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The Relationship Between Secondary Traumatic Stress, Anxiety, Depression, and Coping Styles in Healthcare Workers After the Kahramanmaraş 2023 Earthquakes

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ABSTRACT

Objective: The aim was to determine the relationship between secondary traumatic stress, anxiety, depression, and coping styles in healthcare workers following the devastating 2023 Kahramanmaraş earthquakes.

Method: A total of 243 healthcare workers aged 18-65 years working at Ankara Bilkent City Children's Hospital between April 2023 and June 2023 were included in our study. Participants were assessed with the Brief Symptom Inventory, Ways of Coping with Stress Scale and Secondary Traumatic Stress Scale.

Results: Anxiety, depression and secondary traumatic stress were positively correlated with ineffective coping styles and negatively correlated with effective coping styles. Younger age and female gender were associated with higher levels of anxiety and depression, while secondary traumatic stress was more prevalent among those involved in treating earthquake-affected patients. Regression analysis revealed that ineffective coping styles were associated with anxiety, depression and secondary traumatic stress. Additionally, time spent treating earthquake-affected patients was linked to secondary traumatic stress, and the loss of a relative was associated with anxiety.

Conclusion: Healthcare workers relying more on ineffective coping styles may face a greater risk of anxiety, depression and secondary traumatic stress.

Keywords: Anxiety, earthquake, depression, healthcare workers, secondary traumatic stress

INTRODUCTION

On 6 February 2023, two major earthquakes of magnitude 7.7 and 7.6 occurred in the Pazarcık and Elbistan districts of Kahramanmaraş at 04:17 and 13:24 local time, respectively. These earthquakes caused more than 48,000 deaths, destroyed more than half a million buildings, and caused widespread destruction in 11 provinces of Türkiye (Kahramanmaraş and Hatay Earthquakes Report 2023). After this great disaster in our country, many healthcare workers were directed to the earthquake region. However, the earthquakes also impacted the hospitals in the region, leading to patients receiving treatment in various hospitals throughout the country. It is known that healthcare workers have to adapt quickly to new working conditions and heavy workloads in such disaster situations (Küçükparlak 2021). Moreover, the family members of healthcare workers have also been impacted by earthquakes that have affected a vast geographical area. Together with the emotional burden of their own losses, it is thought that participating in the treatment of traumatized patients may have a negative impact on the mental health of healthcare workers (Kristensen et al. 2012).

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According to the DSM-5, trauma is defined as an encounter with death or serious injury through a direct or occupational context, in a real or intimidating way (APA 2013). Frequent interactions with trauma victims expose healthcare workers to the negative effects of traumatic life events and may indirectly affect them (Bride et al. 2004). Healthcare workers involved in the treatment of trauma victims may experience intrusive memories and disturbing dreams related to the traumatic events experienced by their patients, which can lead to negative changes in cognition, mood, arousal, and reactivity (Živanović and Vukćević Marković 2020a). In the literature, various terms such as burnout, vicarious traumatization, compassion fatigue, and secondary traumatic stress have been proposed to describe the stress reactions experienced by professionals dealing with trauma victims (Gökçe and Yılmaz 2017).

The distinction between secondary traumatic stress (STS) and posttraumatic stress disorder (PTSD) is not clear in the literature. According to DSM 5, recurrent or excessive exposure to traumatic events other than electronic media platforms is considered under the title of PTSD (APA 2013). On the other hand, STS results from empathic interaction with the trauma of others and is a concept that has been studied mostly in healthcare workers who are in regular contact with trauma victims (Figley 2013, Ogińska-Bulik et al. 2021). STS is defined as the behaviors and emotions that arise as a result of indirect exposure to trauma or the desire to help traumatized individuals while in a professional relationship with people experiencing traumatic events (Bride et al. 2004, Figley 2013). Studies conducted on healthcare workers in the literature have associated some individual and trauma-related factors with STS. These factors include young age, female gender, level of exposure to a traumatic event, and previous trauma experience (Marmar et al. 1996, Wagner et al. 1998, Ursano et al. 1999, Fullerton et al. 2004, Yılmaz 2007, Carmassi et al. 2022). In a study conducted on healthcare workers during the COVID-19 outbreak in Türkiye, the predictor variables found for STS included work type, anxiety and fear symptoms, presence of COVID-19 in the family, and loss due to COVID-19 (Yörük et al. 2022).

In the literature, there are studies suggesting that working with trauma victims may increase the risk of having psychiatric symptoms in healthcare workers (Shaukat et al. 2020, Saragih et al. 2021). A study examining the impact of the 2021 Zagreb earthquakes and COVID-19 pandemic on the mental health of medical students revealed that 75.3% of students had increased anxiety and 65.2% had increased depression symptoms (Romic et al. 2021). Živanovic and Vukčević Marković (2020b) suggested that secondary traumatization has an impact on anxiety and depressive symptoms, which in turn affect quality of life. In recent years, especially after the COVID-19 pandemic, studies on anxiety, depression, and STS that healthcare workers may experience during health crises have become more common (Trumello et al. 2020, Ruiz-Fernández et al. 2020, Lluch et al. 2022).

