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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

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Abstract

Objectives: This study was aimed to determine the relationship between job stress and WRQoL among emergency medical technicians (EMTs) in Lorestan Province, Western Iran.

Methods: This is a cross-sectional study using census method among 430 emergency medical technicians who had been engaged in their respective units for more than six months from all emergency facilities in Lorestan Province. Data were collected from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-Related Quality of Life (WRQoL). The odd ratio with 95% Confidence Interval (CI) was used to declare the statistical association ($p \leq 0.05$).

Results: All participants were exclusively males, with a mean age of 32 ± 6.87 years. The overall average score of job stress using the HSE scale was 2.69 ± 0.43 ; while the overall quality of working life score was 2.48 ± 1.01 . The type of working shift was found to have a significant impact on the HSE-average score, ($F(3,417) = 5.26, P = 0.01$); and on the WRQoL-average score, ($F(3,417) = 6.89, P < 0.01$).

Conclusions: Two-thirds of EMTs working in governmental hospitals had job stress and a low quality of work-related life. Work shift was statistically significant associated with EMTs' job stress and WRQoL. To improve the WRQoL among EMTs, we suggest the urgent need for organizational intermissions that aim to diminish work-related stress. Furthermore, rescheduling should be explored as a strategy for reducing stress caused by shift work.

Keywords: Job stress, Work-related quality of life, Emergency medical technician, HSE, WRQoL

Introduction:

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3 Working in emergency medicine can be challenging, and healthcare workers are subjected to a variety of
4 pressures (1). Critical incident exposure, workplace aggression, unpredictability, workload, and time pressure are
5 among them. Additional environmental stressors in the prehospital context include traffic safety concerns and
6 unexpected accident scenes (2). Several studies have demonstrated the alarming prevalence of burnout syndrome,
7 posttraumatic stress disorder (PTSD), and other related health difficulties among first responders and emergency
8 medical service personnel (3)(4)(5)(6)(7). Furthermore, those stressors might cause hostility, aggression,
9 absenteeism, and turnover among emergency medical technicians (EMTs).

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13 Job stress refers to the psychological stress caused by the imbalance between the needs of the target and the
14 individual's ability to adapt to specific job conditions (8). Job stress is one of the most important workplace health
15 risks among employees worldwide (9). One of the complications of modern life is the presence of stress in the
16 workplace (10). It is a common condition of the 21st century that affects people in a variety of conditions and is
17 responsible for absenteeism among health-care workers (11). 137.3 million working days were lost to due to
18 sickness and injury as it is estimated by the UK national statistics (12). This is only the material dimension of the
19 issue of stress; in addition, stress has a significant impact on employees, their families, and patients (9).

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23 In 2021, job stress (new or long-standing) was the biggest work-related health issue in the UK, which
24 accounted for 50% of all job-related illnesses with an incidence rate of 2,480 per 100,000(13). The cost of sickness
25 and stress-related absenteeism is estimated at 4 billion pounds a year(12). Numerous studies have shown that the job
26 stress experienced by the pre-hospital emergency staff is significantly higher than that of other healthcare workers
27 because they are the first people to be present in a variety of emergencies, from fatal accidents to minor injuries and
28 illnesses (14)(15). Meanwhile, emergency medical technicians face stressful environments such as congested areas
29 and critically ill patients where it is difficult to work (16).

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33 Neglecting the ongoing stress that is inflicted on employees, particularly healthcare workers, would
34 eventually result in a lack of motivation and morale in the staff (17). There is enormous capital lost annually due to
35 the lack of physical and mental health of employees, impaired performance, quitting, and changing jobs due to job
36 stress. Stress and its complications result in the loss of hundreds of working days each year. About 30% of the
37 workforce in developed countries suffers from job stress. The International Labor Organization also estimates that
38 the costs incurred by countries due to job stress are about 1 to 3.5% of GDP and are currently increasing (18)(19).

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42 Work-related quality of life (WRQoL) is an organizational culture or management style in which
43 employees feel ownership, self-reliance, responsibility, and self-esteem(20). WRQoL is a multidimensional structure
44 that includes several concepts such as welfare measures, health services, incentive plans, job fit, job security, job
45 design, importance to the role and position of the individual in the organization, providing growth and development,
46 participation in decision making, reducing job conflicts and ambiguities and education(21). According to the
47 research, companies that provide a better work quality of life for their employees are more successful in retaining
48 their valuable employees and have higher profitability (22). However, job stress reduces the WRQoL and increases
49 the risk of work-related injuries. The WRQoL is critical for organizations to be able to attract and retain human
50 resources (23).

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3 Job stress in emergency medical technicians is typically higher than in other professionals, and since they
4 are often the first healthcare team exposed to different stressful conditions and sick patients, the nature of the job
5 and its contents are in a high level of stress. Research evidence related to job stress among EMTs is limited in the
6 study area. Therefore, this study was conducted to determine the relationship between job stress and quality of work-
7 life among Emergency Medical Technicians (EMT) in Lorestan Province, Western Iran in 2019.
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10 11 12 **Material and methods:**

13 A census approach was used to conduct a cross-sectional survey among 430 emergency medical technicians who
14 had been engaged in their respective units for more than six months from all emergency facilities in Lorestan
15 Province. The number of participants was 25, 37, 22, 38, 21, 19, 115, 61, 28, 54, and 10 from Alashtar, Aligoudarz,
16 Azna, Broujerd, Doroud, Dooreh, Khorramabad, Kouhdasht, Nourabad, Poldokhtar, and Sepiddasht, respectively.
17 This study was approved by the institutional review of Lorestan University of medical Sciences Verbal agreement
18 was taken from all participants. The confidentiality principle was maintained so that there was no need to mention
19 the names of the individuals in the questionnaires, and it was assured that the information was just provided to the
20 researcher and used in the study. Data were collected from April to July 2019 using two standard questionnaires: Job
21 Stress (HSE) and Work-related quality of life (WRQoL).
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26 **Job Stress Questionnaire:** The management standard was assessed using a 35-item indicator tool created by the
27 Health and Safety Executive (HSE) to measure work-related stress among employees. The tool consists of seven
28 items. These items are: (1) Demands (including such issues as workload, work patterns, and the working
29 environment). (2) Control (how much say the person has in the way they do their work). (3 & 4) Manger and peers'
30 support (including the encouragement, sponsorship, and resources provided by the organization, line management,
31 and colleagues). (5) Relationships at work (including promoting positive working practices to avoid conflict and
32 dealing with unacceptable behaviour). (6) Role (whether people understand their role within the organization and
33 whether the organization ensures that the person does not have conflicting roles). (7) Change (how organizational
34 change (large or small) is managed and communicated in the organization). The validity of the HSE-scale was 83%
35 ($\alpha=0.83$)(24).
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40 **Work-Related Quality of Life Questionnaire (WRQoL):** This is a multidimensional concept that includes job and
41 professional satisfaction factors, working conditions, general health status, home-work relationship, work stress, and
42 work control. The questionnaire comprises a five-Likert scale from strongly disagree to strongly agree (25). The
43 validity of the questionnaire was confirmed by experts, and its reliability was determined by the test-retest method.
44 The questions had a 95% correlation value, while the alpha Cronbach coefficient for determining the internal
45 relevance of the questions was 78%. The scale's reliability was 79% ($\alpha=0.79$)(25).
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48 49 **Patient and Public Involvement**

50 This was a cross-sectional study that meaningfully engaged all emergency medical technicians working in different
51 cities of Lorestan province in identifying priority research questions, research training, all facets of recruitment and
52 data collection, and in interpreting the results and co-authoring this manuscript. Additionally, we trained them in the
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informal settlements of the study conducted in their workplaces, who contributed likewise to informing the study focus, and data collection efforts.

Statistical analysis: Descriptive statistics were used to determine the characteristics of participants and the overall scores of job-stress and work-related quality of life. Pearson correlation was used to assess the correlation between the domains of the two questionnaires (HSE and WRQoL). The odd ratio at (95% CI, P -value \leq 0.05) was used to declare the statistical association. All analyses were done using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp (26).

Results:

All emergency medical technicians (EMTs) who participated in this study were exclusively male, with a mean age of 32 ± 6.87 years. Based on their educational level, 18.1% held a diploma while the rest (81.9%) had an academic education degree. All other socio-demographic characteristics of the participant are provided in Table 1.

Table 1. Demographic characteristics of the Emergency Medical Technicians (ETMs) (N=430)

Variables [N*]	Categories	n (%)
Age (years) [427]	20-30	222 (51.5)
	30-40	146 (33.9)
	40-50	56 (13.0)
	50-60	3 (0.7)
Education level [406]	High school	78 (19.2)
	Diploma	235 (57.9)
	Bachelor	90 (22.2)
	Master	3 (0.7)
Marital Status [406]	Single	167 (38.7)
	Married	239 (55.5)
Length of Service (years) [410]	1-5	162(37.6)
	6-10	190(44.2)
	11-15	13(3.1)
	>15	45(10.5)
Native Status [412]	Native to the city	225 (52.3)
	Native to the province	127 (29.5)
	Non-indigenous	60 (14.0)
Working Shift Status [421]	Constant morning shift	6 (1.4)
	Circulating shift	51 (11.9)
	24-hour shift	228(53.0)
	48-hour shift	136 (31.6)

*Number of responses for each variables.

Emergency Medical Technicians (EMTs) with a master's degree had the highest HSE (3.5 ± 0.01) and WRQoL (4.0 ± 0.01) average scores. Regarding marital status, native status, and length of service, there were no significant differences of them, neither with HSE nor with WRQoL average scores. However, the type of working shift had a significant impact on the HSE-average score, $F(3,417) = 5.26$, $P = 0.01$; and on the WRQoL-average score, $F(3,417) = 6.89$, $P < 0.01$, as the highest average scores were reported among those who worked on the 48-hour shift (2.79 ± 0.46) of the HSE, and the fixed morning shift (2.87 ± 0.01) of the WRQoL.

The overall average score of job stress using the HSE scale was (2.69 ± 0.43), with peer support as the highest stressor domain among EMTs (2.89 ± 0.63). While the overall quality of working life score was (2.48 ± 1.01), with

control at work as the highest factor that might impact the quality of working life (2.47±0.90). (See Table 2 for more details) Generally, 73.5% of respondents reported having work-related stress, with 46% having a low work-related quality of life (lower than the overall mean). The response rate for each specific question of the HES and WRQoL standards was provided in supplementary tables 1 and 2.

Table 2: Stressor domain scores and work related quality of life scores by factors among the EMTs (N=430)

	Domains and Factors	n	Score Mean (SD)	95% CI
Stressor domains	Demand	405	2.11 (0.56)	1.93-2.08
	Control	402	2.54 (0.60)	2.44-2.59
	Manager's support	410	2.58 (0.82)	2.48-2.67
	Peer's support	413	2.89 (0.63)	2.82-2.98
	Relationship	414	1.75 (0.81)	1.58-1.78
	Role	415	3.12(0.64)	3.00-3.16
	Change	411	2.61 (0.80)	2.62-2.71
	Overall HSE (N)	430	2.69 (0.43)	2.65-2.73
WRQoL- factors	Job career satisfaction	410	2.39 (0.77)	2.30-2.48
	Control at work	413	2.47 (0.90)	2.37 -2.58
	General well-being	393	2.45 (0.54)	2.38-2.51
	Home-work interface	422	2.44 (1.01)	2.32-2.55
	Stress at work	420	1.96(1.00)	1.84-2.08
	Working conditions	423	2.12 (0.98)	2.00-2.23
	Overall quality of working life	424	2.48 (1.01)	2.35-2.60

To assess the linear relationship between stresser domains and WRQoL factors, pearson correlation was used (Table 3). There were a strong positive relationship between two domains of HSE, which are peer support and the change ($r = 0.72$, $N = 394$, $p < 0.001$). In other words, increasing the peers' support in work environment the higher the change might apply. Regarding the WRQoL factors, however, job career satisfaction was found to have a significant positive impact on control at work ($r = 0.72$, $N = 395$, $P < 0.001$), general well-being ($r = 0.72$, $N = 379$, $P < 0.001$), home-work interference ($r = 0.77$, $N = 407$, $P < 0.001$), and working conditions ($r = 0.77$, $N = 407$, $P < 0.001$).

Table 3: Correlation between HSE-domains and WRQoL factors.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Demand	(0.80)													
2	Control	0.03	(0.74)												
3	Manager support	-0.11*	0.55**	(0.72)											
4	Peer support	-0.20**	0.56**	0.67**	(0.74)										
5	Relationship	0.50**	-0.03	-0.16**	-0.26**	(0.81)									
6	Role	-0.17**	0.34**	0.28**	0.47**	-0.24**	(0.76)								
7	Change	-0.11*	0.54**	0.72**	0.64**	-0.17**	0.35**	(0.73)							
8	Job career satisfaction	-0.25**	0.31**	0.52**	0.41**	-0.25**	0.25**	0.48**	(0.71)						
9	Control at work	-0.13*	0.40**	0.60**	0.42**	-0.11*	0.22**	0.55**	0.72**	(0.71)					
10	General well-being	-0.30**	0.45**	0.43**	0.44**	-0.25**	0.34**	0.41**	0.73**	0.64**	(0.73)				
11	Home-work interface	-0.25**	0.30**	0.50**	0.38**	-0.18**	0.24**	0.41**	0.77**	0.65**	0.62**	(0.70)			
12	Stress at work	0.38**	-0.02	-0.18**	-0.23**	0.40**	-0.20**	-0.19**	-0.23**	-0.11*	-0.26**	-0.22**	(0.83)		
13	Working conditions	-0.24**	0.24**	0.48**	0.37**	-0.19**	0.30**	0.47**	0.77**	0.63**	0.64**	0.72**	-0.28**	(0.72)	
14	Overall quality of working life	-0.30**	0.20**	0.39**	0.30**	-0.18**	0.28**	0.32**	0.66**	0.52**	0.59**	0.52**	-0.29**	0.64**	(0.74)

Note: Pearson's correlation coefficient was used. Alpha reliability coefficients are given in parenthesis.

* P value <0.05, ** P value < 0.01.

Discussion

Considering that the work environment for emergency medical personnel is very stressful since they are often the first healthcare team exposed to different stressful conditions and sick patients, the nature of the job and its contents are subject to a high level of stress. Research evidence related to job stress among EMTs is limited in the study area. Hence, this study was conducted to determine the relationship between job stress and the quality of work-life among EMT personnel in Lorestan province.

The results of the present study showed that the overall stress was a little more than the average among all participants (M, 2.69; IC, 2.65-2.73). This finding is in a harmony with the Ashgh et al. study, in which the male employees of emergencies in Golestan province were found to experience moderate work stress(27). Another study shows that emergency physicians experience a subclinical level of anxiety due to repetitive exposure to serious incidents like the death of an adolescent or a child (7). In regards to WRQoL, the overall quality of working life was a little less than the moderate range (M, 2.48; IC, 2.35-2.60). A cross-sectional analysis of 908 health employees from 15 hospitals shows that the majority of employees were dissatisfied with occupational health and safety and also indicated that their work was not interesting and satisfying (21). High WRQoL seems to have a protective factor. All of these, high stress and low WRQoL, not only affect the EMTs themselves, but can also have an adverse impact on patient care (7).

