

# Review of psychological trauma: theory, practice, policy and research

## *Revisione del trauma psicologico: teoria, pratica, politica e ricerca*

MOHAMMAD TAHAN<sup>1,2\*</sup>, HAMID TAHERI<sup>3</sup>, TAMKEEN SALEEM<sup>4</sup>

\*E-mail: t.mohammad2@gmail.com

<sup>1</sup>Young Researchers and Elite Club, Birjand Branch, Islamic Azad University, Birjand, Iran

<sup>2</sup>Lecturer, Department of Psychology, Qaenat Branch, Islamic Azad University, Qaenat, Iran

<sup>3</sup>Assistant Professor, Department of Mathematics, Qaenat Branch, Islamic Azad University, Qaenat, Iran

<sup>4</sup>Assistant Professor, Department of Psychology, International Islamic University, Islamabad, Pakistan

**SUMMARY.** We present a concise state-of-the-art review of psychological trauma and post-traumatic stress disorder (PTSD) for mental health practitioners. This article is also set to present the nature of traumatic incidents, their common presentation, their disruptions to normal psychological and biological functioning, and the negative health care impact of untreated incidents. Originally, the trauma response to extreme life events and PTSD was conceptualized as normal responses to overwhelming situations. However, in the last few years, there has been an increase in the acceptance of the idea that exposure to a traumatic situation/stimulus may not be sufficient to explain the development of PTSD. In addition, the individual vulnerability factors play a significant role in understanding this condition. In principle, this paper also focuses on the associative relationship between social support and psychological trauma because of methodological review. Hence, due to the paucity of such types of studies, this review starts with the findings and different aspects considered on the nature of social support, and then the general outcomes of this association. Furthermore, the relationship between support and human physiology is also presented. To further strengthen the objectives in review, the methodological issues and limitations are discussed in each section. Finally, this review article concludes the evaluation of the research specific to psychological trauma and social support in the field of combat, sexual abuse, and battering.

**KEY WORDS:** trauma, psychological intervention, PTSD, symptoms of psychological trauma, psychoneuroendocrinology.

**RIASSUNTO.** Viene qui presentata una rassegna concisa e aggiornata del trauma psicologico e del disturbo da stress post-traumatico (PTSD) per professionisti della salute mentale. Vengono presentati la natura degli incidenti traumatici, la loro presentazione comune, le loro interruzioni del normale funzionamento psicologico e biologico e l'impatto sanitario negativo degli incidenti non trattati. In origine, la risposta al trauma da eventi di vita estremi e PTSD è stata concettualizzata come normale risposta a situazioni opprimenti. Tuttavia, negli ultimi anni c'è stato un aumento nell'accettazione dell'idea che l'esposizione a una situazione/stimolo traumatico potrebbe non essere sufficiente per spiegare lo sviluppo del PTSD. Inoltre, i fattori di vulnerabilità individuali giocano un ruolo significativo nella comprensione di questa condizione. In linea di principio, questo articolo si concentra anche sulla relazione associativa tra supporto sociale e trauma psicologico a causa della revisione metodologica. Quindi, a causa della scarsità di tali tipi di studi, questa revisione inizia con i risultati e i diversi aspetti considerati sulla natura del supporto sociale, e quindi i risultati generali di questa associazione. Inoltre, viene anche presentata la relazione tra supporto e fisiologia umana. Per rafforzare ulteriormente gli obiettivi in esame, le questioni metodologiche e i limiti sono discussi in ciascuna sezione. Vengono presi in esame il trauma psicologico e il supporto sociale anche nell'ambito del combattimento, dell'abuso sessuale e dei maltrattamenti.

**PAROLE CHIAVE:** trauma, intervento psicologico, PTSD, sintomi del trauma psicologico, psiconeuroendocrinologia.

## INTRODUCTION

Psychological trauma is a type of damage to the human psyche reported as a consequence of a traumatic event that may involve a singular experience or enduring event, or multiple events. These multiple events may completely and considerably overwhelm the individual's ability to cope or integrate the ideas and emotions involved with that particular experience. There were also strong associations found by researchers between stereotype awareness, childhood trauma

and psychopathology in people with psychosis, their siblings and controls<sup>1</sup>. Currently, the consequences of psychological trauma have been studied and described by many researchers for centuries in which exposure to psychological trauma is common. In addition, its consequences on the individuals and communities affected can hardly be overestimated<sup>2</sup>. Apparently, it is now common knowledge that people exposed to different types of assaults, military combat, natural disasters and car accidents are especially at risk for lingering emotional imbalance. Trauma characteristic which

## *Review of psychological trauma: theory, practice, policy and research*

was responsible for distress and the relative contribution of the trauma versus people's pre-existing personalities are still deliberated as a matter of argument among researchers and clinicians. Previous research studies focused on the topics like impact of large-scale military trauma<sup>3</sup> or disasters like floods, fires, etc. Earlier diagnostic tools created a fiction that the increased level of psychological impact could result only from traumas that are not usually the part of most people's routine lives. It has largely been shunned by modern research<sup>4</sup>.

Earlier studies also pointed that every individual exposed to such traumatic situation would develop into serious mental health issues. Recent study conducted in Sri Lankan population demonstrated the relative impact of traumatic experiences and daily stressors on mental health<sup>5</sup>.

It has been demonstrated in extensive research work that many people are very distressed initially following trauma. However, out of that only few people develop long-standing mental health disorders. For example, childhood sexual abuse is very commonly considered as the strongest traumatic stress factor which is commonly well-studied<sup>6</sup>. Clearly, for the majority of childhood sexual abuse survivors, the event itself is found to be associated with psychological distress in adulthood<sup>7</sup>. Hence, for most victims, psychological distress related with traumatic stress passes relatively quicker. In return, this does not murmur the discomfort experienced by chronic sufferers, but emphasizes that some people react to trauma with greater elasticity compared with others<sup>8</sup>. Researchers are still trying to find which factors are responsible for resiliency or vulnerability following trauma<sup>9</sup>. Such research work is especially needed for developing more efficient therapeutic options.

Some scientists are quarrelling for a restricted rainbow of life-threatening experiences and others, arguing that different types of life events like sexual harassment, marital infidelity are significantly traumatic<sup>10</sup> which becomes consequential argument about the definition of trauma. An event that is capable of producing an instant state of severe fear, helplessness or horror can be a traumatic stressor or aggravating factor<sup>11</sup>. Agorastos et al.<sup>12</sup> tried to explain developmental trajectories of early life stress and psychological trauma in a recently conducted study.

A person's emotional responsiveness at the time of the trauma is the best predictors of post-traumatic stress disorder (PTSD). Through this, Galatzer-Levy et al.<sup>13</sup> tried to demonstrate it with the help of utilization of machine learning tools for prediction of post-traumatic stress factor and re-examination of cortisol in the prediction and pathways to non-remitting PTSD.

