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Assessing the Severity of Earthquake Trauma on Syrian Refugee Survivors in Southern Turkey and Displaced Individuals in Northwest Syria

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Abstract: The study sought to investigate the extent and intensity of earthquake-related psychological distress experienced by Syrian refugee survivors residing in southern Turkey and displaced individuals in northwest Syria. A technique focused on providing detailed descriptions and conducting thorough analysis was employed. Three scales of post-traumatic stress disorder (PTSD), Trauma History Screen (THS), and Brief Trauma Questionnaire (BTQ) were used. The study included 600 participants, with 300 participants from each region. The prevalence rate of PTSD among survivors one year after the 2023 Turkey earthquake was high, around 68%. while the prevalence rate of THS and BTQ was low. The results for PTSD indicated that there were statistically significant differences only between age and marital status in southern Turkey. As for northwest Syria, there were statistically significant differences only in gender. The results for THS and BTQ indicated statistically significant differences only between gender, age, and working status in southern Turkey. As for northwest Syria, there were statistically significant differences between gender, education level, and working status. There was a positive direct correlation between PTSD on the one hand and THS and BTQ on the other hand. This indicates that the level of PTSD increases as THS and BTQ increase. In regression analysis, the results showed that THS and BTQ contribute to interpreting the variance in PTSD. When THS and BTQ increase, they contribute to increased symptoms of PTSD. The beta value for THS in southern Turkey and northwestern Syria was ($\beta = 1.127$, $\beta = 0.793$), respectively. While the beta value for BTQ in southern Turkey was ($\beta = 0.70$) .Conclusions: Both THS and BTQ make a statistically significant contribution to explaining the variations in PTSD among survivors in the research of the two locations. The incidence of Post-Traumatic Stress Disorder (PTSD) among survivors was 68%. PTSD was found to be linked with older age, female gender, widowhood, and divorce.

Keywords: Earthquake trauma, Syrian refugee, Displaced people

Introduction

Earthquakes are classified as natural disasters that arise from geological and atmospheric events occurring on the Earth's surface. They are one of the most pressing concerns of the modern period, and they have become a public health concern affecting everyone, including psychological disorders and trauma. According to the International Catastrophe Database, natural catastrophe incidences have increased significantly from the mid-twentieth century to the present (Saeed & Gargano, 2022). The global frequency of earthquakes has grown sixfold in the last forty years (Farooqui et al., 2017). On February 6, 2023, two powerful earthquakes struck southern Turkey's Kahramanmaraş, measuring 7.7 and 7.6 on the Richter scale. They also had a widespread impact, notably in northwestern Syria. The seismic event was the most severe in 80 years, with the greatest earthquake-affected region to date, earning it the title "century disaster." The incident resulted in a significant number of casualties among Turkish citizens and Syrian refugees and widespread destruction of residential properties and infrastructure.

The earthquake-damaged region in southern Turkey affected 1.7 million of the 3.8 million Syrian refugees (Karlsen, 2023). According to the Turkish Presidency of Disaster and Emergency Management, more than 54,000 people died and 107,000 were injured. Furthermore, around 2.4 million people were displaced (Reliefweb, 2023). The earthquake caused severe destruction in many areas, including health, the economy, social dynamics, and mental health. Despite the obvious risk to physical health and life, the mental health impact is frequently overlooked. Earthquakes substantially impact psychological well-being, causing both short-term and long-term distress.

A review of scientific data suggests that post-traumatic stress disorder occurs at extremely high rates following earthquakes. Furthermore, collective trauma among communities worsens societal psychological difficulties and disturbances (Goldmann & Galea, 2014). Earthquakes and their repercussions pose a global public health risk. Research suggests that survivors of earthquakes are more likely to acquire psychological problems such as post-traumatic stress disorder, anxiety, and depression. It also causes physical and psychological anguish in survivors, perhaps inflicting irreversible harm (Hong & Efferth, 2015). Internally displaced families living in partially ruined homes are among those who have been affected in northwestern Syria (Lindert et al., 2018). Homes, properties, and public infrastructure were severely destroyed across the region (UNHCR, 2023). As a result, survivors sustained considerable physical and psychological suffering.

As a result, governments must focus on this understudied area to avoid and manage the health difficulties linked with the recent earthquake's early onset and massive impacts. While Turkey's policies towards Syrian refugees have been supportive of their access to healthcare, the ongoing crisis in Syria has resulted in refugees staying in Turkey for a lengthy period. This has created refugee hurdles and obstacles (Mavrouli et al., 2023). Following the earthquake, hospitals collapsed, infrastructure was destroyed, and nearly 1.5 million people were displaced in Turkey (Qu et al., 2023). Clear and considerable needs have surfaced in the areas of mental health and social support for both citizens and refugees. Over 100 countries urgently assisted Turkey's humanitarian efforts following the earthquake (Karaoğlan Kahilogulları et al., 2020).

The key problem is to provide long-term and effective mental health support despite a shortage of specialized human resources. This needs ongoing funding for mental health studies, research, specialized training, and program development in southern Turkey and northern Syria. Although earthquakes have received more study attention, there are still gaps in our understanding of their psychological impact on Syrian refugees and displaced individuals. There is still a lack of specialized studies into earthquake trauma. Current efforts center on conducting analytical research better to understand the long-term impact and close knowledge gaps. In the present study, we looked at the relationship between PTSD, THS, and BTQ in earthquake survivors. We hypothesized that PTSD, THS, and BTQ would be highly associated and had similar risk factors. We also hypothesized that exposure to earthquakes and THS would increase the likelihood of PTSD symptoms. The study's goal is to assess levels of post-traumatic stress disorder (PTSD), Trauma History Screen (THS), and Brief Trauma Questionnaire (BTQ) in displaced people in northwestern Syria and refugees in southern Turkey. It also seeks to explore disparities in PTSD, THS, and BTQ based on factors such as gender, age, marital status, employment status, and educational level. The purpose of this research is to improve mental health outcomes, notably in PTSD, THS, and BTQ, by providing needed support and implementing psychosocial programs and community-based interventions that promote resilience and well-being.