In the present study, a significant association was found between work shift and work-related stress. Rotating shift EMTs were more stressed than fixed-shift EMTs. This finding was consistent with research reported in Ethiopia (28) and Jordan(29), which indicated that employees working on rotating shifts were more stressed than their counterparts who worked on fixed shifts; however, those studies were done on nurses. Therefore, working on a fixed shift might be beneficial in improving the WRQoL, as the current study reported.

Change in the work environment to be suited to the employee, by their choice, was found to be related to the peers' and managers' support. A lack of social support among emergency care personnel is a well-known predictor of occupational stress (7). A study found that facilitating social support from coworkers can help in the rehabilitation process after being confronted with traumatic experiences and occupational dangers among those who work in EM(7).

This study has some limitations, including the fact that the cross-sectional study design utilized in this investigation could not determine a temporal association between stress and WRQoL. Given that stress is mainly subjective and psychological, the qualitative method would give rich and reliable information on the EMTs' experiences with stress and related concepts. Furthermore, since the sampling method in the present study was a census, some of the technicians were reluctant and were not satisfied to participate in the study.

Conclusion: This study determined the level of job stress and its relation to the WRQoL among EMT personnel working in government hospitals in Lorestan, Iran. Two-third of EMTs working in governmental hospitals had work-related stress. Work shift was statistically significantly associated with EMTs' work-related stress and WRQoL. Peer support was found to be the most stressful domain among EMTs; while the control domain at work was the highest factor that might impact the quality of working life. EMT personnel have a tremendous role in the

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3 health care delivery system world-wide, especially in emergency situations. Critical incident exposure, workplace
4 aggression, unpredictability, workload, and time pressure are among the challenges that EMTs face during their
5 work. In the mean time, EMTs' experienced work-related stress and low WRQoL may affect not only the health care
6 services but also might increase medical errors and resource expenditure. To improve the quality of work among
7 EMTs, we suggest the urgent need for organizational interventions that aim to diminish work-related stress.
8 Moreover, rescheduling should be explored as a strategy for reducing stress caused by shift work. To demonstrate a
9 true cause-and-effect link, more research employing a mixed-method and analytical design in government and
10 commercial health institutions is recommended.
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16 **Declarations:**

17 **Ethical Approval and Consent to participate:**

18 Human Participants with the ethical approval ID: IR.LUMS.REC.1397-1-99-1254. This study was approved and
19 funded by the institutional review of Lorestan University of medical Sciences. Written informed consent and verbal
20 agreement was taken from all participants. All experimental protocols were approved by Lorestan University of
21 Medical Sciences and the ethical approval ID is: IR.LUMS.REC.1397-1-99-1254.
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25 **Consent for publication:**

26 Not applicable.
27

28 **Availability of supporting data:**

29 All data generated or analyzed during this study are included in this published article.
30

31 **Competing interests**

32 Not applicable.
33

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36

37 **Author's contributions:**

38 H.Sh, Gh.F, A.P, conceptualized and designed the main idea of this study. H.Sh, and R.M. designed the data
39 extraction file, extracted data, and interpreted data. M.M, and B.M. analysed the data. H.Sh, and M.M, wrote the
40 initial draft of the manuscript. All authors approved the final manuscript as submitted and agreed to be accountable
41 for all aspects of the work.
42
43

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Supplementary:

Supplementary table1: Work-related stress (HSE) Categorized by factors (N=430)

Factors	NO	Questions	Response mean (SD)	% non-response
Demands	1	Different groups at work demand things from me that are hard to combine	1.9 (1.01)	1.4
	2	I have unachievable deadlines	1.42(1.12)	1.4
	3	I have to work very intensively	2.72(1.15)	0.2
	4	I have to neglect some tasks because I have too much to do	1.89(1.21)	0.9
	5	I am unable to take sufficient breaks	2.18(1.21)	1.6
	6	I am pressured to work long hours	2.14(1.26)	2.1
	7	I have to work very fast	2.85(1.05)	0.2
	8	I have unrealistic time pressures	1.9(1.15)	1.2
Mean of response (SD)			2.126 (0.468)	
Control	1	I can decide when to take a break	1.95(1.45)	2.1
	2	I have a say in my own work speed	3.11(0.85)	0.9
	3	I have a choice in deciding how I do my work	2.49(1.11)	0.9
	4	I have a choice in deciding what I do at work	2.56(1.16)	1.6
	5	I have some say over the way I work	2.93(0.91)	2.1
	6	My working time can be flexible	2.21(1.18)	1.4
Mean of response (SD)			2.539 (0.432)	
Manger support	1	I am given supportive feedback on the work I do	2.72(0.89)	0.2
	2	I can rely on my line manager to help me out with a work problem	2.74(1.03)	0.9
	3	I can talk to my line manager about something that has upset or annoyed me about work	2.69(1.13)	2.3
	4	I am supported through emotionally demanding work	2.31(1.09)	0.9
	5	My line manager encourages me at work	2.41(1.27)	1.4
Mean of response (SD)			2.576 (0.199)	
Peer Support	1	If work gets difficult, my colleagues will help me	2.92(0.85)	0.9
	2	I get help and support I need from colleagues	2.96(0.81)	2.1
	3	I receive the respect at work I deserve from my colleagues	3.07(0.78)	0.2
	4	My colleagues are willing to listen to my work-related problems	2.62(0.85)	1.6
Mean of response (SD)			2.892 (0.192)	
Relationship	1	I am subject to personal harassment in the form of unkind words or behavior	1.07(1.12)	0.7
	2	There is friction or anger between colleagues	2.11(1.12)	0.9
	3	I am subject to bullying at work	1.69(1.22)	2.3
	4	Relationships at work are strained	2.16(1.28)	0.7
Mean of response (SD)			1.757 (0.505)	
Role	1	I am clear what is expected of me at work	3.3(0.78)	1.6
	2	I know how to go about getting my job done	3.22(0.82)	2.3
	3	I am clear what my duties and responsibilities are	3.24(0.92)	0.9
	4	I am clear about the goals and objectives for my department	2.98(1.05)	0.2
	5	I understand how my work fits into the overall aim of the organization	2.87(0.92)	0.2
Mean of response (SD)			3.121(0.185)	
Change	1	I have sufficient opportunities to question managers about change at work	2.69(1.06)	1.9
	2	Staff are always consulted about change at work	2.69(1.03)	0.9
	3	When changes are made at work, I am clear how they will work out in practice	2.46(0.92)	2.3
Mean of non-response (SD)			2.613 (0.131)	
Overall mean (SD)			2.694 (0.439)	

Supplementary table 2: Work Related Quality of Life (WRQoL) Response (N=430)

NO	Questions	Response average	% non-response
1	I have a clear set of goals and aims to enable me to do my job	2.935	0.2
2	I feel able to voice opinions and influence changes in my area of work	2.746	0.9
3	I have the opportunity to use my abilities at work	2.537	1.6
4	I feel well at the moment	2.958	2.3
5	My employer provides adequate facilities and flexibility for me to fit work in around my family life	2.602	1.6
6	My current working hours / patterns suit my personal circumstances	2.525	0.2
7	I often feel under pressure at work	2.357	0.2
8	When I have done a good job it is acknowledged by my line manager	2.490	1.3
9	Recently, I have been feeling unhappy and depressed	1.980	1.6
10	I am satisfied with my life	2.918	2.3
11	I am encouraged to develop new skills	2.528	1.4
12	I am involved in decisions that affect me in my own area of work	2.585	2.8
13	My employer provides me with what I need to do my job effectively	2.639	1.2
14	My line manager actively promotes flexible working hours / patterns	2.687	1.4
15	In most ways my life is close to ideal	2.387	0.2
16	I work in a safe environment	2.154	1.4
17	Generally things work out well for me	2.346	2.1
18	I am satisfied with the career opportunities available for me here	2.355	1.4
19	I often feel excessive levels of stress at work	2.295	2.5
20	I am satisfied with the training I receive in order to perform my present job	2.544	0.7
21	Recently, I have been feeling reasonably happy all things considered	2.492	1.4
22	The working conditions are satisfactory	2.476	0.2
23	I am involved in decisions that affect members of the public in my own area of work	2.324	0.9
24	I am satisfied with the overall quality of my working life	2.577	1.6
Overall mean (SD)		2.506 (0.553)	

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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

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Abstract

Objective: This study was aimed to determine the relationship between job stress and WRQoL among emergency medical technicians (EMTs) in Lorestan Province, Western Iran.

Design: This was a cross-sectional study.

Methods: Totally 430 emergency medical technicians who had been engaged in their respective units for more than six months from all emergency facilities in Lorestan Province were selected using census method. Data were collected from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-Related Quality of Life (WRQoL). The odd ratio with 95% Confidence Interval (CI) was used to declare the statistical association ($p \leq 0.05$).

Results: All participants were exclusively males, with a mean age of 32 ± 6.87 years. The overall average score of job stress using the HSE scale was 2.69 ± 0.43 ; while the overall quality of working life score was 2.48 ± 1.01 . The type of working shift was found to have a significant impact on the HSE-average score, ($F(3,417) = 5.26, P = 0.01$); and on the WRQoL-average score, ($F(3,417) = 6.89, P < 0.01$).

Conclusion: Two-thirds of EMTs working in governmental hospitals had job stress and a low quality of work-related life. Work shift was statistically significant associated with EMTs' job stress and WRQoL.

Keywords: Job stress, Work-related quality of life, Emergency medical technician, HSE, WRQoL

STRENGTHS AND LIMITATIONS OF THIS STUDY

1- Based on the previous studies, this is the first study to determine the relationship between job stress and WRQoL among all emergency medical technicians (EMTs) in a large location situated in Lorestan province.

2- Presence of validated questionnaires in literature means that reliable and validated questionnaires have been developed.

3- There was a sufficient number of participants to examine the the relationship between job stress and quality of work life.

4- Including the fact that the cross-sectional study design utilized in this investigation could not determine a temporal association.

5- Given that stress is mainly subjective and psychological, the qualitative method would give rich and reliable information on the EMTs' experiences with stress and related concepts.

Introduction:

Working in emergency medicine can be challenging, and healthcare workers are subjected to a variety of pressures (1). Critical incident exposure, workplace aggression, unpredictability, workload, and time pressure are

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3 54 among them. Additional environmental stressors in the prehospital context include traffic safety concerns and
4 55 unexpected accident scenes (2). Several studies have demonstrated the alarming prevalence of burnout syndrome,
5 56 posttraumatic stress disorder (PTSD), and other related health difficulties among first responders and emergency
6 57 medical service personnel (3)(4)(5)(6)(7). Furthermore, those stressors might cause hostility, aggression,
7 58 absenteeism, and turnover among emergency medical technicians (EMTs).

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9 60 Job stress refers to the psychological stress caused by the imbalance between the needs of the target and the
10 61 individual's ability to adapt to specific job conditions (8). Job stress is one of the most important workplace health
11 62 risks among employees worldwide (9). One of the complications of modern life is the presence of stress in the
12 63 workplace (10). It is a common condition of the 21st century that affects people in a variety of conditions and is
13 64 responsible for absenteeism among health-care workers (11). 137.3 million working days were lost to due to
14 65 sickness and injury as it is estimated by the UK national statistics (12). This is only the material dimension of the
15 66 issue of stress; in addition, stress has a significant impact on employees, their families, and patients (9).

16 67
17 68 In 2021, job stress (new or long-standing) was the biggest work-related health issue in the UK, which
18 69 accounted for 50% of all job-related illnesses with an incidence rate of 2,480 per 100,000(13). The cost of sickness
19 70 and stress-related absenteeism is estimated at 4 billion pounds a year(12). Numerous studies have shown that the job
20 71 stress experienced by the pre-hospital emergency staff is significantly higher than that of other healthcare workers
21 72 because they are the first people to be present in a variety of emergencies, from fatal accidents to minor injuries and
22 73 illnesses (14)(15). Meanwhile, emergency medical technicians face stressful environments such as congested areas
23 74 and critically ill patients where it is difficult to work (16).

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25 76 Neglecting the ongoing stress that is inflicted on employees, particularly healthcare workers, would
26 77 eventually result in a lack of motivation and morale in the staff (17). There is enormous capital lost annually due to
27 78 the lack of physical and mental health of employees, impaired performance, quitting, and changing jobs due to job
28 79 stress. Stress and its complications result in the loss of hundreds of working days each year. About 30% of the
29 80 workforce in developed countries suffers from job stress. The International Labor Organization also estimates that
30 81 the costs incurred by countries due to job stress are about 1 to 3.5% of GDP and are currently increasing (18)(19).

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32 83 Work-related quality of life (WRQoL) is an organizational culture or management style in which
33 84 employees feel ownership, self-reliance, responsibility, and self-esteem(20). WRQoL is a multidimensional structure
34 85 that includes several concepts such as welfare measures, health services, incentive plans, job fit, job security, job
35 86 design, importance to the role and position of the individual in the organization, providing growth and development,
36 87 participation in decision making, reducing job conflicts and ambiguities and education(21). According to the
37 88 research, companies that provide a better work quality of life for their employees are more successful in retaining
38 89 their valuable employees and have higher profitability (22). However, job stress reduces the WRQoL and increases
39 90 the risk of work-related injuries. The WRQoL is critical for organizations to be able to attract and retain human
40 91 resources (23).

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42 93 Job stress in emergency medical technicians is typically higher than in other professionals, and since they
43 94 are often the first healthcare team exposed to different stressful conditions and sick patients, the nature of the job
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and its contents are in a high level of stress. Research evidence related to job stress among EMTs is limited in the study area.

Existence of remote and deprived villages, dilapidated road structure and vehicle accidents and crashes, being injured by wild animals attacks, high suicide rate, poverty and low income, climate change and mountainous nature of the region, presence of dangerous occupations and related activities, infectious and noncommunicable diseases, and the lack of proper access to health care services are the main issues that affects people and ETMs in times of crisis. Though the evidence is expanding, there have been limited studies comparing the relationship between job stress and work quality of life especially among Emergency Medical Technicians. Therefore, this study was conducted to determine the relationship between job stress and quality of work-life among Emergency Medical Technicians (EMTs) in Lorestan Province, Western Iran in 2019.

Material and methods:

Participants

A census approach was used to conduct a cross-sectional survey among 430 emergency medical technicians (EMTs) who had been engaged in their respective units for more than six months from all emergency facilities in Lorestan Province. The number of participants was 25, 37, 22, 38, 21, 19, 115, 61, 28, 54, and 10 from Alashtar, Aligoudarz, Azna, Broujerd, Doroud, Dooreh, Khorramabad, Kouhdasht, Nourabad, Poldokhtar, and Sepiddasht, respectively. This study was approved by the institutional review of Lorestan University of medical Sciences. Written informed consent and verbal agreement was taken from all technicians before participating in the study. The confidentiality principle was maintained so that there was no need to mention the names of the individuals in the questionnaires, and it was assured that the information was just provided to the researcher and used in the study. Data were collected from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-related quality of life (WRQoL). Data were collected during all shifts (morning, evening and night), when the (EMTs) were at work at the time being to answer the questions.

