International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Review Article

Risk Factors of Posttraumatic Stress Disorder That Arises From an Earthquake Disaster

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ABSTRACT

This study aimed to investigate the risk factors for the development of PTSD that arises from a catastrophic event such as an earthquake disaster. For a systematic literature review, research studies selection and evaluation were done with respect to the posttraumatic stress disorder, earthquake disaster and associated risk factors. Studies were searched out with the help of MEDLINE, PUBMED, BMC, ELSEVIER, WILEY, JAP, and Google Scholar. Findings showed that the major risk factors associated for the development of PTSD in people who confronted earthquake disaster were gender (female), age, previous histories of psychiatric problems, loss of beloved one, substance abuse, disabilities, comorbidity, prior experiences of traumatic events, poverty, and lack of intervention programs for affected people. The major psychological problem which developed aftermath of an earthquake disaster was PTSD. PTSD persisted for a longer period if it was left untreated after an event. There were several risk factors which were responsible for the development of PTSD but the major factor that increased the probability of getting PTSD was comorbidity. Through proper intervention programs and on time diagnosis can minimize the chances of getting PTSD among earthquake survivors.

Keywords: Earthquake, Natural Disaster, Posttraumatic Stress Disorder

INTRODUCTION

In spite of the cross-national discrepancies in the occurrence of traumatic events, it is ubiquitous; all worldwide societies get exposed to different types of trauma. It is worth mentioning here that mainly adults experience more traumatic events in their lives, as indicated by the data based on the population of different countries. (Benjet et al., 2016; Burri & Maercker, 2014). [1,2] The purpose of this review article was to explore the risk factors for the progression of posttraumatic stress disorder in people who were confronted/ exposed/ experienced a catastrophic event like an earthquake disaster. Due to the high comorbidity rates and long duration persistence of symptoms of PTSD in aftermath of an earthquake disaster, was the reason for the selection of an earthquake for a review study. Risk Factors of Posttraumatic Stress Disorder that arises from an Earthquake Disaster

Natural disasters: They are typically unexpected, sudden onset, slow onset and overpowering in nature. It tends to involve a lack of control over natural forces, which is uncontrollable. The natural disasters can be of different types: earthquakes, floods and flash floods, tsunamis, drought, agricultural diseases and pests, damaging winds, emergency diseases (pandemic influenza), extreme heat, hail, hurricanes and tropical storms, landslides and debris flow, thunderstorms and lightning, tornadoes, wildfire, winter and ice storms, sinkholes and etc. In terms of intensity in above-listed disasters, an earthquake is considered to be

one of the most devastating events that bring a lot of chaos and destruction as compared to other types of disasters. Some injuries may not be visible or may have not any outwardly physical signs, but its emotional price one pays is tremendous; it's possible that the entire life of an individual may become affected by psychological problems. Because it is quite common for people who have experienced a natural disaster to have strong emotional reactions. Natural disasters also vary widely in the amount and the nature of the stress they involve: duration, loss of life, personal injury, or injury to loved ones, property damage, terror, helplessness, gruesome sights, sounds and smells, dislocation from one's home and unavailability of social support.

Earthquake: As it is well-known earth is dynamic and evolving each second to hours, day to weeks and month to years, and hence earthquakes are witnessed. An earthquake begins with a high magnitude of seismic waves and ends up with n numbers of aftershock that can be the low intensity of magnitude from the main earthquake. Its impact varies from one place to another place. An earthquake near the coastline brings not only seismic waves but also strong tsunami waves like Fukushima Daiichi Nuclear disaster following the Tohoku earthquake, 2011(Japan) and 24th December 2004 Tsunami (India). In addition, a Himalayan region earthquake comes with lots of landslide, avalanches, Glacier Lake Outburst Flood (GLOF's), lake burst and flood etc. that made more damage in Nepal 2015 earthquake. Nepal faced two major disastrous earthquakes: first disastrous event, on April 25, 2015, struck by a 7.8 magnitude earthquake (intensity level was VIII (Severe)), the epicentre was located in Barpak, Gorkha. A second massive earthquake of 7.3 magnitudes (intensity level was VIII (Severe)), occurred on May 12, 2015, in the border of two districts (Dolakha and Sindhupalchowk), Nepal. A chain of aftershocks started immediately after the main earthquake with intervals of 15-30 minutes. As of 18 December 2017, over and above 488 numbers of aftershocks with magnitude greater or equal to 4 have occurred in continuum followed by an initial earthquake (Gorkha earthquake). [3]