Literature Review

This literature review aims to bring together study findings on PTSD symptoms among earthquake survivors. Earthquakes are catastrophic events with far-reaching psychological consequences, bringing emotional suffering ranging from frustration to serious mental disorders. According to Baryshnikova and Pham (2019) and Du et al. (2018), it may have short-term and long-term consequences on mental health. Assessing and addressing psychological needs is critical following earthquakes (Wang et al., 2015). Survivors, particularly the elderly, frequently develop PTSD symptoms and major psychological disorders in the months following earthquakes (Jia et al., 2010). Following the earthquake, symptoms of PTSD and trauma appeared (Sangalang et al., 2019).

Furthermore, a study conducted following the Nepal earthquake found an increase in the prevalence of common mental diseases (Zhang & Ho, 2011). Individuals exposed to earthquakes are up to four times more likely to develop significant psychological distress (Lavenda et al., 2017). Furthermore, THS is regarded as a critical element in shaping the outcomes of psychological diseases following natural catastrophes (Tang et al., 2014). THS exposure increases persons' susceptibility to psychiatric diseases and stress in the future (Gargano et al., 2019; Stroud, 2018). As a result, when trauma survivors are exposed to THS, they are more than twice as likely

to experience signs of depression and other disorders (Lilly et al., 2010). PTSD symptoms have been present throughout human history (Friedman, 2013). Gender, age, economic status, level of education, social status, employment status, exposure to THS, and lack of social support are the primary risk factors associated with the development of PTSD symptoms in the aftermath of natural disasters.

Younger age and female gender are more commonly regarded as risk factors (Chen et al., 2020; Goldmann & Galea, 2014). Women are thought to be the most prone to developing PTSD symptoms after disasters (Acierno et al., 2007; Dai et al., 2016; Doocy et al., 2013). Individuals who have lost their property due to earthquakes and floods, particularly widows and divorcees, experience more psychological disorders and issues. They have increased PTSD symptoms (Telles et al., 2009). According to Farooqui, the prevalence rate of PTSD symptoms following earthquakes ranged from 4.10% to 67.07% among adults (Farooqui et al., 2017).

The diagnosis of PTSD symptoms comprises four major factors: continual re-experiencing of the incident, avoidance of trauma-related symptoms, unfavorable changes in general reactivity, and heightened arousal (Bowles, 2013; Farooqui et al., 2017). According to Sonmez and Hocaoglu (2023), the level of trauma, loss of relatives and property, reduced coping abilities, displacement, and direct exposure to the disaster all contribute to the development of PTSD symptoms (Sonmez & Hocaoglu, 2023). The educational level significantly improves their ability to adapt after the disaster (S. Chen et al., 2020).

Individuals who have been frequently exposed to natural disasters and THS exhibit reduced levels of resilience and coping in the face of trauma (Mao & Agyapong, 2021). THS raises the risk of acquiring mental health issues and reduces the rate of recovery following earthquakes (Chen et al., 2020). An individual's exposure to two earthquakes poses a larger danger to mental health (Xie et al., 2017). The prevalence of PTSD symptoms was 42% after one month and 13% after thirteen months following Turkey's 1999 Golcuk earthquake (Lavenda et al., 2017). Following the 1999 Marmara earthquake, 25% of people experienced PTSD (Altindag et al., 2005; Tural et al., 2004). Önder et al. (2006) found that three years after the earthquake, it reached 19.2% (Onder et al., 2006). 48.2% of people have PTSD after the 2008 Sichuan earthquake in China (Xu & Song, 2011a).

According to İlhan et al. (2023), 51.4% of respondents reported experiencing PTSD symptoms three months following the earthquake (İlhan et al., 2023). Another study found a 62.8% frequency of PTSD one month after the Sichuan earthquake (B. Wang et al., 2011). It reached 40.1% a year after the earthquake (Xu & Song, 2011b). On the other hand, eight years after the same earthquake, the frequency of PTSD was 18.6% (Reinhardt et al., 2021). A study of survivors of the Japanese earthquake and tsunami found that older adults are more prone to experience PTSD symptoms (Gautam & Khadka Mishra, 2023). A study of Hurricane Katrina survivors found that PTSD symptoms increased, as did suicide rates, which increased from 3% to 6%. It revealed that 27% of post-traumatic stress disorder symptoms and 47% of suicidal behavior occurred in the future (Kessler et al., 2008). A study conducted one month after the earthquake revealed a prevalence rate of 18.7% for PTSD. It was discovered that people who experienced more of these symptoms were elderly, female, had lower educational levels, lacked social support, did not take preventative measures, and had THS. Prompt intervention and psychological rehabilitation during a disaster are vital for building resilience and facilitating a rapid recovery (Chen et al., 2014).

Several studies have indicated that the lifetime prevalence rate of thirdhand smoke (THS) has reached 39.1%. The prevalence of post-traumatic stress disorder (PTSD) symptoms among individuals who were exposed to traumatic events was found to be 23.6%, according to a study conducted by Breslau et al (Breslau et al., 2014). in 2014. A study revealed that the prevalence of post-traumatic stress disorder (PTSD) symptoms related to the earthquake was 42% one month after the event and decreased to 23% after thirteen months. The intensity of PTSD symptoms showed a notable decrease over time with medical follow-up, dropping from 49.53% to 31.35% (Lavenda et al., 2017; Lilly et al., 2010; Xu & Song, 2011a). The incidence rates of post-traumatic stress disorder (PTSD) among individuals who survived earthquakes varied from 10% to 87% (Altindag et al., 2005).