The inclusion criteria for emergency medical technicians were, engaged in their respective units for more than six months, eager to participate and complete the research questions. The authors excluded those who had been engaged in their respective units for less than six months from all emergency facilities. Based on Cochran's sample size formula, 430 ETMs with the inclusion criteria were selected. [$z= 1.96$, $N= 450$, $p=q= 0.5$, $d= 0.01$]

$$n = \frac{Nz^2pq}{Nd^2 + z^2pq} = 430$$

Job Stress Questionnaire: The management standard was assessed using a 35-item indicator tool created by the Health and Safety Executive (HSE) to measure work-related stress among employees. The tool consists of seven items. These items are: (1) Demands (including such issues as workload, work patterns, and the working environment). (2) Control (how much say the person has in the way they do their work). (3 & 4) Manager and peers' support (including the encouragement, sponsorship, and resources provided by the organization, line management, and colleagues). (5) Relationships at work (including promoting positive working practices to avoid conflict and dealing with unacceptable behaviour). (6) Role (whether people understand their role within the organization and whether the organization ensures that the person does not have conflicting roles). (7) Change (how organizational

change (large or small) is managed and communicated in the organization). The validity of the HSE-scale was 83% ($\alpha=0.83$). This questionnaire contains 35 questions with 7 subscales. The subscales are: 1- Demand: questions number (18, 6, 9, 12, 16, 3, 20, 22), 2- Control (30, 10, 15, 19, 25, 2), 3- Officials support (7, 27, 24, 31), 4- Colleagues support (8, 23, 29, 33, 35), 5- Relationship (5, 14, 21, 34), 6- Role (1, 7, 11, 13, 17) and 7- Changes (32, 28, 26). The Likert scale was defined as Strongly disagree: 0, Disagree: 1, No opinion: 2, Agree: 3, Strongly agree: 4. All 7 stress-items were scored on a scale of 1 to 4 ranged between 7 to 28. Those above and those below the median value 16, were signified as more and less job stress respectively (24). The validity and reliability of the Persian version of the questionnaire was %78 and %65 using the Cronbach's Alpha and split-half method, respectively and HSE is a valid and reliable questionnaire for studying job stress (25).

Work-Related Quality of Life Questionnaire (WRQoL): This is a multidimensional concept that includes job and professional satisfaction factors, working conditions, general health status, home-work relationship, work stress, and work control. The questionnaire comprises a five-Likert scale from strongly disagree to strongly agree 1 to 5 (25). The validity of the questionnaire was confirmed by experts, and its reliability was determined by the test-retest method. The questions had a 95% correlation value, while the alpha Cronbach coefficient for determining the internal relevance of the questions was 78%. The scale's reliability was 79% ($\alpha=0.79$). Subscale scores are as: Job and Career Satisfaction (JCS) with a sub-scale reliability of 0-86 (item 5), General Well-Being (GWB) 0-82 (item 18), Home-Work Interface (HWI) 0-82 (item 17), Stress at Work (SAW) 0-81 (item 7), Control at Work (CAW) 0-81 (item 12) and Working Conditions (WCS) 0-75 (item 9)(26). The validity and reliability of the Persian version of the questionnaire was %95 and %78 using the Cronbach's Alpha and it is a valid and reliable questionnaire (27)

Patient and Public Involvement

This was a cross-sectional study that meaningfully engaged all emergency medical technicians working in different cities of Lorestan province in identifying priority research questions, research training, all facets of recruitment and data collection, and in interpreting the results and co-authoring this manuscript. Additionally, we trained them in the informal settlements of the study conducted in their workplaces, who contributed likewise to informing the study focus, and data collection efforts.

Statistical analysis

Descriptive statistics were used to determine the characteristics of participants and the overall scores of job-stress and work-related quality of life. Pearson correlation was used to assess the correlation between the domains of the two questionnaires (HSE and WRQoL). The odd ratio at (95% CI, $P\text{-value}\leq 0.05$) was used to declare the statistical association. All analyses were done using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.

Results:

All 430 emergency medical technicians (EMTs) who participated in this study were exclusively male (100%), with a mean age of 32 ± 6.87 years. Based on their educational level, 19.2% held a diploma while the rest (80.8%) had an academic education degree, additionally 58.9% of them were married. Totally 115 (30.5%) of them were

163 students while they were working simultaneously and 395 (91.9%) of them were officially hired by the
 164 organization. All other socio-demographic characteristics of the participant are provided in Table 1.

165 **Table 1.** Demographic characteristics of the Emergency Medical Technicians (ETMs) (N=430)
 166

Variables [N*]	Categories	n (%)	
Age (years) [427]	20-30	222 (51.5)	
	30-40	146 (33.9)	
	40-50	56 (13.0)	
	50-60	3 (0.7)	
Education Level [406]	Diploma	78 (19.2)	
	Associated Degree	235 (57.9)	
	Bachelor	90 (22.2)	
	Master	3 (0.7)	
Marital Status [406]	Single	167 (41.1)	
	Married	239 (58.9)	
Employment History (years) [410]	0-5	162(37.6)	
	6-10	190(44.2)	
	11-15	13(3.1)	
	>15	45(10.5)	
Native Status [412]	Native to the city	225 (52.3)	
	Native to the province	127 (29.5)	
	Non-indigenous	60 (14.0)	
Working Shift Status [421]	Constant morning shift	6 (1.4)	
	Circulating shift	51 (11.9)	
	24-hour shift	228(53.0)	
	48-hour shift	136 (31.6)	
	Major	Public Health	3 (0.7)
[390]	Medical emergencies	269 (62.6)	
	Accounting	6 (1.4)	
	Anesthesia	17 (4.0)	
	Mechanics	3 (0.7)	
	Crisis Management	5 (1.2)	
	Emergency and disaster management	8 (1.9)	
	Humanities	52 (12.1)	
	Science	8 (1.9)	
	Operating room technology	6 (1.4)	
	Nursing	13 (3.0)	
	Number of Shifts (per month) [401]	<10	36 (9.0)
		10-12	293 (73.0)
≥13		72 (18.0)	
Locale of Service [404]	Urban Bases	150 (37.1)	
	Road Stations	179 (44.3)	
	Urban and Road Bases	75 (18.6)	
Type of Bases Location [367]	Canopies	55 (15.0)	
	Building	312 (85.0)	

167 *Number of responses for each variables.
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170 Emergency Medical Technicians (EMTs) with a master's degree had the highest HSE (3.5±0.01) and WRQoL
 171 (4.0±0.01) average scores. Regarding martial status, native status, and length of service, there were no significant
 172 differences of them, neither with HSE nor with WRQoL average scores. However, the type of working shift had a

173 significant impact on the HSE-average score, $F(3,417) = 5.26, P = 0.01$; and on the WRQoL-average score, $F(3,417) = 6.89, P < 0.01$, as the highest average scores were reported among those who worked on the 48-hour shift (2.79±0.46) of the HSE, and the fixed morning shift (2.87±0.01) of the WRQoL.

176 The overall average score of job stress using the HSE scale was (2.69±0.43), with peer support as the highest stressor domain among EMTs (2.89±0.63). While the overall quality of working life score was (2.48±1.01), with control at work as the highest factor that might impact the quality of working life (2.47±0.90). (See Table 2 for more details) Generally, 73.5% of respondents reported having work-related stress, with 46% having a low work-related quality of life (lower than the overall mean). The response rate for each specific question of the HES and WRQoL standards was provided in supplementary tables 1 and 2.

183 **Table 2:** Stressor domain scores and work related quality of life scores by factors among the EMTs (N=430)

	Domains and Factors	n	Score Mean (SD)	95% CI
Stressor domains	Demand	405	2.11 (0.56)	1.93-2.08
	Control	402	2.54 (0.60)	2.44-2.59
	Manager's support	410	2.58 (0.82)	2.48-2.67
	Peer's support	413	2.89 (0.63)	2.82-2.98
	Relationship	414	1.75 (0.81)	1.58-1.78
	Role	415	3.12(0.64)	3.00-3.16
	Change	411	2.61 (0.80)	2.62-2.71
	Overall HSE (N)	430	2.69 (0.43)	2.65-2.73
WRQoL- factors	Job career satisfaction	410	2.39 (0.77)	2.30-2.48
	Control at work	413	2.47 (0.90)	2.37 -2.58
	General well-being	393	2.45 (0.54)	2.38-2.51
	Home-work interface	422	2.44 (1.01)	2.32-2.55
	Stress at work	420	1.96(1.00)	1.84-2.08
	Working conditions	423	2.12 (0.98)	2.00-2.23
	Overall quality of working life	424	2.48 (1.01)	2.35-2.60

185 The difference in scores between demographic variables are shown in Table 3.

188 **Table 3:** Difference in HSE and WRQoL scores between demographic variables

Variable	Category	n	Sum. HSE Mean±SD	Sum. WRQoL Mean±SD
Education Level	Diploma	78	60.70±10.90	56.78±15.42
	Associated Degree	235	61.84±7.93	57.88±14.62
	Bachelor	90	60.76±9.36	57.28±15.50
	Master	3	80.00±0.00	91.66±0.00
Marital Status	Single	167	61.28±9.83	57.62±13.38
	Married	239	62.27±8.85	58.50±15.55
Native Status	Native to the city	225	61.95±9.41	57.80±14.50
	Native to the province	127	61.31±7.59	56.31±14.30
	Non-indigenous	60	62.78±11.21	61.51±18.68
Working Shift Status	Constant morning shift	6	60.71±5.47	74.47±2.85
	Circulating shift	51	63.54±5.72	55.65±4.93

	24-hour shift	228	60.91±10.13	56.29±14.58
	48-hour shift	136	62.01±9.00	60.08±18.20
Locale of Service	Urban Bases	150	65.17±7.49	62.16±13.26
	Road Stations	179	61.24±9.83	56.79±15.92
Type of Bases Location	Urban and Road Bases	75	57.77±8.25	52.77±14.99
	Canopies	55	63.24±11.09	56.57±18.99
	Building	312	62.25±8.89	58.52±13.96

Among the participants, 1.4% had between 0-5 shifts, 52.8% between 6-10 shifts and 39.1% between 11-15 shifts per month. Based on the results, most of the EMTs 337(78.37%) had a moderate level of job stress, 48(11.16%) low and 45(10.46%) had severe job stress. Based on the Tukey's result, there was no significant relationship between job stress and none of the sub-groups related to employment type ($p > 0.05$). Table 4

Table 4. Correlation between job stress and demographic factors on quality of work life among EMTs based on multiple regression model. $n=234$

Variable	Mean±SD	β	t	P-Value
Educational level	2.09±0.66	-0.53	-0.39	0.69
Marital status	1.57±0.49	0.69	0.35	0.72
Job status	8.19±5.97	0.71	3.16	0.002
Shifts per month	11.03±2.36	0.57	1.58	0.11
Job stress score (HSE)	62.14±8.64	0.76	7.98	<0.001
Quality of work life score (QWL)	58.80±13.92			

To assess the linear relationship between stresser domains and WRQoL factors, pearson correlation was used (Table 4). There were a strong positive relationship between two domains of HSE, which are peer support and the change ($r = 0.72$, $N = 394$, $p < 0.001$). In other words, increasing the peers' support in work environment the higher the change might apply. Regarding the WRQoL factors, however, job career satisfaction was found to have a significant positive impact on control at work ($r = 0.72$, $N = 395$, $P < 0.001$), general well-being ($r = 0.72$, $N = 379$, $P < 0.001$), home-work interference ($r = 0.77$, $N = 407$, $P < 0.001$), and working conditions ($r = 0.77$, $N = 407$, $P < 0.001$). Table 5

206 **Table 5:** Correlation between HSE-domains and WRQoL factors.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Demand	(0.80)													
2 Control	0.03	(0.74)												
3 Manager support	-0.11*	0.55**	(0.72)											
4 Peer support	-0.20**	0.56**	0.67**	(0.74)										
5 Relationship	0.50**	-0.03	-0.16**	-0.26**	(0.81)									
6 Role	-0.17**	0.34**	0.28**	0.47**	-0.24**	(0.76)								
7 Change	-0.11*	0.54**	0.72**	0.64**	-0.17**	0.35**	(0.73)							
8 Job career satisfaction	-0.25**	0.31**	0.52**	0.41**	-0.25**	0.25**	0.48**	(0.71)						
9 Control at work	-0.13*	0.40**	0.60**	0.42**	-0.11*	0.22**	0.55**	0.72**	(0.71)					
10 General well-being	-0.30**	0.45**	0.43**	0.44**	-0.25**	0.34**	0.41**	0.73**	0.64**	(0.73)				
11 Home-work interface	-0.25**	0.30**	0.50**	0.38**	-0.18**	0.24**	0.41**	0.77**	0.65**	0.62**	(0.73)			
12 Stress at work	0.38**	-0.02	-0.18**	-0.23**	0.40**	-0.20**	-0.19**	-0.23**	-0.11*	-0.26**	-0.25**	(0.83)		
13 Working conditions	-0.24**	0.24**	0.48**	0.37**	-0.19**	0.30**	0.47**	0.77**	0.63**	0.64**	0.72**	-0.28**	(0.72)	
14 Overall quality of working life	-0.30**	0.20**	0.39**	0.30**	-0.18**	0.28**	0.32**	0.66**	0.52**	0.59**	0.52**	-0.29**	0.64**	(0.74)

Note: Pearson's correlation coefficient was used. Alpha reliability coefficients are given in parenthesis.

* P value <0.05, ** P value < 0.01.

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Discussion

Considering that the work environment for emergency medical personnel is very stressful since they are often the first healthcare team exposed to different stressful conditions and sick patients, the nature of the job and its contents are subject to a high level of stress. Research evidence related to job stress among EMTs is limited in the study area. Hence, this study was conducted to determine the relationship between job stress and the quality of work-life among EMT personnel in Lorestan province.

The results of the present study showed that most of the EMTs 337(78.37%) had a moderate level of job stress (M, 2.69; IC, 2.65-2.73). This finding is in a harmony with the Ashgh et al. study, in which the male employees of emergencies in Golestan province were found to experience moderate work stress(28). Another study shows that emergency physicians experience a subclinical level of anxiety due to repetitive exposure to serious incidents like the death of an adolescent or a child (7). In regards to WRQoL, the overall quality of working life was a little less than the moderate range (M, 2.48; IC, 2.35-2.60). A cross-sectional analysis of 908 health employees from 15 hospitals shows that the majority of employees were dissatisfied with occupational health and safety and also indicated that their work was not interesting and satisfying (21). High WRQoL seems to have a protective factor. All of these, high stress and low WRQoL, not only affect the EMTs themselves, but can also have an adverse impact on patient care (7).

In the present study, a significant association was found between work shift and work-related stress. Rotating shift EMTs were more stressed than fixed-shift EMTs. This finding was consistent with research reported in Ethiopia (29) and Jordan(30), which indicated that employees working on rotating shifts were more stressed than their counterparts who worked on fixed shifts; however, those studies were done on nurses. Therefore, working on a fixed shift might be beneficial in improving the WRQoL, as the current study reported.