In plain areas like in north India, an earthquake brings devastation through damaging of buildings. For example, on 26th January 2001 a massive earthquake of 7.9 magnitudes struck Gujarat and thereafter aftershocks persisted for many days. This earthquake was named the Bhuj earthquake. Some major examples of natural disasters happened in the Indian's location and physiography are Nepal-Bihar earthquake (1934), Latur earthquake (1993), Kashmir earthquake (2005), Rann of Kutch earthquake (1819), Jabalpur earthquake (1997), Indian Ocean earthquake (2004), Sikkim earthquake (2011), Uttarkashi earthquake (1991) and so on. Consequences of catastrophic events are always devastating to both living things and non-living things. The major impact can be seen in our ecosystem that can influence directly and indirectly all human beings. [4]

Posttraumatic Stress Disorder:

PTSD is defined as disorders that might recur in a person who had witnessed/experienced/ confronted disastrous events such as death, serious injuries, threatening situations, drowning, war, rape, riots, violence, physical abuse, emotional abuse and acid attack. The probability of getting PTSD depends upon a number of important factors like the intensity of a traumatic event; duration of a traumatic event; personal history of facing a traumatic event; the nature of a traumatic event. Galatzer-Levy & Bryant, (2013) [5] found that there are "6, 36,120" different ways to get a PTSD. According to the WHO report (2013) [6] all over the world, the majority of adolescents and children get confronted with traumatic events. A globally significant section of children is exposed to traumatic events such as natural disasters, armed combat, and humanitarian emergencies (such asconflicts, epidemics,

drought, natural disasters). As mentioned in the report of UNICEF (2014), [7] there are some countries where approximately 230 million children were living in an environment where armed battles had taken place. These armed fights increase the chances of children to getting raped, enrolled as child soldiers, made hostages, forced to migration or displacement, witnesses' bloodshed, death, and loss of loved ones, or becomes orphans (UNICEF, 2009). [8] It has been found that the major common outcome from the devastating natural disaster (earthquake) is PTSD, with rates ranging from 2% to 87% (Atwoli, Stein, Koenen, & et al., 2015). [9] A very little attention has been given to risk factors and mental health consequences associated withearthquakes. (Carr et al., 1995; Goenjian et al., 1994; McMillen, North, and Smith, 2000; Sharan, Chaudhary, Kavathekar, and et al., 1996). [10- 13]

In fact, individuals are likely to experience multiple traumatic events in theirlifetime (Breslau, Kessler, Chilcoat, & et al., 1998; Kessler et al., 1995; Resick et al., 1993). [14, 15, 16] In 2008 "Mental Health Global Action Programme" was commenced by WHO to tackle the mental disorders worldwide. The mhGAP main goal is to provide primary health care for SUD's, mental and neurological disorders. It is worth mentioning, WHO took an initiative to add up PTSD, bereavement and acute stress in the mhGAP. It is quite common among human beings to experience loss and traumatic events in their lives. In an aforementioned study done by WHO on 21countries, people recounted different types of traumatic events such as 21.8% witnessed violence, 18.8% experienced violence, 17.7% got accidents, 16.2% confronted war, 12.5% experienced trauma associated to their loss of beloved one. According to the WHO report, around 3.6% of people suffered from PTSD all around the world in the last year. [17]

Risk factors for progression of PTSD:

The expected risk for the development of PTSD in any person who is either victimized or witnessed or confronted life-threatening situations varies with the types of traumatic events. Associated risk factors for the development of PTSD comprises: natural disasters (such as flood, earthquake, fire, landslide, cloudburst, tornadoes, tsunami, etc.), terrorist act, accidents (e.g., industrial accident, plane, train, bus, car, etc.), domestic violence, physical and psychological abuse, rape, physical and sexual assault, riots, and so on. If we talk about the associated risk factors for PTSD, the first thing comes in the mind is Trauma types. PTSD risks vary with Trauma types such as interpersonal violence is thought to involve the highest tendency to get a PTSD a study done by Caramanica, Brackbill, Stellman, & et al., 2015; Fossion et al., 2015. [18, 19] A second risk factor is Trauma History i.e., if a person is exposed or confronted a traumatic event in his/her past lives then the possibility of getting PTSD again is very easy. A study suggested that with the earlier history of exposure or confrontation of traumatic violence leads to later development of PTSD (Lowe, Walsh, Uddin, & et al., 2014; Smith, Summers, Dillon, & et al., 2016). [20, 21]