The best predictor in PTSD is previous history of anxiety disorders or depression, while the third predictor can be considered as stress following the trauma such as financial issues, low socio-economic support, and chronic pain, etc.<sup>14</sup>. Objective physical characteristics or damages because of the trauma like damage to own vehicles commonly finish a distant fourth in predicting who can develop PTSD. Majority of people suffering from PTSD also get affected by depression and another anxiety disorders such as generalized anxiety disorder, panic disorders<sup>15</sup>. Alcohol consumption and drug abuse is also a common finding after receiving psychological trauma<sup>16</sup>. Recent research studies demonstrated that psychological trauma, PTSD and depression impact significantly on

overall status of personal health, physical wellbeing and use of medical care<sup>17</sup>. In short, it is fair to conclude that psychological trauma can make one physically sick.

Alcohol intoxication can be considered as a best predictor of being a sufferer of sexual assault while psychological trauma is not only responsible for the development of different types of mental health disorders, but it can also be an after-effect of such problems<sup>18</sup>.

Ill-considered therapeutic approach occasionally administered kindness for trauma victims or trauma survivors and misguided good intentions. Even if effective treatment protocols are available for both acutely and chronically distressed trauma survivors, other initiatives, like single-session debriefing delivered immediately after the trauma incident, have since failed to demonstrate any positive results to patients<sup>19</sup>. Clinicians usually need to focus minimally on the specific type of trauma and more on the instant emotional experience and support to the trauma survivor<sup>20</sup>.

Over the last 25 years, it has been well understood that a great deal exists after the sequential outcomes of trauma, about good and bad methods of coping with trauma and about efficient therapeutic management of psychological trauma as psychological trauma is a very vast topic for investigation and clinical practice. However, points such as vulnerability factors, the preventive measures in trauma, immediate intervention for distressed trauma survivors, and effective treatment and management for chronic PTSD need to be studied in.

### **METHOD**

The present study was based on a scoping review of published studies that examined trauma. For the reporting of the methodology and findings, the criteria of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used. However, a protocol for this review was not registered.

### **Study eligibility**

Studies that examined the trauma were considered in this review for analysis. All studies available based on experiments, surveys, observation, interviews, whether quantitative or qualitative were considered eligible to be included for the present study. On contrary, letters to the editors, secondary reports, and short communications were excluded from the review.

### **Search strategy and information sources**

The search period and information sources were defined for the present review. The search period was restricted from 2000 onwards. Therefore, based on the published information, this period was considered a suitable interval for the examination of the trauma based the published information. The medium of language was restricted to English. The database used for information search included Web of Science, MEDLINE, and PubMed, Embase, Scopus. Searches were executed in January 2020 and updated in June 2020 to ensure that we captured all studies published after 2000.

For the optimization of the sensitivity, specific keywords were selected for search in databases. The keywords included: "Trau-

ma”, “Psychoneuroendocrinology”, “PTSD”, “Psychological intervention”. Searches were based on text words as well as controlled vocabulary. A reference scanning of relevant papers was also carried out to locate further publications.

### Selection of sources of evidence

All the relevant studies identified through the databases were verified by the researchers independently. Initially the titles and abstracts were analyzed for relevance. Subsequently the full length articles were scrutinized to settle on which study was eligible for inclusion in the review (based on the inclusion criteria).

### Data collection and analysis

A data extraction form was designed to distil details concerning the origin, aim/s, setting, design, participants, the method of data collection and analysis, and main findings. The findings of the selected studies were synthesized.

## HISTORICAL DEVELOPMENT OF PSYCHOLOGICAL TRAUMA STUDIE

During the year 1970s a shift in the model was reported in the pattern that psychological trauma was conceived and therapeutically managed<sup>21</sup>. Until then, it was considered that individuals without a significant family history of mental disorders or other related evidence of predisposition, if exposed to a traumatic event, might result into an acute psychological distress syndrome. However, it would then go on to an automatic recovery in a natural way with no need for long-term measures, rather in a similar way as a self-healing injury<sup>22</sup>. The invention of ‘delayed stress syndrome’ during the Vietnam War seemed to demonstrate that healthy soldiers exposed to stress could suffer from chronic, ill effects that were not apparent at the time of their exposure<sup>23</sup>. Until then, the terrifying event was considered merely as a trigger, assumed a crucial significance in the genesis and description of psychiatric breakdown. Concept of psychological trauma also saw the retreat into the obscurity of ‘secondary gain’, the attention and rewards that a patient gained as a consequence of a recognized disorder<sup>24</sup>. Before the 1970s any individual who broke down and suffered from long-term effects was considered constitutionally liable or the product of a degenerate family; in either case, obligation lay with the individual; however, not everything was associated with a pre-exposure predisposition – since it was also considered that ‘secondary gain’, which was generally but not solely financial, could prohibit the mechanism involved in recovery. Causation was affiliated to the event itself, and individual patients were considerably absolved from blame or duty after the admission of PTSD to DSM-III in 1980<sup>25</sup>.

Professor Edgar Jones of the History of Medicine and Psychiatry at the Institute of Psychiatry and King’s Centre for Military Health Research, London, UK, completed a doctorate in clinical psychopathology. His research interests include the nature and treatment of post-combat disorders, including PTSD, and military psychiatry history<sup>26</sup>. Simon Wes-

sely is Professor of Epidemiological and Liaison Psychiatry at Guy’s, King’s and St Thomas’ School of Medicine and the Institute of Psychiatry, London, UK. His research focus included the nature, epidemiology, therapeutic management of chronic fatigue syndrome, and other unexplained syndromes, such as Gulf War-related illnesses. In both World Wars, psychological casualties were partially considered a failure of group cohesiveness and morale<sup>27</sup>. It was argued that the susceptible could be protected by training, comradeship, and unity of purpose. Breakdown finally reflected on the reputation of the organization and its leadership. The acknowledgment of PTSD by the American Psychiatric Association was, in part, a response to the anti-Vietnam War movement, which characterized the veteran as a victim of an ‘insane’ and unpopular battle. However, it was also an output of a society that regarded the individuals’ needs as paramount, in which rights triumphed over duties<sup>28</sup>.

## PSYCHOLOGICAL TRAUMA AND PTSD

PTSD may develop if a person receives unexpected extreme traumatic stressors<sup>29</sup>. Significant traumatic events which will usually lead to the development of PTSD include war, violent and harmful personal assault like sexual assault and physical attack, being taken hostage or kidnapped, confinement as a prisoner of war, torture, terrorist attack, or severe car accidents. Factors such as sexual assault or witnessing serious injuries, or the unexpected demise of a beloved person may develop PTSD, especially in children<sup>30</sup>. The disorder may also be reported after natural disasters like wildfire, tornado, hurricane, flood, and earthquake<sup>31</sup>. During such terrifying events, individuals assume that his/her own lives are in danger and have no control over what is happening in their lives.

Also felt, anybody who has faced a life-threatening situation can feel scared, angry, or confused. Many individuals may develop some acute symptoms after a traumatic affair such as sleep disturbance, derealization, severe anxiety disorders, dissociative symptoms, dissociative amnesia, low concentration, etc.<sup>32</sup>. However, it is not necessary that the symptoms may get resolved, but sometimes it is also observed that the symptoms also get worse in some of the trauma victims, and the condition further progresses to PTSD. It is still not well understood why few people develop the land into PTSD while others do not. Any well-known factors that may help determine the likelihood a person may develop PTSD or not<sup>33</sup>. Both the period and severity of the trauma are among significant associated risk factors. The span from and the extent of the reaction to the concerned event, feeling about how good the condition is under control, loss of or hurt to a dearest or close one, and the level of cooperation, help, and support the victims receives in the post-traumatic phase of the event are all different types of factors influencing the likelihood that one may progress towards PTSD<sup>34</sup>.