Change in the work place from emergency wards to other wards suited to the employee, by their choice, was found to be related to the peers' and managers' support. A lack of social support among emergency care personnel is a well-known predictor of occupational stress (7). A study found that facilitating social support from coworkers can help in the rehabilitation process after being confronted with traumatic experiences and occupational dangers among those who work in EM(7). Yang et.al (2002) also reported similar results on the difference between job stress of nurses in the emergency department compared to other departments (31). Employees working in different departments of the hospital experience different degrees of job stress due to their types of activities (32). However, few studies reported a low level of job stress for nurses in comparison to other employees (33); perhaps it is due to, in addition to the differences in the populations studied, the adjustment of nurses to severe and chronic conditions with stressful working conditions compared to other employees. In the present study, it was found that there was no significant difference between the mean score of job stress and marital status, education level, native status, type of employment and type of base location, while the relationship between the mean of job stress score and working shift status and employment history were significant. According to a study conducted by Golshiri et al. (2013), it was found that there is a significant reverse relationship between the employment history and the level of job stress; in other words, the higher job experience, the lower job stress is. Accordingly, it can be concluded that the most compatibility of nurses with the unique status of the medical emergency department and the increase in

work skills and work experience as a result of increasing the job record is one that can explain this relationship (34). In the study of Khodaveysi et.al (2005), they approved that the increase in skills and work experience due to the increase in job records was mentioned as the most important factors in job stress (35). This study has some limitations, including the fact that the cross-sectional study design utilized in this investigation could not determine a temporal association between stress and WRQoL. Given that stress is mainly subjective and psychological, the qualitative method would give rich and reliable information on the EMTs' experiences with stress and related concepts. Furthermore, since the sampling method in the present study was a census, some of the technicians were reluctant and were not satisfied to participate in the study.

Conclusion

This study determined the level of job stress and its relation to the WRQoL among EMT personnel working in government hospitals in Lorestan, Iran. Based on the evidence provided from the current analysis, two-third of EMTs working in governmental hospitals had work-related stress. Work shift was statistically significantly associated with EMTs' work-related stress and WRQoL. In this study, peer support was found to be the most stressful domain among EMTs; while the control domain at work was the highest factor that might impact the quality of working life. It is likely that EMT personnel may have a tremendous role in the health care delivery system world-wide, especially in emergency situations. Critical incident exposure, workplace aggression, unpredictability, workload, and time pressure are among the challenges that EMTs may face during their work. In the mean time, EMTs' experienced work-related stress and low WRQoL may affect not only the health care services but also might increase medical errors and resource expenditure. It would seem that to improve the quality of work among EMTs, the urgent need for organizational interventions aim to diminish work-related stress could be used as a comprehensive assessment. Moreover, rescheduling should be explored as a strategy for reducing stress caused by shift work. To demonstrate a true cause-and-effect link, more research employing a mixed-method and analytical design in government and commercial health institutions is recommended.

Declarations:

Ethical Approval and Consent to participate:

Human Participants with the ethical approval ID: IR.LUMS.REC.1397-1-99-1254. This study was approved and funded by the institutional review of Lorestan University of medical Sciences. Written informed consent and verbal agreement was taken from all participants. All experimental protocols were approved by Lorestan University of Medical Sciences and the ethical approval ID is: IR.LUMS.REC.1397-1-99-1254.

Consent for publication:

Not applicable.

Availability of supporting data:

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

Competing interests

Not applicable.

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Author's contributions:

H.Sh, Gh.F, and A.P, conceptualized and designed the main idea of this study. H.Sh, and R.M. designed the data extraction file, extracted data, and interpreted data. M.M, and B.M. analysed the data. All authors wrote the initial

295 draft of the manuscript and approved the final manuscript as submitted and agreed to be accountable for all aspects
296 of the work.

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Supplementary:

Supplementary table1: Work-related stress (HSE) Categorized by factors (N=430)

Factors	NO	Questions	Response mean (SD)	% non-response
Demands	1	Different groups at work demand things from me that are hard to combine	1.9 (1.01)	1.4
	2	I have unachievable deadlines	1.42(1.12)	1.4
	3	I have to work very intensively	2.72(1.15)	0.2
	4	I have to neglect some tasks because I have too much to do	1.89(1.21)	0.9
	5	I am unable to take sufficient breaks	2.18(1.21)	1.6
	6	I am pressured to work long hours	2.14(1.26)	2.1
	7	I have to work very fast	2.85(1.05)	0.2
	8	I have unrealistic time pressures	1.9(1.15)	1.2
Mean of response (SD)			2.126 (0.468)	
Control	1	I can decide when to take a break	1.95(1.45)	2.1
	2	I have a say in my own work speed	3.11(0.85)	0.9
	3	I have a choice in deciding how I do my work	2.49(1.11)	0.9
	4	I have a choice in deciding what I do at work	2.56(1.16)	1.6
	5	I have some say over the way I work	2.93(0.91)	2.1
	6	My working time can be flexible	2.21(1.18)	1.4
Mean of response (SD)			2.539 (0.432)	
Manger support	1	I am given supportive feedback on the work I do	2.72(0.89)	0.2
	2	I can rely on my line manager to help me out with a work problem	2.74(1.03)	0.9
	3	I can talk to my line manager about something that has upset or annoyed me about work	2.69(1.13)	2.3
	4	I am supported through emotionally demanding work	2.31(1.09)	0.9
	5	My line manager encourages me at work	2.41(1.27)	1.4
Mean of response (SD)			2.576 (0.199)	
Peer Support	1	If work gets difficult, my colleagues will help me	2.92(0.85)	0.9
	2	I get help and support I need from colleagues	2.96(0.81)	2.1
	3	I receive the respect at work I deserve from my colleagues	3.07(0.78)	0.2
	4	My colleagues are willing to listen to my work-related problems	2.62(0.85)	1.6
Mean of response (SD)			2.892 (0.192)	
Relationship	1	I am subject to personal harassment in the form of unkind words or behavior	1.07(1.12)	0.7
	2	There is friction or anger between colleagues	2.11(1.12)	0.9
	3	I am subject to bullying at work	1.69(1.22)	2.3
	4	Relationships at work are strained	2.16(1.28)	0.7
Mean of response (SD)			1.757 (0.505)	
Role	1	I am clear what is expected of me at work	3.3(0.78)	1.6
	2	I know how to go about getting my job done	3.22(0.82)	2.3
	3	I am clear what my duties and responsibilities are	3.24(0.92)	0.9
	4	I am clear about the goals and objectives for my department	2.98(1.05)	0.2
	5	I understand how my work fits into the overall aim of the organization	2.87(0.92)	0.2
Mean of response (SD)			3.121(0.185)	
Change	1	I have sufficient opportunities to question managers about change at work	2.69(1.06)	1.9
	2	Staff are always consulted about change at work	2.69(1.03)	0.9
	3	When changes are made at work, I am clear how they will work out in practice	2.46(0.92)	2.3
Mean of non-response (SD)			2.613 (0.131)	
Overall mean (SD)			2.694 (0.439)	

Supplementary table 2: Work Related Quality of Life (WRQoL) Response (N=430)

NO	Questions	Response average	% non-response
1	I have a clear set of goals and aims to enable me to do my job	2.935	0.2
2	I feel able to voice opinions and influence changes in my area of work	2.746	0.9
3	I have the opportunity to use my abilities at work	2.537	1.6
4	I feel well at the moment	2.958	2.3
5	My employer provides adequate facilities and flexibility for me to fit work in around my family life	2.602	1.6
6	My current working hours / patterns suit my personal circumstances	2.525	0.2
7	I often feel under pressure at work	2.357	0.2
8	When I have done a good job it is acknowledged by my line manager	2.490	1.3
9	Recently, I have been feeling unhappy and depressed	1.980	1.6
10	I am satisfied with my life	2.918	2.3
11	I am encouraged to develop new skills	2.528	1.4
12	I am involved in decisions that affect me in my own area of work	2.585	2.8
13	My employer provides me with what I need to do my job effectively	2.639	1.2
14	My line manager actively promotes flexible working hours / patterns	2.687	1.4
15	In most ways my life is close to ideal	2.387	0.2
16	I work in a safe environment	2.154	1.4
17	Generally things work out well for me	2.346	2.1
18	I am satisfied with the career opportunities available for me here	2.355	1.4
19	I often feel excessive levels of stress at work	2.295	2.5
20	I am satisfied with the training I receive in order to perform my present job	2.544	0.7
21	Recently, I have been feeling reasonably happy all things considered	2.492	1.4
22	The working conditions are satisfactory	2.476	0.2
23	I am involved in decisions that affect members of the public in my own area of work	2.324	0.9
24	I am satisfied with the overall quality of my working life	2.577	1.6
Overall mean (SD)		2.506 (0.553)	

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

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*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at

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<http://www.annals.org/>, and *Epidemiology* at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

Abstract

Objective: This study was aimed to determine the relationship between job stress and WRQoL among emergency medical technicians (EMTs) in Lorestan Province, Western Iran.

Design: This was a cross-sectional study.

Methods: Totally 430 emergency medical technicians who had been engaged in their respective units for more than six months from all emergency facilities in Lorestan Province were selected using census method. Data were collected from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-Related Quality of Life (WRQoL). The odd ratio with 95% Confidence Interval (CI) was used to declare the statistical association ($p \leq 0.05$).

Results: All participants were exclusively males, with a mean age of 32 ± 6.87 years. The overall average score of job stress using the HSE scale was 2.69 ± 0.43 ; while the overall quality of working life score was 2.48 ± 1.01 . The type of working shift was found to have a significant impact on the HSE-average score, ($F(3,417) = 5.26, P = 0.01$); and on the WRQoL-average score, ($F(3,417) = 6.89, P < 0.01$).

Conclusion: Two-thirds of EMTs working in governmental hospitals had job stress and a low quality of work-related life. Additionally, work shift was statistically significant associated with EMTs' job stress and WRQoL.

Keywords: Job stress, Work-related quality of life, Emergency medical technician, HSE, WRQoL

STRENGTHS AND LIMITATIONS

1. First study to examine job stress and WRQoL among EMTs in a specific region.
2. Validated questionnaires used for data collection.
3. Sample size sufficient for examining job stress and WRQoL relationship.
4. Cross-sectional design limits temporal association determination.
5. Qualitative methods can provide reliable and rich information on EMTs' experiences with stress.

Introduction:

Working in emergency medicine can be challenging, and healthcare workers are subjected to a variety of pressures (1). Critical incident exposure, workplace aggression, unpredictability, workload, and time pressure are among them. Additional environmental stressors in the prehospital context include traffic safety concerns and unexpected accident scenes (2). Several studies have demonstrated the alarming prevalence of burnout syndrome, posttraumatic stress disorder (PTSD), and other related health difficulties among first responders and emergency medical service personnel (3)(4)(5)(6)(7). Furthermore, those stressors might cause hostility, aggression, absenteeism, and turnover among emergency medical technicians (EMTs).

Job stress refers to the psychological stress caused by the imbalance between the needs of the target and the individual's ability to adapt to specific job conditions (8). Job stress is one of the most important workplace health risks among employees worldwide (9). One of the complications of modern life is the presence of stress in the workplace (10). It is a common condition of the 21st century that affects people in a variety of conditions and is responsible for absenteeism among health-care workers (11). 137.3 million working days were lost to due to

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3 47 sickness and injury as it is estimated by the UK national statistics (12). This is only the material dimension of the
4 48 issue of stress; in addition, stress has a significant impact on employees, their families, and patients (9).

5 49 In 2021, job stress (new or long-standing) was the biggest work-related health issue in the UK, which
6 50 accounted for 50% of all job-related illnesses with an incidence rate of 2,480 per 100,000(13). The cost of sickness
7 51 and stress-related absenteeism is estimated at 4 billion pounds a year(12). Numerous studies have shown that the job
8 52 stress experienced by the pre-hospital emergency staff is significantly higher than that of other healthcare workers
9 53 because they are the first people to be present in a variety of emergencies, from fatal accidents to minor injuries and
10 54 illnesses (14)(15). Meanwhile, emergency medical technicians face stressful environments such as congested areas
11 55 and critically ill patients where it is difficult to work (16).

12 56 Neglecting the ongoing stress that is inflicted on employees, particularly healthcare workers, would
13 57 eventually result in a lack of motivation and morale in the staff (17). There is enormous capital lost annually due to
14 58 the lack of physical and mental health of employees, impaired performance, quitting, and changing jobs due to job
15 59 stress. Stress and its complications result in the loss of hundreds of working days each year. About 30% of the
16 60 workforce in developed countries suffers from job stress. The International Labor Organization also estimates that
17 61 the costs incurred by countries due to job stress are about 1 to 3.5% of GDP and are currently increasing (18)(19).

18 62 Work-related quality of life (WRQoL) is an organizational culture or management style in which
19 63 employees feel ownership, self-reliance, responsibility, and self-esteem(20). WRQoL is a multidimensional structure
20 64 that includes several concepts such as welfare measures, health services, incentive plans, job fit, job security, job
21 65 design, importance to the role and position of the individual in the organization, providing growth and development,
22 66 participation in decision making, reducing job conflicts and ambiguities and education(21). According to the
23 67 research, companies that provide a better work quality of life for their employees are more successful in retaining
24 68 their valuable employees and have higher profitability (22). However, job stress reduces the WRQoL and increases
25 69 the risk of work-related injuries. The WRQoL is critical for organizations to be able to attract and retain human
26 70 resources (23).

27 71 Job stress in emergency medical technicians is typically higher than in other professionals, and since they
28 72 are often the first healthcare team exposed to different stressful conditions and sick patients, the nature of the job
29 73 and its contents are in a high level of stress. Research evidence related to job stress among EMTs is limited in the
30 74 study area.

31 75 Lorestan Province in Western Iran is a region that faces numerous challenges, including remote and
32 76 deprived villages, dilapidated road structures, and the presence of dangerous occupations. Emergency Medical
33 77 Technicians (EMTs) in this region are particularly vulnerable to these challenges, which can have a significant
34 78 impact on their job stress and work-related quality of life (WRQoL). Despite the importance of this topic, there have
35 79 been limited studies that have investigated the relationship between job stress and WRQoL among EMTs in this
36 80 region. Therefore, the present study aims to fill this gap by examining the relationship between job stress and
37 81 WRQoL among EMTs in Lorestan Province. By doing so, we hope to provide new insights into the factors that
38 82 affect the well-being of EMTs in this region and contribute to the development of effective interventions to improve
39 83 their working conditions and overall quality of life.

84 **Material and methods:**

85 **Participants**

86 A census approach was used to conduct a cross-sectional survey among 430 emergency medical technicians (EMTs)
87 who had been engaged in their respective units for more than six months from all emergency facilities in Lorestan
88 Province. The number of participants was 25, 37, 22, 38, 21, 19, 115, 61, 28, 54, and 10 from Alashtar, Aligoudarz,
89 Azna, Broujerd, Doroud, Dooreh, Khorramabad, Kouhdasht, Nourabad, Poldokhtar, and Sepiddasht, respectively.
90 This study was approved by the institutional review of Lorestan University of medical Sciences. Written informed
91 consent and verbal agreement was taken from all technicians before participating in the study. The confidentiality
92 principle was maintained so that there was no need to mention the names of the individuals in the questionnaires,
93 and it was assured that the information was just provided to the researcher and used in the study. Data were collected
94 from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-related quality of life
95 (WRQoL). Data were collected during all shifts (morning, evening and night), when the (EMTs) were at work at the
96 time being to answer the questions.

97 Eligible emergency medical technicians (EMTs) were those who had been working in their respective units for at
98 least six months and were willing to participate in the study. EMTs who had been working for less than six months
99 or who did not meet the inclusion criteria were excluded. Using Cochran's sample size formula ($n = \frac{Nz^2pq}{Nd^2 + z^2pq}$
100 = 430) where [$z = 1.96$, $N = 450$, $p = q = 0.5$, $d = 0.01$], we selected a total of 430 EMTs who met the inclusion
101 criteria.