It has been shown that common risk factors which increases the impact of an earthquake include, female gender (Basoglu, Salcigu, &Livanou, 2002; Carr et al., 1995; Livanou, Basoglu, Salcioglu, &Kalender, 2002; Salcioglu, Basoglu, &Livanou, 2003; Sharan et al., 1996), [22, 10, 23, 24, 13] any prior history of psychiatric disorder (Basoglu et al., 2002; Nolen-Hoeksema& Morrow, 1991; Salcioglu et al., 2003), [22, 25, 24] older age people(Jia, Tian, Liu, & et al., 2010; Salcioglu et al., 2003), [26,24] low level or primary level of education (Armenian et al., 2000; Basoglu et al., 2002; Cénat, &Derivois, 2014; Karanci&Rustemli, 1995), [27, 22, 28, 29] number of exposure to an earthquake (Armenian et al., 2000; Carr etal., 1995; Goenjian et al., 1994), [27, 10, 11] loss of loved ones (Basoglu et al., 2002; Goenjian et al., 1994; Cerdá, Paczkowski, Galea, & et al., 2012), [22, 11, 30] immovable property losses (Armenian et al., 2000;

Freedy, Saladin, Kilpatrick, Resnick, and Saunders, 1994), [27, 31] getting under the demolished houses or buildings**,**many worked as a rescuer after an earthquake (Basoglu et al., 2002; Salcioglu et al., 2003), [22, 24] fear during and after an earthquake (Basoglu et al., 2002; Livanou et al., 2002; Salcioglu et al., 2003), [22, 30, 24] and unavailability of social support after an earthquake (Armenian et al., 2000; Bland et al., 1997). [27, 32]

A study was done by Basoglu et al., 2004 [33] on two samples of Turkey: one from the epicentre of Marmara earthquake in Turkey and second 100 km from the epicentre in Istanbul. Depression comorbid with PTSD had 14% and 8% rate in Istanbul whereas only PTSD had 23% and 16% rate at the epicentre in Turkey. Fear during an earthquake had the strongest predictor of traumatic stress symptoms. Other Significant predictors were female gender, past history of psychiatric disorders, loss of beloved ones, participated as a member of the rescue team, loss of immovable property. Major findings of their studies were natural disasters, especially an earthquake have devastating psychological consequences for a long period of time. In 2013 Lushan earthquake, Wang and Lu (2017) [34] found that those people who trapped inside the debris of houses or lost the beloved ones in the devastating earthquake were more likely to develop the PTSD. In the year 2000, Global Burden of Disease (GBD), Version 1 estimated that PTSD burden has been increased by 0.6% of the total Global Year Living with Disability (YLDs), published in 2001 WHO report. [35] The probability of getting risk of PTSD is higher for rape victim that is 49%; 31.9% in physically mugged; 23.7% in sexually assaulted; 16.8% in severe accidents such as car and train accidents; 15.4% in stabbing and shooting by gun; 14.3% in sudden loss of beloved family as well as friends; 10.4% in children who suffers life-threatening illness; 7.3% in confronting murder and serious injury; 3.8% in natural disaster. [36]

Comorbidity and PTSD:

Comorbidity is an amalgamation of at least two or more mental disorders than a single mental disorder, more severe and extreme combinations lead to deleterious consequences of health. As we know there are some other factors which can also lead to the comorbidity involves: Environmental factors like prior history of disaster confrontation and major stressors (Cloitre et al., 2009; de Graaf et al., 2002; Kilpatrick et al., 2003); [37- 39] individual factors like ethnicity differences and gender (Couwenbergh et al., 2006; Kilpatrick et al., 2003). [40, 39] Hence the post-disaster comorbidities are the result of the above-mentioned factors and the past history of experiences/ confrontation/ witnessing the traumatic events. Sometimes the intensity level of disaster appears to either moderate or increase the risk of a probability of comorbidity of PTSD and Depression among youths (Goenjian et al., 2001; Lai et al., 2012). [12, 41] PTSD is significantly found to be comorbid with the most common disorder is depression. Other disorders which comorbid with PTSD are as follows: Sleep problems like insomnia, major depressive episode (MDE), Generalized Anxiety Disorder (GAD), Panic Disorder, Social Phobia, substance use disorder (SUD) like alcohol abuse or dependence, Drug abuse or dependence, Conduct disorder, Mania and so on.

