

## The Impact of Posttraumatic Stress Disorder on the Quality of Life: A Systematic Review

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### Authors' contributions

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

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### ABSTRACT

**Aims:** To review the relevant literature on Quality of Life (QOL) impairment in PTSD and the impact of treatment interventions on QOL.

**Methods:** A database search from 1980-2012 was conducted using Medline, PsycINFO, and the PILOTS database using the keywords: "PTSD", "posttraumatic stress disorder", "stress disorders", "quality of life", "QOL", and "health-related quality of life." Two reviewers applied pre-defined selection criteria independently and reached a consensus on the inclusion of 37 studies that focused on QOL in PTSD. The impact of PTSD

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interventions on QOL was analyzed.

**Results:** The findings revealed that QOL is gravely impaired in PTSD populations, such as veterans, refugees, survivors of terrorist attacks, natural disaster survivors, rescue personnel, and survivors of violence. Research shows that PTSD is an independent predictor of QOL impairment and that various psychotherapeutic and pharmacological treatment modalities might potentially improve QOL in PTSD. However, their ability to improve QOL up to community norm levels is unclear.

**Conclusion:** QOL is seriously compromised in patients suffering from PTSD. It would be important to include QOL as an outcome measure in PTSD clinical and research work in order to identify the PTSD treatments that best improve QOL in different populations.

*Keywords:* Posttraumatic stress disorder; quality of life; Health-related quality of life; PTSD; QOL.

## 1. INTRODUCTION

Posttraumatic Stress Disorder (PTSD) is a chronic disabling condition characterized by distinct clusters of symptoms, which include, according to the DSM-IV-TR criteria, persistent: re-experiencing of the traumatic event, avoidance of stimuli associated with the trauma and numbing of general responsiveness, and symptoms of increased arousal. The DSM-5 separated avoidance from numbing and latter was included under the expanded additional new criterion of negative alterations of cognitions and mood [1-2]. Its lifetime prevalence is estimated to be 5.7% in the United States [3]. Traditionally recognized as “shell shock” or “combat neurosis”, PTSD began receiving more attention in the 1970s and was finally conferred official recognition in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980. Although PTSD first emerged as a diagnosis primarily because of its impact on war veterans, many studies have demonstrated the presence of PTSD in several civilian populations including refugees and emergency relief personnel, as well as victims of domestic abuse, terrorist attacks, urban violence, torture, and natural disasters.

There is growing evidence that PTSD results in an enormous burden of disease and gravely impacts Quality of Life (QOL) in both veteran and civilian populations [4-5]. Furthermore, PTSD is associated with high rates of comorbid psychiatric and medical disorders as well as alcohol and drug abuse, resulting in poor physical health and subsequently diminished QOL [6-7].

QOL is a broad, multidimensional measurement of physical, psychological, social, and environmental aspects of life. The World Health Organization (WHO) describes quality of life as “individuals’ perception of their position in life, in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns.” [8] Health-Related Quality of Life (HRQOL) refers to aspects of an individual’s life that directly impact his or her health [9].

The focus of the medical field is now moving from simple life preservation towards general health promotion. As part of this change, QOL is becoming a crucial part of the evaluation and management of disease as well as a vital tool for assessing the outcome of treatment [10-12]. Thus, it is essential to understand the effect of PTSD on QOL. It is also important to analyze QOL in each of the different PTSD populations. Synthesized information on the specific impact of PTSD on QOL is relatively scarce. The current review attempts to correct

this problem by examining the extent of QOL impairment in different PTSD populations as well as the impact of treatment on QOL.

## 2. METHOD

The literature search strategy is depicted in Fig. 1.

