

<b>Access this article online</b>
<b>Quick Response Code:</b>

<b>Website:</b> <a href="http://www.jehp.net">www.jehp.net</a>
<b>DOI:</b> 10.4103/jehp.jehp_498_21

# Bio-psycho-social health assessment in prehospital emergency technicians: A systematic review

Vahid Delshad<sup>1,2</sup>, Marcus Stueck<sup>3</sup>, Abbas Ebadi<sup>4,5</sup>, Mariola Bidzan<sup>6</sup>, Hamidreza Khankeh<sup>2,7</sup>

<sup>1</sup>Student Research Committee, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, <sup>2</sup>Health in Emergency and Disaster Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, <sup>3</sup>DPFA Academy of Work and Health, Leipzig, Germany, <sup>4</sup>Behavioral Sciences Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran, <sup>5</sup>Nursing Management, Nursing Management, Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran, <sup>6</sup>Institute of Psychology, University of Gdansk, Gdańsk, Poland, <sup>7</sup>Department of Clinical Science and Education, Karolinska Institute, Stockholm, Sweden

## Address for correspondence:

Prof. Hamidreza Khankeh, Health in Emergency and Disaster Research Center, The University of Social Welfare and Rehabilitation Sciences, Tehran, Iran. Department of Clinical Science and Education, Karolinska Institute, Stockholm, Sweden. E-mail: [hamid.khankeh@ki.se](mailto:hamid.khankeh@ki.se)  
Prof. Marcus Stueck, DPFA Academy of Work and Health, Leipzig, Germany. E-mail: [marcus.stueck@dpfa.de](mailto:marcus.stueck@dpfa.de)

Received: 16-04-2021  
Accepted: 26-05-2021  
Published: 26-02-2022

## Abstract:

**BACKGROUND:** Health is a complex structure and has physical, psychological, and social approaches. The importance and impact of health assessment have caused considerable attention to be paid to the employees of the health system and the determining factors of this relationship. Hence, the main purpose of this study was to find out the bio-psycho-social health situation in prehospital emergency technicians as the research question staff.

**MATERIALS AND METHODS:** The present study is a systematic review and data have retrieved through extensive search in Scopus, Web of Science, PubMed (including Medline), Cochrane Library, Irandoc, Magiran, MedLib, and SID databases with a combination of keywords of "Health," "Assessment," "Social," "Psychological," "Biological," "Emergency," and "prehospital," according to the search strategy, between 2000 and 2021 11 studies were reviewed; then, they were entered based on the objectives of the study and narrative analysis was performed by the researcher.

**RESULTS:** After analyzing the articles, a total of 4 factors affecting bio-psycho-social health in prehospital emergency technicians have been extracted and identified, which included health management, bio-psycho-social factors, occupational factors, and behavioral factors.

**CONCLUSION:** This research showed four factors, namely health management, bio-psycho-social factors, occupational factors, and behavioral factors which could be effective in Bio-Psycho-Social health. Since prehospital emergency services have an important role in maintaining the health of the community, which requires attention to the bio-psycho-social health of emergency personnel, more studies have focused on health management among the four mentioned factors, but the need to examine the other three factors for a more accurate assessment of the health of emergency personnel seems necessary. Therefore, prevention and response strategies based on bio-psycho-social health assessment models are proposed to promote the health of prehospital emergency technician staff.

## Keywords:

Assessment, bio-psycho-social, emergency medical services, health

## Introduction

Health has a broad meaning and its definition is influenced by the level of awareness of people in societies with different conditions. Health is a dynamic process, its meaning will change over time and it can be affected by many factors.<sup>[1]</sup> In 2003, the World Health Organization (WHO) defined health as

"complete physical, mental and social health, and not merely the absence of a disease." This definition implies that health is a multidimensional issue and it should be noted that its different dimensions affect each other.<sup>[2]</sup> The model of biopsychology, hygiene, diseases, and health care was first proposed by George Engel 40 years ago and the model of social biopsychology is very popular around the world.<sup>[3]</sup>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [WKHLRPMedknow\\_reprints@wolterskluwer.com](mailto:WKHLRPMedknow_reprints@wolterskluwer.com)

**How to cite this article:** Delshad V, Stueck M, Ebadi A, Bidzan M, Khankeh H. Bio-psycho-social health assessment in prehospital emergency technicians: A systematic review. *J Edu Health Promot* 2022;11:41.