Very few research studies have been done on comorbidity and disaster mental health deals with PTSD and Depression. Across different types of disasters such as earthquake, hurricanes, and cyclones, the estimated occurrence rate of comorbidity was around 10% among youth (Fan et al., 2011; Kar& Bastia, 2006; Lai et al., 2012). [42, 43, 41] Evidence showed that comorbidity rates vary with gender wise, with an extreme high comorbidity rate of 10.5% found in girls whereas only 6.5% comorbidity rates found in boys (Fan et al., (2011). [42] In a 13 months longitudinal study Fullerton et al., 2004 [44] found that those rescue workers who involved in the plane crash event develop ASD, PTSD and

depression. Kilpatrick et al., (2003) [39] found in a national survey sample of adolescents that there was a greater likelihood of association of comorbidity and severe trauma exposure: 38% of adolescents with depression and 26% of adolescents with PTSD, fulfil the conditions of Substance Use Disorder (SUD). Danielson et al., (2010) [45] found that the number of psychiatric disorders exhibited by post-disaster youth with PTSD as a primary disorder. Those people who confronted or exposed to the disaster have high probability to get depression (Miguel-Tobal et al., 2006), [46] generalized anxiety disorder (GAD), panic disorder, and substance use (Breslau et al., 1991; Kessler et al., 1995; North et al., 1999, 2002; Vlahov et al., 2002) [47, 15, 48, 49, 50] along with PTSD.

Different faces of PTSD in different ages:

The major causes behind the development of PTSD in children are as follows: natural disasters, man-made disasters, sexual abuse, physical abuse, psychological abuse, gun shootings in school, major accidents, deployment (in the military family), inattention and sudden loss of beloved ones, a war refugee, migration. As stated by the National Institutes of Health, Department of Veteran Affairs, and Sidran Institute, in the U.S. 70% (approx. 223.4 million) of adults confronted at least one traumatic event in their lives. Out of 70%, only 20% (44.7 million) people develop PTSD. Approximately 24.4 million Americans i.e., equivalent to the total population of Texas, have struggled with PTSD at any particular time. Out of ten women, one woman suffers from PTSD and more vulnerable to develop PTSD twice as likely to men. There are certain noteworthy facts about the PTSD which includes: after one month of traumatic events, the more severe symptoms of PTSD lead to certain drastic changes in structure as well as brain function. Earlier it was thought PTSD happened only to the combat veterans. Those who were struggling with this disorder often faced a rejection from family, friends, society, military colleagues, and sometimes terminated from the military service (due to a sticky tag of "weak" and not able to cope up any battle again). [51]

A Posttraumatic Stress Disorder can develop if a person comprised symptoms, not less than one month after confronting the odd situations or traumatic events. For the 2011 survey, children with age of 1 month to 17 years were recruited for the assessment of PTSD. Three out of five children experienced Sexual Abuse (6%), Child Abuse by a Caregiver (14%), physical assault (41%), and watched Violent Act (22%). Out of five different types of violence, approximately 57.77% of children got confrontation of not less than one violence in the past year. Major symptoms associated with the PTSD in children varies widely from Preschool to Elementary to Middle and High school. In the following survey three age groups emerged out: Alcohol dependency found in 46% of Children with PTSD; by the age of 18 years, 40% of PTSD children developed comorbidity with the major depressive disorder; and social anxiety/ specific phobia developed in 30% of children with PTSD. Three categorizations were done on the basis of schooling: First, children are in the "Preschool" have the following symptoms such as parting from parents create a feeling of panic, shouting and crying frequently, loss of weight due to the poor appetite, nightmares and flashbacks, reformation of trauma again while playing. Second, those children who are in the "Elementary School" have the following symptoms such as deconcentration, sleeping difficulties, anxiety, guilt and shame. Third, those children who are in the "Middle and High school" have the following symptoms such as dependency on the drug and alcohol abuse, depression, self-harm, eating disorders, involvement in the unsafe sexual activities. Besides above-mentioned symptoms, there are some additional symptoms like hypervigilance, irritability and not showing any interest in the hitherto loved and adored activities. The most useful

techniques for the treatment of PTSD in teens and children are Play therapy, EMDR (Eye Movement Desensitization and Reprocessing), PFA (Psychological First Aid) and CBT (Cognitive Behavior Therapy). [52]

PTSD is quite common among children and teen as reported by the U.S. Child Protection services, around 3 million cases come in a year. About 30% of the cases have the proof of abuse and on the basis of these reported cases; a general idea is formed about the occurrence of different types of abuse such as 65% in negligence, 18% in physical abuse, 10% in sexual abuse, and 7% in psychological abuse. In addition, each year 3 to 10 million children experienced and confronted the family violence. Estimated number of cases of child physical abuse is approximately 40% to 60%. Each child either boy (14% to 43%) or girl (15% to 43%) experienced at least one traumatic event in their lives. Studies reported that girls (3% to 15%) are more vulnerable to get PTSD as a comparison to the boys (1% to 6%). Factors that increase the probability of getting the highest level of PTSD symptoms in children can include severity of the trauma; the reaction of the parents to the trauma; and maximum and a minimum distance of a child from a traumatic event. Though, this high level of severity of PTSD symptoms may be going to down by the family support and maximum distance from the disastrous place. Researches done on the child sexual abuse showed that children develop or suffer from certain problems such as loneliness, distant from others, aggressiveness, fear, anxiety, worry, sadness, low self-esteem, and feeling difficulty in trusting on others. Although they also develop behavioural issues such as substance abuse, self-harming, and out of place sexual behaviour. Children ages less than and equal to 6 years have different criteria in the DSM-5 for the identification of PTSD symptoms. Different treatment methods are used for children with PTSD which includes: CBT, EMDR, Play therapy and Psychological First Aid (PFA).