102 **Job Stress Questionnaire:** The management standard was assessed using a 35-item indicator tool created by the
103 Health and Safety Executive (HSE) to measure work-related stress among employees. The tool consists of seven
104 items. These items are: (1) Demands (including such issues as workload, work patterns, and the working
105 environment). (2) Control (how much say the person has in the way they do their work). (3 & 4) Manager and peers'
106 support (including the encouragement, sponsorship, and resources provided by the organization, line management,
107 and colleagues). (5) Relationships at work (including promoting positive working practices to avoid conflict and
108 dealing with unacceptable behaviour). (6) Role (whether people understand their role within the organization and
109 whether the organization ensures that the person does not have conflicting roles). (7) Change (how organizational
110 change (large or small) is managed and communicated in the organization). The validity of the HSE-scale was 83%
111 ($\alpha = 0.83$). This questionnaire contains 35 questions with 7 subscales. The subscales are: 1- Demand: questions
112 number (18, 6, 9, 12, 16, 3, 20, 22), 2- Control (30, 10, 15, 19, 25, 2), 3- Officials support (7, 27, 24, 31), 4-
113 Colleagues support (8, 23, 29, 33, 35), 5- Relationship (5, 14, 21, 34), 6- Role (1, 7, 11, 13, 17) and 7- Changes (32,
114 28, 26). The Likert scale was defined as Strongly disagree: 0, Disagree: 1, No opinion: 2, Agree: 3, Strongly agree:
115 4. All 7 stress-items were scored on a scale of 1 to 4 ranged between 7 to 28. Those above and those below the
116 median value 16, were signified as more and less job stress respectively (24). The validity and reliability of the
117 Persian version of the questionnaire was %78 and %65 using the Cronbach's Alpha and split-half method,
118 respectively and HSE is a valid and reliable questionnaire for studying job stress (25).

Work-Related Quality of Life Questionnaire (WRQoL): This is a multidimensional concept that includes job and professional satisfaction factors, working conditions, general health status, home-work relationship, work stress, and work control. The questionnaire comprises a five-Likert scale from strongly disagree to strongly agree 1 to 5 (25). The validity of the questionnaire was confirmed by experts, and its reliability was determined by the test-retest method. The questions had a 95% correlation value, while the alpha Cronbach coefficient for determining the internal relevance of the questions was 78%. The scale's reliability was 79% ($\alpha=0.79$). Subscale scores are as: Job and Career Satisfaction (JCS) with a sub-scale reliability of 0-86 (item 5), General Well-Being (GWB) 0-82 (item 18), Home-Work Interface (HWI) 0-82 (item 17), Stress at Work (SAW) 0-81 (item 7), Control at Work (CAW) 0-81 (item 12) and Working Conditions (WCS) 0-75 (item 9)(26). The validity and reliability of the Persian version of the questionnaire was %95 and %78 using the Cronbach's Alpha and it is a valid and reliable questionnaire (27)

Patient and Public Involvement

This was a cross-sectional study that meaningfully engaged all emergency medical technicians working in different cities of Lorestan province in identifying priority research questions, research training, all facets of recruitment and data collection, and in interpreting the results and co-authoring this manuscript. Additionally, we trained them in the informal settlements of the study conducted in their workplaces, who contributed likewise to informing the study focus, and data collection efforts.

Statistical analysis

Descriptive statistics were used to determine the characteristics of participants and the overall scores of job-stress and work-related quality of life. Pearson correlation was used to assess the correlation between the domains of the two questionnaires (HSE and WRQoL). The odd ratio at (95% CI, $P\text{-value}\leq 0.05$) was used to declare the statistical association. All analyses were done using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.

Results:

All 430 emergency medical technicians (EMTs) who participated in this study were exclusively male (100%), with a mean age of 32 ± 6.87 years. Based on their educational level, 19.2% held a diploma while the rest (80.8%) had an academic education degree, additionally 58.9% of them were married. Totally 115 (30.5%) of them were students while they were working simultaneously and 395 (91.9%) of them were officially hired by the organization. All other socio-demographic characteristics of the participant are provided in Table 1.

Table 1. Demographic characteristics of the Emergency Medical Technicians (ETMs) (N=430)

Variables [N*]	Categories	n (%)
Age (years) [427]	20-30	222 (51.5)
	30-40	146 (33.9)
	40-50	56 (13.0)
	50-60	3 (0.7)
Education Level [406]	Diploma	78 (19.2)
	Associated Degree	235 (57.9)
	Bachelor	90 (22.2)
	Master	3 (0.7)

Marital Status	Single	167 (41.1)
[406]	Married	239 (58.9)
Employment History (years)	0-5	162(37.6)
[410]	6-10	190(44.2)
	11-15	13(3.1)
	>15	45(10.5)
Native Status	Native to the city	225 (52.3)
[412]	Native to the province	127 (29.5)
	Non-indigenous	60 (14.0)
Working Shift Status	Constant morning shift	6 (1.4)
[421]	Circulating shift	51 (11.9)
	24-hour shift	228(53.0)
	48-hour shift	136 (31.6)
Major	Public Health	3 (0.7)
[390]	Medical emergencies	269 (62.6)
	Accounting	6 (1.4)
	Anesthesia	17 (4.0)
	Mechanics	3 (0.7)
	Crisis Management	5 (1.2)
	Emergency and disaster management	8 (1.9)
	Humanities	52 (12.1)
	Science	8 (1.9)
	Operating room technology	6 (1.4)
Number of Shifts (per month)	Nursing	13 (3.0)
[401]	<10	36 (9.0)
	10-12	293 (73.0)
	≥13	72 (18.0)
Locale of Service	Urban Bases	150 (37.1)
[404]	Road Stations	179 (44.3)
Type of Bases Location	Urban and Road Bases	75 (18.6)
[367]	Canopies	55 (15.0)
	Building	312 (85.0)

*Number of responses for each variables.

Emergency Medical Technicians (EMTs) with a master's degree had the highest HSE (3.5±0.01) and WRQoL (4.0±0.01) average scores. Regarding marital status, native status, and length of service, there were no significant differences of them, neither with HSE nor with WRQoL average scores. However, the type of working shift had a significant impact on the HSE-average score, $F(3,417) = 5.26, P = 0.01$; and on the WRQoL-average score, $F(3,417) = 6.89, P < 0.01$, as the highest average scores were reported among those who worked on the 48-hour shift (2.79±0.46) of the HSE, and the fixed morning shift (2.87±0.01) of the WRQoL.

The overall average score of job stress using the HSE scale was (2.69±0.43), with peer support as the highest stressor domain among EMTs (2.89±0.63). While the overall quality of working life score was (2.48±1.01), with control at work as the highest factor that might impact the quality of working life (2.47±0.90). (See Table 2 for more details) Generally, 73.5% of respondents reported having work-related stress, with 46% having a low work-related quality of life (lower than the overall mean). The response rate for each specific question of the HES and WRQoL standards was provided in supplementary tables 1 and 2.

Table 2: Stressor domain scores and work related quality of life scores by factors among the EMTs (N=430)

	Domains and Factors	n	Score Mean (SD)	95% CI
Stressor domains	Demand	405	2.11 (0.56)	1.93-2.08
	Control	402	2.54 (0.60)	2.44-2.59
	Manager's support	410	2.58 (0.82)	2.48-2.67
	Peer's support	413	2.89 (0.63)	2.82-2.98
	Relationship	414	1.75 (0.81)	1.58-1.78
	Role	415	3.12(0.64)	3.00-3.16
	Change	411	2.61 (0.80)	2.62-2.71
	Overall HSE (N)	430	2.69 (0.43)	2.65-2.73
WRQoL- factors	Job career satisfaction	410	2.39 (0.77)	2.30-2.48
	Control at work	413	2.47 (0.90)	2.37 -2.58
	General well-being	393	2.45 (0.54)	2.38-2.51
	Home-work interface	422	2.44 (1.01)	2.32-2.55
	Stress at work	420	1.96(1.00)	1.84-2.08
	Working conditions	423	2.12 (0.98)	2.00-2.23
	Overall quality of working life	424	2.48 (1.01)	2.35-2.60

The difference in scores between demographic variables are shown in Table 3.

Table 3: Difference in HSE and WRQoL scores between demographic variables

Variable	Category	n	Sum. HSE Mean±SD	Sum. WRQoL Mean±SD
Education Level	Diploma	78	60.70±10.90	56.78±15.42
	Associated Degree	235	61.84±7.93	57.88±14.62
	Bachelor	90	60.76±9.36	57.28±15.50
	Master	3	80.00±0.00	91.66±0.00
Marital Status	Single	167	61.28±9.83	57.62±13.38
	Married	239	62.27±8.85	58.50±15.55
Native Status	Native to the city	225	61.95±9.41	57.80±14.50
	Native to the province	127	61.31±7.59	56.31±14.30
	Non-indigenous	60	62.78±11.21	61.51±18.68
Working Shift Status	Constant morning shift	6	60.71±5.47	74.47±2.85
	Circulating shift	51	63.54±5.72	55.65±4.93
	24-hour shift	228	60.91±10.13	56.29±14.58
Locale of Service	48-hour shift	136	62.01±9.00	60.08±18.20
	Urban Bases	150	65.17±7.49	62.16±13.26
	Road Stations	179	61.24±9.83	56.79±15.92
Type of Bases Location	Urban and Road Bases	75	57.77±8.25	52.77±14.99
	Canopies	55	63.24±11.09	56.57±18.99
	Building	312	62.25±8.89	58.52±13.96

Among the participants, 1.4% had between 0-5 shifts, 52.8% between 6-10 shifts and 39.1% between 11-15 shifts per month. Based on the results, most of the EMTs 337(78.37%) had a moderate level of job stress, 48(11.16%) low and 45(10.46%) had severe job stress. Based on the Tukey's result, there was no significant relationship between job stress and none of the sub-groups related to employment type ($p > 0.05$). Table 4

179 Table 4. Correlation between job stress and demographic factors on quality of work life among EMTs based on
180 multiple regression model. n=234

Variable	Mean±SD	β	t	P-Value
Educational level	2.09±0.66	-0.53	-0.39	0.69
Marital status	1.57±0.49	0.69	0.35	0.72
Job status	8.19±5.97	0.71	3.16	0.002
Shifts per month	11.03±2.36	0.57	1.58	0.11
Job stress score (HSE)	62.14±8.64	0.76	7.98	<0.001
Quality of work life score (QWL)	58.80±13.92			

181
182 To assess the linear relationship between stresser domains and WRQoL factors, pearson correlation was used
183 (Table 4). There were a strong positive relationship between two domains of HSE, which are peer support and the
184 change ($r = 0.72$, $N = 394$, $p < 0.001$). In other words, increasing the peers' support in work environment the higher
185 the change might apply. Regarding the WRQoL factors, however, job career satisfaction was found to have a
186 significant positive impact on control at work ($r = 0.72$, $N = 395$, $P < 0.001$), general well-being ($r = 0.72$, $N = 379$,
187 $P < 0.001$), home-work interference ($r = 0.77$, $N = 407$, $P < 0.001$), and working conditions ($r = 0.77$, $N = 407$,
188 $P < 0.001$). (See Supplementary Table. 1)

199 Discussion

200 Emergency medical personnel work in an inherently stressful environment, as they are often the first
201 healthcare team to respond to critical and traumatic incidents. This constant exposure to high-pressure situations and
202 sick patients can result in significant levels of job stress. Despite the challenges faced by emergency medical
203 technicians (EMTs), research on job stress in this profession is limited in the study area. Therefore, to bridge this
204 gap in the literature, we conducted a study aimed at exploring the relationship between job stress and the quality of
205 work-life among EMT personnel in Lorestan province. By understanding the impact of job stress on the quality of
206 work-life, we can identify strategies and interventions that promote better mental health and well-being for EMTs.

207 The findings of the present study indicate that a substantial proportion of EMTs, comprising 337 (78.37%),
208 experienced moderate levels of job stress (M, 2.69; IC, 2.65-2.73). This result aligns with a previous study
209 conducted by Ashgh et al., which reported that male emergency employees in Golestan province experienced
210 moderate work stress (28). Similarly, a study on emergency physicians demonstrated that repetitive exposure to
211 critical incidents, such as the death of a child or adolescent, can result in a subclinical level of anxiety(7). Regarding

212 WRQoL, the overall quality of work life among EMTs was found to be slightly lower than moderate (M, 2.48; IC,
213 2.35-2.60). This result is consistent with the findings of a cross-sectional analysis of 908 health employees from 15
214 hospitals, which revealed that a majority of participants reported dissatisfaction with occupational health and safety
215 and uninteresting work (21). Moreover, high levels of WRQoL were found to have a protective effect, as high levels
216 of stress and low levels of WRQoL not only impact EMTs but also negatively affect patient care (7).

217 In the present study, a significant association was found between work shift and work-related stress. Rotating
218 shift EMTs were more stressed than fixed-shift EMTs. This finding was consistent with research reported in
219 Ethiopia (29) and Jordan(30), which indicated that employees working on rotating shifts were more stressed than
220 their counterparts who worked on fixed shifts; however, those studies were done on nurses. Rotating shift work can
221 disrupt the natural circadian rhythm of the body, leading to sleep deprivation and exhaustion. This can increase the
222 likelihood of errors and decrease work performance, causing more stress for the EMTs. Additionally, rotating shift
223 work can make it difficult to maintain a healthy work-life balance, which can also contribute to higher levels of
224 stress (31). It may be helpful to include suggestions for potential solutions, such as offering more flexible scheduling
225 options or providing resources for stress management and coping strategies. Therefore, working on a fixed shift
226 might be beneficial in improving the WRQoL, as the current study reported.

227 Change in the work place form emergency wards to other wards suited to the employee, by their choice,
228 was found to be related to the peers' and managers' support. A lack of social support among emergency care
229 personnel is a well-known predictor of occupational stress (7). A study found that facilitating social support from
230 coworkers can help in the rehabilitation process after being confronted with traumatic experiences and occupational
231 dangers among those who work in EM(7). Yang et.al (2002) also reported similar results on the difference between
232 job stress of nurses in the emergency department compared to other departments (32). Employees working in
233 different departments of the hospital experience different degrees of job stress due to their types of activities (33).
234 However, few studies reported a low level of job stress for nurses in comparison to other employees (34); perhaps it
235 is due to, in addition to the differences in the populations studied, the adjustment of nurses to severe and chronic
236 conditions with stressful working conditions compared to other employees. In the present study, it was found that
237 there was no significant difference between the mean score of job stress and marital status, education level, native
238 status, type of employment and type of base location, while the relationship between the mean of job stress score
239 and working shift status and employment history were significant. According to a study conducted by Golshiri et al.
240 (2013), it was found that there is a significant reverse relationship between the employment history and the level of
241 job stress; in other words, the higher job experience, the lower job stress is. Accordingly, it can be concluded that
242 the most compatibility of nurses with the unique status of the medical emergency department and the increase in
243 work skills and work experience as a result of increasing the job record is one that can explain this relationship (35).
244 In the study of Khodaveysi et.al (2005), they approved that the increase in skills and work experience due to the
245 increase in job records was mentioned as the most important factors in job stress (36).