There is a limited amount of research that has assessed the extent and consequences of severe traumatic experiences (BTQ) on mental diseases associated with disasters. A study conducted by Harville found that BTQ resulting from disasters related to a depression rate of 67% (Harville et al., 2015). Upon careful examination of prior research, it became evident that there was a lack of adequate focus on the correlation between post-traumatic stress disorder (PTSD) symptoms, traumatic health symptoms (THS), and behavioral and psychological trauma symptoms (BTQ) among individuals who have experienced earthquakes. This study is notable for its extensive investigation of the interaction between earthquake survivors in southern Turkey and northern Syria. As acknowledged by the researcher, these regions have not received sufficient attention in

previous studies. Prior research has demonstrated increased levels of symptoms associated with post-traumatic stress disorder (PTSD) after earthquakes, underscoring the significance of our work in doing a more thorough analysis of this issue. The study stands out due to its approach, which involved the utilization of three scales about PTSD symptoms, THS and BTQ. Until now, no prior research has attempted to integrate these three scales, which enhances the thoroughness and comprehensiveness of detailing and analyzing this occurrence. This study aims to investigate the influence and contribution of Traumatic Head Injury (THI) and Blast Traumatic Brain Injury (BTBI) on symptoms of Post-Traumatic Stress Disorder (PTSD), with a specific emphasis on comprehending the correlation between these factors.

Methods

Study Design

This investigation was carried out in regions impacted by the earthquake. The study was conducted on Syrian refugees living in camps located in southern Turkey (Hatay Province), namely in Al-Sinaa, Adib, and AlSafa camps. It also included Syrian displaced individuals staying in camps in northwestern Syria (Jenderes area), specifically in Hayel, Abu Yarub, Rahmat, Ahl al-Khair, and Hurya camps. According to data from camp management, administrative authorities, and official local councils, the population in the camps in southern Turkey was around 3130 individuals. In comparison, the population in the camps in northern Syria was approximately 5166 individuals. The study was conducted using personal interviews performed by experts with the camps' occupants from October 2023 to March 2024. Before conducting the study, the Institutional Ethics Committee of the camp administration approved it. This study was carried out in compliance with The Belmont Report.

Participants

The study encompassed Syrian individuals who survived the earthquake in southern Turkey and northern Syria. The study sample was selected using the random sampling technique. The researchers successfully contacted all participants of the sample through face-to-face interviews. According to Morgan's calculation, 315 persons in Turkey and 311 people in Syria were accepted to participate in each sample, accounting for more than 3% of the study population. The questionnaire, PTSD, THS, and BTQ were all explained clearly. After at least 20 minutes of relaxation in a quiet environment free of visual and auditory stimuli, specialists completed the questions in a personal interview format. Teams from the Ataa Humanitarian Relief Organization and Department of Mental Health and Psychosocial Support, present in the research locations in Turkey and Syria, worked on administering questionnaires to earthquake survivors, with all personnel having relevant expertise and specialization. Participants who did not complete all questionnaire items were eliminated (N = 15 in Turkey and 11 in Syria), leaving each sample with 300 participants. All participants provided informed consent. The study was conducted utilizing a four-part structured questionnaire. The individuals' sociodemographic traits were discussed in the first section. In the second section, individuals were questioned about post-traumatic stress disorder. The third section inquired about the Trauma History Screen, while the fourth section asked about the Brief Trauma Questionnaire. Participants were instructed to answer all questions.

Measures

PTSD, THS, and BTQ were classified using the American Psychiatric Association's symptom criteria. PTSD is a set of 30 items developed by researcher Dr. Jassim Al-Khawaja in 1996 to assess trauma-related reactions. The scale covers four significant aspects that correspond to DSM-V PTSD criteria: the sensation of reliving the event, emotional problems, avoidance of thinking about the trauma, and hyperexcitability. Participants responded to the questions using a 5-point Likert scale (1 = not at all, 5 = excessively). THS is made up of fourteen binary items (yes or no) meant to assess previous traumatic events by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (Carlson et al., 2011). The Brief Trauma Questionnaire (BTQ) is a modified self-report questionnaire that includes ten traumatic incidents (Koenen et al., 2009; Schnurr et al., 1999). It is intended to assess exposure to severe trauma as defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), with a focus on life-threatening occurrences and crucial episodes. The internal consistency and validity of the items on the PTSD, THS, and BTQ scales have been proven. The Lehman classification was used to estimate this study's degree of correlation coefficient (Lehman, 2005). The Cronbach Alpha technique revealed the questionnaire is reliable (McHorney et al., 1992).

Statistical Analysis

The study had a total of (600) participants, with (300) coming from southern Turkey and another 300 from northwestern Syria. The sample size was calculated using the online Morgan equation and calculator (https://clincalc.com/). Both the analytical and descriptive approaches were used to analyze the variables. The categorical variables were shown as numbers and percentages (Krejcie et al., 1996). The numerical variables were represented as mean ± standard deviation. The groupings' distribution was determined using the Kolmogorov-Smirnov test. The categorical variables were analyzed using the chi-square test. The Analysis of Variance (ANOVA) test and the student t-test were used to examine the numerical variables. The data was analyzed using standard linear regression analysis. Pearson correlations were used to evaluate the relationships between the psychological factors. The statistical significance level was defined as $p < 0.05$. The mean item intercorrelation was optimum, and the internal consistency, as measured by Cronbach's α, was outstanding (Lehman, 2005). The statistical analysis was performed using SPSS® for Windows version 27.0 (IBM, Chicago, IL, United States) (SPSS, 2019).