As a risk factor, culture played a major role in showing the sex differences of symptoms of PTSD among male and female. Norris et al. (2001) [53] found that high gender differences existed in the prevalence rate of PTSD among the Mexican, whereas diminished rate among the African-American. According to Norris and her colleagues (2007), [54] women who belong to traditional cultures, have a high risk of PTSD in a more magnified form. Men and women not only differ in terms of the experience of trauma but they also differ in brain responses to trauma. The brain reacts differently to threatening stimuli and fear-arousing stimuli in women than men. For fearful stimuli, certain brain areas activated more in women (such as Dorsal ACC, right rostral ACC and right amygdala) than men. The right hemisphere is involved in negative emotions in particular. Above mentioned brain areas involved in the emotional reactivity, mind-body awareness as well as in the stress response. In one of the study, women attained fear stimuli more rapidly than men. If we talked about the coping style in gender wise then it varied differently among men and women for traumatic events. Women have a tendency to unveil more ruminative and emotional responses to traumatic events such as seeking social support, feeling lonely, caretaking and emotional support. However, men exhibited or unveil more anger emotion, avoidant responses and problem-solving when they encountered any traumatic events. Women were not only affected by self-traumatic experiences but also by observing other people who were close to them such as friends, children, parents and beloved ones. [55]

CONCLUSION

Based on this review study, it can be concluded that there is a vast variation in associated risks factors for the development of PTSD among earthquake survivors. There are several major factors which come

into play for the progression of symptoms of PTSD. The symptoms of PTSD varies with age, sex, losses, resilience, intensity/duration of an earthquake, numbers of exposure of traumatic event in life, coping style, drug addiction, comorbidity, culture, previous history of mental illness and natural disaster types. Based on earthquake research studies, certain psychological symptoms recover their own, within a limited time frame. Whereas, ignorance of PTSD symptoms for a long run leads to the persistence of symptoms of PTSD for a whole life after an incident. Females get widely affected by earthquake disaster and suffer from a number of psychological problems. The deliberate ignorance of these risk factors made the conditions more severe after the 6 months of an earthquake disaster. However, there is a need to do in-depth study in the area of risk factors involved in the progression of PTSD aftermath of an earthquake disaster. A natural disaster like earthquake leaves their footprint permanently in the unconscious and conscious mind of affected people (especially children and female) for a lifetime.

REFERENCES

1. Benjet, C., E. Bromet, E. G. Karam, R. C. Kessler, K. A. McLaughlin, and A. M. Ruscio and others, "The Epidemiology Of Traumatic Event Exposure Worldwide: Results From The World Mental Health Survey Consortium", *Psychological Medicine*, 46/02 (2015), 327-343
2. Burri, Andrea, and Andreas Maercker, "Differences In Prevalence Rates Of PTSD In Various European Countries Explained By War Exposure, Other Trauma And Cultural Value Orientation", *BMC Research Notes*, 7/1 (2014).
3. "National Seismological Center", *Seismonepal.Gov.Np*, 2019 <http://www.seismonepal.gov.np/index.php?action=inquiry> [accessed 23 February 2019]
4. "Natural And Man-Made Disaster And Their Impact On Environment", *Biology Discussion*, 2019 <http://www.biologydiscussion.com/essay/natural-and-man-made-disaster-and-their-impact-on-environment/7134> [accessed 23 February 2019]
5. Galatzer-Levy, Isaac R., and Richard A. Bryant, "636,120 Ways To Have Posttraumatic Stress Disorder", *Perspectives On Psychological Science*, 8/6 (2013), 651-662.
6. "WHO | WHO Releases Guidance On Mental Health Care After Trauma", *Who.Int*, 2019 <http://www.who.int/mediacentre/news/releases/2013/trauma_mental_health_20130806/en/>
7. "UNICEF Annual Report 2014", *UNICEF*, 2019 <https://www.unicef.org/publications/index_82455.html> [accessed 23 February 2019]
8. *Unicef.Org*, 2019 <https://www.unicef.org/publications/files/UNICEF_Annual_Report_2009_EN_061510.pdf>
9. Atwoli, Lukoye, Dan J. Stein, Karestan C. Koenen, and Katie A. McLaughlin, "Epidemiology Of Posttraumatic Stress Disorder", *Current Opinion In Psychiatry*, 28/4 (2015), 307-311
10. Carr, V. J., T. J. Lewin, R. A. Webster, P. L. Hazell, J. A. Kenardy, and G. L. Carter, "Psychosocial Sequelae Of The 1989 Newcastle Earthquake: I. Community Disaster Experiences And Psychological Morbidity 6 Months Post-Disaster", *Psychological Medicine*, 25/03 (1995), 539
11. Goenjian, Armen K., Luis Molina, Alan M. Steinberg, Lynn A. Fairbanks, Maria Luisa Alvarez, and Haig A. Goenjian and others, "Posttraumatic Stress And Depressive Reactions Among Nicaraguan Adolescents After Hurricane Mitch", *American Journal Of Psychiatry*, 158/5 (2001), 788-794
12. McMillen, J. Curtis, Carol S. North, and Elizabeth M. Smith, "What Parts of PTSD Are Normal: Intrusion, Avoidance, or Arousal? Data From The Northridge, California, Earthquake", *Journal Of Traumatic Stress*, 13/1 (2000), 57-75
13. Sharan, P., Chaudhary, G., Kavathekar, A. S., & Saxena, S, "Preliminary Report of Psychiatric Disorders in Survivors Of A Severe Earthquake", *American Journal Of Psychiatry*, 153/4 (1996), 556-558.