Coping strategies, in which individuals evaluate an event they have experienced and whether they can cope with it, are one of the factors that determine how the mental health of healthcare workers will be affected when they encounter a trauma such as an earthquake (Lazarus and Folkman 1984,Pang et al. 2021). According to Folkman and Lazarus' (1988) theory, coping is defined as an individual's use of mental and behavioral resources in the presence of a stressful event and serves as a mediator for one's emotional state. Coping styles can be conceptualized as effective or ineffective depending on whether they focus on the stressor itself or the person's response to it (problem-focused or emotion-focused) (Littleton et al. 2007). Problem-focused coping strategies aim to identify the source of stress and to think about and implement possible solutions to reduce its negative effects. On the other hand, emotion-focused coping involves both an emotional response to stressors and receiving emotional support from others (Lazarus 1991). In the literature, there are several studies investigating the relationship between coping styles used by professionals working with traumatized individuals and anxiety, depression, and STS. A study on rescue workers suggested that coping strategies could predict posttraumatic symptoms after an earthquake (Chang et al. 2003). In addition, a study conducted in 2013 found a relationship between ineffective coping and STS, anxiety, and depression among healthcare workers in a children's hospital (McGarry et al. 2013).

The wounds of Kahramanmaraş 2023 earthquakes, which struck immediately after the COVID-19 pandemic and impacted the entire country, are still in the process of healing. Due to the size of the affected area and the delivery of healthcare services throughout the country after the earthquakes, it is believed that the Kahramanmaraş 2023 earthquakes may have caused negative effects such as STS, anxiety, and depression in healthcare workers. In our study, we aimed to determine the anxiety, depression, STS levels, and coping styles of healthcare workers after the Kahramanmaraş 2023 earthquakes and to reveal the relationship between these factors. The hypothesis of our study is that there will be a negative relationship between the use of effective coping strategies and anxiety, depression, and STS in healthcare workers and a positive relationship between the use of ineffective coping strategies and these factors. In addition, it is aimed to determine individual factors such as age, gender, and coping styles that may affect anxiety, depression, and STS in healthcare workers, as well as trauma-related factors such as participation in the treatment of earthquake-affected patients and the time spent working with them, working in

a service in the earthquake region, having relatives affected by the earthquake, previous trauma history, and following the news about the Kahramanmaraş 2023 earthquakes. To the best of our knowledge, our study is the first in the literature investigating the relationship between anxiety, depression, STS, and coping strategies in healthcare workers after the Kahramanmaraş 2023 earthquakes and is believed to contribute to the literature.

METHOD

Participants

In our study, healthcare workers between the ages of 18 and 65 working in the pediatric patient group at Ankara Bilkent City Children's Hospital, a central hospital far from the earthquake zone where approximately 1287 healthcare professionals are employed and patients affected by the earthquake are directed, were reached between April and June 2023, and 258 healthcare workers volunteered to participate in the research. The same specialist performed the assessments. The study included healthcare workers who did not have a known physical or mental illness that could prevent the assessment. Insufficient data led to the exclusion of fifteen healthcare professionals from the study. The study included a total of 243 health professionals, including 136 (56%) nurses, 94 (38.7%) doctors, 5 (2.1%) psychologists, 5 (2.1%) social workers, and 3 (1.2%) child development specialists. We included healthcare workers who conducted medical or psychological treatment, provided psychosocial support, or participated in care services for patients affected by the earthquakes in our study. We also included healthcare workers from other departments of our hospital who were not directly involved in treating patients affected by the earthquakes, but were believed to be affected in different ways, such as following the news. We obtained written informed consent from all healthcare workers participating in the study. Research approval dated 12.04.2023 and numbered E2-23-3850 was obtained from the Ankara Bilkent City Hospital Ethics Committee, and all study procedures were performed in accordance with the Declaration of Helsinki.

Data Collection Tools

Sociodemographic Data Form: The researchers prepared this form to gather sociodemographic information about the healthcare workers participating in the study, such as age, gender, marital status, occupation, and trauma exposure history.

Brief Symptom Inventory (BSI): Derogatis (1992) prepared the BSI, a 53-item scale, to identify psychiatric problems in various medical conditions. The BSI is also an adequate scale for measuring stress-related psychological symptoms. The BSI, a 5-point Likert-type self-report scale, scores items from 0 to 4. Turkish adaptation, validity, and reliability studies of the BSI were conducted by Şahin and Durak (1994), and it was shown that the scale was valid and reliable. Factor analysis showed that the BSI has a five-factor structure including anxiety, depression, negative self, somatization, and hostility (Şahin et al. 2002). We used the anxiety and depression subscales of BSI in our study.

Secondary Traumatic Stress Scale (STSS): The STSS developed by Bride et al. (2004) consists of 17 items and three sub-dimensions: intrusion, avoidance, and arousal. Intrusion is experiencing the traumatic event again and feeling psychological distress. Avoidance is the desensitization of the patients to traumatic events and the decrease in their desire to meet other people. Arousal means having difficulty sleeping, feeling restless, and having disturbing dreams. The five-point Likert-type scale is scored as never = 1, rarely = 2, occasionally = 3, often = 4, and very often = 5. The lowest score that can be obtained from the scale is 17, and the highest score is 85. As the total score and sub-dimension scores increase, the level of being affected also increases. The Turkish validity and reliability study of the scale was conducted by Yıldırım et al. (2018), and it was shown that the Turkish form of the scale is valid and reliable.

Ways of Coping with Stress Scale (WCSS): Lazarus and Folkman (1980) developed the Ways of Coping Inventory to assess individuals' coping behaviors during stressful situations. The Turkish validity and reliability of the shortened form of the scale, which is a four-point Likert-type scale consisting of 30 items, was conducted by Hisli Şahin and Durak (1995). In this study, it was shown that the scale was valid and reliable and consisted of two sub-dimensions: effective approach (problem-focused) and ineffective approach (emotion-focused). The factor analysis of same study revealed that the effective approach dimension included self-esteemed, optimistic, and seeking social support approach sub-dimensions, while the ineffective approach dimension included desperate and submissive approach sub-dimensions. In addition, the total score of the scale can also be calculated; a high total score indicates an increased ability to cope with stress (Hisli Şahin and Durak 1995).