Table 1. The relationship between sociodemographic characteristics and the scores of PTSD, THS, and BTQ

Variables /Study area	**n (%)**		**PTSD**		**THS**		**BTQ**	
	Southern Türkiye	**Northern Syria**	**Southern Türkiye** (p-Value) mean±SD	**Northern Syria** (p-Value) mean±SD	**Southern Türkiye** (p-Value) mean±SD	**Northern Syria** (p-Value) mean±SD	**Southern Türkiye** (p-Value) mean±SD	**Northern Syria** (p-Value) mean±SD
Gender			(0.556)	**(0.041)**	**(<0.001)**	**(<0.001)**	**(0.005)**	**(<0.001)**
Male	141 (47)	142 (47.3)	3.42±0.61	3.36±0.55	0.42±0.14	0.47±0.15	0.30±0.16	0.44±0.19
Female	159 (53)	158 (52.7)	3.46±0.63	3.49±0.57	0.34±0.14	0.36±0.19	0.24±0.16	0.
Age			**(0.004)**	(0.166)	**(0.037)**	(0.184)	**(0.003)**	(0.631)
From 19-30 years old	108 (36)	104 (34.7)	3.27±0.63	3.39±0.57	0.35±0.15	0.42±0.19	0.22±0.15	0.33±0.24
From 31-40 years old	78 (26)	81 (27)	3.52±0.55	3.34±0.62	0.39±0.13	0.41±0.17	0.28±0.15	0.36±0.22
From 41-50 years old	66 (22)	63 (21)	3.60±0.63	3.53±0.49	0.39±0.14	0.45±0.17	0.30±0.18	0.37±0.20
More than 51 years	48 (16)	52 (17.3)	3.48±0.60	3.51±0.55	0.42±0.15	0.37±0.18	0.31±0.16	0.34±0.20
Marital status			**(0.014)**	(0.330)	(0.418)	(0.055)	(0.118)	(0.145)
Single	16 (5.3)	19 (6.3)	3.21±0.71	3.21±0.44	0.34±0.17	0.37±0.16	0.26±0.19	0.36±0.24
Married	256 (85.3)	257 (85.7)	3.42±0.62	3.44±0.57	0.38±0.14	0.42±0.18	0.26±0.16	0.35±0.22
Widow	23 (7.7)	22 (7.3)	3.74±0.40	3.44±0.65	0.40±0.14	0.32±0.20	0.34±0.15	0.24±0.22
Divorced	5 (1.7)	2 (0.7)	3.90±0.32	3.71±0.58	0.46±0.17	0.50±0.05	0.34±0.25	0.30±0.28
Educational status			(0.882)	(0.526)	(0.612)	**(<0.001)**	(0.412)	**(0.013)**
Not knowing how to read and write	47 (15.7)	71 (23.7)	3.40±0.71	3.39±0.57	0.37±0.14	0.33±0.18	0.27±0.16	0.27±0.20
High school or below	233 (77.7)	205 (68.3)	3.45±0.60	3.43±0.55	0.38±0.15	0.43±0.18	0.26±0.16	0.37±0.22
Institute	7 (2.3)	9 (3)	3.36±0.65	3.68±0.57	0.45±0.18	0.41±0.15	0.35±0.13	0.32±0.24
University	13(4.3)	15 (5)	3.54±0.61	3.39±0.81	0.40±0.12	0.52±0.17	0.31±0.19	0.39±0.21
Working status			(0.461)	(0.959)	**(0.002)**	**(<0.001)**	**(0.032)**	**(0.003)**
Employed	94 (31.3)	80 (26.7)	3.42±0.66	3.43±0.57	0.36±0.14	0.39±0.19	0.25±0.16	0.33±0.23
Unemployed	206 (68.7)	220 (73.3)	3.48±0.53	3.42±0.56	0.42±0.14	0.47±0.14	0.30±0.17	0.41±0.19

*The statistical significance at the 0.05 level (2-tailed).

Results

The study began with 315 individuals from southern Turkey. A total of fifteen individuals still need to finish the questionnaire. Three hundred earthquake survivors participated, with 159 (53%) females and 141 (47%) males. The most significant percentage was aged 19 to 30, at 108 (36%). In northwest Syria, 311 participants were initially included. Eleven people still need to finish the questionnaire. Of the 300 participants, 158 (52.7%) were female and the remaining 142 (47.3%) were male. The most considerable percentage was in the 19 to 30 age group, with 104 (34.7%). In terms of PTSD, the findings revealed statistically significant differences in age ($p=0.004$) and marital status ($p=0.014$) in southern Turkey, with no significant differences identified in other variables ($p>0.05$). In northwest Syria, the only difference was gender ($p=0.041$). Only gender, age, and job status showed statistically significant differences in southern Turkey's THS and BTQ outcomes. Gender, education level, and working status differed in northwest Syria (Table 1). In southern Turkey, 56.3% of refugees had severe PTSD, while in northwest Syria, 55.7% of displaced people had PTSD. In terms of THS, statistics from southern Turkey showed that 55.7% of refugees had (5-8) traumatic events. Similarly, in northwestern Syria, 58.7% of the refugees had been subjected to 5-8 traumatic events. According to the findings, 68.8% of refugees in Southern Turkey had PTSD, whereas 38.21% and 27.38% of Syrian refugees had THS and BTQ episodes, respectively (Table 2).

Table 2. The Level of PTSD, THS, and BTQ in earthquake survivors in southern Turkey and northwestern Syria

Variable		n (%)		Mean (Std. Deviation)		Percentage %	
		Southern Türkiye	Northern Syria	Southern Türkiye	Northern Syria	Southern Türkiye	Northern Syria
PTSD (level)	Low	32(10.7)	25(8.3)	3.44(0.623)	3.43(0.571)	68.8	68.6
	moderate	99(33)	108(36)				
	High	169(56.3)	167(55.7)				
THS (events)	(1-4)	120(40)	99(33)	0.382(0.150)	0.416(0.186)	38.21	41.67
	(5-8)	167(55.7)	176(58.7)				
	(9-13)	13(4.3)	25(8.3)				
BTQ				0.273(0.166)	0.351(0.225)	27.38	35.13

*The statistical significance at the 0.05 level (2-tailed).