246 The present study is not without limitations. Firstly, the cross-sectional study design utilized in this
247 investigation precludes us from determining a temporal association between stress and WRQoL. Augmenting the
248 quantitative approach with qualitative methods, which offer in-depth and trustworthy information on EMTs' stress

249 experiences and related concepts, may have enhanced the study's findings. Semi-structured interviews or focus
250 groups could be used to obtain detailed information on specific stressors and coping strategies experienced by
251 EMTs. Additionally, the use of observational methods could provide insights into the nonverbal behaviors and
252 interactions that occur between EMTs and their patients, which may impact their stress levels and WRQoL. By
253 incorporating such qualitative methods, the study could have achieved a more nuanced understanding of the
254 complex and multidimensional nature of stress and its impact on EMTs. Secondly, the census sampling method
255 employed in this study faced reluctance from some technicians, which could have introduced selection bias. Lastly,
256 an important limitation is the gender bias in the Emergency Medical Services centers in Lorestan province. During
257 our study, there were no female employees or dispatch codes, and the administrative and dispatch and MCHC
258 (Medical Care Monitoring Center) personnel were predominantly female, rendering them ineligible for inclusion in
259 our study. While the Sanjeh Organization has been recruiting female emergency medicine students in large cities
260 like Tehran and has female personnel in dispatch codes in these areas, there are presently no female personnel in
261 dispatch codes in Lorestan province due to cultural and operational limitations, precluding us from including female
262 patients in our study. Furthermore, the study did not provide detailed information about the conditions of the
263 research environment, such as the types of emergencies that the workers were responding to or the work schedules
264 and procedures. These conditions may have affected the level of job stress and the quality of work life of the EMTs.
265 Therefore, future studies should take into account the specific characteristics of the work environment to better
266 understand the factors that contribute to job stress and work quality of life among EMTs. In addition, future research
267 could explore the perspectives of EMTs themselves, as well as those of their supervisors and colleagues, to gain a
268 more comprehensive understanding of the work-related stressors and their impact on the quality of work life in this
269 profession. By addressing these limitations, future studies can help to inform the development of effective
270 interventions and policies aimed at reducing job stress and improving the quality of work life among EMT
271 personnel.

275 **Conclusion**

276 This study determined the level of job stress and its relation to the WRQoL among EMT personnel working in
277 government hospitals in Lorestan, Iran. Based on the evidence provided from the current analysis, two-third of
278 EMTs working in governmental hospitals had work-related stress. Work shift was statistically significantly
279 associated with EMTs' work-related stress and WRQoL. In this study, peer support was found to be the most
280 stressful domain among EMTs; while the control domain at work was the highest factor that might impact the
281 quality of working life. It is likely that EMT personnel may have a tremendous role in the health care delivery
282 system world-wide, especially in emergency situations. Critical incident exposure, workplace aggression,
283 unpredictability, workload, and time pressure are among the challenges that EMTs may face during their work. In
284 the mean time, EMTs' experienced work-related stress and low WRQoL may affect not only the health care services
285 but also might increase medical errors and resource expenditure. It would seem that to improve the quality of work
286 among EMTs, the urgent need for organizational interventions aim to diminish work-related stress could be used as

287 a comprehensive assessment. Moreover, rescheduling should be explored as a strategy for reducing stress caused by
288 shift work. To demonstrate a true cause-and-effect link, more research employing a mixed-method and analytical
289 design in government and commercial health institutions is recommended.

290

291 **Declarations:**

292 **Ethical Approval and Consent to participate:**

293 Human Participants with the ethical approval ID: IR.LUMS.REC.1397-1-99-1254. This study was approved and
294 funded by the institutional review of Lorestan University of medical Sciences. Written informed consent and verbal
295 agreement was taken from all participants. All experimental protocols were approved by Lorestan University of
296 Medical Sciences and the ethical approval ID is: IR.LUMS.REC.1397-1-99-1254.

297 **Consent for publication:**

298 Not applicable.

299 **Availability of supporting data:**

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

301 **Competing interests**

302 Not applicable.

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305 **Author's contributions:**

306 H.Sh, Gh.F, and A.P, conceptualized and designed the main idea of this study. H.Sh, and R.M. designed the data
307 extraction file, extracted data, and interpreted data. M.M, and B.M. analysed the data. All authors wrote the initial
308 draft of the manuscript and approved the final manuscript as submitted and agreed to be accountable for all aspects
309 of the work.

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312

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14 341 [psychiatric-units-a-research-review.php?aid=3653](https://www.hsj.gr/medicine/factors-influencing-stress-and-job-satisfaction-of-nurses-working-in-psychiatric-units-a-research-review.php?aid=3653)
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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

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Table 5: Correlation between HSE-domains and WRQoL factors.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Demand	(0.80)													
2 Control	0.03	(0.74)												
3 Manager support	-0.11*	0.55**	(0.72)											
4 Peer support	-0.20**	0.56**	0.67**	(0.74)										
5 Relationship	0.50**	-0.03	-0.16**	-0.26**	(0.81)									
6 Role	-0.17**	0.34**	0.28**	0.47**	-0.24**	(0.76)								
7 Change	-0.11*	0.54**	0.72**	0.64**	-0.17**	0.35**	(0.73)							
8 Job career satisfaction	-0.25**	0.31**	0.52**	0.41**	-0.25**	0.25**	0.48**	(0.71)						
9 Control at work	-0.13*	0.40**	0.60**	0.42**	-0.11*	0.22**	0.55**	0.72**	(0.71)					
10 General well-being	-0.30**	0.45**	0.43**	0.44**	-0.25**	0.34**	0.41**	0.73**	0.64**	(0.73)				
11 Home-work interface	-0.25**	0.30**	0.50**	0.38**	-0.18**	0.24**	0.41**	0.77**	0.65**	0.62**	(0.73)			
12 Stress at work	0.38**	-0.02	-0.18**	-0.23**	0.40**	-0.20**	-0.19**	-0.23**	-0.11*	-0.26**	-0.25**	(0.83)		
13 Working conditions	-0.24**	0.24**	0.48**	0.37**	-0.19**	0.30**	0.47**	0.77**	0.63**	0.64**	0.72**	-0.28**	(0.72)	
14 Overall quality of working life	-0.30**	0.20**	0.39**	0.30**	-0.18**	0.28**	0.32**	0.66**	0.52**	0.59**	0.52**	-0.29**	0.64**	(0.74)

Note: Pearson's correlation coefficient was used. Alpha reliability coefficients are given in parenthesis.

* P value < 0.05, ** P value < 0.01.

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Supplementary:

Supplementary table1: Work-related stress (HSE) Categorized by factors (N=430)

Factors	NO	Questions	Response mean (SD)	% non-response
Demands	1	Different groups at work demand things from me that are hard to combine	1.9 (1.01)	1.4
	2	I have unachievable deadlines	1.42(1.12)	1.4
	3	I have to work very intensively	2.72(1.15)	0.2
	4	I have to neglect some tasks because I have too much to do	1.89(1.21)	0.9
	5	I am unable to take sufficient breaks	2.18(1.21)	1.6
	6	I am pressured to work long hours	2.14(1.26)	2.1
	7	I have to work very fast	2.85(1.05)	0.2
	8	I have unrealistic time pressures	1.9(1.15)	1.2
Mean of response (SD)			2.126 (0.468)	
Control	1	I can decide when to take a break	1.95(1.45)	2.1
	2	I have a say in my own work speed	3.11(0.85)	0.9
	3	I have a choice in deciding how I do my work	2.49(1.11)	0.9
	4	I have a choice in deciding what I do at work	2.56(1.16)	1.6
	5	I have some say over the way I work	2.93(0.91)	2.1
	6	My working time can be flexible	2.21(1.18)	1.4
Mean of response (SD)			2.539 (0.432)	
Manger support	1	I am given supportive feedback on the work I do	2.72(0.89)	0.2
	2	I can rely on my line manager to help me out with a work problem	2.74(1.03)	0.9
	3	I can talk to my line manager about something that has upset or annoyed me about work	2.69(1.13)	2.3
	4	I am supported through emotionally demanding work	2.31(1.09)	0.9
	5	My line manager encourages me at work	2.41(1.27)	1.4
Mean of response (SD)			2.576 (0.199)	
Peer Support	1	If work gets difficult, my colleagues will help me	2.92(0.85)	0.9
	2	I get help and support I need from colleagues	2.96(0.81)	2.1
	3	I receive the respect at work I deserve from my colleagues	3.07(0.78)	0.2
	4	My colleagues are willing to listen to my work-related problems	2.62(0.85)	1.6
Mean of response (SD)			2.892 (0.192)	
Relationship	1	I am subject to personal harassment in the form of unkind words or behavior	1.07(1.12)	0.7
	2	There is friction or anger between colleagues	2.11(1.12)	0.9
	3	I am subject to bullying at work	1.69(1.22)	2.3
	4	Relationships at work are strained	2.16(1.28)	0.7
Mean of response (SD)			1.757 (0.505)	
Role	1	I am clear what is expected of me at work	3.3(0.78)	1.6
	2	I know how to go about getting my job done	3.22(0.82)	2.3
	3	I am clear what my duties and responsibilities are	3.24(0.92)	0.9
	4	I am clear about the goals and objectives for my department	2.98(1.05)	0.2
	5	I understand how my work fits into the overall aim of the organization	2.87(0.92)	0.2
Mean of response (SD)			3.121(0.185)	
Change	1	I have sufficient opportunities to question managers about change at work	2.69(1.06)	1.9
	2	Staff are always consulted about change at work	2.69(1.03)	0.9
	3	When changes are made at work, I am clear how they will work out in practice	2.46(0.92)	2.3
Mean of non-response (SD)			2.613 (0.131)	
Overall mean (SD)			2.694 (0.439)	

Supplementary table 2: Work Related Quality of Life (WRQoL) Response (N=430)

NO	Questions	Response average	% non-response
1	I have a clear set of goals and aims to enable me to do my job	2.935	0.2
2	I feel able to voice opinions and influence changes in my area of work	2.746	0.9
3	I have the opportunity to use my abilities at work	2.537	1.6
4	I feel well at the moment	2.958	2.3
5	My employer provides adequate facilities and flexibility for me to fit work in around my family life	2.602	1.6
6	My current working hours / patterns suit my personal circumstances	2.525	0.2
7	I often feel under pressure at work	2.357	0.2
8	When I have done a good job it is acknowledged by my line manager	2.490	1.3
9	Recently, I have been feeling unhappy and depressed	1.980	1.6
10	I am satisfied with my life	2.918	2.3
11	I am encouraged to develop new skills	2.528	1.4
12	I am involved in decisions that affect me in my own area of work	2.585	2.8
13	My employer provides me with what I need to do my job effectively	2.639	1.2
14	My line manager actively promotes flexible working hours / patterns	2.687	1.4
15	In most ways my life is close to ideal	2.387	0.2
16	I work in a safe environment	2.154	1.4
17	Generally things work out well for me	2.346	2.1
18	I am satisfied with the career opportunities available for me here	2.355	1.4
19	I often feel excessive levels of stress at work	2.295	2.5
20	I am satisfied with the training I receive in order to perform my present job	2.544	0.7
21	Recently, I have been feeling reasonably happy all things considered	2.492	1.4
22	The working conditions are satisfactory	2.476	0.2
23	I am involved in decisions that affect members of the public in my own area of work	2.324	0.9
24	I am satisfied with the overall quality of my working life	2.577	1.6
Overall mean (SD)		2.506 (0.553)	

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract	1	Line 1 Page 1
Introduction		
Background/rationale	2	Line 51-99
Objectives	3	Line 21
Methods		
Study design	4	Line 103
Setting	5	Line 103-112
Participants	6	(a) Line 103-106, 114-116
Variables	7	Line 119-145
Data sources/ measurement	8*	Line 104-106
Bias	9	NA
Study size	10	Line 117-118
Quantitative variables	11	NA
Statistical methods	12	(a) Line 152-157 (b) NA (c) NA (d) NA (e) NA
Results		
Participants	13*	(a) Line 160 (b) NA (c) NA
Descriptive data	14*	(a) Line 160-167 (b) NA
Outcome data	15*	Line 206-207
Main results	16	(a) Line 170-207 (b) NA (c) NA
Other analyses	17	NA
Discussion		
Key results	18	Line 36
Limitations	19	Line 255-260
Interpretation	20	Line 262-276
Generalisability	21	NA
Other information		
Funding	22	Line 280-283, 290-291

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at

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<http://www.annals.org/>, and *Epidemiology* at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

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The relationship between Job Stress and Work-Related Quality of Life among Emergency Medical Technicians: A cross-sectional Study

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Abstract

Objective: This study was aimed to determine the relationship between job stress and WRQoL among emergency medical technicians (EMTs) in Lorestan Province, Western Iran.

Design: This was a cross-sectional study.

Methods: Totally 430 emergency medical technicians who had been engaged in their respective units for more than six months from all emergency facilities in Lorestan Province were selected using single stage cluster sampling method. Data were collected from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-Related Quality of Life (WRQoL). The odd ratio with 95% Confidence Interval (CI) was used to declare the statistical association ($p \leq 0.05$).

Results: All participants were exclusively males, with a mean age of 32 ± 6.87 years. The overall average score of job stress using the HSE scale was 2.69 ± 0.43 ; while the overall quality of working life score was 2.48 ± 1.01 . The type of working shift was found to have a significant impact on the HSE-average score, ($F(3,417) = 5.26, P = 0.01$); and on the WRQoL-average score, ($F(3,417) = 6.89, P < 0.01$).

Conclusion: Two-thirds of EMTs working in governmental hospitals had job stress and a low quality of work-related life. Additionally, work shift was statistically significant associated with EMTs' job stress and WRQoL.

Keywords: Job stress, Quality of work life, Emergency medical technician, Stress, HSE, WRQoL

STRENGTHS AND LIMITATIONS

1. First study to examine job stress and WRQoL among EMTs in a specific region.
2. Validated questionnaires used for data collection.
3. Sample size sufficient for examining job stress and WRQoL relationship.
4. Cross-sectional design limits temporal association determination.
5. Qualitative methods can provide reliable and rich information on EMTs' experiences with stress.

Introduction:

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3 54 Working in emergency medicine can be challenging, and healthcare workers are subjected to a variety of
4 55 pressures (1). Critical incident exposure, workplace aggression, unpredictability, workload, and time pressure are
5 56 among them. Additional environmental stressors in the prehospital context include traffic safety concerns and
6 57 unexpected accident scenes (2). Several studies have demonstrated the alarming prevalence of burnout syndrome,
7 58 posttraumatic stress disorder (PTSD), and other related health difficulties among first responders and emergency
8 59 medical service personnel (3)(4)(5)(6)(7). Furthermore, those stressors might cause hostility, aggression,
9 60 absenteeism, and turnover among emergency medical technicians (EMTs).

11 61 Job stress refers to the psychological stress caused by the imbalance between the needs of the target and the
12 62 individual's ability to adapt to specific job conditions (8). Job stress is one of the most important workplace health
13 63 risks among employees worldwide (9). One of the complications of modern life is the presence of stress in the
14 64 workplace (10). It is a common condition of the 21st century that affects people in a variety of conditions and is
15 65 responsible for absenteeism among health-care workers (11). 137.3 million working days were lost to due to
16 66 sickness and injury as it is estimated by the UK national statistics (12). This is only the material dimension of the
17 67 issue of stress; in addition, stress has a significant impact on employees, their families, and patients (9).