Statistical Analysis

Analyses were performed by an academic biostatistician using free and open-source R software (version 4.3.2, https://cran.r-project.org) and the SPSS 23.0 statistical package (Chicago, IL). Shapiro-Wilk's test was used to evaluate the assumption of a normal distribution of numerical variables. Homogeneity of variance was evaluated by Levene's test. Mean±standard deviation was given for numerical variables that met the assumption of normal distribution, and median (25-75p) descriptive statistics were provided for variables that did not. Categorical variables were presented as frequency and

percentage. Student's *t*-test was used to analyze whether there was a difference between the groups in terms of numerical scale scores. Cohen's d effect size was calculated for Student's *t*-test (0.2=small, 0.5=medium and 0.8=large). As a result of univariate analyses for anxiety, depression, and secondary traumatic stress dependent variables, variables with p<0.20 were determined as candidate variables for the multiple linear regression model (Alpar 2021). Since the residuals were normally distributed, multiple linear regression models were constructed using the stepwise variable selection method. The variance inflation factor (VIF) was used to examine whether there was a multicollinearity problem among the numerical variables. The presence of autocorrelation for the regression model was examined with the Durbin-Watson d statistic, and it was decided that there was no autocorrelation in the model. The correlation matrix graph (Figure 1) was plotted using the metan package (Olivoto and Lúcio 2020). The statistical significance value was determined as p<0.05.

RESULTS

Of the healthcare workers (n=243) who participated in our study, 74.1% (n=180) were female and 25.9% (n=63) were male, and their median age was 29 years (25-75p=26-33). 159 (65.4%) of the healthcare workers participated in the treatment of patients affected by the earthquake, while 84 (34.6%) did not. Earthquakes affected the relatives of 87 (35.8%) of the healthcare workers, and 26 (10.7%) of the healthcare workers were assigned to the earthquake zone. Relatives of 81 healthcare workers (33.3%) experienced financial loss or shelter problems, relatives of 19 workers (7.8%) suffered physical injuries, and relatives of 13 workers (5.3%) lost their lives. 236 (97.1%) of the healthcare workers followed the news about the Kahramanmaraş 2023 earthquakes. Table 1 presents the demographic characteristics of healthcare workers, and table 2 presents the results of clinical variables related to anxiety, depression, STS, and coping strategies.

In our study, Pearson correlation analysis was applied to reveal the relationship between the age of healthcare workers, the time spent in the treatment of traumatized patients, the effective and ineffective approach sub-dimensions of the WCSS, the anxiety and depression sub-dimensions of the BSI, and the total score of the STSS. It was determined that there was a low level significant negative correlation between age and BSI-anxiety (r=-0,17; p=0,008) and age and BSI-depression (r=-0,14; p=0,032) scores. In addition, there was a low significant positive correlation between age and WCSS-effective approach score (r=0.22; p<0.001). It was found that there was a significant low-level positive correlation between the working time spent in the treatment of traumatized patients and the STSS total score (r=0.25;

Table 1. Demographic Characteristics of the Healthcare Workers

Variables	Participants (n=243)
Age	29 (26-33)
Gender	
Female	180 (74.1%)
Male	63 (25.9%)
Occupation	
Doctor	94 (38.7%)
Nurse	136 (56%)
Psychologist	5 (2.1%)
Child Development Specialist	3 (1.2%)
Social Worker	5 (2.1%)
Educational Status	
University	166 (68.3%)
Master's Degree	62 (25.5%)
PhD	15 (6.2%)
Marital Status	
Married	125 (51.4%)
Single	114 (46.9%)
Divorced	4 (1.6%)
Income Level (Turkish Lira)	30000 (20000-50000)
Previous Trauma History	
No	178 (73.3%)
Yes	65 (26.7%)
Participation in Treatment	
No	84 (34.6%)
Yes	159 (65.4%)
Following the News	
No	7 (2.9%)
Yes	236 (97.10%)

Data are presented as median (25. percentile-75. percentile). Categorical variables reported as frequency (percent).

Table 2. Clinical Variables of the Healthcare Workers

Variables	Participants (n=243)
BSI	
Anxiety	6.90±7.46
Depression	9.84±9.04
WCSS	
Self-esteemed approach	13.28±3.98
Desperate approach	9.05±4.25
Submissive approach	5.86±3.19
Optimistic approach	8.62±±2.66
Seeking social support approach	8.62±2.66
Effective approach	29.46±6.90
Ineffective approach	14.91±6.42
Total	56.55±10.54
STSS	
Intrusion	11.20±4.65
Avoidance	16.21±5.48
Arousal	11.54±4.60
Total	38.94±13.16

Data are presented as and mean ± SD.
BSI: Brief Symptom Inventory, WCSS: Ways of Coping with Stress Scale, STSS: Secondary Traumatic Stress Scale

p<0.001). STSS total score showed a moderately significant positive correlation with BSI-anxiety (r=0.67; p<0.001), BSI-depression (r=0.65; p<0.001) and WCSS-ineffective approach (r=0.48; p<0.001) scores, while a low significant negative correlation was found between STSS total score and WCSS-effective approach scores (r=-0.38; p<0.001). In addition, it was determined that BSI-anxiety and BSI-depression scores showed a moderately significant positive correlation with WCSS-ineffective approach score (r=0.49, p<0.001; r=0.47, p<0.001, respectively). There was a low level significant negative correlation between BSI-anxiety and WCSS-effective approach scores (r=-0.35, p<0.001) and a moderate level significant negative correlation between BSI-depression and WCSS-effective approach scores (r=-0.41, p<0.001) (Figure 1).