The study's findings in Southern Turkey revealed that 89.70% of participants had experienced at least one traumatic event. The most prevalent traumatic event THS that persons were subjected to was the sudden loss of house and property or a sudden move, accounting for 269 (89.70%). There were a total of 508 traumatic occurrences. People subjected to a tropical storm, flood, earthquake, or fire came in second, accounting for approximately 230 (76.70%). There were a total of 284 traumatic occurrences. In contrast, the least traumatic experience was being exposed to or forced to have sexual intercourse as a youngster, with only four (1.30%). They were exposed to an average of five traumatic experiences. Each individual was subjected to at least one traumatic experience and up to nine traumatic occurrences. In northwest Syria, the survey found that 84% of individuals had been exposed to at least one traumatic event. The most prevalent traumatic event THS that persons were subjected to was the abrupt loss of house and property or a sudden move, accounting for 252 (84%). There were a total of 516 traumatic occurrences. In contrast, the slightest traumatic incident was being exposed to or compelled to engage in sexual intercourse as an adult, with only 5 (1.7%) reported. They had been exposed to an average of five traumatic occurrences. Each subject had at least one stressful incident and up to eleven traumatic occurrences (Table 3).

People in southern Turkey have experienced severe trauma (BTQ) and a variety of significant injuries throughout their lifetimes. The most common severe trauma they reported was being exposed to a large natural or technical disaster, such as a fire, hurricane, flood, earthquake, or chemical leak. 223 (74.3%), whereas the least severe occurrence was, Before the age of 18, have you been subjected to physical punishment or beating by a parent, educator, or teacher to the point where you were terrified, felt you would be wounded, or were you exposed to cuts, bruises, or other injuries? which achieved a percentage of 50, equivalent to 16.7%. People who feared their lives were at risk or may be gravely injured: The majority, 198 (88.79%), have experienced a major natural or technical disaster, such as a fire, storm, flood, earthquake, or chemical spill. Individuals who sustained severe injuries: The most significant number, 26 (35.61%), were individuals who feared their lives were in danger or could be gravely hurt and had previously been in a severe vehicle accident, a profound work accident, or another situation where something serious occurred. Table 4 displays the results in northwestern Syria.

Table 3. Rates of endorsement for traumatic events and total number of traumatic events for participants

Events THS	Rates of endorsement for traumatic events				Total number of traumatic events	
	Southern Türkiye		Northern Syria		Southern Türkiye	Northern Syria
	n (%)	**R**	**n (%)**	**R**	**n**	**n**
A really bad car ,boat, train, or airplane accident	89(29.7)	6	130(43.3)	6	114	204
A really bad accident at work or home	87(29)	7	113(37.7)	7	134	195
A hurricane, flood, earthquake, tornado, or fire	230(76.7)	2	200(66.7)	4	284	235
Hit or kicked hard enough to injure – as a child	50(16.7)	11	64(21.3)	10	149	235
Hit or kicked hard enough to injure – as an adult	53(17.7)	10	34(11.3)	12	183	79
Forced or made to have sexual contact – as a child	4(1.3)	13	0	0	3	0
Forced or made to have sexual contact – as an adult	0	0	5(1.7)	13	0	5
Attack with a gun, knife, or weapon	59(19.7)	8	65(21.7)	8	86	121
During military service – seeing something horrible or being badly scared	50(16.7)	12	60(20)	11	104	128
Sudden death of close family or friend	210(70)	4	242(80.7)	2	380	474
Seeing someone die suddenly or get badly hurt or killed	144(48)	5	190(63.3)	5	269	386
Some other sudden event that made you feel very scared, helpless, or horrified	220(73.3)	3	204(68)	3	476	422
Sudden move or loss of home and possessions	269(89.7)	1	252(84)	1	508	516
Suddenly abandoned by spouse, partner, parent, or family	61(20.3)	9	66(22)	9	77	73

The statistical significance at the 0.05 level (2-tailed). R=Rank

Table 4. Rates of endorsement for Severe trauma (BTQ) for Southern Turkey and Northern Syria participants

Event BTQ	**Southern Türkiye**				**Northern Syria**			
	Rates of endorsement for Has this ever happened to you?		If the event happened, did you think your life was in danger or you might be seriously injured?	If the event happened, were you seriously injured?	Rates of endorsement for Has this ever happened to you?		If the event happened, did you think your life was in danger or you might be seriously injured?	If the event happened, were you seriously injured?
	n (%)	**R**	**n (%)**	**n (%)**	**n (%)**	**R**	**n (%)**	**n (%)**
-Have you ever served in a war zone, or have you ever served in a noncombat job that exposed you to war-related casualties.	68(22.7)	5	53(77.94)	10(18.86)	122(40.7)	5	85(69.6)	30(35.2)
-Have you ever been in a serious car accident, or a serious accident at work or somewhere else?	94(31.3)	3	73(77.65)	26(35.61)	134(44.7)	4	103(76.8)	37(35.9)
-Have you ever been in a major natural or technological disaster, such as a fire, tornado, hurricane, flood, earthquake, or chemical spill?	223(74.3)	1	198(88.78)	19(9.59)	160(53.3)	2	117(73.1)	29(24.7)
-Have you ever had a life-threatening illness such as cancer, a heart attack, leukemia, AIDS, multiple sclerosis, etc.?	61(20.3)	7	25(40.98)	**N/A**	65(21.7)	8	40(61.5)	**N/A**
-Before age 18, were you ever physically punished or beaten by a parent, caretaker, or	50(16.7)	8	12(24)	4(33.33)	44(14.7)	9	27(61.3)	8(29.6)

