpha, and the stability of the scale over time (two-week interval test-retest reliability) by calculating the ICC. To assess the stability of the scale over time (test-retest reliability), we asked 20 EMTs (by convenience sampling method) to complete the scale twice — the second time being two weeks after the first data collection. This timeframe was selected to limit recall of the initial responses [30].

Analysis

In this study, data analysis was done in two stages. At the qualitative stage, data were analyzed through conventional qualitative content analysis. Exploratory factor analysis was done in the quantitative phase. Also, internal consistency and stability reliability were investigated.

Ethics

The Tabriz University of Medical Sciences Ethics Committee approved the study (IR.TBZMED.REC.1394.816). Informed consent was obtained prior to participation from all participants willing to provide feedback on the scale items (in Step 2) and those who completed the questionnaire (in Step 3). All participants signed informed and written consent forms before being interviewed and they were assured that all of their information would remain confidential. The principle of anonymity and the

right to withdraw from the study were considered for all participants.

RESULTS

The age of the participants in the qualitative phase of the study was 43 ± 7.3 years. All but two of the experts in the EMD were males. To establish the construct validity, a total of 260 questionnaires were collected from 98 urban and suburban ambulance stations of DEMMC of the East Azerbaijan province. However, 13 questionnaires were excluded as questionnaires were incomplete (5%). The average and standard deviation age of the participants was 33.00 ± 6.57 years. All respondents in the study were males and they participated in PHEC services with various degrees including Nursing, EMTs, Anesthesia Technician, and diplomas (Tab. 1).

Face and content validity

Based on the CVR, CVI, and suggestions of the 15 panelists, 20 items were excluded and 10 items were corrected so finally, 54 items remained in the instrument. After face and content validity, OSS had two dimensions with 54 items with SCVI/Ave equal to 0.92.

Construct validity

To assess the construct validity of the scale, the sampling adequacy was examined by the Kaiser–Meyer–Olkin test, yielding 0.98 as its result, and the Bartlett test was found significant ($p < 0.001$). In the EFA, using Varimax rotation, six components with eigenvalues more than 1.0 were extracted which explained 52.38% of the variance. The first component with 14 items accounted for 13.50% of the variance and was called "patient and family conditions" The second component with 12 items accounted for 13.24% of the variance and was called "environmental and occupational conditions". The third component with 9 items accounted for 9.23% of the variance and was called "traumatic consequence". The fourth component with five items accounted for 6.30% of the variance and was called "supportive management problems", the fifth component with five items accounted for 5.36% of the variance and was called "lack of support", and finally, the sixth component with five items accounted for 4.73% of the variance and was called "interpersonal and individual tension" (Tab. 2 and 3). Five items with factor load lower than 0.4 were removed. Figure 1 shows item reduction in each stage of the study.

Reliability

The internal consistency of the 50 scale, based on Cronbach's alpha, was estimated at 0.92 for the entire scale and 0.91 to 0.92 for its subscales. When the scale was assessed again after a two-week interval in the same sample of participants, the value of the ICC coefficient for the entire scale was 0.95 and ranged from 0.52 to 0.93 for its dimensions (Tab. 2).

Scoring of the instrument

Our final OSS-EMT instrument measured both the severity of the stressors and the amount of exposure to stressors in six subscales, including patient and family conditions, environmental and occupational conditions, traumatic consequences, supportive management problems, lack of support, and interpersonal and individual tension. Answers to all of the items were set on Likert scale in both measures. The first one measured the severity of the stressor and was designed as a 6-degree Likert scale (no

Table 2. The explained variance, Cronbach's alpha coefficients, and test-retest in occupational stress scale in emergency medical technician

Factor	Items	Explained variance (%)	Cronbach's alpha	ICC; p value
Factor 1 (patient and family conditions)	14	13.50	0.92	0.66; 0.017
Factor 2 (environmental and occupational conditions)	12	13.25	0.91	0.93; $p < 0.001$
Factor 3 (traumatic consequence)	9	9.23	0.91	0.85; 0.007
Factor 4 (supportive management problems)	5	6.30	0.91	0.87; $p < 0.001$
Factor 5 (lack of support)	5	5.36	0.90	0.92; $p < 0.001$
Factor 6 (interpersonal and individual tension)	5	4.73	0.92	0.52; 0.077
3OSS-EMT	50	52.38	0.92	0.95; $p < 0.001$

ICC — intra-class correlation coefficient; OSS-EMT — occupational stress scale-emergency medical technicians