Because biological, psychological, and social factors can be distinguished as “the systems,” it can be considered that they can be conceptually differentiated, defined, and measured. In a study by Kusnanto *et al.*, in 2021, it was stated that Bio-Psycho-Social factors affected health and well-being. The researchers stated that biological, psychological, and social factors affected physical health and well-being.<sup>[4]</sup> Theorists believe that the issue of health is very complex and controversial as well as it has different models, including biomedical models which emphasize diseases as well as psychosocial and bio-psycho-social models which emphasize health and well-being.<sup>[5]</sup>

One of the models that is the result of combining biological, psychosocial, and bio-psychological models is the social model. From the viewpoint of biology, the most common dimension of health is physical, which can be evaluated more easily than its other dimensions.<sup>[6]</sup> From the viewpoint of psychology, measuring mental health will be more difficult than measuring physical health. Mental health is not only the absence of mental illness but also the ability to adapt to environmental conditions and to have an appropriate reaction to problems and life events. It is an important aspect of mental health.<sup>[6]</sup> The social dimension interacts with the biological and mental system which includes daily activities, environmental stressors, interpersonal relationships, etc.<sup>[7]</sup>

A study by Frazier *et al.*, in 2020, reviewed the bio-psychological model of health and disease. They concluded that health psychology was evolving to make exciting advances that significantly improved people’s lives. For over 40 years, this bio-psychological model has established interrelationships between biological, psychological, and socio-environmental effects on health and diseases.<sup>[8]</sup>

Psychological health is important for prehospital workers. They are constantly exposed to physical, psychological, and social stress that leads to diseases. In a study conducted by Engert *et al.*, in 2020, it was stated that exposure to psychosocial factors led to bio-behavioral side effects.<sup>[9]</sup> Traditional behavioral and biological risk factors play an important role in relation to psychosocial stress.<sup>[10]</sup> Therefore, measures taken to promote health must pay attention to all aspects of the biological, psychological, social, and general health of society. This is important for prehospital technicians due to the nature of their work; routine “everyday” contacts and unpleasant situations can cause frustration and emotional distress which are leading to excessive fatigue as well as stress during and after the accident.<sup>[11,12]</sup>

A study performed by Lebares, *et al.*, in 2021, showed that stress endangered the bio-psycho-social function (e.g., burnout, alertness) of paramedics, and that stress could

be associated with burnout which might increase the risk of depression, chronic anxiety, and learning disabilities.<sup>[13]</sup>

Declining social relationships negatively affects mental health. The fact is that prehospital technicians are in direct contact with patients and it may undoubtedly lead to psychological maladaptation and concerns, including depression and anxiety, about their mental health.<sup>[14]</sup>

Obviously, health care providers who provide emergency medical services, must be biologically, psychologically, and socially healthy so that people can benefit from more efficient services.<sup>[15]</sup> Therefore, to realize the above factors in paramedics, the first step is to know how the situation in the world is. This needs a comprehensive search to find out the studies, which can be possible by a systematic review.

Hence, this study sought to assess the bio-psycho-social health in prehospital emergency technicians according to the definition of the WHO, and to know the possibility of improving it.

## Materials and Methods

### Study design and setting

The present study is a systematic review that has been conducted in 2020 and 2021 according to the PRISMA guidelines, whose steps are shown in Figure 1.<sup>[16]</sup>

### Information sources and search

In the present study, official articles and reports published between 2000 and 2021, were assessed to assessment of bio-psycho-social health in prehospital technicians. To extract the data, internet resources were searched and data collection was done based on the inclusion criteria. Data related to this step were identified and retrieved according to the search strategy through an extensive search in databases, such as Scopus, Web of Science, PubMed (including Medline), Cochrane Library, Irandoc, Magiran, MedLib, and SID with a combination of keywords “Assessment,” “health,” “Social,” “Psychological,” “Physical” “Pre-Hospital,” “Biopsychosocial,” and “Emergency.” For this purpose, using the operators of AND, OR, keyword combinations were loaded separately in related databases. Then, all articles related to the study area were extracted. The initial search was based on the title of the articles and the features of the databases were used to restrict the search results.

### Search strategy

The researchers searched all the articles under medical thematic headings. The following keywords and terms were accordingly searched. The operators (AND, OR,) were used in a database.