teacher so that: you were very frightened; or you thought you would be injured; or you received bruises, cuts, welts, lumps or other injuries? -Not including any punishments or beatings you already reported in Question 5, have you ever been attacked, beaten, or mugged by anyone, including friends, family members or strangers?	81(27)	4	37(45.67)	6(16.21)	84(28)	7	47(55.9)	12(25.5)
-Has anyone ever made or pressured you into having some type of unwanted sexual contact?	0	0	0	0	9(3)	10	0	0
-Have you ever been in any other situation in which you were seriously injured, or have you ever been in any other situation in which you feared you might be seriously injured or killed?	101(33.7)	2	**N/A**	24(23.76)	153(51)	3	**N/A**	8(22.8)
-Has a close family member or friend died violently, for example, in a serious car crash, mugging, or attack?	0	0	**N/A**	0	165(55)	1	**N/A**	12(20)
-Have you ever witnessed a situation in which someone was seriously injured or killed, or have you ever witnessed a situation in which you feared someone would be seriously injured or killed?	62(20.7)	6	**N/A**	**N/A**	124(41.3)	6	**N/A**	**N/A**

The statistical significance at the 0.05 level (2-tailed). R=Rank

The Pearson correlation coefficient test was utilized to determine the association between PTSD, THS, and BTQ. The information is presented in Table 5. The Lehman classification was used to calculate the degree of correlation coefficient (Lehman, 2005). The findings show a favorable and statistically significant association between PTSD, THS, and BTQ. In general, higher exposure to THS and BTQ leads to an increase in PTSD symptoms (Table 5).

Table 5. Pearson correlation coefficient test between PTSD, THS, and BTQ

	Variables	PTSD	THS	BTQ
Southern Türkiye	PTSD	1		
	THS	0.390**	1	
	BTQ	0.359**	0.630**	1
Northern Syria	PTSD	1		
	THS	0.292**	1	
	BTQ	0.224**	0.677**	1

*Correlation is significant at the 0.05 level (2-tailed). *p≤0.05 **p≤0.001

Table 6. Results of linear regression analysis of THS and BTQ with PTSD

	Dependent Variable	Independent variable	R	R2	F (p value)	B	T (p value)	VIF
Southern Türkiye	PTSD	THS	0.417	0.174	31.177(0.000)	1.127	4.007(0.000)	1.210
		BTQ				0.70	2.757(0.006)	1.210
Northern Syria	PTSD	THS	0.294	0.086	14.043(0.000)	0.793	3.431(0.001)	1.094
		BTQ				0.124	0.649(0.517)	1.094

*The statistical significance at the 0.05 level (2-tailed).

A linear regression model was employed to investigate the effects of THS and BTQ on PTSD. The findings revealed that THS and BTQ help to explain the variance in PTSD. For example, in southern Turkey, when THS increased by one unit, PTSD symptoms increased by (1.127) units, and when BTQ increased by one unit, PTSD

symptoms increased by (0.70). However, the result (β = 0.124) for BTQ is not statistically significant in northwest Syria (see Table 6).

Discussion

Trauma levels were measured one year later in earthquake survivors in southern Turkey and northwestern Syria. The average PTSD scale score among refugees in southern Turkey was 68.8%, while in northwest Syria was 68.6%. Half of the earthquake survivors in the sample exhibited a high rate of trauma response. The findings in southern Turkey revealed that 56.3% of the earthquake survivors who were refugees exhibited a significant degree of post-traumatic stress disorder (PTSD). In comparison, 33% displayed a moderate level of symptoms. In northwest Syria, a significant majority of the displaced population, precisely 55.7%, experienced a severe degree of post-traumatic stress disorder (PTSD). In comparison, 36% had a moderate level of PTSD. This conclusion corroborated prior research conducted on individuals who had experienced other stressful situations, such as natural catastrophes and earthquakes (Farooqui et al., 2017; Ilhan et al., 2023; Lavenda et al., 2017; Lilly et al., 2010; B. Wang et al., 2011; Xu & Song, 2011a).

Statistical analysis of the data from southern Turkey revealed that there were no significant differences in symptoms of post-traumatic stress disorder (PTSD) between males and females. This finding aligns with the findings of other investigations (Gay et al., 2020). This is because both male and female migrants were subjected to identical events with equal intensity and timing. Several research has found no correlation between post-traumatic stress reactions and gender (El hamaoui et al., 2002; Sheeran & Zimmerman, 2002). Furthermore, the findings on post-traumatic stress disorder (PTSD) indicated that there were no notable disparities in education level and work status, which aligns with the observations made in earlier studies (Bliwise et al., 2022).

Significant statistical differences were seen among different age groups. The age group with the highest number of individuals was between 41 and 50, followed by the age group between 31 and 40. This is because individuals in older age frequently have more difficulties and obligations throughout their lives. This encompasses challenging encounters, encountering health issues, and additional distressing occurrences. Due to the inherent characteristics of these difficulties, individuals in older age are more susceptible to distressing events that can result in post-traumatic stress disorder (PTSD). In addition, individuals may possess a more extensive historical background of prior experiences that can impact their capacity to adjust to traumatic occurrences. The findings also indicated notable differences among the marital statuses, with the highest observed among the divorced, followed by the widowed participants. Consistent with the results of prior research (Telles et al., 2009).