14. Breslau, Naomi, Ronald C. Kessler, Howard D. Chilcoat, Lonni R. Schultz, Glenn C. Davis, and Patricia Andreski, "Trauma And Posttraumatic Stress Disorder In The Community", *Archives Of General Psychiatry*, 55/7 (1998), 626
15. Kessler, R. C, Sonnega, A., Bromet, E., Hughes, M. & Nelson, C. B, "Posttraumatic stress disorder in the National Comorbidity Survey", *Archives of General Psychiatry* 52 (1995) 1048–1060
16. Resnick, Heidi S., Dean G. Kilpatrick, Bonnie S. Dansky, Benjamin E. Saunders, and Connie L. Best, "Prevalence Of Civilian Trauma And Posttraumatic Stress Disorder In A Representative National Sample Of Women.", *Journal Of Consulting And Clinical Psychology*, 61/6 (1993), 984-991
17. "WHO | WHO Releases Guidance On Mental Health Care After Trauma", *Who.Int*, 2019 <http://www.who.int/mediacentre/news/releases/2013/trauma_mental_health_20130806/en/> [accessed 23 February 2019]
18. Caramanica, Kimberly, "Posttraumatic Stress Disorder After Hurricane Sandy Among Persons Exposed To The 9/11 Disaster", *International Journal Of Emergency Mental Health And Human Resilience*, 17/1 (2015)
19. Fossion, Pierre, Christophe Leys, Caroline Vandeleur, Chantal Kempenaers, Stéphanie Braun, and Paul Verbanck and others, "Transgenerational Transmission Of Trauma In Families Of Holocaust Survivors: The Consequences Of Extreme Family Functioning On Resilience, Sense Of Coherence, Anxiety And Depression", *Journal Of Affective Disorders*, 171 (2015), 48-53
20. Lowe, R S, K Walsh, and M Uddin, "'Bidirectional Relationships between Trauma Exposure and Posttraumatic Stress: A Longitudinal Study of Detroit Residents': Correction to Lowe Et Al. (2014).," *Journal of Abnormal Psychology*, 124/2 (2015), 462–62
21. Smith, Hillary L., Berta J. Summers, Kirsten H. Dillon, and Jesse R. Cougle, "Is Worst-Event Trauma Type Related To PTSD Symptom Presentation And Associated Features?", *Journal Of Anxiety Disorders*, 38 (2016), 55-61
22. Basoglu, Metin, EbruŞalcio??lu, and Maria Livanou, "Traumatic Stress Responses In Earthquake Survivors In Turkey", *Journal Of Traumatic Stress*, 15/4 (2002), 269-276
23. Livanou, Maria, MetinBaşsoğlu, EbruŞsalcioğlu, and DenizKalendar, "Traumatic Stress Responses In Treatment-Seeking Earthquake Survivors In Turkey", *The Journal Of Nervous And Mental Disease*, 190/12 (2002), 816-823
24. Şalcioğlu, Ebru, MetinBaşoğlu, & Maria Livanou, "Long-Term Psychological Outcome For Non-Treatment-Seeking Earthquake Survivors in Turkey", *The Journal Of Nervous And Mental Disease*, 191/3 (2003), 154-160
25. Nolen-Hoeksema, Susan, and Jannay Morrow, "A Prospective Study Of Depression And Posttraumatic Stress Symptoms After A Natural Disaster: The 1989 Loma Prieta Earthquake.", *Journal Of Personality And Social Psychology*, 61/1 (1991), 115-121
26. Jia, Zhaobao, WenhuaTian, Weizhi Liu, Yang Cao, Jin Yan, and Zhisheng Shun, "Are The Elderly More Vulnerable To Psychological Impact Of Natural Disaster? A Population-Based Survey Of Adult Survivors Of The 2008 Sichuan Earthquake", *BMC Public Health*, 10/1 (2010)
27. Armenian, Haroutune K., Masahiro Morikawa, Arthur K. Melkonian, Ashot P. Hovanesian, NuneHaroutunian, and Philip A. Saigh and others, "Loss As A Determinant Of PTSD In A Cohort Of Adult Survivors Of The 1988 Earthquake In Armenia: Implications For Policy", *Acta Psychiatrica Scandinavica*, 102/1 (2000), 58-64
28. Cénat, Jude Mary, and Daniel Derivois, "Assessment Of Prevalence And Determinants Of Posttraumatic Stress Disorder And Depression Symptoms In Adults Survivors Of Earthquake In Haiti After 30 Months", *Journal Of Affective Disorders*, 159 (2014), 111-117
29. Karanci, A. Nuray, And AhmetRüstemli, "Psychological Consequences Of The 1992 Erzincan (Turkey) Earthquake", *Disasters*, 19/1 (1995), 8-18.
30. Cerdá, Magdalena, Magdalena Paczkowski, SandroGalea, Kevin Nemethy, Claude Péan, and MoïseDesvarieux, "Psychopathology In The Aftermath Of The Haiti Earthquake: A Population-Based Study Of Posttraumatic Stress Disorder And Major