Differences between factors thought to be related to BSI-anxiety, BSI-depression, and STSS total scores, such as gender, participation in the treatment of patients affected by the earthquake, working in the earthquake zone, past trauma history, the status of the relatives of healthcare workers affected by the earthquake, and following news about the earthquake, were analyzed using the Student-*t* test. BSI-anxiety and BSI-depression scores were found to be statistically significantly higher in women (p=0.028 and p=0.026, respectively) and in those with relatives who had financial loss or shelter problems due to the earthquake (p=0.026 and p=0.030, respectively). In addition, the STSS total score of the healthcare workers who participated in the treatment of patients affected by the earthquake was found to be statistically significantly higher than the others (p=0.008) (Table 3). According to the univariate analysis for anxiety, depression and STS, variables with a significance value of p<0.20 were determined as candidate variables for three separate multiple linear regression models. No multicollinearity or autocorrelation problem was found in the data.

In our study, three different multiple stepwise linear regression models were used to investigate the factors that may be associated with anxiety, depression, and STS. The ANOVA test showed that all three models were statistically significant (F=35.038, F=53.524, and F=42.228, respectively; p<0.001). As a result, the WCSS-ineffective approach, WCSS-effective approach, and loss of a relative due to earthquakes were found to be significantly associated with the BSI-anxiety score (p<0.001, p<0.001, p=0.028; R^2=0.305, respectively). Secondly, the WCSS-ineffective approach and WCSS-effective approach were significantly associated with the BSI depression score (p<0.001 for both; R^2=0.308). Finally, according to the multiple stepwise linear regression analysis, WCSS-ineffective approach, WCSS-effective approach and time spent treating the traumatized patients were significantly associated with the total score of STSS (p<0.001 for all; R^2=0.348) (Table 4).

Table 3. Univariate Analysis for Anxiety, Depression, and Secondary Traumatic Stress

	Anxiety	p	ES	Depression	p	ES	STS	p	ES
Participation in treatment									
No	5.82±7.48			8.73±8.19			35.89±12.81		
Yes	7.47±7.41	**0.102**	0.221	10.43±9.43	**0.163**	0.189	40.55±13.10	**0.008**	0.358
Having Affected Relatives - Physical injury									
No	6.69±7.30			9.73±8.97			38.52±13.03		
Yes	9.37±8.97	**0.133**	0.360	11.11±9.95	0.526	0.152	43.84±14.10	**0.091**	0.406
- Financial or shelter loss									
No	6.11±7.05			8.95±8.77			38.24±13.44		
Yes	8.47±8.03	**0.026**	0.319	11.62±9.35	**0.030**	0.297	40.33±12.54	**0.191**	0.159
- Loss of a relative									
No	6.64±7.00			9.70±8.78			38.50±12.93		
Yes	11.46±12.72	**0.199**	0.470	12.31±13.00	0.312	0.235	46.62±15.35	**0.067**	0.621
Duty at the Earthquake Site									
No	6.89±7.46			9.93±9.02			38.74±13.10		
Yes	6.92±7.58	0.985	0.004	9.08±9.31	0.650	0.093	40.62±13.80	0.470	0.143
Previous Trauma History									
No	6.54±7.02			9.57±8.80			38.33±13.16		
Yes	7.86±8.53	0.224	0.177	10.57±9.70	0.448	0.110	40.62±13.12	0.208	0.174
Gender									
Female	7.41±8.06			10.60±9.72			39.83±13.35		
Male	5.44±5.17	**0.028**	0.290	7.67±6.27	**0.026**	0.327	36.40±12.35	**0.064**	0.262

Data are presented as mean±standard deviation. Differences between groups were analyzed using Student-*t* test.
Variables with p<0.20 determined as candidate variables for multiple linear regression models are shown in bold.
ES: Effect size, STS: Secondary traumatic stress

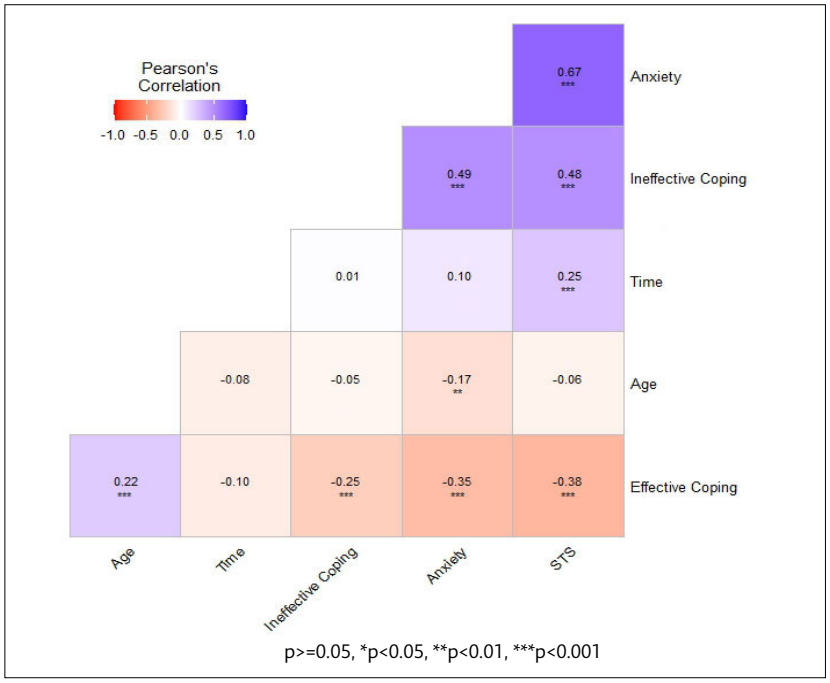

Figure 1. Pearson correlation analysis results

Table 4. Linear Regression Results of Factors Affecting Anxiety, Depression and Secondary Traumatic Stress