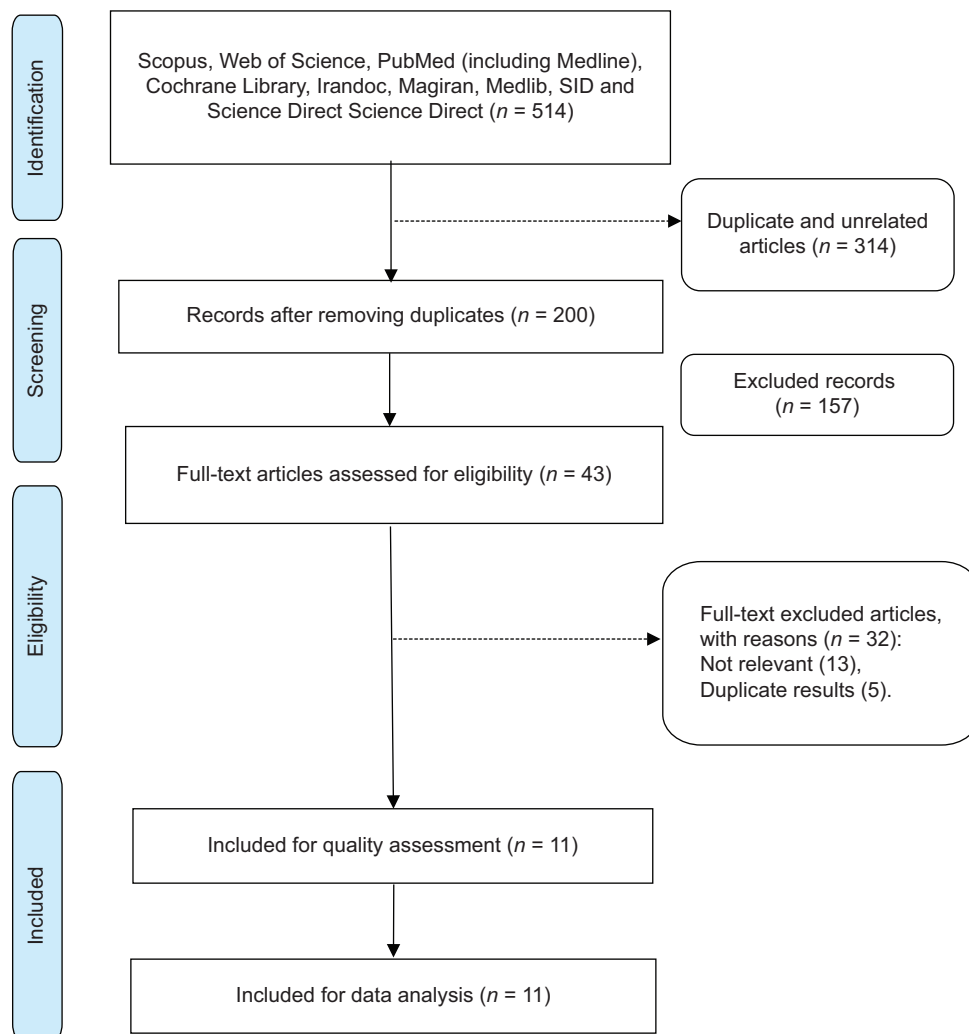


Figure 1: The results of the PRISMA flow of the systematic literature search

### Search concepts and keywords in the PubMed database

((“Emergency” [ti]) OR (“Assessment” [tiab]) OR (Biological[tiab])OR(“Psychosocial” [ti])OR(“social” OR (social AND Psychological) OR (“Pre-hospital”) OR(HealthANDemergency)OR(HealthAND“emergency staff”)) AND((Biological [tiab]) OR (Emergency OR (Healthcare [tiab]) OR (“Psychological”) OR (social ANDHealthcare))OR(social[tiab])OROR(“Pre-hospital emergency”) OR (Assessment AND Pre-hospital) OR (“Pre-hospital”)OR (Psychological AND Biological) OR (“Health AND system AND staff”) OR (social AND Biological) OR (Pre-hospital AND “Biological”)) AND((Healthcare [tiab]) OR (“Psychological” [ti]) OR (staff [ti]) OR (“Psychosocial models”) OR (“Pre-hospital AND Biological”) OR (Model AND Biopsychosocial)) AND2000/1/1:2021/1/1[dp].

The search concepts and keywords in the database were presented in Table 1.

### Inclusion and exclusion criteria

The inclusion criteria were full-text articles which examined the purpose of the present study in 2000–2021. Accordingly, all resources whose publication time was out of the defined period, whose publication language was non-English, whose full-text format was not available, or were not related to biological, psychological, or social factors were excluded from the study. Then, the selected articles were entered into the study according to its objectives and the relevant data.

### Selection of studies

In the process of collecting research data, 514 articles were studied by the researchers in the desired period and ones related to the research objectives were extracted and recorded. After removing 314 duplicate and unrelated articles, the 200 remaining ones were reviewed and articles related to bio-psycho-social health were selected. Initially, according to the search strategy of retrieved articles, in terms of the relevance of the article title or abstract to the purpose of the research, 157 unrelated