The correlation between social support, solid marital connections, and the ability to manage PTSD is that these factors strengthen one's capacity to deal with the condition. Conversely, traumatic events like divorce and the loss of a partner have a notable influence on mental health. Several studies investigating the relationship between marital status and stress response have made contrasting claims. Some studies suggest that being married decreases the risk of stress, while others show the opposite (Englert et al., 2008; Javidi, 2012). The study findings in northwest Syria indicate that there were no statistically significant variations in the prevalence of PTSD among different age groups, marital statuses, education levels, and occupational status. Nevertheless, there were statistically significant differences based on gender, with males demonstrating lower levels of PTSD in comparison to females. This finding aligns with the results reported in research by S. Chen et al. (2020) and Goldmann and Galea (2014) (S. Chen et al., 2020; Goldmann & Galea, 2014). Research has shown that women are more susceptible to developing symptoms of post-traumatic stress disorder (PTSD) during disasters, as evidenced by studies conducted by Acierno et al. (2007), Dai et al. (2016), and Doocy et al. (2013).The findings suggest that females exhibit elevated levels of stress and post-traumatic stress disorder (PTSD) compared to males (Fan et al., 2015). Previous research has indicated that post-traumatic stress disorder (PTSD) is more commonly seen in girls compared to boys, as observed by Meiser-Stedman et al. in 2012 (Meiser-Stedman et al., 2012).

The incidence of THS in southern Turkey was relatively low, with a prevalence rate of 38.21%. On average, each individual encountered approximately five stressful events. The findings indicated that 89.70% of the participants encountered at least one stressful event. The reason for this is the adverse circumstances of war and forced migration that Syrians have endured. The prevailing traumatic experiences that individuals encountered were abrupt displacement from their residence and possessions or immediate migration. These findings are consistent with prior research on the cumulative occurrence of traumatic events that individuals experience

throughout their lives (Breslau et al., 2014; Ghannam & Thabet, 2014; Joseph et al., 2000). The THS study is a crucial and regular component of evaluating mental health, as it can significantly enhance the identification of symptoms related to PTSD (McCloskey, 1999). In northwest Syria, the incidence of THS was found to be 41.67%, indicating a relatively low level of prevalence. The mean number of traumatic episodes per individual was approximately five. Each individual experienced at least one traumatic incident and, at most, eleven traumatic occurrences. The prevailing traumatic experience that individuals encountered was the abrupt deprivation of their residence and belongings or the unexpected displacement. This discovery aligns with previous studies carried out in various traumatic events (Vrana & Lauterbach, 1994). Prior studies have demonstrated that the presence of previous traumatic experiences and preexisting emotional problems are significant factors that contribute to the ongoing presence of post-traumatic stress disorder (PTSD) (Mayou et al., 2002; Wang et al., 2000).

The findings in southern Turkey indicated no statistically significant variations in the THS based on marital status and level of education. Although there were statistically significant disparities based on gender, the mean value for males exceeded that of girls. The findings of this study align with earlier research, indicating that males are more susceptible to the effects of cumulative traumatic incidents (Vrana & Lauterbach, 1994; Wilker et al., 2021). This could be attributed to the heightened psychological burden on the family's primary care person. Furthermore, there were notable variations in the data based on age, with the most significant proportions observed among individuals aged 51 years and above. The findings indicated that individuals between 19 and 30 exhibited reduced levels of THS, indicating a preference for this age range. When comparing the work status of individuals, it was discovered that employed individuals had higher levels of THS than unemployed ones. This indicates that the individual's employment situation has a substantial influence on their psychological well-being since individuals who experience difficulties such as loss of income or financial instability tend to exhibit more signs of psychological disorders. There were no significant variations in THS based on age and marital status in northwest Syria. However, there were notable differences based on gender, with males having a higher average THS than females. Significant differences were seen based on the education level variable, with the greatest education level being university in THS. The results favored the education level of the inability to read and write, which exhibited low levels of THS. Significant statistical differences were seen in the THS averages of employed and jobless individuals. Employed individuals exhibit a greater level of total mental health status than those unemployed. The findings of this study are incongruent with those of other investigations (Brattstrom et al., 2015).

The incidence of BTQ in southern Turkey was 27.38%. The prevailing BTQ encountered by individuals was "being subjected to a significant natural disaster, such as a conflagration, cyclone, deluge, seismic event, or chemical spill." In northwest Syria, the incidence rate of BTQ was 35.13%. The most frequently encountered BTQ was "The violent death of a family member or close friend, such as in a severe car accident, robbery, or attack." Research conducted within these environments could have been more frequent. The findings in southern Turkey indicated no statistically significant variations in BTQ based on marital status and degree of education. Nevertheless, there were statistically significant disparities based on gender, as the average BTQ for males exceeded that of girls, suggesting that males experienced higher levels of BTQ than females. Furthermore, there were statistically significant variations based on age, with the highest groups being individuals aged 51 years and above. The findings indicated that the age group between 19 and 30 years had reduced levels of BTQ exposure compared to the other age groups. Regarding work status, there were substantial disparities in the average BTQ levels between employed and unemployed individuals. Employed people had higher BTQ levels, suggesting that work position significantly influences BTQ. The findings in northwest Syria indicated no statistically significant variations in BTQ based on age and marital status. Nevertheless, gender had a role in the observed differences, as BTQ levels were higher in males than females, suggesting that males had greater exposure to BTQ than females. This can be attributed to the fact that males, who take on the task of providing care for the entire family, may encounter heightened psychological stress. Furthermore, there were statistically significant disparities based on the education level variable, with university-educated individuals having the highest exposure to BTQ. The findings indicated that individuals with an "illiterate" education level exhibited lower levels of BTQ than those with a university or secondary school education or below. Regarding employment status, there were statistically significant variations in BTQ levels between employed and unemployed individuals. Employed individuals had greater BTQ levels than the jobless. This suggests that the individual's employment status substantially influences their BTQ. A statistically significant moderate positive connection was found in southern Turkey between the overall scores of PTSD and the combined scores of THS and BTQ ($p < 0.05$). The correlation value between PTSD symptoms and THS is 0.39, and the correlation coefficient between PTSD and BTQ is 0.36. This implies that there is a positive correlation between the THS and BTQ scores and the severity of PTSD symptoms. This study discovered a direct relationship between the occurrence of psychiatric diseases and the response to trauma, which aligns with earlier research conducted by