	Unstandardized Coefficients		Standardized Coefficients	t	p	95% CI	VIF
	β	SE	Beta				
Anxiety*							
Constant	6.414	2.276		2.819	**0.005**	1.932-10.897	
Ineffective coping	0.500	0.065	0.430	7.728	**<0.001**	0.372-0.627	1.068
Effective coping	-0.244	0.060	-0.226	-4.030	**<0.001**	-0.363- (-0.125)	1.078
Loss of a relative	3.960	1.792	0.120	2.210	**0.028**	0.430-7.491	1.010
Depression**							
Constant	13.578	2.723		4.986	**<0.001**	8.214-18.942	
Ineffective coping	0.549	0.078	0.390	7.038	**<0.001**	0.395-0.703	1.067
Effective coping	-0.405	0.073	-0.309	-5.574	**<0.001**	-0.548- (-0.262)	1.067
Secondary traumatic stress***							
Constant	38.189	3.975		9.607	**<0.001**	30.358-46.020	
Ineffective coping	0.851	0.111	0.415	7.668	**<0.001**	0.632-1.069	1.067
Effective coping	-0.481	0.104	-0.252	-4.630	**<0.001**	-0.685-(-0.276)	1.078
Working Time	0.117	0.029	0.216	4.089	**<0.001**	0.061-0.174	1.011

*Multiple stepwise linear regression model for anxiety: Participation in treatment, presence of physical injury in relatives of health workers, presence of financial loss or shelter problems, age, and gender were adjusted. (R=0.553, R^2 =0.305, F=35.038; p<0.001, Durbin Watson=1.870)
** Multiple stepwise linear regression model for depression: Participation in treatment, the presence of financial loss or shelter problems in the relatives of health workers, age, and gender were adjusted. R=0.555, R^2 =0.308, F= 53.524.; p<0.001, Durbin Watson=1858)
*** Multiple stepwise linear regression model for secondary traumatic stress: Participation in treatment, presence of physical injury in the relatives of health workers, presence of financial loss or shelter problems, death of a relative, and gender were adjusted. (R=0.590, R^2 =0.348, F=42.228; p<0.001, Durbin Watson=1.908)
SE=Standard error, VIF=Variance inflation factor, CI=Confidence interval, Working Time: Working time spent with traumatized patients

DISCUSSION

Our study focuses on the coping strategies and mental health problems of healthcare workers involved in the treatment of patients affected by the Kahramanmaraş 2023 earthquakes. Despite the large number of studies on the mental health of healthcare workers in the aftermath of the COVID-19 pandemic, few studies have examined the emotional effects of their involvement in the treatment of earthquake victims. Our study revealed a correlation between ineffective coping strategies and increased anxiety,

depression, and STS, while effective coping strategies were associated with decreased symptom severity in healthcare workers. Furthermore, younger age and female gender were associated with anxiety and depression, while treatment attendance and time spent treating traumatized patients were associated with STS.

In the literature, there are various studies investigating the relationship between coping strategies and psychological symptoms of healthcare workers (Bourke and Craun 2014, Akinsulure-Smith et al. 2018, İlhan and Küpeli 2022,). Vukčević Marković and Živanović (2022) suggest that ineffective coping strategies may exacerbate STS symptoms, while effective coping strategies, such as positive reinterpretation and planning, serve as primary protective factors against STS. Chen et al. (2021) suggested that negative coping style is an independent risk factor for both anxiety and depression in healthcare workers. Research also shows that while most coping strategies alleviate distress in the short term, some fail to address or resolve the underlying problem in the long term, leading to negative psychological consequences and even causing additional difficulties (Snyder and Pulvers 2001). However, the use of appropriate coping strategies by employees under stressful working conditions may be useful in preventing psychological problems (Maresca 2022). Therefore, it is considered important to establish preventive intervention programs that improve the coping strategies of healthcare workers (Alkhawaldeh et al. 2020).

In the literature, there are studies similar to our study suggesting that STS levels are higher in healthcare workers who have direct contact with trauma victims (Greinacher et al. 2019, Orrù et al. 2021). In a study conducted after the Great East Japan earthquake and tsunami in 2011, it was found that social workers who counselled victims had higher STS levels compared to others (Kanno et al. 2016). In addition, research shows that there is a correlation between the working time spent with the treatment of trauma victims and STS in various professional groups, including mental health and child protection service workers (Cornille and Meyers 1999, Creamer and Liddle 2005). In line with these findings, shift arrangements during crisis periods are thought to be one of the factors that can positively affect the mental health of healthcare workers (Shaukat et al. 2020, Melnyk et al. 2022).

In our study, there was no difference in anxiety and depression levels between healthcare workers who participated in the treatment of patients affected by the earthquake and those who did not. In contrast to our findings, it has been reported that anxiety and depression levels were higher in healthcare workers who participated in the treatment of affected patients during the COVID-19 pandemic (Lai et al. 2020, Kirk et al. 2021). The fact that the COVID-19 pandemic spanned over a prolonged period, combined with the fact that our study was conducted immediately after the earthquake, may explain why no difference was observed in anxiety and depression levels between the two groups in our study. Longitudinal studies are needed to explore this issue further.