It is difficult to continue with daily activities as PTSD may disturb routine life<sup>35</sup>. Symptoms are intensively dependent on the causative traumatic factors or events like wildfires, which would considerably lead towards the development of more symptoms of anxiety, depression, somatization, hostility, and paranoia while veterans returning from

## *Review of psychological trauma: theory, practice, policy and research*

the wars reported more issues with sleep, and sleep-disordered breathing problems. Comorbid PTSD patients also complained more frequently about distressing auditory hallucinations<sup>36</sup>.

Based on its time-span, PTSD can be divided into two types of acute and chronic PTSD. If symptoms are found to persist for less than three months, it is labeled as “acute PTSD,” otherwise; it is named as “chronic PTSD”<sup>37</sup>. Also, a “delayed-onset PTSD” which especially refers to a situation where the disease onset is reported at least six months after the traumatic event<sup>38</sup>. In 2000, the American Psychiatric Association (APA) had revised the diagnostic criteria of PTSD in which the threshold for diagnosing PTSD was set to a lower level. This is so that it is in accordance to the new criteria and diagnosis of PTSD that could be made in those individuals, who would not have been diagnosed with the condition previously<sup>39</sup>.

### **DIFFERENT TYPES OF PSYCHOLOGICAL TRAUMA AND PTSD**

Psychological trauma contributes to the shock of an extreme stressor critical event on an individual's normal psychological and biological functioning<sup>40</sup>. This process and its after effects have been considered the subject of extensive scrutiny during the past few years. Traumatic events may increase when a person is confronted with threatened death or serious type of injury, or some other threat to one's physical integrity<sup>41</sup>. These traumatic events may also be reported by witnessing these events happening with others<sup>42</sup>. Additionally, adult victims or witnesses must experience intense fear or helplessness, whereas in children, particularly, this type of intense fear may be presented as a disorganized or agitated behavioral pattern<sup>43</sup>.

Those persons who get traumatized will develop characteristic symptoms which may include intrusive recall of the event, restraint of the traumatic situations with a numbing of general responsiveness, and increased physiological arousal<sup>44</sup>. Intrusive symptoms consist of the continuous re-experiencing of the event in the form of images, recollections, thoughts, day dreams, and nightmares<sup>45</sup>. Victims may behave or feel as if they were reliving these events, and may experience greater distress in the face of events that remind the victim of that particular trauma. Avoidance symptoms includes avoiding places and related thoughts associated with the trauma, issues in recall of the event, a significant loss of interest in other important aspects of the person's life<sup>46</sup>.

### **EPIDEMIOLOGY OF PSYCHOLOGICAL TRAUMA**

It has been studied and reported that 60.7% of men and 51.2% of women would experience at least one potential-psychological traumatic event in their lifetime<sup>47</sup>. Even if PTSD can be reported at any age, it is more commonly reported in younger adults, as they are more prone to precipitating scenarios. PTSD can also be reported in the children population<sup>48</sup>. Men and women populations differ in the types of psychological traumas to which they are exposed and their susceptibility to developing PTSD. The lifetime prevalence

of PTSD is considerably found to be on the higher side in women than men. This means that women are more likely to develop PTSD than men<sup>49</sup>. The prevalence of PTSD depends considerably on different types of populations. Lifetime preponderance of PTSD varies from 0.3% in China to 6.1% in New Zealand. In the general American population, the prevalence of PTSD is around 6.8%. Reported rates amidst crime victims were between 19% and 75%, and rates as high as 80% have been documented following rape<sup>50</sup>.

Even if consistent international data on psychological trauma and related disorders are limited, significant proportions of populations in many countries around the world are exposed to terrorism, compelled relocation, and assault, which advocates that the overall preponderance of exposure to traumatic events globally may be reported on higher side<sup>51</sup>.

PTSD influences not only trauma victims but also affects rescue workers; the incidence of PTSD among direct victims of disasters was noted to be 30-40%; the percentage in rescue workers was 10-20%<sup>52</sup>. The incidence of PTSD among police, fire, and emergency department workers ranged from 6-32% in research studies<sup>53</sup>. Another study showed that, as compared to an overall incidence percentage of 4% for the general population<sup>16</sup>, the incidence in rescue/recovery occupational group ranged from 5-32%, with the Rate reported in search and rescue personnel (25%), firefighters (21%), and employees with no previous training for handling calamity<sup>54</sup>. One study reported that the incidence rate of PTSD was considerably found to be on the higher side in those individuals who performed tasks uncommon for their profession<sup>55</sup>. Trauma survivors who had been in imminent danger of dying during the disaster and lost their co-workers and dear friends were more susceptible to developing PTSD than the general population<sup>56</sup>. September 11, 2001 terrorist attacks in New York City can be considered an example<sup>57</sup>.

Military War, one of the worst and intense stressor factors known to humans, is the main war-related mental health issues noted by those who experienced traumatic events. In countries like Iraq and Afghanistan, the main war-related mental health issues were PTSD, various anxiety disorders, and depression<sup>58</sup>. Armed forces have a higher incidence of anxiety disorders, depression, alcohol abuse, and PTSD<sup>59</sup>. After 15 years to the Vietnam War, 15% of male veterans are still affected by PTSD, and near about one-third of them would suffer from PTSD in their lifetime<sup>30</sup>. The prevalence rate of PTSD in Gulf War veterans was found to be 12.1%<sup>60</sup>. It was reported that children in the high-risk population who have been abused or who have faced natural disasters may have an even higher incidence of PTSD than adults in various analyses of PTSD. Loss of a parent in childhood is another intensive trauma. It showed a stronger relation with psychiatric sequelae as compared to the sudden natural parental death<sup>61</sup>.

During the last few decades, internationally conducted research studies have demonstrated that over 50% of the general population has been exposed to the psychological trauma. Men are usually more exposed to non-interpersonal types of trauma; women are seriously influenced by interpersonal trauma, of which physical and sexual assaults are the most common types. In these types of cases, poly-trauma is more commonly reported than single trauma<sup>62</sup>. Despite the higher incidence of psychological trauma reported in the



general population, not all exposed individuals develop mental illnesses related to the trauma. Female gender, interpersonal trauma, and childhood trauma constitute the risk factors which are found to be associated with the further development of psychopathology<sup>63</sup>. Childhood abuse is strongly associated with a wide range of psychiatric disturbances in adulthood that includes mood disorders, anxiety, and substance abuse disorders in a set of epidemiological research studies<sup>64</sup>.

PTSD is the most studied diagnosis as a result of psychological trauma, which includes early traumatic experiences. However, there are strong evidences showing that emotional negligence, as well as physical and sexual abuse during childhood, constructs the important risk factors in the futuristic development of depression in adulthood not only in one depressive episode but in its recurrence<sup>65</sup>. Being a major reason of morbidity globally, post-traumatic depression is twice common than PTSD in the general population. In most of the countries, the number of individuals who will suffer from depressive disorders during their lives falls within an 8-12% range<sup>66</sup>.