Auxéméry (2012) and Basoglu et al. (2004) . A substantial positive association was found in northwest Syria between the total scores of post-traumatic stress disorder (PTSD) and the total scores of the traumatic history scale (THS) and B. trauma questionnaire (BTQ), with a p-value of < 0.05. This correlation suggests that elevated THS and BTQ scores are linked to heightened levels of PTSD symptoms. The correlation coefficients indicate a favorable relationship between PTSD symptoms and both THS and BTQ, with correlation values of 0.292 and 0.224, respectively. This conclusion supports the results of earlier research that suggest a positive correlation between prior traumatic events and heightened reaction to subsequent traumas (Attfield et al., 2015; Auxéméry, 2012; Javidi, 2012; Kilic, 2005).

The findings in southern Turkey indicate that THS and BTQ account for roughly 17.4% of the variation in PTSD symptoms. The β coefficient, representing the correlation between PTSD and THS, was found to be statistically significant ($\beta = 1.127$, $p < 0.05$). This indicates that for every incremental rise in THS, there is a proportional increase of 1.127 units in PTSD symptoms. In addition, the β coefficient representing the association between PTSD symptoms and BTQ was shown to be statistically significant ($\beta = 0.70$, $p < 0.05$). This suggests that a one-unit increase in BTQ results in a 0.70-unit rise in the degree of PTSD. Consequently, the symptoms of PTSD can be anticipated by both THS and BTQ, indicating the direct impact of increased THS and BTQ on PTSD symptoms. Regression analyses conducted in several studies have consistently demonstrated a positive correlation and significant impact between post-traumatic stress disorder (PTSD) and prior traumatic experiences (Gould et al., 2021; Hoppen & Morina, 2021). The findings in northwest Syria indicate that THS and BTQ account for approximately 8.6% of the variability in PTSD symptoms. The β coefficient representing the connection between PTSD symptoms and THS was found to be statistically significant ($\beta = 0.793$, $p < 0.05$). This demonstrates a positive correlation between THS and PTSD symptoms, with a coefficient of 0.793. This means that for every one-unit increase in THS, there is a corresponding increase of 0.793 units in PTSD symptoms. Nevertheless, the β coefficient representing the correlation between PTSD symptoms and BTQ was found to be 0.124, with a p-value greater than 0.05, indicating that the link was not statistically significant. Therefore, only THS can forecast PTSD symptoms in this situation. It may be inferred that there is a positive correlation between the degree of PTSD symptoms and the amount of traumatic life events (THS) experienced. This suggests that high levels of THS directly contribute to the severity of PTSD symptoms .

Limitations

The current study has several limitations. Questionnaires that needed to be completed or were untrustworthy were not included. Reliable population statistics are limited. Access to several locations in northwest Syria is restricted due to security concerns. Individuals residing in these regions experience challenging psychological states due to armed conflicts and forced migration, which can impact their survey responses and hinder their capacity to concentrate and offer precise information. In certain areas, people have low levels of self-awareness and education; thus, data must be gathered directly and in a simple way.

Conclusion

We have reached practical conclusions indicating the importance of directing efforts toward providing psychological and social support to earthquake survivors. Additionally, we have presented a series of proposals for future research that could contribute to expanding knowledge in the areas covered by this study. Syrian refugees and displaced people who survived the earthquake in southern Turkey and northwestern Syria suffer from a high level of PTSD symptoms. Therefore, it is recommended that mental health and psychosocial support centers be established in areas affected by the earthquake. These centers should provide guidance, awareness, educational training, and treatment programs to raise awareness, address social problems and psychological disorders, and assist earthquake survivors in recovering, adapting, and integrating into society properly. PTSD symptoms were more common in older age groups than in younger age groups. They were also more prevalent among social groups such as divorced individuals and widows. It was found that the prevalence of THS and BTQ was low. The low level of education in the study areas, especially in northwestern Syria, highlights the need to take adequate measures to improve the education level in those areas, including strengthening literacy programs. Unemployment rates have witnessed a significant increase, especially in northwestern Syria. This necessitates strengthening the provision of psychological and social support and supporting the search for job opportunities, aiming to enhance economic opportunities and improve psychological and living conditions. Increased PTSD symptoms were observed in individuals exposed to higher levels of THS and BTQ. Finally, it is recommended that psychological support programs that offer resilience strategies, recovery from trauma, and disaster management techniques be implemented. This includes strengthening both immediate response and

long-term recovery and resilience strategies to address the mental health needs of earthquake-affected populations. Additionally, adopting electronic mental health methods can help broaden the reach of beneficiaries. Conducting further studies and research encompassing other types of trauma and psychological disorders that earthquake survivors may encounter is advisable.

Ethical Approval

All participants were required to provide informed consent before proceeding to the questionnaires. Contact information for the research team was given at the beginning and end of each study for any inquiries that may occur during the research. Participants could end questionnaires or interviews anytime without justifying and facing any consequences. Furthermore, participants had up to one week after completing the questionnaires or responses to contact the researcher if they wanted to remove their data. If a person withdraws, their data will be permanently deleted and not included in any analysis published in this research

Authors Contributions

Study concept and design (D.B., M.H.), acquisition of the data (D.B., M.H.), analysis and interpretation of the data (D.B., M.H.), drafting of the manuscript (D.B., M.H.), critical revision of the manuscript for important intellectual content (D.B.).

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Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors

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