Table 3. Results of the exploratory factor analysis (EFA) using rotated component matrix

Factors and items	Rotated component matrix					
	1	2	3	4	5	6
Patient and family conditions						
Deaths of patients after much effort to save them	0.75					
Dealing with patients who have committed suicide	0.72					
Performing CPR at the accident scene or in the presence of family members	0.71					
Confronting with violence in patients and their families	0.62					
Contact and care for addicted patients	0.61					
Contact and care for patients with severe burns	0.61					
Excessive expectations of patients and their families	0.57					
Contact with attendees at the scene of accident	0.53					
Contact with patients who have been victims of family violence	0.53					
Facing the death of young and suspicious patients	0.52					
Facing with injured people of sever accidents	0.49					
Facing and care for patients requiring CPR	0.48					
Facing with patients with mental disorders	0.48					
Facing with severely injured patients	0.48					
Environmental and occupational conditions						
The voice of wireless		0.77				
Dispatching to scene by the emergency medical dispatch		0.75				
Dispatched to scene by the emergency medical dispatch (very fast)		0.71				
Dispatching at midnight during the break		0.61				
Seeing familiar people while moving a patient on a stretcher		0.61				
Dispatch to previous scene		0.60				
Dispatch to scene while eating		0.60				
Driving at high speed (in life threatening or CPR patients)		0.52				
Failure to handover patients at the hospital		0.51				
Stress after outpatient missions at the pre-hospital		0.51				
Continuous missions without time to relax and refresh		0.48				
Dispatch missions in unfavorable environmental or atmospheric conditions		0.48				
Traumatic consequence						
Contact with infectious patients (such as AIDS, hepatitis, etc.)			0.73			
Equipment breakdown during mission			0.64			
Contact with hazardous chemicals at work and missions			0.61			
Breakdown or accident with ambulance during missions			0.60			
Mission in dark and abandoned places			0.57			
The possibility of injury to colleagues during a mission			0.54			
Lack of experience in a colleague during a mission			0.54			
The risk of self-injury during mission			0.54			
Fear of further complaints from patients and their families			0.46			
Supportive management problem						
The problem of identifying the patient's chief complaint				0.48		
Delay in reaching the accident sense due to urban traffic				0.52		
Unclear job description of emergency medical technicians				0.60		

Table 3 (cont.). Results of the exploratory factor analysis (EFA) using rotated component matrix

Factors and items	Rotated component matrix					
	1	2	3	4	5	6
Lack of permission to emergency medical technicians for many medical treatments				0.42		
Delay in reaching the accident place due to the location of the accident				0.54		
Lack of support						
Lack of ambulance equipment					0.64	
Lack of access to a physician for counselling					0.60	
Inadequate training on how to use certain medical equipment					0.57	
Transmission of life threatening patients with ambulance in difficult and helpless conditions					0.47	
Low number of emergency medical technicians per shift					0.47	
Interpersonal and individual tension						
Lack of individual awareness in dealing with patients with high medical knowledge						0.78
Facing with emergency medical colleagues in emergency bases						0.74
Contact with emergency staff in hospitals emergency department						0.63
Being away from family for 24 hours						0.44
Fear of lost equipment during mission						0.42

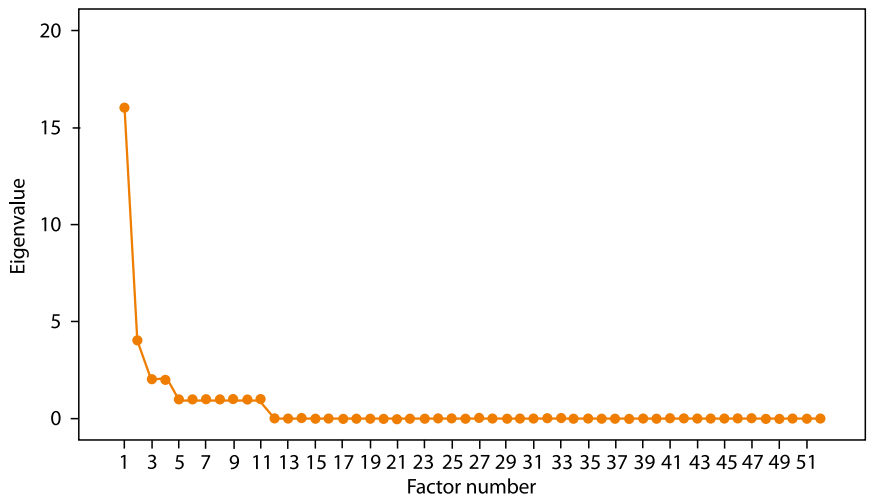

FIGURE 1. Scree plot in exploratory factor analysis

stress = 0, very low stress = 1, low stress = 2, average stress = 3, high stress = 4, very high stress = 5). The second one, measured the amount of exposure to stressors which was also designed as a 6-degree Likert scale (no exposure = 0, very low exposure = = 1, low exposure = 2, average exposure = 3, high exposure = 4, very high exposure = 5). Because the designed instrument measured both the severity and the exposure to stressors in EMTs, this tool can be used as a scale for measuring the stress burden in EMTs.