#### NEUROBIOLOGICAL LINK BETWEEN CHILDHOOD TRAUMA TO ADULT DEPRESSION

Research and findings suggest that early days suffering is related to many neurobiological manifestations, which may build up the diathesis for later life psychopathology. Sensitization of the neuro-endocrine and autonomic stress response system, glucocorticoid resistance, amplified central corticotropin-releasing factor (CRF) activity, immune activation, and lowered hippocampal volume is caused by childhood disturbance<sup>67</sup>. So far, a major focal point of research work in this domain has been the role of the hypothalamic-pituitary-adrenal (HPA) axis, both as a marker of the stress reaction and as a mediator of supplementary downstream pathophysiological changes<sup>68</sup>. The Locus Coeruleus-Norepinephrine (LC-NE) system, which is found to be involved in substantial reciprocal innervation of regions throughout the central nervous system, works in close contact with the HPA axis<sup>69</sup>.

The dysregulation of HPA-axis consists of modifications in the pituitary receptiveness to CRF stimulus telling changes of CRF receptors because of changes in the action of the para-ventricular nucleus (PVN-) median importance to CRF circuit. This type of impairment of physiological alteration is distinguished by an increased and dulled adrenocorticotrophic hormone (ACTH) response to corticotropin releasing hormone (CRH) stimulation<sup>70</sup>.

Pechtel and Pizzagalli<sup>71</sup> noted that women with a past history of child abuse with mainly depression were reported considerably amplified cortisol receptiveness to psychological pressure as compared with strong control subjects and battered women lacking depression. In (CRH) stimulation trial among these women, those with an earlier history of childhood abuse without any depression exhibited increased level of ACTH response along with normal-to-decreased cortisol response. In contrast, women with a preceding past of childhood exploitation with co-morbid chief depression showed dulled ACTH responses, because of unceasing overexposure of the pituitary gland to CRH<sup>72</sup>. These findings ar-

ticulate that there is a possibility of an initial sensitization of the stress hormone system during early life adversity, representing a natural susceptibility for the expansion of depression and anxiety disorders in later life<sup>73</sup>.

Another scenario where neurobiological apparatus affected by early exposure to trauma is directly related to the neuropeptide oxytocin (OT) in which this neuropeptide exhibits a major role in mediating social affiliation, social support, mother-child attachment, and trust. OT has stress-protective effects and decreases amygdala reactivity in humans<sup>74</sup>. Evidences have made known a decreased OT level in the central nervous system in patients with history of babyhood trauma. Such results further sustain the supposition that early on, unfavorable occurrences may obstruct the maturity of brain systems implicated in social attachment, leading to decreased resilience against stress and anxiety<sup>75</sup>.

#### RISK FACTORS

Several research studies on traumatic stress suggested that trauma amount – and not the personality behavior of exposed person – was accountable for the development of PTSD. The amount of trauma, pre-trauma demographic variables, and temperament traits are the top indicators of the severity of PTSD symptoms<sup>76</sup>. The mean PTSD score after burn augmented with hospitalization period, male gender, younger age, and higher total body surface area burned<sup>77</sup>. In a sample of 7076 adults, neuroticism, which is a character trait defined by the inclination to react to actions with greater than average negative effect, is predicted at the onset of both anxiety disorders and depression. There is a high possibility that the level of neuroticism predictive for PTSD severity for people with high neuroticism is more likely to choose less efficient coping strategies<sup>78</sup>. Studies from the cognitive perspective show that the person who does not lose the sense of control during the trauma are less likely to develop PTSD. After contact to trauma, people who depend upon dissociative coping strategies seem more likely to acquire PTSD in comparison to people who depend upon other strategies<sup>79</sup>. After the terrible earthquake in Bam, the occurrence of PTSD in survivors was 36.3% in those older than 15 years and 51.6% in students younger than<sup>80</sup>. Having any bodily injuries incapacitating day to day activities, living far from the parents, female gender, lower education, unemployment, and loss of family members had a significant correlation with the growth of PTSD<sup>81</sup>.

#### TRAUMATIC STRESSORS IN PSYCHOLOGICAL TRAUMA

PTSD is restricted to people who have experienced exceptionally threatening and distressing events. The ICD-10 definition states that PTSD may develop after «a stressful event or situation of an exceptionally threatening or catastrophic nature, which is likely to result into pervasive distress in almost anyone» (World Health Organization). After other upsetting events that are described as 'traumatic events' in day to day language, such as divorce, loss of a job or failing an examination, PTSD would thus not be diag-

## *Review of psychological trauma: theory, practice, policy and research*

nosed. In these types of cases, a diagnosis of adjustment disorder may be considered.

The DSM-IV highlights that a traumatic stressor usually involves a perceived threat to life (either one's own life or that of another person) or physical integrity, and intense fear, helplessness or horror. Other emotional responses of trauma survivors with PTSD include guilt, intense anger, shame or emotional numbing.

Whether or not people develop PTSD depends on their subjective perception of the traumatic event as well as on the objective facts. People who are threatened with a replica gun for example, believe that they are about to be shot, or people who only contract minor injuries during a road traffic accident but believe at the time that they are about to die, may develop PTSD. Furthermore, those at risk of PTSD include not only those who are directly affected by a horrific event, but also witnesses, perpetrators and those who help PTSD sufferers.

### **CLINICAL CONSIDERATIONS**

Trauma at the time of upbringing leads to the expansion of a range of psychiatric and medical disorders. It includes anxiety disorders, somatization disorder, PTSD, character disorders, depression, alcohol and substance abuse, consumption disorders, chronic fatigue syndrome, fibromyalgia, functional gastrointestinal disorders, and cardiovascular diseases<sup>82</sup>. The involvement with anxiety, depressive, and somatoform symptoms is a vital co-morbidity linked to childhood disturbance. Such co-morbidities are most often there in general medical patients along with more expensive costs in health resources<sup>83</sup>.

### **Differential diagnoses of PTSD**

Post-traumatic stress disorder is not the only disorder that may be triggered by a traumatic event. Following differential diagnosis can be considered are:

- depression (predominance of low mood, lack of energy, loss of interest, suicidal ideation);
- specific phobias (fear and avoidance restricted to certain situations);
- adjustment disorders (less severe stressor, different pattern of symptoms; see below);
- enduring personality changes after catastrophic experience (prolonged extreme stressor, different pattern of symptoms; see below);
- dissociative disorders;
- neurological damage due to injuries sustained during the event;
- psychosis (hallucinations, delusions).

### **Co-morbidity of PTSD**

84% of patients who are practically suffering from PTSD can have co-morbid circumstances such as alcohol or drug abuse; feeling shame, fruitless and despair; physical sign and symptoms; employment issues; divorce; and family hostility which makes life difficult for them PTSD add to the growth

of several different problems such as anxiety disorders, *e.g.*, social phobia (28%), panic disorder (9.5%) and substance abuse/dependency disorders (31%), major depressive disorder (48%), conduct disorder (29%), alcohol abuse/dependence (40%), mania (9%), etc.<sup>84</sup>.