**Table 1: Search concepts and keywords in databases**

Round	Search syntax	Description	NNR
1: PubMed	((“Emergency” [ti]) OR (“Assessment” [tiab]) OR (Biomedical [tiab]) OR (“Psychosocial” [ti]) OR (“social”) OR (Assessment AND Psychological) OR (“Pre-hospital”) OR (Health AND emergency) OR (Health AND “emergency staff”)) AND ((Biological [tiab]) OR (Emergency) OR (Healthcare [tiab]) OR (“Psychological”) OR (social AND Healthcare)) OR (social [tiab]) OR (Health) OR (“Pre-hospital emergency”) OR (Assessment AND Pre-hospital) OR (“Pre-hospital”) OR (Psychological AND Biological) OR (“Health AND system AND staff”) OR (social AND Biological) OR (Pre-hospital AND “Biological”)) AND ((Healthcare [tiab]) OR (“Psychological” [ti]) OR (staff [ti]) OR (“Psychosocial models”) OR (“Pre-hospital AND Biological”) OR (Model AND Biopsychosocial)) AND 2000/1/1:2021/1/1[dp]	Systematic Reviews Books and Documents Clinical trials Meta-analysis Reviews Randomized controlled trials	22
2: Scopus	(TITLE (“Emergency”) OR TITLE-ABS (“Pre-Hospital”) OR TITLE (Biological) OR TITLE-ABS (social) OR ALL (Health AND “emergency staff) OR TITLE-ABS (“Healthcare”) OR TITLE-ABS (Psychological”)) AND (TITLE (staff AND Pre-hospital) OR ALL (Health AND system AND staff) OR TITLE (social AND Healthcare) AND (TITLE (staff) OR ALL (modeling) OR TITLE (“Psychological AND Biological”) OR TITLE-ABS (Psychological AND social) OR ALL (“Pre-hospital AND Biological”) OR ALL (“Psychological Model”) OR ALL (Model AND Bio-psycho-social)) AND (PUBYEAR<2021 AND PUBYEAR>2000)	Articles conferences Reviews Chapters Books Notes Conferences Reviews Books Letters Editorials Short surveys	12
3: Web of Science	(TI=(“Emergency”) OR TI=(“Pre-Hospital”) OR TI=(Biological) OR TS=(“social”) OR TS=(Pre-Hospital AND Emergency) OR TI=(“Healthcare”)) AND (TI=(Psychological) OR TI=(Emergency) OR TI=(Assessment AND Pre-hospital) OR TS=(“Psychological AND Biological”) AND (TI=(Psychological AND social) OR TS=(modeling) OR TI=(“Pre-hospital AND Biological”) OR TI=(Pre-hospital AND sociological) OR TS=(“Psychological Model”) OR TS=(“Pre-hospital AND Psychological”) OR TS=(Model AND social)) AND PY=(2000-2021)	Articles Reviews Letters Books chapters Books Reviews Reprints Books Retracted publications Retractions Data papers	16

articles were removed. In the next step, all 43 remaining articles were examined for access to their full texts and 32 articles whose texts were not related to the purpose of the study, were removed; so, only articles which were in accordance with the inclusion criteria and were in line with the research objectives were selected.

### Extracting the data

First, by considering the inclusion and exclusion criteria, the title and abstract of The article’s full texts were transferred to two trained and skilled researchers. Each article was independently judged by the two researchers. In case of rejection of the articles by both referees, the reason was mentioned and in case of disagreement between the referees, the article was referred to a third researcher. After reviewing and analyzing the selected articles, the results in various areas related to the assessment of bio-psycho-social health in prehospital emergency staff were recorded in the form [Table 2].

### Quality assessment of articles

To evaluate the quality of the articles and according to the type of the study, the appropriate CASP checklist was used, which is a method for reviewing articles

and evaluating their quality as well as it includes eight different checklists. In the present study, this checklist was used in accordance with the selected articles. There were 10 questions. The quality of articles was divided into three levels: high, medium, and low. In this research, most studies were at the intermediate level [Table 2].<sup>[17]</sup>

### Results

Out of 514 studies that were reviewed, 11 were eligible and related to the objectives of the present study, which were analyzed. The titles and specifications of the articles included in the study are presented in Table 2 by author, year, quality, purpose, main findings, and general conclusion.

Data analysis at this stage was done by qualitative content analysis. Bio-psycho-social models are used in the management of prehospital emergency staff. The classification of the study findings based on the qualitative content analysis is described in Table 3.

Based on the qualitative content analysis of the research findings, including health management,