18 68 In 2021, job stress (new or long-standing) was the biggest work-related health issue in the UK, which
19 69 accounted for 50% of all job-related illnesses with an incidence rate of 2,480 per 100,000(13). The cost of sickness
20 70 and stress-related absenteeism is estimated at 4 billion pounds a year(12). Numerous studies have shown that the job
21 71 stress experienced by the pre-hospital emergency staff is significantly higher than that of other healthcare workers
22 72 because they are the first people to be present in a variety of emergencies, from fatal accidents to minor injuries and
23 73 illnesses (14)(15). Meanwhile, emergency medical technicians face stressful environments such as congested areas
24 74 and critically ill patients where it is difficult to work (16).

25 75 Neglecting the ongoing stress that is inflicted on employees, particularly healthcare workers, would
26 76 eventually result in a lack of motivation and morale in the staff (17). There is enormous capital lost annually due to
27 77 the lack of physical and mental health of employees, impaired performance, quitting, and changing jobs due to job
28 78 stress. Stress and its complications result in the loss of hundreds of working days each year. About 30% of the
29 79 workforce in developed countries suffers from job stress. The International Labor Organization also estimates that
30 80 the costs incurred by countries due to job stress are about 1 to 3.5% of GDP and are currently increasing (18)(19).

31 81 Work-related quality of life (WRQoL) is an organizational culture or management style in which
32 82 employees feel ownership, self-reliance, responsibility, and self-esteem(20). WRQoL is a multidimensional structure
33 83 that includes several concepts such as welfare measures, health services, incentive plans, job fit, job security, job
34 84 design, importance to the role and position of the individual in the organization, providing growth and development,
35 85 participation in decision making, reducing job conflicts and ambiguities and education(21). According to the
36 86 research, companies that provide a better work quality of life for their employees are more successful in retaining
37 87 their valuable employees and have higher profitability (22). However, job stress reduces the WRQoL and increases
38 88 the risk of work-related injuries. The WRQoL is critical for organizations to be able to attract and retain human
39 89 resources (23).

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3 90 Job stress in emergency medical technicians is typically higher than in other professionals, and since they
4 91 are often the first healthcare team exposed to different stressful conditions and sick patients, the nature of the job
5 92 and its contents are in a high level of stress. Research evidence related to job stress among EMTs is limited in the
6 93 study area.

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9 94 Lorestan Province in Western Iran is a region that faces numerous challenges, including remote and
10 95 deprived villages, dilapidated road structures, and the presence of dangerous occupations. Emergency Medical
11 96 Technicians (EMTs) in this region are particularly vulnerable to these challenges, which can have a significant
12 97 impact on their job stress and work-related quality of life (WRQoL). Despite the importance of this topic, there have
13 98 been limited studies that have investigated the relationship between job stress and WRQoL among EMTs in this
14 99 region. Therefore, the present study aims to fill this gap by examining the relationship between job stress and
15 100 WRQoL among EMTs in Lorestan Province. By doing so, we hope to provide new insights into the factors that
16 101 affect the well-being of EMTs in this region and contribute to the development of effective interventions to improve
17 102 their working conditions and overall quality of life.

103 **Material and methods:**

104 **Participants**

105 Single stage cluster approach was used to conduct a cross-sectional survey among 430 emergency medical
106 106 technicians (EMTs) who had been engaged in their respective units for more than six months from all emergency
107 107 facilities in Lorestan Province. In this study, single stage cluster sampling method method was used. In this way,
108 108 each city in Lorestan province was considered as a cluster and participants were selected by simple random
109 109 sampling based on the proportion of the desired sample in each city. The number of participants was 25, 37, 22, 38,
110 110 21, 19, 115, 61, 28, 54, and 10 from Alashtar, Aligoudarz, Azna, Broujerd, Doroud, Dooreh, Khorramabad,
111 111 Kouhdasht, Nourabad, Poldokhtar, and Sepiddasht, respectively.

112 This study was approved by the institutional review of Lorestan University of medical Sciences. Written informed
113 113 consent and verbal agreement was taken from all technicians before participating in the study. The confidentiality
114 114 principle was maintained so that there was no need to mention the names of the individuals in the questionnaires,
115 115 and it was assured that the information was just provided to the researcher and used in the study. Data were collected
116 116 from April to July 2019 using two standard questionnaires: Job Stress (HSE) and Work-related quality of life
117 117 (WRQoL). Data were collected during all shifts (morning, evening and night), when the (EMTs) were at work at the
118 118 time being to answer the questions. Eligible emergency medical technicians (EMTs) were those who had been
119 119 working in their respective units for at least six months and were willing to participate in the study. EMTs who had
120 120 been working for less than six months or who did not meet the inclusion criteria were excluded. Using Cochran's

121 sample size formula ($n = \frac{Nz^2pq}{Nd^2 + z^2pq} = 430$) where [$z = 1.96$, $N = 450$, $p = q = 0.5$, $d = 0.01$], we selected a total of 430

122 EMTs who met the inclusion criteria.

123 During our study, there were no female employees or dispatch codes, and the administrative and dispatch and
124 124 MCHC (Medical Care Monitoring Center) personnel were predominantly female, rendering them ineligible for
125 125 inclusion in our study. While the Sanjeh Organization has been recruiting female emergency medicine students in
126 126 large cities like Tehran and has female personnel in dispatch codes in these areas, there are presently no female

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3 127 personnel in dispatch codes in Lorestan province due to cultural and operational limitations, precluding us from
4 128 including female patients in our study.

6 129 **Job Stress Questionnaire:** The management standard was assessed using a 35-item indicator tool created by the
7 130 Health and Safety Executive (HSE) to measure work-related stress among employees. The tool consists of seven
8 131 items. These items are: (1) Demands (including such issues as workload, work patterns, and the working
9 132 environment). (2) Control (how much say the person has in the way they do their work). (3 & 4) Manager and peers'
11 133 support (including the encouragement, sponsorship, and resources provided by the organization, line management,
12 134 and colleagues). (5) Relationships at work (including promoting positive working practices to avoid conflict and
13 135 dealing with unacceptable behaviour). (6) Role (whether people understand their role within the organization and
14 136 whether the organization ensures that the person does not have conflicting roles). (7) Change (how organizational
15 137 change (large or small) is managed and communicated in the organization). The validity of the HSE-scale was 83%
16 138 ($\alpha=0.83$). This questionnaire contains 35 questions with 7 subscales. The subscales are: 1- Demand: questions
17 139 number (18, 6, 9, 12, 16, 3, 20, 22), 2- Control (30, 10, 15, 19, 25, 2), 3- Officials support (7, 27, 24, 31), 4-
18 140 Colleagues support (8, 23, 29, 33, 35), 5- Relationship (5, 14, 21, 34), 6- Role (1, 7, 11, 13, 17) and 7- Changes (32,
19 141 28, 26). The Likert scale was defined as Strongly disagree: 0, Disagree: 1, No opinion: 2, Agree: 3, Strongly agree:
20 142 4. All 7 stress-items were scored on a scale of 1 to 4 ranged between 7 to 28. Those above and those below the
21 143 median value 16, were signified as more and less job stress respectively (24). The validity and reliability of the
22 144 Persian version of the questionnaire was %78 and %65 using the Cronbach's Alpha and split-half method,
23 145 respectively and HSE is a valid and reliable questionnaire for studying job stress (25).

24 146 **Work-Related Quality of Life Questionnaire (WRQoL):** This is a multidimensional concept that includes job and
25 147 professional satisfaction factors, working conditions, general health status, home-work relationship, work stress, and
26 148 work control. The questionnaire comprises a five-Likert scale from strongly disagree to strongly agree 1 to 5 (25).
27 149 The validity of the questionnaire was confirmed by experts, and its reliability was determined by the test-retest
28 150 method. The questions had a 95% correlation value, while the alpha Cronbach coefficient for determining the
29 151 internal relevance of the questions was 78%. The scale's reliability was 79% ($\alpha=0.79$). Subscale scores are as: Job
30 152 and Career Satisfaction (JCS) with a sub-scale reliability of 0-86 (item 5), General Well-Being (GWB) 0-82 (item
31 153 18), Home-Work Interface (HWI) 0-82 (item 17), Stress at Work (SAW) 0-81 (item 7), Control at Work (CAW) 0-
32 154 81 (item 12) and Working Conditions (WCS) 0-75 (item 9)(26). The validity and reliability of the Persian version of
33 155 the questionnaire was %95 and %78 using the Cronbach's Alpha and it is a valid and reliable questionnaire (27)

34 156 **Patient and Public Involvement**

35 157 This was a cross-sectional study that meaningfully engaged all emergency medical technicians working in different
36 158 cities of Lorestan province in identifying priority research questions, research training, all facets of recruitment and
37 159 data collection, and in interpreting the results and co-authoring this manuscript. Additionally, we trained them in the
38 160 informal settlements of the study conducted in their workplaces, who contributed likewise to informing the study
39 161 focus, and data collection efforts.

40 162 **Statistical analysis**

Descriptive statistics were used to determine the characteristics of participants and the overall scores of job-stress and work-related quality of life. Pearson correlation was used to assess the correlation between the domains of the two questionnaires (HSE and WRQoL). The odd ratio at (95% CI, P-value \leq 0.05) was used to declare the statistical association. All analyses were done using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.

Results:

All 430 emergency medical technicians (EMTs) who participated in this study were exclusively male (100%), with a mean age of 32 \pm 6.87 years. Based on their educational level, 19.2% held a diploma while the rest (80.8%) had an academic education degree, additionally 58.9% of them were married. Totally 115 (30.5%) of them were students while they were working simultaneously and 395 (91.9%) of them were officially hired by the organization. All other socio-demographic characteristics of the participant are provided in Table 1.

Table 1. Demographic characteristics of the Emergency Medical Technicians (ETMs) (N=430)

Variables [N*]	Categories	n (%)	
Age (years) [427]	20-30	222 (51.5)	
	30-40	146 (33.9)	
	40-50	56 (13.0)	
	50-60	3 (0.7)	
Education Level [406]	Diploma	78 (19.2)	
	Associated Degree	235 (57.9)	
	Bachelor	90 (22.2)	
	Master	3 (0.7)	
Marital Status [406]	Single	167 (41.1)	
	Married	239 (58.9)	
Employment History (years) [410]	0-5	162(37.6)	
	6-10	190(44.2)	
	11-15	13(3.1)	
	>15	45(10.5)	
Native Status [412]	Native to the city	225 (52.3)	
	Native to the province	127 (29.5)	
	Non-indigenous	60 (14.0)	
Working Shift Status [421]	Constant morning shift	6 (1.4)	
	Circulating shift	51 (11.9)	
	24-hour shift	228(53.0)	
	48-hour shift	136 (31.6)	
	Major [390]	Public Health	3 (0.7)
		Medical emergencies	269 (62.6)
		Accounting	6 (1.4)
		Anesthesia	17 (4.0)
		Mechanics	3 (0.7)
Crisis Management		5 (1.2)	
Emergency and disaster management		8 (1.9)	
Humanities		52 (12.1)	
Science		8 (1.9)	
Number of Shifts (per month)	Operating room technology	6 (1.4)	
	Nursing	13 (3.0)	
	<10	36 (9.0)	

	[401]	10-12	293 (73.0)
		≥13	72 (18.0)
Locale of Service		Urban Bases	150 (37.1)
	[404]	Road Stations	179 (44.3)
Type of Bases Location		Urban and Road Bases	75 (18.6)
	[367]	Canopies	55 (15.0)
		Building	312 (85.0)

*Number of responses for each variables.

Emergency Medical Technicians (EMTs) with a master's degree had the highest HSE (3.5±0.01) and WRQoL (4.0±0.01) average scores. Regarding marital status, native status, and length of service, there were no significant differences of them, neither with HSE nor with WRQoL average scores. However, the type of working shift had a significant impact on the HSE-average score, $F(3,417) = 5.26, P = 0.01$; and on the WRQoL-average score, $F(3,417) = 6.89, P < 0.01$, as the highest average scores were reported among those who worked on the 48-hour shift (2.79±0.46) of the HSE, and the fixed morning shift (2.87±0.01) of the WRQoL.

The overall average score of job stress using the HSE scale was (2.69±0.43), with peer support as the highest stressor domain among EMTs (2.89±0.63). While the overall quality of working life score was (2.48±1.01), with control at work as the highest factor that might impact the quality of working life (2.47±0.90). (See Table 2 for more details) Generally, 73.5% of respondents reported having work-related stress, with 46% having a low work-related quality of life (lower than the overall mean). The response rate for each specific question of the HES and WRQoL standards was provided in supplementary tables 1 and 2.

Table 2: Stressor domain scores and work related quality of life scores by factors among the EMTs (N=430)

	Domains and Factors	n	Score Mean (SD)	95% CI
Stressor domains	Demand	405	2.11 (0.56)	1.93-2.08
	Control	402	2.54 (0.60)	2.44-2.59
	Manager's support	410	2.58 (0.82)	2.48-2.67
	Peer's support	413	2.89 (0.63)	2.82-2.98
	Relationship	414	1.75 (0.81)	1.58-1.78
	Role	415	3.12(0.64)	3.00-3.16
	Change	411	2.61 (0.80)	2.62-2.71
	Overall HSE (N)	430	2.69 (0.43)	2.65-2.73
WRQoL- factors	Job career satisfaction	410	2.39 (0.77)	2.30-2.48
	Control at work	413	2.47 (0.90)	2.37 -2.58
	General well-being	393	2.45 (0.54)	2.38-2.51
	Home-work interface	422	2.44 (1.01)	2.32-2.55
	Stress at work	420	1.96(1.00)	1.84-2.08
	Working conditions	423	2.12 (0.98)	2.00-2.23
	Overall quality of working life	424	2.48 (1.01)	2.35-2.60

The difference in scores between demographic variables are shown in Table 3.

Table 3: Difference in HSE and WRQoL scores between demographic variables

Variable	Category	n	Sum. HSE Mean±SD	Sum. WRQoL Mean±SD
Education Level	Diploma	78	60.70±10.90	56.78±15.42
	Associated Degree	235	61.84±7.93	57.88±14.62
	Bachelor	90	60.76±9.36	57.28±15.50
	Master	3	80.00±0.00	91.66±0.00
Marital Status	Single	167	61.28±9.83	57.62±13.38
	Married	239	62.27±8.85	58.50±15.55
Native Status	Native to the city	225	61.95±9.41	57.80±14.50
	Native to the province	127	61.31±7.59	56.31±14.30
	Non-indigenous	60	62.78±11.21	61.51±18.68
Working Shift Status	Constant morning shift	6	60.71±5.47	74.47±2.85
	Circulating shift	51	63.54±5.72	55.65±4.93
	24-hour shift	228	60.91±10.13	56.29±14.58
	48-hour shift	136	62.01±9.00	60.08±18.20
Locale of Service	Urban Bases	150	65.17±7.49	62.16±13.26
	Road Stations	179	61.24±9.83	56.79±15.92
	Urban and Road Bases	75	57.77±8.25	52.77±14.99
Type of Bases Location	Canopies	55	63.24±11.09	56.57±18.99
	Building	312	62.25±8.89	58.52±13.96

Among the participants, 1.4% had between 0-5 shifts, 52.8% between 6-10 shifts and 39.1% between 11-15 shifts per month. Based on the results, most of the EMTs 337(78.37%) had a moderate level of job stress, 48(11.16%) low and 45(10.46%) had severe job stress. Based on the Tukey's result, there was no significant relationship between job stress and none of the sub-groups related to employment type ($p > 0.05$). Table 4

Table 4. Correlation between job stress and demographic factors on quality of work life among EMTs based on multiple regression model. $n=234$

Variable	Mean±SD	β	t	P-Value
Educational level	2.09±0.66	-0.53	-0.39	0.69
Marital status	1.57±0.49	0.69	0.35	0.72
Job status	8.19±5.97	0.71	3.16	0.002
Shifts per month	11.03±2.36	0.57	1.58	0.11
Job stress score (HSE)	62.14±8.64	0.76	7.98	<0.001
Quality of work life score (QWL)	58.80±13.92			

To assess the linear relationship between stresser domains and WRQoL factors, Pearson correlation was used (Table 4). There was a strong positive relationship between two domains of HSE, which are peer support and the change ($r = 0.72$, $N = 394$, $p < 0.001$). In other words, increasing the peers' support in work environment the higher the change might apply. Regarding the WRQoL factors, however, job career satisfaction was found to have a significant positive impact on control at work ($r = 0.72$, $N = 395$, $P < 0.001$), general well-being ($r = 0.72$, $N = 379$,

214 P<0.001), home-work interference ($r = 0.77$, $N = 407$, $P < 0.001$), and working conditions ($r = 0.77$, $N = 407$,
215 $P < 0.001$). (See Supplementary Table. 1)

226 Discussion

227 Emergency medical personnel work in an inherently stressful environment, as they are often the first
228 healthcare team to respond to critical and traumatic incidents. This constant exposure to high-pressure situations and
229 sick patients can result in significant levels of job stress. Despite the challenges faced by emergency medical
230 technicians (EMTs), research on job stress in this profession is limited in the study area. Therefore, to bridge this
231 gap in the literature, we conducted a study aimed at exploring the relationship between job stress and the quality of
232 work-life among EMT personnel in Lorestan province. By understanding the impact of job stress on the quality of
233 work-life, we can identify strategies and interventions that promote better mental health and well-being for EMTs.