Depression", *Depression And Anxiety*, 30/5 (2012), 413-424
31. Freedy, John R., Michael E. Saladin, Dean G. Kilpatrick, Heidi S. Resnick, and Benjamin E. Saunders, "Understanding Acute Psychological Distress Following Natural Disaster", *Journal Of Traumatic Stress*, 7/2 (1994), 257-273
32. Bland, Roger C, "Epidemiology of Affective Disorders: A Review", *The Canadian Journal Of Psychiatry*, 42/4 (1997), 367-377.
33. Basoglu, Metin, CengizKiliç, EbruSalcioglu, and Maria Livanou, "Prevalence Of Posttraumatic Stress Disorder And Comorbid Depression In Earthquake Survivors In Turkey: An Epidemiological Study", *Journal Of Traumatic Stress*, 17/2 (2004), 133-141.
34. Wang, Yan, and Yi Lu, "The Relationship Between Earthquake Exposure And Posttraumatic Stress Disorder In 2013 Lushan Earthquake", *IOP Conference Series: Earth And Environmental Science*, 108 (2018), 042014
35. Ayuso-Mateos,, Jose, "Global Burden Of Post-Traumatic Stress Disorder In The Year 2000: Version 1 Estimates.", 2010 <http://www.who.int/healthinfo/statistics/bod_posttraumaticstressdisorder.pdf>
36. "Post Traumatic Stress Disorder Fact Sheet | Sidran.Org", Sidran.Org, 2019 <https://www.sidran.org/resources/for-survivors-and-loved-ones/post-traumatic-stress-disorder-fact-sheet/>
37. Cloitre, Marylene, Bradley C. Stolbach, Judith L. Herman, Bessel van der Kolk, Robert Pynoos, and Jing Wang and others, "A Developmental Approach To Complex PTSD: Childhood And Adult Cumulative Trauma As Predictors Of Symptom Complexity", *Journal Of Traumatic Stress*, 22/5 (2009), 399-408
38. de Graaf, Ron, Rob V. Bijl, FilipSmit, Wilma A.M. Vollebergh, and J. Spijker, "Risk Factors For 12-Month Comorbidity Of Mood, Anxiety, And Substance Use Disorders: Findings From The Netherlands Mental Health Survey And Incidence Study", *American Journal Of Psychiatry*, 159/4 (2002), 620-629
39. Kilpatrick, Dean G., Kenneth J. Ruggiero, Ron Acierno, Benjamin E. Saunders, Heidi S. Resnick, and Connie L. Best, "Violence And Risk Of PTSD, Major Depression, Substance Abuse/Dependence, And Comorbidity: Results From The National Survey Of Adolescents.", *Journal Of Consulting And Clinical Psychology*, 71/4 (2003), 692-700
40. Couwenbergh, Christianne, Wim van den Brink, Kirsten Zwart, Coby Vreugdenhil, Patricia van Wijngaarden-Cremers, and Rutger J. van der Gaag, "Comorbid Psychopathology In Adolescents And Young Adults Treated For Substance Use Disorders", *European Child & Adolescent Psychiatry*, 15/6 (2006), 319-328
41. Lai, Betty S., Annette M. La Greca, Beth A. Auslander, and Mary B. Short, "Children's Symptoms Of Posttraumatic Stress And Depression After A Natural Disaster: Comorbidity And Risk Factors", *Journal Of Affective Disorders*, 146/1 (2013), 71-78
42. Fan, Fang, Ying Zhang, Yanyun Yang, Lei Mo, and Xianchen Liu, "Symptoms Of Posttraumatic Stress Disorder, Depression, And Anxiety Among Adolescents Following The 2008 Wenchuan Earthquake In China", *Journal Of Traumatic Stress*, 24/1 (2011), 44-53
43. Kar, N, and K Bastia, "Post-Traumatic Stress Disorder, Depression And Generalized Anxiety Disorder In Adolescents After A Natural Disaster: A Study Of Comorbidity", *Clinical Practice And Epidemiology In Mental Health*, 2 (2006), 1–7
44. Fullerton, Carol S., Robert J. Ursano, and Leming Wang, "Acute Stress Disorder, Posttraumatic Stress Disorder, And Depression In Disaster Or Rescue Workers", *American Journal Of Psychiatry*, 161/8 (2004), 1370-1376
45. Kmett Danielson, Carla, Alexandra Macdonald, Ananda B. Amstadter, Rochelle Hanson, Michael A. de Arellano, and Benjamin E. Saunders and others, "Risky Behaviors And Depression In Conjunction With—Or In The Absence Of—Lifetime History Of PTSD Among Sexually Abused Adolescents", *Child Maltreatment*, 15/1 (2009), 101-107
46. Miguel-Tobal, Juan J., Antonio Cano-Vindel, Hector Gonzalez-Ordi, IciarIruarrizaga, Sasha Rudenstine, and David Vlahov and others, "PTSD And Depression After The Madrid March 11 Train Bombings", *Journal Of Traumatic Stress*, 19/1 (2006), 69-80