**Table 2: The titles and specifications of articles included in the study for the final review**

Author	Year of publishing	Quality level	Study purposes	Main findings	Conclusion
Kim <i>et al.</i> <sup>[25]</sup>	2021	High	The purpose of this study was to evaluate biological indicators	Life satisfaction was subsequently associated with many specific health conditions and other health behaviors	These results suggested that life satisfaction was a valuable goal for policies that enhanced several indicators of mental well-being, health behaviors, and physical health
Maake <sup>[24]</sup>	2020	Medium	The purpose of this study was to investigate behavioral factors in the workplace	A total of 245 health care providers participated in the study, including 119 people with behavioral injuries who were the main perpetrators of the general public	The results of the study showed that exposure to violence was common in the field. Knowing the nature and extent of violence in the workplace might help provide specific solutions to the problem
Afshari <i>et al.</i> <sup>[26]</sup>	2020	High	The aim of this study was occupational injuries in prehospital emergency staff	People had an average level of work. The highest and lowest scores were related to mental demands and physical demands, respectively. In addition, participants had a moderate level of job satisfaction	The results showed a relationship between job satisfaction and mental demands as well as frustration in prehospital emergency staff. Therefore, it was necessary to develop appropriate strategies
Erving <i>et al.</i> <sup>[20]</sup>	2020	Medium	The purpose of this study was to examine the stressors and psychosocial resources that harmed physical and mental health	An important finding was that chronic stresses, after adapting to other stresses, as well as psychological resources had a negative effect on mental and physical health	The results showed that all psychological sources were the destructive health effects of exposure to stress. The effects of stress and psychological resources varied by health
Nino <i>et al.</i> <sup>[23]</sup>	2020	Medium	The purpose of this study was to investigate the psychosocial factors of the health center staff	The findings showed the NASA-TLX Index had to do with working days and the workload. Increasing the mental workload made the situation worse	The results showed that an increase in awareness and warning to employees about the need to analyze how to perform their duties to reduce health risks was needed
Bazazan <i>et al.</i> <sup>[18]</sup>	2019	Medium	The aim of this study was to increase job satisfaction in health care providers	Findings showed the work schedule was significantly correlated with the physical demands, performance, frustration with job, satisfaction level, mental demands and negative relationship	The results of the study showed that there was a night shift among emergency workers with low job satisfaction
Hemsworth <i>et al.</i> <sup>[34]</sup>	2018	High	The purpose of this study was a comprehensive analysis of the psychometric properties of health-care workers	Findings obtained from a questionnaire showed that the psychometric analysis was satisfactory. However, there were concerns about burnout and the stress scale	The results showed that efforts to improve measures, burnout and the scale of traumatic stress in health-care workers should be accelerated
Kusnanto <i>et al.</i> <sup>[4]</sup>	2018	High	The purpose of this study was to investigate the bio-psycho-social factors on health care workers	The findings showed that because clinical guidelines and performance indicators were medically bio-centric, the workload and incompetence in primary care might hinder the implementation of the bio-psychological model	The results showed that the bio-psycho-social model potentially improved clinical outcomes for patients and health care providers
Copeland and Henry <sup>[27]</sup>	2018	Medium	The aim of this study was to investigate the effect of behavioral factors on prehospital emergency staff	The findings showed that all three dimensions of professional life quality could be very difficult with exposure to physical behaviors	The results showed that exposure to nonphysical violence in the workplace could affect employees' compassionate satisfaction, burnout and secondary stress
Wade and Halligan <sup>[22]</sup>	2017		The objective of this study was to evaluate the health of prehospital emergency staff based on the bio-psycho-social model	The findings showed that illness and health were the results of interactions between biological, psychological and social factors	The results showed that better understanding and application of the bio-psychological model by people who provided health services could help improve the outcome of health care while controlling costs
Farre and Rapley <sup>[19]</sup>	2017		The aim of this study was to investigate basic principles of health based on a bio-psycho-social approach	Findings showed that the bio-psycho-social model has been influenced by aspects of education	The results showed that the optimal use of available evidence, an evidence-based collection of the bio-psychological model and psychosocial needs related to specific conditions/populations, could help bridge the gap between philosophy and practice

NASA-TLX=NASA task load index

**Table 3: The results in various areas related to the study aim**


---

Health management
Health based on biology <sup>[17]</sup>
Health based on the psychological approach <sup>[19]</sup>
Biological and psychological factors
Biological dimensions <sup>[4]</sup>
Stressors <sup>[21]</sup>
Interacting with others <sup>[27]</sup>
Quality of life <sup>[28]</sup>
High-risk situations <sup>[23]</sup>
Occupational factors
Lack of manpower, workload <sup>[18,29]</sup>
Occupational accidents <sup>[24]</sup>
Job dissatisfaction <sup>[20]</sup>
Behavioral factors
Physical behaviors <sup>[17,24]</sup>

---

bio-psycho-social factors, behavioral factors, and occupational factors, each of the factors was described.

### Health management

Health management advocates a life-based approach and describes the bio-centric concepts of identity. Humans meet cross-border experiences with climate change, natural disasters, increased stress, depression, and an extreme fatigue syndrome as a result of the disruption caused by modern societies, declining health, and their ability to communicate.<sup>[5]</sup> Drake *et al.* found that bio-psycho-social health led to the organization and improvement of the efficiency and effectiveness of prehospital emergency staff and could improve patients' care while controlling costs. Paying more attention to paramedics as individuals who provide services and care, supplies a more comprehensive approach to being able to contribute to a more successful and sustainable health system.<sup>[18]</sup> Furthermore, in a study conducted by Farre *et al.*, in 2017, the "principles of health" based on a bio-psycho-social approach were examined and it was stated that having physical and mental health in health-care workers could improve the quality of care and the better understanding of biological and psychological integration of the health and disease in the provision of health services.<sup>[19]</sup>

### Biological and psychological factors Biological and psychological factors

Health has a holistic view of diseases. The psychological and social aspects of this view are placed next to the biological aspect. In a study conducted by Kusnanto in 2018, with the aim of examining bio-psycho-social factors on health care workers, it was concluded that bio-psycho-social factors emphasized the biological, psychological, and social dimensions of health care workers and the provision of health services would have unique answers to them.<sup>[4]</sup>

Another study by Erving *et al.*, in 2020, examined stressors and psychosocial resources that contributed to physical and mental health. One of the important findings was chronic stress which, even after adjustment with other psychological pressures and resources, had a negative effect on mental and physical health. Psychological resources such as social support, dominance, and self-esteem did not completely improve.<sup>[20]</sup>