### **Treatment of psychological trauma**

Members with trauma at the very early age may show a neuro-biological medical subtype of depressive disorder; its healing management is not supported enough by medical guidelines<sup>85</sup>. Researchers studying the effect of childhood sufferings on treatment results in depression are restricted. Some of the research study has shown that patients with long standing depression and childhood trauma react superior to psychotherapy alone adjacent to pharmacotherapy<sup>86</sup>. The other three studies have showcased that non-responsiveness to antidepressant medicines was associated with childhood misuse in both outpatients and inpatients department. There is urgent need to develop different ways of treatment for patients suffering from depression and having a past history of babyhood abuse and evaluated in depth about the efficacy of the same. Including and using the psychotherapies with observed evidences in the curative management of depression, interpersonal psychotherapy (IPT) is one of the very pertinent at this point. IPT is a time-bounded psychotherapy that emphasizes on societal and interpersonal troubles in the patient's present life, for understanding and treating symptoms<sup>87</sup>.

There is adequate proof that the patients exposed to early trauma often look for care due to interpersonal troubles, especially re-victimization phenomenon. These interpersonal problems can be realized considering the neurobiological outcomes of psychological trauma as well as be analyzed from the psychoanalysis prototype, considering the thought of compulsion to recur the trauma<sup>88</sup>. Relating to the evidence-based data of IPT in curing the depression and the need to recur the trauma to realize the interpersonal problems amongst the patients with the early sufferings, we structured a model of intervention that we call IMT (interpersonal model to take care of the patients suffering with depression and early trauma history)<sup>89</sup>.

It is to be considered that, in the very beginning the interview, early trauma and interpersonal problems in patients having depression are asked about. After that, this model gives a focus on a present dysfunctional interactional pattern associated with depression, in which violent behavior and victimization are at the core. Such a pattern is understood as a recurrence of childhood disturbing experience<sup>90</sup>. The intervention focuses on emergent a cognitive realization of delicate characteristics and activities allowing the recurrence of disturbing experiences in the present. The objective of the intervention is to differentiate the present from the past, circumvent the re-victimization, and promote the de-victimization.

### **DISCUSSION**

Psychological trauma and one of its consequences, the PTSD, consists of central elements of the human being with

a susceptibility to having a mal-adjusted response in the form of a hazardous threat and resilience to sufficiently cope-up with a traumatic event. These events are situations that pertain to each subject with biological and psychosocial factors in its construction<sup>91</sup>. Clinical exploration of a traumatic situation or the suspicion of its presence is often avoided as it is difficult for the health professional as well as for the subject who has experienced it. Being the victim of a traumatic event and not being able to adapt can be considered as a psychological or moral weakness and could even constitute a stigma<sup>92</sup>. It is not infrequent either that feelings of guilt arise, which makes it even more difficult for PTSD treatment.

Carvajal in 2018 demonstrated in different groups studied<sup>93</sup> for the somatic comorbidities have been found with cardiovascular, gastrointestinal, and respiratory pathologies, with chronic pain, sleep disorders, obesity, metabolic syndrome, immunological disorders, and even accelerated aging was also reported. There is also a higher prevalence of risk factors like high body mass index and cigarette and alcohol consumption<sup>94-101</sup>. All of these pathologies make PTSD treatment quite difficult, requiring comprehensive management.

Our review focused on the biological perspective of psychological trauma; Wolf et al.<sup>102</sup> also focused on biological perspective of psychological trauma and established that, while genetic molecular markers can give orientation in relation to the inheritance pattern to present a PTSD, a better indicator of the vulnerability to a peri-traumatic response would be to provide phenotypes of traumatic stress spectrum and its genetic load. An important challenge in the therapeutic management of psychological trauma is to establish the true prevalence of PTSD among different types and class of population such as immigrants, refugee, and asylum-seeker populations. Various research studies demonstrated variable findings (9% to 86%)<sup>103,104</sup>, in which general researchers found that these findings were found to be higher than the local population. We have to consider that risk factors and traumatic events which can be reported before, during, or after migration has occurred. Another neurobiological angle for consideration is the trans-generational transmission of PTSD, which can be transferred from the mother, a victim of child abuse, to the child. Moog et al. found that newborns from these mothers presented with a smaller intracranial volume with reduction in the cortex gray matter, which allow to state that the consequences of child abuse can appear from intrauterine life onward<sup>105</sup>.

Our review also focuses on the futuristic need to have more and more precise prevalence and for conduct of research studies requiring more of representative and comparable sample sizes (including time of the study, the different assessment instruments that are used, cultural and religious aspects, etc.).

PTSD can be considered as a diagnostic term that very clearly reflects a model of mental disorder. A well recognized and identified psychological stressor is mandatory to generate the classical symptomatic triad together with other psychopathological phenomena. There are also neurobiological correlates of stress response to threat. In this case the biological and psychological elements of the mental disease intertwine very well. Today's knowledge on PTSD does not allow the etiopathogenetic separation between an organic origin and a psychological motivation. Psychological trauma is always accompanied by neurobiological manifestations,

which are increasingly better identified, in animal models as well as in PTSD patients<sup>106,107</sup>.

Deliberate acts of interpersonal violence, severe accidents, disasters or military action are traumatic events reported as PTSD. Those are at risk of PTSD include survivors of war and torture, of accidents and disasters, and of violent crime (for example, physical and sexual assaults, sexual abuse, bombings and riots), refugees, women who have experienced traumatic childbirth, people diagnosed with a life-threatening illness, and members of the armed forces, police and other emergency personnel<sup>107</sup>.

### Financial burden of psychological trauma and PTSD

Costing data for PTSD management and their consequent outcomes are very scarce to non-existent due to the fact that different methods of economic evaluation command a fairly high level of consensus as reported by Drummond et al.<sup>108</sup>. In addition, the preferred approach is to conduct a cost-effectiveness analysis to examine different types of alternative interventions in the absence of known quantity-of-life or quality-of-life data. Alternatives are assessed by both their impact on costs and meaningful health-related gains in this form of economic evaluation which makes this approach delivers the incremental cost per unit of benefit achieved.

It is always useful to examine the additional costs that one intervention or programme imposes over the other, as compared with the additional effects or benefits each delivers<sup>108</sup>. As with other disorders for which multiple treatments are practiced in the case of PTSD, since there may be a considerable difference in cost between patients at first presentation and patients continuing a treatment program, there is an intense need to compare incremental costs with incremental outcomes. Plus, future studies should focus and present these in a cost-effectiveness analysis with allowance for the uncertainty of costs and consequences. Despite efforts to prevent and treat the condition, the majority of economic evaluations of PTSD unfortunately fail to meet rigorous criteria for health economic appraisal.

### CONCLUSIONS

There is no doubt that PTSD constitutes a diagnostic entity considering its historical aspect, from its first detailed descriptions in soldiers to today's definitions that include neurobiological variables and network analysis models. PTSD can also be considered as a transversal diagnosis through the different scenarios of the human activities. Nevertheless, it is a construct which is in full development conceptually, as well as in the challenge to clarify the different phenotypes that can be present.

*Conflict of interests:* the authors have no conflict of interests to declare.

*Ethics approval and consent to participate:* the present study was a review-based study in which there was no public or patient involvement. Neither any sample was requested to make statements on the study design and nor was consulted to develop patient related outcomes or interpretation of the findings. Patients were not asked to play a part in the inscribing or editing of this research paper for readability or precision.