234 The findings of the present study indicate that a substantial proportion of EMTs, comprising 337 (78.37%),
235 experienced moderate levels of job stress (M , 2.69; IC , 2.65-2.73). This result aligns with a previous study
236 conducted by Ashgh et al., which reported that male emergency employees in Golestan province experienced
237 moderate work stress (28). Similarly, a study on emergency physicians demonstrated that repetitive exposure to
238 critical incidents, such as the death of a child or adolescent, can result in a subclinical level of anxiety(7). Regarding
239 WRQoL, the overall quality of work life among EMTs was found to be slightly lower than moderate (M , 2.48; IC ,
240 2.35-2.60). This result is consistent with the findings of a cross-sectional analysis of 908 health employees from 15
241 hospitals, which revealed that a majority of participants reported dissatisfaction with occupational health and safety
242 and uninteresting work (21). Moreover, high levels of WRQoL were found to have a protective effect, as high levels
243 of stress and low levels of WRQoL not only impact EMTs but also negatively affect patient care (7).

244 In the present study, a significant association was found between work shift and work-related stress. Rotating
245 shift EMTs were more stressed than fixed-shift EMTs. This finding was consistent with research reported in
246 Ethiopia (29) and Jordan(30), which indicated that employees working on rotating shifts were more stressed than
247 their counterparts who worked on fixed shifts; however, those studies were done on nurses. Rotating shift work can
248 disrupt the natural circadian rhythm of the body, leading to sleep deprivation and exhaustion. This can increase the
249 likelihood of errors and decrease work performance, causing more stress for the EMTs. Additionally, rotating shift
250 work can make it difficult to maintain a healthy work-life balance, which can also contribute to higher levels of
251 stress (31). It may be helpful to include suggestions for potential solutions, such as offering more flexible scheduling
252 options or providing resources for stress management and coping strategies. Therefore, working on a fixed shift
253 might be beneficial in improving the WRQoL, as the current study reported.

254 Change in the work place from emergency wards to other wards suited to the employee, by their choice,
255 was found to be related to the peers' and managers' support. A lack of social support among emergency care
256 personnel is a well-known predictor of occupational stress (7). A study found that facilitating social support from
257 coworkers can help in the rehabilitation process after being confronted with traumatic experiences and occupational
258 dangers among those who work in EM(7). Yang et.al (2002) also reported similar results on the difference between
259 job stress of nurses in the emergency department compared to other departments (32). Employees working in
260 different departments of the hospital experience different degrees of job stress due to their types of activities (33).
261 However, few studies reported a low level of job stress for nurses in comparison to other employees (34); perhaps it
262 is due to, in addition to the differences in the populations studied, the adjustment of nurses to severe and chronic
263 conditions with stressful working conditions compared to other employees. In the present study, it was found that
264 there was no significant difference between the mean score of job stress and marital status, education level, native
265 status, type of employment and type of base location, while the relationship between the mean of job stress score
266 and working shift status and employment history were significant. According to a study conducted by Golshiri et al.
267 (2013), it was found that there is a significant reverse relationship between the employment history and the level of
268 job stress; in other words, the higher job experience, the lower job stress is. Accordingly, it can be concluded that
269 the most compatibility of nurses with the unique status of the medical emergency department and the increase in
270 work skills and work experience as a result of increasing the job record is one that can explain this relationship (35).
271 In the study of Khodaveysi et.al (2005), they approved that the increase in skills and work experience due to the
272 increase in job records was mentioned as the most important factors in job stress (36).

273 The present study is not without limitations. Firstly, the cross-sectional study design utilized in this
274 investigation precludes us from determining a temporal association between stress and WRQoL. Augmenting the
275 quantitative approach with qualitative methods, which offer in-depth and trustworthy information on EMTs' stress
276 experiences and related concepts, may have enhanced the study's findings. Semi-structured interviews or focus
277 groups could be used to obtain detailed information on specific stressors and coping strategies experienced by
278 EMTs. Additionally, the use of observational methods could provide insights into the nonverbal behaviors and
279 interactions that occur between EMTs and their patients, which may impact their stress levels and WRQoL. By
280 incorporating such qualitative methods, the study could have achieved a more nuanced understanding of the
281 complex and multidimensional nature of stress and its impact on EMTs. Lastly, an important limitation is the gender
282 bias in the Emergency Medical Services centers in Lorestan province. During our study, there were no female
283 employees or dispatch codes, and the administrative and dispatch and MCHC (Medical Care Monitoring Center)
284 personnel were predominantly female, rendering them ineligible for inclusion in our study. While the Sanjeh
285 Organization has been recruiting female emergency medicine students in large cities like Tehran and has female
286 personnel in dispatch codes in these areas, there are presently no female personnel in dispatch codes in Lorestan
287 province due to cultural and operational limitations, precluding us from including female patients in our study.
288 Furthermore, the study did not provide detailed information about the conditions of the research environment, such
289 as the types of emergencies that the workers were responding to or the work schedules and procedures. These
290 conditions may have affected the level of job stress and the quality of work life of the EMTs. Therefore, future

291 studies should take into account the specific characteristics of the work environment to better understand the factors
292 that contribute to job stress and work quality of life among EMTs. In addition, future research could explore the
293 perspectives of EMTs themselves, as well as those of their supervisors and colleagues, to gain a more
294 comprehensive understanding of the work-related stressors and their impact on the quality of work life in this
295 profession. By addressing these limitations, future studies can help to inform the development of effective
296 interventions and policies aimed at reducing job stress and improving the quality of work life among EMT
297 personnel.

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301 **Conclusion**

302 This study determined the level of job stress and its relation to the WRQoL among EMT personnel working in
303 government hospitals in Lorestan, Iran. Based on the evidence provided from the current analysis, two-third of
304 EMTs working in governmental hospitals had work-related stress. Work shift was statistically significantly
305 associated with EMTs' work-related stress and WRQoL. In this study, peer support was found to be the most
306 stressful domain among EMTs; while the control domain at work was the highest factor that might impact the
307 quality of working life. It is likely that EMT personnel may have a tremendous role in the health care delivery
308 system world-wide, especially in emergency situations. Critical incident exposure, workplace aggression,
309 unpredictability, workload, and time pressure are among the challenges that EMTs may face during their work. In
310 the mean time, EMTs' experienced work-related stress and low WRQoL may affect not only the health care services
311 but also might increase medical errors and resource expenditure. It would seem that to improve the quality of work
312 among EMTs, the urgent need for organizational interventions aim to diminish work-related stress could be used as
313 a comprehensive assessment. Moreover, rescheduling should be explored as a strategy for reducing stress caused by
314 shift work. To demonstrate a true cause-and-effect link, more research employing a mixed-method and analytical
315 design in government and commercial health institutions is recommended.

316

317 **Declarations:**

318 **Ethical Approval and Consent to participate:**

319 Human Participants with the ethical approval ID: IR.LUMS.REC.1397-1-99-1254. This study was approved and
320 funded by the institutional review of Lorestan University of medical Sciences. Written informed consent and verbal
321 agreement was taken from all participants. All experimental protocols were approved by Lorestan University of
322 Medical Sciences and the ethical approval ID is: IR.LUMS.REC.1397-1-99-1254.

323 **Consent for publication:**

324 Not applicable.

325 **Availability of supporting data:**

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

327 **Competing interests**

328 Not applicable.

329 **Funding:**

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331 **Author's contributions:**

332 H.Sh, Gh.F, and A.P, conceptualized and designed the main idea of this study. H.Sh, and R.M. designed the data
333 extraction file, extracted data, and interpreted data. M.M, and B.M. analysed the data. All authors wrote the initial
334 draft of the manuscript and approved the final manuscript as submitted and agreed to be accountable for all aspects
335 of the work.

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338

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Supplementary:

Supplementary table1: Work-related stress (HSE) Categorized by factors (N=430)

Factors	NO	Questions	Response mean (SD)	% non-response
Demands	1	Different groups at work demand things from me that are hard to combine	1.9 (1.01)	1.4
	2	I have unachievable deadlines	1.42(1.12)	1.4
	3	I have to work very intensively	2.72(1.15)	0.2
	4	I have to neglect some tasks because I have too much to do	1.89(1.21)	0.9
	5	I am unable to take sufficient breaks	2.18(1.21)	1.6
	6	I am pressured to work long hours	2.14(1.26)	2.1
	7	I have to work very fast	2.85(1.05)	0.2
	8	I have unrealistic time pressures	1.9(1.15)	1.2
Mean of response (SD)			2.126 (0.468)	
Control	1	I can decide when to take a break	1.95(1.45)	2.1
	2	I have a say in my own work speed	3.11(0.85)	0.9
	3	I have a choice in deciding how I do my work	2.49(1.11)	0.9
	4	I have a choice in deciding what I do at work	2.56(1.16)	1.6
	5	I have some say over the way I work	2.93(0.91)	2.1
	6	My working time can be flexible	2.21(1.18)	1.4
Mean of response (SD)			2.539 (0.432)	
Manger support	1	I am given supportive feedback on the work I do	2.72(0.89)	0.2
	2	I can rely on my line manager to help me out with a work problem	2.74(1.03)	0.9
	3	I can talk to my line manager about something that has upset or annoyed me about work	2.69(1.13)	2.3
	4	I am supported through emotionally demanding work	2.31(1.09)	0.9
	5	My line manager encourages me at work	2.41(1.27)	1.4
Mean of response (SD)			2.576 (0.199)	
Peer Support	1	If work gets difficult, my colleagues will help me	2.92(0.85)	0.9
	2	I get help and support I need from colleagues	2.96(0.81)	2.1
	3	I receive the respect at work I deserve from my colleagues	3.07(0.78)	0.2
	4	My colleagues are willing to listen to my work-related problems	2.62(0.85)	1.6
Mean of response (SD)			2.892 (0.192)	
Relationship	1	I am subject to personal harassment in the form of unkind words or behavior	1.07(1.12)	0.7
	2	There is friction or anger between colleagues	2.11(1.12)	0.9
	3	I am subject to bullying at work	1.69(1.22)	2.3
	4	Relationships at work are strained	2.16(1.28)	0.7
Mean of response (SD)			1.757 (0.505)	
Role	1	I am clear what is expected of me at work	3.3(0.78)	1.6
	2	I know how to go about getting my job done	3.22(0.82)	2.3
	3	I am clear what my duties and responsibilities are	3.24(0.92)	0.9
	4	I am clear about the goals and objectives for my department	2.98(1.05)	0.2
	5	I understand how my work fits into the overall aim of the organization	2.87(0.92)	0.2
Mean of response (SD)			3.121(0.185)	
Change	1	I have sufficient opportunities to question managers about change at work	2.69(1.06)	1.9
	2	Staff are always consulted about change at work	2.69(1.03)	0.9
	3	When changes are made at work, I am clear how they will work out in practice	2.46(0.92)	2.3
Mean of non-response (SD)			2.613 (0.131)	
Overall mean (SD)			2.694 (0.439)	

Supplementary table 2: Work Related Quality of Life (WRQoL) Response (N=430)

NO	Questions	Response average	% non-response
1	I have a clear set of goals and aims to enable me to do my job	2.935	0.2
2	I feel able to voice opinions and influence changes in my area of work	2.746	0.9
3	I have the opportunity to use my abilities at work	2.537	1.6
4	I feel well at the moment	2.958	2.3
5	My employer provides adequate facilities and flexibility for me to fit work in around my family life	2.602	1.6
6	My current working hours / patterns suit my personal circumstances	2.525	0.2
7	I often feel under pressure at work	2.357	0.2
8	When I have done a good job it is acknowledged by my line manager	2.490	1.3
9	Recently, I have been feeling unhappy and depressed	1.980	1.6
10	I am satisfied with my life	2.918	2.3
11	I am encouraged to develop new skills	2.528	1.4
12	I am involved in decisions that affect me in my own area of work	2.585	2.8
13	My employer provides me with what I need to do my job effectively	2.639	1.2
14	My line manager actively promotes flexible working hours / patterns	2.687	1.4
15	In most ways my life is close to ideal	2.387	0.2
16	I work in a safe environment	2.154	1.4
17	Generally things work out well for me	2.346	2.1
18	I am satisfied with the career opportunities available for me here	2.355	1.4
19	I often feel excessive levels of stress at work	2.295	2.5
20	I am satisfied with the training I receive in order to perform my present job	2.544	0.7
21	Recently, I have been feeling reasonably happy all things considered	2.492	1.4
22	The working conditions are satisfactory	2.476	0.2
23	I am involved in decisions that affect members of the public in my own area of work	2.324	0.9
24	I am satisfied with the overall quality of my working life	2.577	1.6
Overall mean (SD)		2.506 (0.553)	

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract	1	Line 1 Page 1
Introduction		
Background/rationale	2	Line 51-99
Objectives	3	Line 21
Methods		
Study design	4	Line 103
Setting	5	Line 103-112
Participants	6	(a) Line 103-106, 114-116
Variables	7	Line 119-145
Data sources/ measurement	8*	Line 104-106
Bias	9	NA
Study size	10	Line 117-118
Quantitative variables	11	NA
Statistical methods	12	(a) Line 152-157 (b) NA (c) NA (d) NA (e) NA
Results		
Participants	13*	(a) Line 160 (b) NA (c) NA
Descriptive data	14*	(a) Line 160-167 (b) NA
Outcome data	15*	Line 206-207
Main results	16	(a) Line 170-207 (b) NA (c) NA
Other analyses	17	NA
Discussion		
Key results	18	Line 36
Limitations	19	Line 255-260
Interpretation	20	Line 262-276
Generalisability	21	NA
Other information		
Funding	22	Line 280-283, 290-291

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at

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