Effects of work stress on the mental and social health of prehospital emergency personnel have an important role in how they interact with others. Social isolation negatively affects personal relationships and intensifies feelings of isolation and withdrawal. In a study conducted by Rentscher *et al.*, in 2020, it was thought that psychological stressors could also lead to social problems.<sup>[21]</sup> Wade *et al.*, in 2017, reported that prolonged exposure to psychosocial stress could create unfavorable social conditions and could also lead to psychological disorders, such as fatigue and anxiety.<sup>[22]</sup>

Working in health centers is considered a high-risk job. According to a study conducted in 2020 by Nino *et al.* (2020) with the aim of examining the psychosocial factors of health center employees, it was concluded that physical, mental, social, biological, and individual characteristics were different in them. Factors such as increased mental workload, job fatigue, lack of communication could have negative effects on psychological and social characteristics.<sup>[23]</sup> Therefore, mental disorders, such as anxiety and depression, can affect attitudes, beliefs, and general perceptions of individuals.<sup>[24]</sup>

Another study at the University of Michigan in 2021 looked at well-being indicators and showed that there were 35 indicators of physical, behavioral and psychosocial health, including indicators of life satisfaction, physical health, healthy behaviors, and all psychological indicators. Social indicators had the highest percentage and the results showed that life satisfaction was a valuable goal compared to other indicators of mental well-being, healthy behaviors and physical health.<sup>[25]</sup>

### Occupational factors

The concept of job satisfaction is an important phenomenon in the health sector. Emergency departments are often the busiest in hospitals. Given the important role of prehospital emergency technicians in out-of-hospital patient care, increasing their job satisfaction can directly affect the quality of care and patients' satisfaction. The amount of mental work that can be important in understanding the performance of prehospital staff and the high level of mental load without enough time to rest, are associated with biological problems such as stress, depression, or burnout.<sup>[26]</sup> Occupational stressors are mostly high and unpredictable. Prehospital staff are

constantly encountered with the workload, working in rotating shifts, lack of workforce and overcrowding due to close contact with patients and their companions.<sup>[23]</sup>

A report from the University of the Netherlands in 2018 on occupational hazards in the Netherlands found that reducing stressful conditions of patients was difficult, but not impossible by using experiences and protecting health-care workers from emotional exhaustion and post stress symptoms. In addition to the accident, this study emphasized the importance of reducing demand for working time and increasing job resources to address stress-related outcomes in emergency workers.<sup>[27]</sup> Having enough ability to perform the assigned tasks plays an important role in preventing work-related accidents. Excessive work increases physical stress and job dissatisfaction. In a study performed by Afshari *et al.*, in 2020, with the aim of investigating occupational injuries in prehospital emergency staff, they found that there was a relationship between job satisfaction, mental demand, and frustration in prehospital emergency technicians. Therefore, it was necessary to develop appropriate strategies.<sup>[28]</sup> In another study conducted by Hames *et al.*, in 2018, for the purpose of psychoanalysis of health workers in Canada and Australia, a questionnaire was prepared and distributed in two hospitals in Australia and Canada, resulting in 273 datasets from Australia and 303 datasets from Canada. Then, it was found that the psychometric feature analysis was satisfactory. However, it raised concerns about burnout and the scale of secondary trauma stress.<sup>[29]</sup>

### Behavioral factors

Members of the prehospital emergency department are often exposed to violence in the workplace, which may have physical, psychological, and workforce consequences. In a study conducted by Copeland and Henry, in 2018, the impact of behavioral factors on prehospital emergency staff was evaluated and it was concluded that exposure to physical behaviors in the workplace could affect employees' compassionate satisfaction, burnout, and secondary stress. More attention should be paid to the impact of physical behaviors in the workplace. In addition, tolerating unreasonable behaviors in the workplace can affect the quality of professional life.<sup>[27]</sup> In another study conducted by Maake *et al.*, in 2020, behavioral factors in the workplace were examined and it was stated that exposure to behavioral factors that had a simultaneous physical and psychological risk, was negative and very worrying as well as it might affect family and friends.<sup>[24]</sup>

### Discussion

In the present study, the bio-psycho-social health of prehospital emergency clinical staff was examined.

Based on qualitative content analysis of the studies, four factors of health management, bio-psycho-social factors, occupational factors, and behavioral factors were extracted. The findings indicated that health management was more important among the mentioned factors. Therefore, in health management, the boundaries are not entirely clear between health and diseases, also between happiness and sadness because these boundaries are influenced by cultural, social, psychological, and biological considerations, although the bio-psycho-social model has been admitted and promoted by medical schools and major medical organizations.<sup>[30]</sup> Lack of health management can also lead to poor physical, mental and emotional health, as well as reduced productivity and it can be associated with increased mortality as well as physical and mental illnesses. Most studies in this area have shown that the perception of physical health, fatigue, and stress among paramedics who had long-term job stress could be directly related to physical and mental illness in a challenging work environment, and operational factors also played a role in stress. Occupational factors such as indicators, key performance issues, quotas, operating standards, response times, and expectations are pressures to be managed by the ambulance personnel in addition to the actual clinical role and what they face daily.<sup>[31]</sup>