*Review of psychological trauma: theory, practice, policy and research*

**REFERENCES**

1. Van Zelst C, Van Nierop M, Van Dam DS, et al. GROUP-investigators. Associations between stereotype awareness, childhood trauma and psychopathology: a study in people with psychosis, their siblings and controls. *PLoS One* 2015; 10: e0117386.
2. Kessler RC, Aguilar-Gaxiola S, Alonso J, et al. Trauma and PTSD in the WHO World Mental Health Surveys. *Eur J Psychotraumatol* 2017; 8 (suppl. 5): 1353383.
3. Cameron KL, Sturdivant RX, Baker SP. Trends in the incidence of physician-diagnosed post-traumatic stress disorder among active-duty U.S. military personnel between 1999 and 2008. *Mil Med Res* 2019; 6: 8.
4. Norris FH. Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol* 1992; 60: 409-18.
5. Ponnampertuma T, Nicolson NA. The relative impact of traumatic experiences and daily stressors on mental health outcomes in Sri Lankan adolescents. *J Trauma Stress* 2018; 31: 487-98.
6. Chivers-Wilson KA. Sexual assault and post-traumatic stress disorder: a review of the biological, psychological and sociological factors and treatments. *Mcgill J Med* 2006; 9: 111-8.
7. Anderson F, Howard L, Dean K. Childhood maltreatment and adulthood domestic and sexual violence victimization among people with severe mental illness. *Soc Psychiatry Epidemiology* 2016; 51: 961-70.
8. Amstadter AB, Vernon LL. Emotional reactions during and after trauma: a comparison of trauma types. *J Aggress Maltreat Trauma* 2008; 16: 391-408.
9. Voges MA, Romney DM. Risk and resiliency factors in post-traumatic stress disorder. *Ann Gen Hosp Psychiatry* 2003; 2: 4.
10. Levine S. Psychological and social aspects of resilience: a synthesis of risks and resources. *Dialogues Clin Neurosci* 2003; 5: 273-80.
11. Brewin CR, Andrews B, Rose S. Fear, helplessness, and horror in post-traumatic stress disorder: investigating DSM-IV criterion A2 in victims of violent crime. *J Trauma Stress* 2000; 13: 499-509.
12. Agorastos A, Pervanidou P, Chrousos GP, et al. Developmental trajectories of early life stress and trauma: a narrative review on neurobiological aspects beyond stress system dysregulation. *Front Psychiatry* 2019; 10: 118.
13. Galatzer-Levy IR, Ma S, Statnikov A, et al. Utilization of machine learning for prediction of post-traumatic stress: a re-examination of cortisol in the prediction and pathways to non-remitting PTSD. *Transl Psychiatry* 2017; 7: e0.
14. Richmond TS, Ruzek J, Ackerson T, et al. Predicting the future development of depression or PTSD after injury. *Gen Hosp Psychiatry* 2011; 33: 327-35.
15. Falkenberg L, Zeckey C, Mommsen P, et al. Long-term outcome in 324 polytrauma patients: what factors are associated with post-traumatic stress disorder and depressive disorder symptoms? *Eur J Med Res* 2017; 22: 44.
16. Khoury L, Tang YL, Bradley B, et al. Substance use, childhood traumatic experience, and post-traumatic stress disorder in an urban civilian population. *Depress Anxiety* 2010; 27: 1077-86.
17. Sareen J. Post-traumatic stress disorder in adults: impact, comorbidity, risk factors, and treatment. *Can J Psychiatry* 2014; 59: 460-7.
18. Borja SE, Callahan JL, Long PJ. Positive and negative adjustment and social support of sexual assault survivors. *J Trauma Stress* 2006; 19: 905-14.
19. Rose SC, Bisson J, Churchill R, et al. Psychological debriefing for preventing post-traumatic stress disorder (PTSD). *Cochrane Database Syst Rev* 2002; 2: CD000560.
20. Center for Substance Abuse Treatment (US). Trauma-informed care in behavioral health services. Rockville (MD): Substance abuse and mental health services administration (US). Treatment improvement protocol (TIP) series, n. 57, Chapter 5, Clinical issues across services; 2014.
21. Spermon D, Darlington Y, Gibney P. Psychodynamic psychotherapy for complex trauma: targets, focus, applications, and outcomes. *Psychol Res Behav Manag* 2010; 3: 119-27.
22. Bowirrat A, Chen TJ, Blum K, et al. Neuro-psychopharmacogenetics and neurological antecedents of post-traumatic stress disorder: unlocking the mysteries of resilience and vulnerability. *Curr Neuropharmacol* 2010; 8: 335-58.
23. Jones E. Historical approaches to post-combat disorders. *Philos Trans R Soc Lond B Biol Sci* 2006; 361: 533-42.
24. Jones E, Wessely S. A paradigm shift in the conceptualization of psychological trauma in the 20th century. *J Anxiety Disorder* 2007; 21: 164-75.
25. Turnbull GJ. A review of post-traumatic stress disorder. Part I: historical development and classification. *Injury* 1998; 29: 87-91.
26. Linden SC, Hess V, Jones E. The neurological manifestations of Trauma: lessons from World War I. *Eur Arch Psychiatry Clin Neurosci* 2011; 262: 253-64.
27. Jones E. War and the practice of psychotherapy: the UK experience 1939-1960. *Med Hist* 2004; 48: 493-510.
28. Kaiser AP, Spiro A 3rd, Lee LO, Stellman JM. Women Vietnam veterans: do PTSD symptoms mediate effects of warzone service on health? *Res Hum Dev* 2012; 9: 210-28.
29. Sin J, Spain D, Furuta M, et al. Psychological interventions for post-traumatic stress disorder (PTSD) in people with severe mental illness. *Cochrane Database Syst Rev* 2017; 1: CD011464.
30. Berenz EC, Vujanovic A, Rappaport LM, et al. A multimodal study of childhood trauma and distress tolerance in young adulthood. *J Aggress Maltreat Trauma* 2017; 27(7): 795-810.
31. McGuire AP, Gauthier JM, Anderson LM, et al. Social support moderates effects of natural disaster exposure on depression and post-traumatic stress disorder symptoms: effects for displaced and non displaced residents. *J Trauma Stress* 2018; 31: 223-33.
32. Van der Kolk B. Post-traumatic stress disorder and the nature of trauma. *Dialogues Clin Neurosci* 2000; 2: 7-22.
33. Voges MA, Romney DM. Risk and resiliency factors in post-traumatic stress disorder. *Ann Gen Hosp Psychiatry* 2003; 2: 4.
34. Kar N. Cognitive behavioral therapy for the treatment of post-traumatic stress disorder: a review. *Neuropsychiatr Dis Treat* 2011; 7: 167-81.
35. Carr S, Hardy A, Fornells-Ambrojo M. The Trauma and Life Events (TALE) checklist: development of a tool for improving routine screening in people with psychosis. *Eur J Psychotraumatol* 2018; 9: 1512265.
36. Luhrmann TM, Alderson-Day B, Bell V, et al. Beyond trauma: a multiple pathways approach to auditory hallucinations in clinical and non-clinical populations. *Schizophr Bull* 2019; 45 (45 Suppl 1): S24-S31.
37. Ahangari E, Tahan M, Syadabadi Z, Sadeghifar A. Investigating the relationship between early maladaptive schemes and fear of negative evaluation in students with test anxiety. *Shenakht Journal of Psychology and Psychiatry* 2020; 7: 1-12.
38. Pai A, Suris AM, North CS. Post-traumatic stress disorder in the DSM-5: controversy, change, and conceptual considerations. *Behav Sci (Basel)* 2017; 7: 7.
39. Committee on the assessment of ongoing effects in the treatment of post-traumatic stress disorder; Institute of Medicine.