An average can be calculated for each subscale and the whole instrument by summing all items in the scale or subscale divided by the number of items in the whole instrument or each subscale which can vary from zero to five. By multiplying the item's score by the intensity scale on the score obtained for the same item on the amount of exposure to stressors, the stress load is calculated, which can range from 0 to 25. A high score on the severity of stressors and the amount of exposure to stressors in scale represents a high level of stress burden for EMTs.

DISCUSSION

The results of this study provide proper evidence of the robustness of factor structure and the reliability of the OSS in EMTs based on the psychometric process. The research team in this study was able to create theoretical and operational definitions of stress in the PHEC, and the results led to the determination of the stress concept in 6 sub-scales in 50 items in PHEC personnel.

Death, suffering and patient care emerged as one of the most prominent sub-scales of OSS in EMTs, and the care of patients in emergency situations, resuscitation, death, suicide attempts, burns, and severe traumas were found to be among the important items. In this dimension, in addition to caring factors, facing traffic accidents, people on the scene, patients and families and their excessive expectations at the scene or at home, were reported as stressful items. The results of the studies showed that the conditions of resuscitation and caring for very ill patients are the most important stressors in PHEC personnel [31, 32]. A study showed that volunteers of the Red Cross engaged in emergency care reported higher levels of emotional exhaustion and depersonalization [33]. During another study, it was concluded that traumatic events, death during care, violence, burn patients, and suicides are among the stressors that EMTs would suffer from [34], while the emergency department staff suffer from stressful factors such as the crowd of the referring patients and caring for very ill patients [35]. Our results are mostly consistent with the findings of similar studies. In addition, some stressors such as facing the crowd at the scene and excessive expectations of patients and their families at the top of emergency needs were limited to the pre-hospital environment. This suggests that there are some intrinsic and natural stressors in emergencies, and certainly, different cultural and social backgrounds will play a role in this.

Wireless voice, high-speed driving in emergency dispatch, continuing dispatch without rest, contact with infectious patients, the possibility of getting involved in an accident with an ambulance, and deployment to remote locations were among other important themes in this study. EMTs have been reported to face high stresses on a daily basis, including the risk of infectious diseases [36], the need for rapid diagnosis and response [37], severe accidents or death of colleagues, high volume of calls, long shifts, continuous shift changes and lack of flexibility in the presentation of work plans [36]. These factors have made the conditions of PHEC mentally challenging [38]. Therefore, the personnel faces many conflicts, and frequently experience violence and massive stress in their role of caring in the front line of the PHEC [39, 40]. The results of this study, while confirming the findings of other similar studies, indicate that EMTs suffer from special harmful stresses in the PHEC working environment in addition to stressful patient care during emergency operations, which causes mental load and many challenges during the care of the patient by the EMTs.

In this study, some of the main themes were as follows: the challenge of diagnosing a patient's problem, delays in arriving at an accident scene, the lack of access to counseling physicians, transferring of sick patients with an ambulance in difficult conditions without any help, and the low number of personnel in emergency operations. These stress factors were categorized as sub-scale of management and supporting problems in this occupation field. Along these lines, certain situations such as delays in arriving at the scene and staff shortages [41], the lack of physicians in emergency situations, the deficiencies and the lack of control in specific conditions have also been considered as stressors. As with other similar studies, our findings also seem to be pointing to management and support problems in this occupational group. Inadequate support and insufficient number of EMTs in PHEC were sub-scales reported as stressor factors in the participants. Of course, such challenges in emergency care situations should be considered and some reforms are needed regarding the structures and processes involved in reducing stress in EMTs and improving the quality of patient care.