According to the findings, psychosocial stress, which is a familiar phenomenon to most people, can lead to adverse health conditions. There is a link between psychosocial stress and many mental and physical problems, including mortality, over the centuries.<sup>[32]</sup> Many studies were conducted on the psychosocial context and the nature of resilience of prehospital emergency technicians to job stress. Prehospital emergency staff uses a number of strategies to deal with the work they do. One used strategy is to divide the event and its emotions to manage immediate demands and the ability to provide care that is protective in the short term but, in the long run, it can be harmful, for example, they emotionally distance from the patient to protect themselves. Avoidance and information retrieval strategies have often been used to regain a sense of control and manage the demands they face.<sup>[11]</sup> Previous studies have shown that the development of accident stress assessment tools is important for prehospital emergency workers because their critical accident and real or perceived sense of control are identified as the factors that cause or increase psychological damage.<sup>[33]</sup> Effects of work stress on the bio-psycho-social health of prehospital emergency personnel have an important role in the way they relate to others. According to studies, the highest amount of stress is related to the internal factor. Assessing stress and personal characteristics are essential for developing basic stress management programs. Prehospital emergency technicians often encounter critical accidents. Their

emotional, cognitive, and behavioral responses are different during and after events.<sup>[34]</sup>

### Limitations and recommendations

One of the limitations of the present study was the limited scope of the search and lack of an adequate number of studies conducted in this field. A small number of bio-psycho-social studies have emphasized the prehospital field and they have been mostly implemented in other fields. Based on the findings of the present study, coherent and practical planning is suggested to be developed according to the job conditions as well as prevention and response strategies are suggested to control psychological and social factors.

### Conclusion

The results of this study showed that health management, bio-psycho-social factors, occupational factors, and behavioral factors could be effective in promoting the health of prehospital emergency technicians. Since prehospital emergency services have an important role in maintaining the health of the community, which requires attention to the bio-psycho-social health of emergency personnel, more studies have focused on health management among the four mentioned factors, but the need to examine the other three factors for a more accurate assessment of the health of emergency personnel seems necessary. In addition, prehospital emergency staff and their families are affected by psychosocial pressures and there must be a balance between the made efforts and the appropriate support for health management, bio-psycho-social factors, as well as training in this area. Furthermore, due to the lack of a comprehensive model for assessing and promoting bio-psycho-social health for prehospital emergency technicians, which can express the relationship between variables and their ratios, designing bio-psycho-social health assessment models is essential to improve the health of prehospital emergency staff.

### Acknowledgment

We would like to express our special thanks of gratitude to Ms. Fahimeh Barghi Shirazi as well as who helped us in doing a lot of research and I came to know about so many new things. I am really thankful to them. Second, I would also like to thank Ms. Elaheh Poyan far and Mr. Padraic Coughlan who helped a lot in native revision and finalizing this project within the limited time frame.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

### References

1. Ramezankhani A, Jahani H, Hatami H, Sharifzadeh G, Hosseini S. Determine the effect of intervention on the adoption of preventive behaviours of the brucellosis was based on the health belief model. 2016.
2. Sulmasy DP. A biopsychosocial-spiritual model for the care of patients at the end of life. *The gerontologist*. 2002;42(suppl\_3):24-33.
3. Bolton D, Gillett G. *The biopsychosocial model of health and disease: New philosophical and scientific developments*: Springer Nature; 2019.
4. Kusnanto H, Agustian D, Hilmanto D. Biopsychosocial model of illnesses in primary care: A hermeneutic literature review. *J Family Med Prim Care*. 2018;7 (3):497-500.
5. Walker JG, Jackson HJ, Littlejohn GO. Models of adjustment to chronic illness: Using the example of rheumatoid arthritis. *Clinical psychology review*. 2004;24 (4):461-88.
6. Kaplan D, Coogan SL. The next advancement in counseling: The bio-psycho-social model. *Vistas: Compelling perspectives on counseling*. 2005:17-25.
7. Pace B. *Renaissance of sickle cell disease research in the Genome Era*: World Scientific; 2007.
8. Frazier LD. The past, present, and future of the biopsychosocial model: A review of *The Biopsychosocial Model of Health and Disease: New philosophical and scientific developments* by Derek Bolton and Grant Gillett. *New Ideas in Psychology*. 2020;57:100755.
9. Engert V, Grant JA, Strauss B. Psychosocial Factors in Disease and Treatment—A Call for the Biopsychosocial Model. *JAMA Psychiatry*. 2020;77 (10):996-7.
10. Rodgers J, Cuevas AG, Williams DR, Kawachi I, Subramanian S. The relative contributions of behavioral, biological, and psychological risk factors in the association between psychosocial stress and all-cause mortality among middle-and older-aged adults in the USA. *GeroScience*. 2021:1-18.
11. Clompus S, Albarran J. Exploring the nature of resilience in paramedic practice: A psycho-social study. *International Emergency Nursing*. 2016;28:1-7.
12. Hugelius K, Berg S, Westerberg E, Gifford M, Adolfsson A. Swedish ambulance managers' descriptions of crisis support for ambulance staff after potentially traumatic events. *Prehospital and disaster medicine*. 2014;29 (6):589.
13. Lebares CC, Coaston TN, Delucchi KL, Guvva EV, Shen WT, Staffaroni AM, *et al.* Enhanced Stress Resilience Training in Surgeons: Iterative Adaptation and Biopsychosocial Effects in 2 Small Randomized Trials. *Ann Surg*. 2021;273 (3):424-32.
14. Usul E, Şan İ, Bekgoz B. The Effect of the COVID-19 Pandemic on the Anxiety Level of Emergency Medical Services Professionals. *Psychiatria Danubina*. 2020;32:563-9.
15. Klimley KE, Van Hasselt VB, Stripling AM. Posttraumatic stress disorder in police, firefighters, and emergency dispatchers. *Aggression and violent behavior*. 2018;43:33-44.
16. Mazhin SA, Khankeh H, Farrokhi M, Aminzadeh M, Poursadeqiyani M. Migration health crisis associated with climate change: A systematic review. *Journal of education and health promotion*. 2020;9.
17. Pursell E. Can the Critical Appraisal Skills Programme check-lists be used alongside Grading of Recommendations Assessment, Development and Evaluation to improve transparency and decision-making? *Journal of advanced nursing*. 2020;76 (4):1082-9.
18. Bazazan A, Dianat I, Bahrapour S, Talebian A, Zandi H, Sharafkhaneh A, *et al.* Association of musculoskeletal disorders and workload with work schedule and job satisfaction among emergency nurses. *International emergency nursing*. 2019;44:8-13.
19. Farre A, Rapley T, editors. *The new old (and old new) medical model: four decades navigating the biomedical and psychosocial*