- Treatment for post-traumatic stress disorder in military and veteran populations: initial assessment. Washington (DC): National Academies Press (US); 2012. History, diagnostic criteria, and epidemiology.
40. Pitman RK, Rasmusson AM, Koenen KC, et al. Biological studies of post-traumatic stress disorder. *Nat Rev Neurosci* 2012; 13: 769-87.
  41. Ehlers CL, Gizer IR, Gilder DA. Lifetime history of traumatic events in an American Indian community sample: heritability and relation to substance dependence, affective disorder, conduct disorder and PTSD. *J Psychiatr Res* 2012; 47: 155-61.
  42. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: American Psychiatric Publishing, 2013.
  43. Margolin G, Vickerman KA. Post-traumatic stress in children and adolescents exposed to family violence: I overview and issues. *Prof Psychol Res Pr* 2007; 38: 613-9.
  44. Liddell BJ, Jobson L. The impact of cultural differences in self-representation on the neural substrates of post-traumatic stress disorder. *Eur J Psychotraumatol* 2016; 7: 30464.
  45. Brewin CR, Gregory JD, Lipton M. Intrusive images in psychological disorders: characteristics, neural mechanisms, and treatment implications. *Psychol Rev* 2010; 117: 210-32.
  46. Center for substance abuse treatment (US). Trauma-informed care in behavioral health services. Rockville (MD): substance abuse and mental health services administration (US); 2014. Treatment Improvement Protocol (TIP) Series, n. 57. Chapter 3: understanding the impact of trauma.
  47. Cahill SP, Pontoski K. Post-traumatic stress disorder and acute stress disorder I: their nature and assessment considerations. *Psychiatry (Edgmont)* 2005; 2: 14-25.
  48. Roberts AL, Dohrenwend BP, Aiello AE, et al. The stressor criterion for post-traumatic stress disorder: does it matter? *J Clin Psychiatry* 2012; 73: e264-e270.
  49. Christiansen DM, Elklit A. Risk factors predict post-traumatic stress disorder differently in men and women. *Ann Gen Psychiatry* 2008; 7: 24.
  50. Atwoli L, Stein DJ, Koenen KC, et al. Epidemiology of post-traumatic stress disorder: prevalence, correlates and consequences. *Curr Opin Psychiatry* 2015; 28: 307-11.
  51. Kessler RC, Aguilar-Gaxiola S, Alonso J, et al. Trauma and PTSD in the WHO World Mental Health Surveys. *Eur J Psychotraumatol* 2017; 8 (suppl. 5): 1353383.
  52. Sandro G, Arijit N, Vlahov D. Epidemiology of post-traumatic stress disorder after disasters. *Epidemiol Rev* 2005; 27: 78-91.
  53. Thorpe LE, Assari S, Deppen S, et al. The role of epidemiology in disaster response policy development. *Ann Epidemiol* 2014; 25: 377-86.
  54. Poston WS, Haddock CK, Jahnke SA, et al. An examination of the benefits of health promotion programs for the national fire service. *BMC Public Health* 2013; 13: 805.
  55. National Collaborating Centre for Mental Health (UK). Post-traumatic stress disorder: the management of PTSD in adults and children in primary and secondary care. Leicester (UK): Gaskell. (NICE Clinical Guidelines, n. 26.) 8: Predictors of PTSD and screening for the disorder; 2015.
  56. Math SB, Nirmala MC, Moirangthem S. Disaster management: mental health perspective. *Indian J Psychol Med* 2015; 37: 261-71.
  57. Galea S, Resnick H, Ahern J, et al. Post-traumatic stress disorder in Manhattan, New York City, after the September 11 terrorist attacks. *J Urban Health* 2002; 79: 340-53.
  58. Reisman M. PTSD treatment for veterans: what's working, what's new, and what's next. *P T* 2016; 41: 623-34.
  59. Hines LA, Sundin J, Rona RJ, Wessely S, Fear NT. Post-traumatic stress disorder post Iraq and Afghanistan: prevalence among military subgroups. *Can J Psychiatry* 2014; 59: 468-79.
  60. Institute of medicine (US) committee on Gulf War and health: Health effects of serving in the Gulf War, Update 2009. Gulf War and Health: Volume 8: Update of health effects of serving in the Gulf War. Washington (DC): National Academies Press (US), Health Outcomes; 2014 Available from: <https://www.ncbi.nlm.nih.gov/books/NBK220113/>
  61. Lai BS, La Greca AM, Auslander BA, Short MB. Children's symptoms of post-traumatic stress and depression after a natural disaster: comorbidity and risk factors. *J Affect Disord* 2012; 146: 71-8.
  62. Freedy JR, Magruder KM, Mainous AG. Gender differences in traumatic event exposure and mental health among veteran primary care patients. *Mil Med* 2010; 175: 750-8.
  63. Axinn WG, Ghimire DJ, Williams NE. Gender, traumatic events, and mental health disorders in a rural Asian setting. *J Health Soc Behav* 2013; 54: 444-61.
  64. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. *Dialogues Clin Neurosci* 2015; 17: 327-35.
  65. Tahan M, Afrooz G, Bolhari J. The effectiveness of smart robot psychological intervention program on good sexual care for elementary school children. *Shenakht Journal of Psychology and Psychiatry* 2021; 7: 53-65.
  66. Vitriol V, Cancino A, Weil K. Depression and psychological trauma: an overview integrating current research and specific evidence of studies in the treatment of depression in public mental health services in Chile. *Depress Res Treat* 2014; 2014: 608671.
  67. Herman JP, McKlveen JM, Ghosal S, et al. Regulation of the hypothalamic-pituitary-adrenocortical stress response. *Compr Physiol* 2016; 6: 603-21.
  68. Smith SM, Vale WW. The role of the hypothalamic-pituitary-adrenal axis in neuroendocrine responses to stress. *Dialogues Clin Neurosci* 2006; 8: 383-95.
  69. Mello AF, Mello MF, Carpenter LL. Update on stress and depression: the role of the hypothalamic-pituitary-adrenal (HPA) axis. *Braz J Psychiatry* 2004; 25: 231-8.
  70. Van Bodegom M, Homberg JR, Henckens MJAG. Modulation of the hypothalamic-pituitary-adrenal axis by early life stress exposure. *Front Cell Neurosci* 2017; 11: 87.
  71. Pechtel P, Pizzagalli DA. Effects of early life stress on cognitive and affective function: an integrated review of human literature. *Psychopharmacology (Berl)* 2010; 214: 55-70.
  72. Anthenelli RM. Focus on: comorbid mental health disorders. *Alcohol Res Health* 2010; 33: 109-17.
  73. Syed SA, Nemeroff CB. Early life stress, mood, and anxiety disorders. *Chronic Stress (Thousand Oaks)* 2017; 1: 2470547017694461.
  74. Beetz A, Uvnäs-Moberg K, Julius H, Kotrschal K. Psychosocial and psychophysiological effects of human-animal interactions: the possible role of oxytocin. *Front Psychol* 2012; 3: 234.
  75. Arain M, Haque M, Johal L, et al. Maturation of the adolescent brain. *Neuropsychiatr Dis Treat* 2013; 9: 449-61.
  76. Sareen J. Post-traumatic stress disorder in adults: impact, comorbidity, risk factors, and treatment. *Can J Psychiatry* 2014; 59: 460-7.
  77. Sadeghi-Bazargani H, Maghsoudi H, Soudmand-Niri M, et al. Stress disorder and PTSD after burn injuries: a prospective study of predictors of PTSD at Sina Burn Center, Iran. *Neuropsychiatr Dis Treat* 2011; 7: 425-9.
  78. Smith KA, Barstead MG, Rubin KH. Neuroticism and conscientiousness as moderators of the relation between social withdrawal and internalizing problems in adolescence. *J Youth Adolesc* 2016; 46: 772-86.