47. Breslau, Naomi, "Traumatic Events And Posttraumatic Stress Disorder In An Urban Population Of Young Adults", *Archives Of General Psychiatry*, 48/3 (1991), 216
48. North, Carol S., "Psychiatric Disorders Among Survivors Of The Oklahoma City Bombing", *JAMA*, 282/8 (1999), 755
49. North, Carol S., Laura Tivis, J. Curtis McMillen, Betty Pfefferbaum, Edward L. Spitznagel, and Jann Cox and others, "Psychiatric Disorders In Rescue Workers After The Oklahoma City Bombing", *American Journal Of Psychiatry*, 159/5 (2002), 857-859
50. Vlahov, D, S Galea, and H Resnick, "Increased Use Of Cigarettes, Alcohol, And Marijuana Among Manhattan, New York, Residents After The September 11Th Terrorist Attacks", *American Journal Of Epidemiology*, 155/11 (2002), 988-996
51. "PTSD Statistics | PTSD United", *Ptsdunited.Org*, 2019 <http://www.ptsdunited.org/ptsd-statistics-2/>
52. "Infographic: PTSD And Trauma In Children", 2017 <https://health.usnews.com/wellness/family/articles/2017-12-29/infographic-ptsd-and-trauma-in-children>
53. Norris, Fran H., Julia L. Perilla, Gladys E. Ibañez, and Arthur D. Murphy, "Sex Differences In Symptoms Of Posttraumatic Stress: Does Culture Play A Role?", *Journal Of Traumatic Stress*, 14/1 (2001), 7-28
54. Norris FH, Foster JD, Weisshaar DL. The epidemiology of sex differences in PTSD across developmental, societal and research contexts. In: Kimerling R, Ouimette P, Wolfe J, editors. Gender and PTSD. Guilford Press; New York: 2002. pp. 3–42.
55. "Why Women Have Higher Rates Of PTSD Than Men", 2018 <https://www.psychologytoday.com/us/blog/the-mindful-self-express/201809/why-women-have-higher-rates-ptsd-men.>

How to cite this article: Maral P. Risk factors of posttraumatic stress disorder that arises from an earthquake disaster. Int J Health Sci Res. 2019; 9(4):322-331.

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