- understandings of health and illness. Healthcare; 2017: Multidisciplinary Digital Publishing Institute.
20. Erving CL, Satcher LA, Chen Y. Psychologically resilient, but physically vulnerable? Exploring the psychosocial determinants of African American women's mental and physical health. *Sociology of Race and Ethnicity*. 2021;7 (1):116-33.
  21. Rentscher KE, Carroll JE, Mitchell C. Psychosocial stressors and telomere length: a current review of the science. *Annual review of public health*. 2020;41:223-45.
  22. Wade DT, Halligan PW. *The biopsychosocial model of illness: a model whose time has come*. SAGE Publications Sage UK: London, England; 2017.
  23. Nino L, Marchak F, Claudio D. Physical and mental workload interactions in a sterile processing department. *International Journal of Industrial Ergonomics*. 2020;76:102902.
  24. Maake CS. *Individual and collective exposure to workplace violence of pre-hospital Emergency Care providers in urban Cape Town*: Cape Peninsula University of Technology; 2020.
  25. Kim ES, Delaney SW, Tay L, Chen Y, Diener ED, Vanderweele TJ. Life Satisfaction and Subsequent Physical, Behavioral, and Psychosocial Health in Older Adults. *The Milbank Quarterly*. 2021;99 (1):209-39.
  26. Delshad V, Khankeh H, Ebadi A, Bidzan M, Harouni G, Stueck M. Psychobiological risk assessment in emergency medical service drivers: study protocol for structural equation modeling. *Health Psychology Report*. 2020;8 (1).
  27. Copeland D, Henry M. The relationship between workplace violence, perceptions of safety, and Professional Quality of Life among emergency department staff members in a Level 1 Trauma Centre. *International Emergency Nursing*. 2018;39:26-32.
  28. Afshari D, Jafarzadeh Z, Nakhaei M, Sahraneshin Samani A, Nourollahi-Darabad M. Mental Workload and Job Satisfaction in Pre-Hospital Emergency Technicians. *Jundishapur Journal of Health Sciences*. 2020;12 (3).
  29. Hames AM. *African American Women with Type 2 Diabetes: A Biopsychosocial-Spiritual Approach*. 2010.
  30. Shields G, Slavich G. Lifetime stress exposure and health: a review of contemporary assessment methods and biological mechanisms. *Soc. Personal. Psychol. Compass* 11, e12335. 2017.
  31. Rice V, Glass N, Ogle K, Parsian N. Exploring physical health perceptions, fatigue and stress among health care professionals. *Journal of multidisciplinary healthcare*. 2014;7:155.
  32. Benatti B, Albert U, Maina G, Fiorillo A, Celebre L, Girone N, *et al.* What happened to patients with obsessive compulsive disorder during the COVID-19 pandemic? A multicentre report from tertiary clinics in northern Italy. *Frontiers in Psychiatry*. 2020;11:720.
  33. Avraham N, Goldblatt H, Yafe E. Paramedics' experiences and coping strategies when encountering critical incidents. *Qualitative Health Research*. 2014;24 (2):194-208.
  34. Hemsworth D, Baregheh A, Aoun S, Kazanjian A. A critical enquiry into the psychometric properties of the professional quality of life scale (ProQol-5) instrument. *Applied Nursing Research*. 2018;39:81-8.