The design and psychometric scale of this study is supported by some studies and instruments in terms of structural concepts in occupational Stress structures in the EMTs. Motie et al. [42] reported the prevalence of stressors in EMTs of Iran under the sub-scales of interpersonal factors, patient care, physical, managerial, and individual environments. Naude and Rothmann [43] defined the concept of occupational Stress in EMTs structurally, with 3 sub-scales of lack of resources, intrinsic stresses, and workloads. In another study, Donnelley [44] summed up stress in emergency medical services (EMS) in four categories: chronic stress, critical incident stress, posttraumatic stress, and alcohol-induced stress.

Expression of occupational Stress in nurses was designed by French et al. in nine dimensions; death and dying, conflict with physicians, inadequate emotional preparation, problems with peer support, problems with supervisors, workload, uncertainty concerning treatment, patients and families, and discrimination with alpha Cronbach of 0.96, and the validity range of sub-scales was reported between 0.65 to 0.88 [45]. The reliability of the OSS in this study was higher than 0.90, which indicates a high correlation between the items in the instrument. Comparison of the results of the present study with other studies shows that, in many cases, the sub-scales are similar and this shows the stability of the factor structure and acceptable reliability of occupational Stress in the population under study. Differences in some of the items confirm the cultural, social, and environmental diversity, and also it highlight the stress during emergency operations in the study. Certainly, further studies are needed to confirm the validity and reliability of the scale.

This is one of the few studies in the world, probably the first in Iran, to investigate this topic. While explaining the methodology precisely, this study evaluated the validity and reliability of the OSS in EMTs based on classical theory [46]. The scales obtained in this study can be due to the simplicity, clarity, and comprehensibility for all individuals and the conformity to Iranian culture, and it can be used for similar and relevant research in terms of subject matter and study population. In addition, the results of this study could be of interest to researchers working on developing the OSS for other health personnel and rescuers such as hospital emergency departments, Red Crescent, firefighters, and the police. The findings of the present study suggest that if the burden of stress among the EMTs is measured through this tool, and then stressors are identified well, one can help prevent and control the burden of stress in the pre-hospital emergency personnel.

Based on the findings of the present study, it is suggested the burden of stress among the EMT should be measured, using this tool, so that by identifying the stressors well, one can help prevent and control the burden of stress in the pre-hospital emergency personnel.

Limitations

This research had limitations that limited the study findings' generalizability. Due to cultural, social, ethnic, and environmental diversity, it may be necessary to check the cultural adaptation of the instrument before using it in other settings. The present scale only measures the stress in the field of emergency operations in the emergency dispatch and is not applicable to other conditions. In addition, due to the dispersion of samples in urban and suburban bases and difficult access to them, it was not possible to use the views of representatives from all of the bases. Lastly, this study was conducted in a single city in the East Azerbaijan province, so it cannot be generalized to other EMTs and emergency units. Future studies should incorporate a variety of contextual and socio-cultural conditions to determine the generalizability of this tool.

In Iran, pre-hospital emergency personnel are all men, and therefore, qualitative interviews for the conceptualization of the content domain were conducted only with male technicians, and therefore this tool may have limitations for use with female technicians.

CONCLUSIONS

The OSS-EMT represents a psychometrically derived instrument that identifies important stressors for EMTs. The scales obtained in this study can be useful due to their simplicity, clarity, and comprehensibility for all individuals and their conformity to Iranian culture, and they can be used for similar and relevant research in terms of subject matter and study population. In addition, the results of this study could be of interest to researchers involved in developing the OSS for other health personnel and rescuers such as hospital emergency departments, Red Crescent, firefighters, and the police. It is suggested that a number of instruments should be designed for stress in crisis, chronic, and post-traumatic stress situations for the PHEC team to measure stress in terms of severity and the amount of exposure PHEC.

Article information and declarations

Data availability statement

All data generated or analyzed during this study are included in this published article.

Ethics statement

None to be declared.

Author contributions

Abbas Dadashzadeh — conception and design of the study, analysis and interpretation of data, collection, assembly, possession of raw data (doing experiments), Final approval of the study; Vahid Zamanzadeh — conception and design of the study, analysis and interpretation of data, collection, assembly, possession of raw data (doing experiments), critical revision, Final approval of the study; Akram Ghahramanian — conception and design of the study, critical revision, and final approval of the study, Javad Dehghannezhad — conception and design of the study, critical revision, final approval of the study; Azad Rahmani — conception and design of the study, analysis, and interpretation of data, final approval of the study; Hadi Hassankhani — conception and design of the study, analysis, and interpretation of data, statistical expertise, final approval of the study; Sharareh Mälardalen — conception and design of the study, final approval of the study.

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Conflict of interest

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Supplementary material

Not applicable.

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