In our study, there was no relationship between age and STS, whereas younger age was associated with anxiety and depressive symptoms. This finding could potentially stem from the fact that the study sample's older healthcare workers employ more effective coping mechanisms. Similar to our study, a recent study showed that increasing age was associated with fewer anxiety symptoms and milder depressive symptoms in healthcare workers with a heavy workload during COVID-19 (Budzyńska and Moryś 2023). However, in the study conducted by İlhan and Küpeli (2022), no effect of age on anxiety, depression, or STS was found. While some researchers suggest that the risk of exposure to trauma and STS increases as the age of healthcare workers increases, others suggest that they may be more prepared for stress, and the risk of STS may decrease as their age and experience increase (Yılmaz 2007). The fact that there was no relationship between age and severity of STS in our study suggests that STS may be more related to other relevant factors.

In our study, it was found that anxiety and depression levels were higher in female healthcare workers. In studies examining the impact of traumatic events such as the COVID-19 pandemic or earthquakes on healthcare workers, similar to our study, it was revealed that the prevalence of anxiety and depression was higher in women (Ehring et al. 2011, Pappa et al. 2020). However, it is thought that this finding should be interpreted considering the higher prevalence of anxiety and depression found in female healthcare workers (Kim et al. 2018).

Finally, our study revealed that the earthquake-related financial loss or shelter problems experienced by relatives of healthcare workers were associated with higher levels of anxiety and depression in healthcare workers, and the loss of a relative could potentially increase their anxiety. There are studies showing that the presence of relatives affected by the current stressful situation is associated with more severe psychiatric symptoms in healthcare workers involved in the treatment of such patients (GebreEyesus et al. 2021, Steudte-Schmiedgen et al. 2021). Similar to our study, research conducted during the COVID-19 period revealed an association between increased anxiety in healthcare workers and the loss of a relative due to COVID-19 (Siamisang et al. 2022). However, our study found no difference in STS between healthcare workers who had relatives affected by the earthquake and those who did not. Contrary to our study, higher STS levels were found in healthcare workers whose relatives were affected by COVID-19 in various studies conducted during the pandemic (Orrù et al. 2021, Yörük et

al. 2022). The findings of our study suggest that healthcare workers whose relatives were not affected by the earthquake experienced similar levels of STS symptoms as those whose relatives were affected and that other factors may be more related to STS.

This study has several limitations. First, our study focused solely on healthcare workers in Ankara Bilkent City Children's Hospital, despite the fact that many hospitals in our country treated patients affected by the Kahramanmaraş 2023 earthquakes. Other limitations of our study include the lack of a structured diagnostic interview to assess the healthcare workers included in the study and the use of self-reported scales to assess anxiety, depression, STS, and coping styles. Furthermore, it's possible that some of the healthcare workers in our study also fit the diagnostic criteria for PTSD, and future studies may evaluate PTSD alongside STS in similar samples. The study's cross-sectional nature hinders the full revelation of the cause-effect relationship between the findings. Another limitation of our study is that it is not known whether the healthcare workers participated in a psychosocial support program or whether they applied to mental health services for their symptoms. In addition, the fact that the study focused on healthcare workers who work with pediatric patients makes it difficult to generalize the findings to all healthcare workers. Our study was conducted shortly after the Kahramanmaraş earthquakes, and longitudinal studies are needed to investigate the long-term effects of trauma on healthcare workers. Future studies should also consider and evaluate other variables such as resilience, self-efficacy, and job satisfaction that may affect the psychological problems of healthcare workers (McGarry et al. 2013, Vagni et al. 2020, İlhan and Küpeli 2022).

CONCLUSION

Our study draws attention to the potential psychological problems that healthcare workers may experience while treating traumatized patients. Our study shows that healthcare workers who use ineffective coping styles are more at risk for anxiety, depression, and STS, and that learning effective coping styles to cope with stress can protect them from psychological problems. It is thought that providing preventive mental health interventions and psychoeducation on trauma exposure is important for healthcare workers.

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REFERENCES

Akinsulure-Smith AM, Espinosa A, Chu T et al. (2018) Secondary traumatic stress and burnout among refugee resettlement workers: The role of coping and emotional intelligence. J Trauma Stress 31: 202-12.

Alkhawaldeh JM, Soh KL, Mukhtar F et al. (2020) Stress management training program for stress reduction and coping improvement in public health nurses: A randomized controlled trial. J Adv Nurs 76: 3123-35.

Alpar R (2021) Applied Multivariate Statictical Methods. 6th Edition ed. Detay Publishing.

American Psychiatric Association (2013) Diagnostic and Statistical Manual of Mental Disorders (5th edn). APA. https://doi.org/10.1176/appi.books.9780890425596.

Bourke ML, Craun SW (2014) Coping with secondary traumatic stress: Differences between UK and US child exploitation personnel. Traumatology 20: 57.

Bride BE, Robinson MM, Yegidis B et al. (2004) Development and validation of the secondary traumatic stress scale. Res Soc Work Pract 14: 27-35.

Budzyńska N, Moryś J (2023) Anxiety and Depression Levels and Coping Strategies among Polish Healthcare Workers during the COVID-19 Pandemic. Int J Environ Res Public Health 20: 3319. .

Carmassi C, Dell'Oste V, Bertelloni CA et al. (2022) Gender and occupational role differences in work-related post-traumatic stress symptoms, burnout and global functioning in emergency healthcare workers. Intensive Crit Care Nurs 69: 103154.