*Review of psychological trauma: theory, practice, policy and research*

79. Fenster RJ, Lebois LAM, Ressler KJ, et al. Brain circuit dysfunction in post-traumatic stress disorder: from mouse to man. *Nat Rev Neurosci* 2018; 19: 535-51.
80. Parvaresh N, Bahramnezhad A. Post-traumatic stress disorder in Bam-survived students who immigrated to Kerman, four months after the earthquake. *Arch Iran Med* 2009; 12: 244-9.
81. Montazeri A, Baradaran H, Omidvari S, et al. Psychological distress among Bam earthquake survivors in Iran: a population-based study. *BMC Public Health* 2005; 5:4.
82. Mock SE, Arai SM. Childhood trauma and chronic illness in adulthood: mental health and socioeconomic status as explanatory factors and buffers. *Front Psychol* 2011; 1: 246.
83. Turner J, Kelly B. Emotional dimensions of chronic disease. *West J Med* 2000; 172: 124-8.
84. Sareen J. Posttraumatic stress disorder in adults: impact, comorbidity, risk factors, and treatment. *Can J Psychiatry* 2014; 59: 460-7.
85. Boyd JE, Lanus RA, McKinnon MC. Mindfulness-based treatments for post-traumatic stress disorder: a review of the treatment literature and neurobiological evidence. *J Psychiatry Neurosci* 2017; 43: 7-25.
86. Hofmann SG, Asnaani A, Vonk IJ, et al. The efficacy of cognitive behavioral therapy: a review of meta-analyses. *Cognit Ther Res* 2012; 36: 427-40.
87. Lipsitz JD, Markowitz JC. Mechanisms of change in interpersonal therapy (IPT). *Clin Psychol Rev* 2013; 33: 1134-47.
88. Chertoff J. Psychodynamic assessment and treatment of traumatized patients. *J Psychother Pract Res* 1998; 7: 35-46.
89. Klier CM, Muzik M, Rosenblum KL, et al. Interpersonal psychotherapy adapted for the group setting in the treatment of postpartum depression. *J Psychother Pract Res* 2001; 10: 124-31.
90. National Research Council (US) and Institute of medicine (US) committee on depression, parenting practices, and the healthy development of children; England MJ, Sim LJ, editors. *Depression in parents, parenting, and children: opportunities to improve identification, treatment, and prevention*. Washington (DC): National Academies Press (US), 2009.
91. Iribarren J, Prolo P, Neagos N, et al. Post-traumatic stress disorder: evidence-based research for the third millennium. *Evid Based Complement Alternat Med* 2005; 2: 503-12.
92. Tahan M, Saleem T, Moshtagh M, Fattahi P, Rahimi R. Psychoeducational Group Therapy for sexual function and marital satisfaction in Iranian couples with sexual dysfunction disorder. *Heliyon* 2020; 6: e04586.
93. Carvajal C. Post-traumatic stress disorder as a diagnostic entity - clinical perspectives. *Dialogues Clin Neurosci* 2018; 20: 161-8.
94. Bartoli F, Crocarno C, Alamia A, et al. Post-traumatic stress disorder and risk of obesity: systematic review and meta-analysis. *J Clin Psychiatry* 2015; 76: e1253-61.
95. Krakow BJ, Ulibarri VA, Moore BA, et al. Post-traumatic stress disorder and sleep-disordered breathing: a review of co morbidity research. *Sleep Med Rev* 2015; 24: 37-45.
96. McLeay SC, Harvey WM, Romaniuk MNM, et al. Physical comorbidities of post-traumatic stress disorder in Australian Vietnam War veterans. *Med J Aust* 2017; 206: 251-7.
97. Siqveland J, Ruud T, Hauff E. Post-traumatic stress disorder moderates the relationship between trauma exposure and chronic pain. *Eur J Psychotraumatol* 2017; 8: 1375337.
98. Solomon Z, Levin Y, Assayag EB, et al. The implication of combat stress and PTSD trajectories in metabolic syndrome and elevated c-reactive protein levels: a longitudinal study. *J Clin Psychiatry* 2017; 78: e1180-6.
99. Roberts AL, Malspeis S, Kubzansky LD, et al. Association of trauma and post-traumatic stress disorder with incident systemic lupus erythematosus in a longitudinal cohort of women. *Arthritis Rheumatol* 2017; 69: 2162-9.
100. Tsai J, Shen J. Exploring the link between post-traumatic stress disorder and inflammation-related medical conditions: an epidemiological examination. *Psychiatr Q* 2017; 88: 909-16.
101. Roberts AL, Koenen KC, Chen Q, et al. Post-traumatic stress disorder and accelerated aging: PTSD and leukocyte telomere length in a sample of civilian women. *Depress Anxiety* 2017; 34: 391-400.
102. Wolf EJ, Miller MW, Sullivan DR. A classical twin study of PTSD symptoms and resilience: evidence for a single spectrum of vulnerability to traumatic stress. *Depress Anxiety* 2018; 35: 132-9.
103. Alpak G, Unal A, Bulbul F, et al. Post-traumatic stress disorder among Syrian refugees in Turkey: a cross-sectional study. *Int J Psychiatry Clin Pract* 2015; 19: 45-50.
104. Firenze A, Aleo N, Ferrara C, et al. The occurrence of diseases and related factors in a center for asylum seekers in Italy. *Zdr Varst* 2016; 55: 21-8.
105. Moog NK, Entringer S, Rasmussen JM, et al. Intergenerational effect of maternal exposure to childhood maltreatment on newborn brain anatomy. *Biol Psychiatry* 2018; 83: 120-7.
106. Michopoulos V, Norrholm SD, Jovanovic T. Diagnostic biomarkers for post-traumatic stress disorder (PTSD): promising horizons from translational neuroscience research. *Biol Psychiatry* 2015; 78: 344-53.
107. Shalev A, Liberzon I, Marmar C. Post-traumatic stress disorder. *N Engl J Med* 2017; 376: 2459-69.
108. Drummond MF, Sculpher MJ, Claxton K, Stoddart GL, Torrance GW. *Methods for the Economic Evaluation of Health Care Programmes*. Oxford, UK: Oxford University Press, 2015.