Chang C-M, Lee L-C, Connor KM et al. (2003) Posttraumatic distress and coping strategies among rescue workers after an earthquake. J Nerv Ment Dis 191: 391-8.

Chen J, Liu X, Wang D et al. (2021) Risk factors for depression and anxiety in healthcare workers deployed during the COVID-19 outbreak in China. Soc Psychiatry Psychiatr Epidemiol 56: 47-55.

Cornille TA, Meyers TW (1999) Secondary traumatic stress among child protective service workers: Prevalence, severity and predictive factors. Traumatology 5: 15-31.

Creamer TL, Liddle BJ (2005) Secondary traumatic stress among disaster mental health workers responding to the September 11 attacks. J Trauma Stress18: 89-96.

Derogatis LR (1992) The brief symptom inventory (BSI): administration, scoring & procedures manual-II. Clinical Psychometric Research.

Ehring T, Razik S, Emmelkamp PM (2011) Prevalence and predictors of posttraumatic stress disorder, anxiety, depression, and burnout in Pakistani earthquake recovery workers. Psychiatry Res 185: 161-6.

Figley CR (2013) Compassion fatigue: Coping with secondary traumatic stress disorder in those who treat the traumatized. Routledge.

Folkman S, Lazarus RS (1980) An analysis of coping in a middle-aged community sample. J Health Soc Behav 21: 219-39.

Folkman S, Lazarus RS (1988) Coping as a mediator of emotion. J Health Soc Behav 54:466-75.

Fullerton CS, Ursano RJ, Wang L (2004) Acute stress disorder, posttraumatic stress disorder, and depression in disaster or rescue workers. Am J Psychiatry 161: 1370-6.

GebreEyesus FA, Tarekegn TT, Amlak BT et al. (2021) Levels and predictors of anxiety, depression, and stress during COVID-19 pandemic among frontline healthcare providers in Gurage zonal public hospitals, Southwest Ethiopia, 2020: A multicenter cross-sectional study. PLoS One 16: e0259906.

Gökçe G, Yılmaz B (2017) Relief workers in disasters: Secondary traumatic stress and coping. J Psychol-Special Topics 2: 198-204.

Greinacher A, Derezza-Greeven C, Herzog W et al. (2019) Secondary traumatization in first responders: a systematic review. Eur J Psychotraumatol 10: 1562840.

Hisli Şahin N, Durak A (1995) Stresle başaçıkma tarzları ölçeği: Üniversite öğrencileri için uyarlanması [Stress coping styles scale: Adaptation for university students.]. Türk Psikoloji Dergisi 10: 56-73.

İlhan B, Küpeli İ (2022) Secondary traumatic stress, anxiety, and depression among emergency healthcare workers in the middle of the COVID-19 outbreak: A cross-sectional study. Am J Emerg Med 52: 99-104.

Kanno H, Kim YM, Constance-Huggins M (2016) Risk and protective factors of secondary traumatic stress in social workers responding to the Great East Japan Earthquake. Soc Dev Issues 38: 64-78.

Kim M-S, Kim T, Lee D et al. (2018) Mental disorders among workers in the healthcare industry: 2014 national health insurance data. Ann Occup Environ Med 30: 1-8.

Kirk AHP, Chong SL, Kam KQ et al. (2021) Psychosocial impact of the COVID-19 pandemic on paediatric healthcare workers. Ann Acad Med Singap 50: 203-11.

Kristensen P, Weisæth L, Heir T (2012) Bereavement and mental health after sudden and violent losses: a review. Psychiatry 75: 76-97.

Küçükparlak İ (2021) Kitlesel travmalarda ikinci travmatizasyon ve tükenmişlik [Secondary traumatization and burnout in massive traumas]. In Kitlesel travmalar ve afetlerde ruhsal hastalıkları önleme, müdahale ve sağaltım kılavuzu [Manual on prevention, intervention and treatment of mental illness in massive traumas and disasters] (eds A Başterzi, Ş Yüksel), Türkiye Psikiyatri Derneği Yayınları.

Lai J, Ma S, Wang Y et al. (2020) Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. JAMA Netw Open 3: e203976.

Lazarus RS, Folkman S (1984) Stress, appraisal, and coping. Springer publishing company.

Lazarus RS (1991) Emotion and adaptation. Oxford University Press.

Littleton H, Horsley S, John S et al. (2007) Trauma coping strategies and psychological distress: A meta-analysis. J Trauma Stress 20: 977-88.

Lluch C, Galiana L, Doménech P et al. (2022) The Impact of the COVID-19 Pandemic on Burnout, Compassion Fatigue, and Compassion Satisfaction in Healthcare Personnel: A Systematic Review of the Literature Published during the First Year of the Pandemic. Healthcare (Basel) 10: 364.

Marmar CR, Weiss DS, Metzler TJ et al. (1996) Characteristics of emergency services personnel related to peritraumatic dissociation during critical incident exposure. Am J Psychiatry 153: 94-102.

Maresca G, Corallo F, Catanese G et al. (2022) Coping Strategies of Healthcare Professionals with Burnout Syndrome: A Systematic Review. Medicina (Kaunas) 58: 327.

McGarry S, Girdler S, McDonald A et al. (2013) Paediatric health-care professionals: Relationships between psychological distress, resilience and coping skills. J Paediatr Child Health 49: 725-32.

Melnyk BM, Hsieh AP, Tan A et al. (2022). Associations among nurses' mental/physical health, lifestyle behaviors, shift length, and workplace wellness support during COVID-19: important implications for health care systems. Nurs Adm Q 46: 5-18.

Ogińska-Bulik N, Gurowiec PJ, Michalska P et al. (2021) Prevalence and predictors of secondary traumatic stress symptoms in health care professionals working with trauma victims: A cross-sectional study. PLoS One 16: e0247596.

Olivoto T, Lúcio ADC (2020) metan: An R package for multi-environment trial analysis. Methods Ecol Evol 11: 783-9.

Orrù G, Marzetti F, Conversano C et al. (2021) Secondary traumatic stress and burnout in healthcare workers during COVID-19 outbreak. Int J Environ Res Public Health 18: 337.

Pang Y, Fang H, Li L et al. (2021) Predictive factors of anxiety and depression among nurses fighting coronavirus disease 2019 in China. Int J Ment Health Nurs 30: 524-32.

Pappa S, Ntella V, Giannakas T et al. (2020) Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Brain Behav Immun 88: 901-7.

Presidency of the Republic of Turkey Presidency of Strategy and Budget. Kahramanmaraş And Hatay Earthquakes Report, Turkey, 2023. (https://www.sbb.gov.tr/wp-content/uploads/2023/03/2023-Kahramanmaras-and-Hatay-Earthquakes-Report.pdf [date accessed: 2013 Aug 15])

Romic I, Silovski H, Mance M et al. (2021) Psychological Effects of "Double Crisis" (COVID-19 Pandemic and Earthquakes) on Croatian Medical Students. Psychiatria Danub 33: 120-5.

Ruiz-Fernández MD, Ramos-Pichardo JD, Ibáñez-Masero O et al. (2020) Compassion fatigue, burnout, compassion satisfaction and perceived stress in healthcare professionals during the COVID-19 health crisis in Spain. J Clin Nurs 29: 4321-30.

Şahin NH, Batıgün AD, Uğurtaş S (2002) The Validity, Reliability and Factor Structure of the Brief Symptom Inventory (BSI) Turk Psikiyatri Derg13: 125-35.

Şahin NH, Durak A (1994) Kisa Semptom Envanteri (Brief Symptom Invetory-BSI): Turk Gencleri Icin Uyarlanmasi [A study of the Brief Symptom Inventory in Turkish Youth]. Türk Psikoloji Dergisi 9: 44-56.

Saragih ID, Tonapa SI, Saragih IS et al. (2021) Global prevalence of mental health problems among healthcare workers during the Covid-19 pandemic: A systematic review and meta-analysis. Int J Nurs Stud 121: 104002.

Shaukat N, Ali DM, Razzak J (2020) Physical and mental health impacts of COVID-19 on healthcare workers: a scoping review. Int J Emerg Med 13: 40.

Siamisang K, Kebadiretse D, Tjirare LT et al. (2022) Prevalence and predictors of depression, anxiety and stress among frontline healthcare workers at COVID-19 isolation sites in Gaborone, Botswana. PLoS One 17: e0273052.

Snyder C, Pulvers KM (2001) Dr. Seuss, the coping machine, and "Oh, the Places You'll Go.". Coping with stress: Effective people and processes, CR Snyder (Ed), Oxford University Press, s. 3-29.

Steudte-Schmiedgen S, Stieler L, Erim Y et al. (2021) Correlates and Predictors of PTSD Symptoms Among Healthcare Workers During the COVID-19 Pandemic: Results of the egePan-VOICE Study. Front Psychiatry 12: 686667.

Trumello C, Bramanti SM, Ballarotto G et al. (2020) Psychological Adjustment of Healthcare Workers in Italy during the COVID-19 Pandemic: Differences in Stress, Anxiety, Depression, Burnout, Secondary Trauma, and Compassion Satisfaction between Frontline and Non-Frontline Professionals. Int J Environ Res Public Health 17: 8358.

Ursano RJ, Fullerton CS, Vance K et al. (1999) Posttraumatic stress disorder and identification in disaster workers. Am J Psychiatry 156: 353-9.

Vagni M, Maiorano T, Giostra V et al. (2020) Coping with COVID-19: emergency stress, secondary trauma and self-efficacy in healthcare and emergency workers in Italy. Front Psychol 11: 566912.

Vukčević Marković M, Živanović M (2022) Coping with secondary traumatic stress. Int J Environ Res Public Health 19: 12881.

Wagner D, Heinrichs M, Ehlert U (1998) Prevalence of symptoms of posttraumatic stress disorder in German professional firefighters. Am J Psychiatry 155: 1727-32.

Yılmaz B (2007) Traumatic Stress in Relief Workers. Turkish Journal Clinical Psychiatry 10:137-47.

Yıldırım G, Kıdak LB, Yurdabakan I (2018) Secondary Traumatic Stress Scale: An adaptation study/Ikincil Travmatik Stres Olcegi: Bir uyarlama calismasi. Anadolu Psikiyatri Dergisi 19: 45-52.

Yörük S, Acikgoz A, Güler D (2022) The predictors of secondary traumatic stress and psychological resilience in healthcare workers during the COVID-19 pandemic: A cross-sectional study in Turkey. Stress Health 38: 746-54.

Živanović M, Vukčević Marković M (2020b) Latent structure of secondary traumatic stress, its precursors, and effects on people working with refugees. PLoS One 15: e0241545.

Živanović M, Vukćević Marković M (2020a) Secondary traumatization. In Social Trauma–An Interdisciplinary Textbook, A Hamburger, C Hancheva, V Volkan (Eds), Springer, s. 295–302.