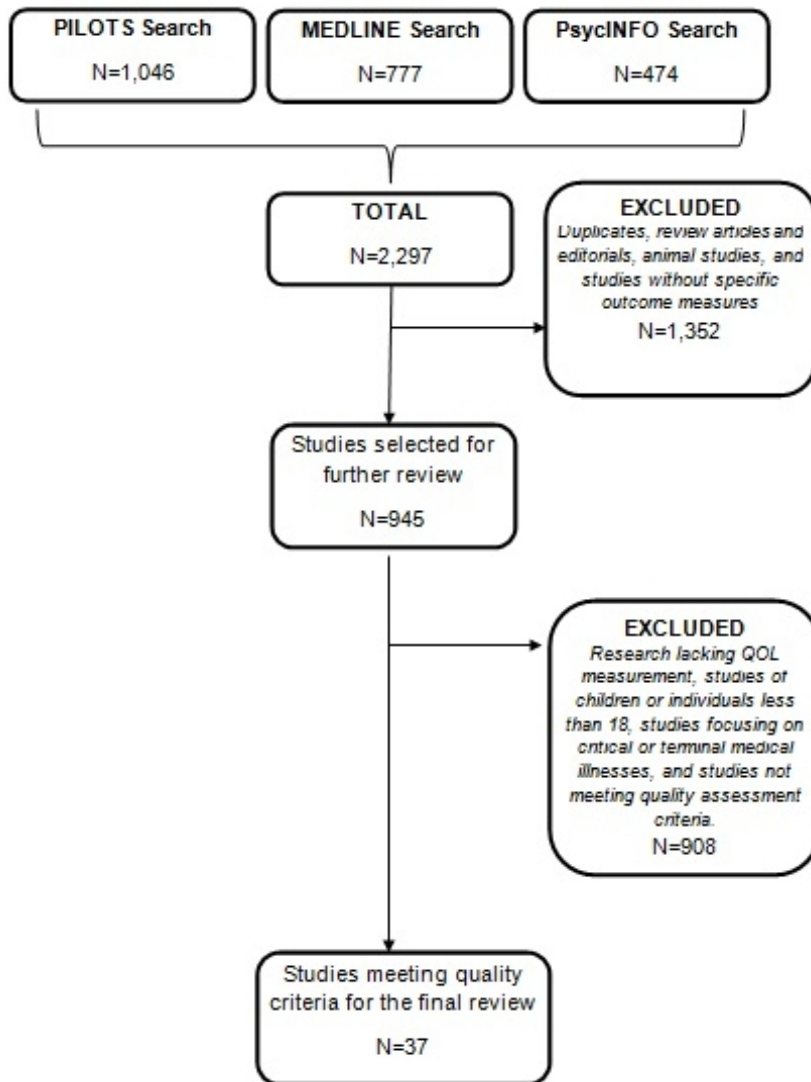


Fig. 1. Search strategy for QOL in PTSD

### 2.1 Data Sources

A search was conducted using MEDLINE and PsycINFO from 1980 (when PTSD was introduced into the *DSM III*) to 2012. The following keywords were used: “PTSD” OR

“posttraumatic stress disorder” OR “stress disorders”, AND “quality of life” OR “QOL” OR “health-related quality of life”. Another search was performed in the Published International Literature on Traumatic Stress database (*PILOTS*) using the keywords “quality of life” OR “QOL” OR “health-related quality of life” and narrowing the search to peer-reviewed journals. The reference lists of review articles were scanned for additional studies. The initial search yielded two thousand two hundred and ninety-seven (2,297) articles. The removal of duplicates, review articles and editorials, animal studies, and studies without specific outcome measures resulted in the elimination of 1,352 articles.

## **2.2 Study Selection Criteria**

Two physicians reviewed the remaining 945 abstracts independently using the following inclusion criteria: 1. Publications in English or availability of an English translation, 2. Peer reviewed journal, 3. Studies of adult humans, 4. Studies (of any design) that focused on PTSD (not merely stress-related symptoms), and 5. Studies that used at least one QOL measure. Exclusion criteria included research lacking QOL measurement, studies of individuals less than age 18, and studies focusing on critical or terminal medical illnesses (where QOL impairments would be difficult to attribute to PTSD). Both reviewers then independently conducted a focused literature review using the full text articles of the studies that met the above criteria. The quality of the studies were evaluated by assessing sample size, outcome measures, patient selection methods, study group comparison, and statistical analysis, as guided by the criteria adapted from Lohr and Carey (1999) by the Agency for Healthcare Research and Quality (2012) [13-14].

## **2.3 Data Extraction and Yield**

The two reviewers reached a consensus on including thirty-seven (37) studies in this review. Research methodology and key findings were derived from the full text and tables of the selected studies, as depicted in Table 1.

## **3. RESULT**

### **3.1 Overview of QOL Measurement Tools**

A large number of reliable multidimensional instruments were developed to assess patient QOL. To date, no instruments have been created specifically for PTSD; therefore this brief overview will instead focus on generic instruments used in PTSD studies. The three most commonly used tools are the World Health Organization Quality of Life (WHOQOL), the 36-Item Short-Form Health Survey (SF-36), and the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q). The WHOQOL assessment was developed by the World Health Organization Quality of Life Group. It contains 100 items following six discrete domains – physical, psychological, independence, social, environment and spirituality – in addition to an overall general QOL and health scale [15]. An abbreviated version, the WHOQOL-BREF was also developed [9]. The Medical Outcome Study 36-Item Short-Form Health Survey is another widely used generic QOL assessment instrument. It measures eight scales: Physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. These eight scales can be grouped into two general categories: physical and mental health [16]. The SF-36 too has an abbreviated version, the 12-item SF-12 [17]. The Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q)

is a measure of satisfaction and enjoyment in a number of domains of functioning, including physical health, mood, social relationships, and living or housing situation [18].

### **3.2 How Impaired is QOL in Different PTSD Populations?**

Several studies have suggested an association of PTSD with lower QOL in people suffering from different types of traumatic experiences [5,19-25]. Patients with past PTSD reported higher QOL than current PTSD patients, but lower levels than individuals who were never affected [26]. Using an approach to establish and predict QOL estimates in addition to a QOL visual analog scale, Doctor et al. found that among the symptoms of PTSD, arousal, anxiety, and depressive symptoms were the strongest predictors of lower QOL scores, while avoidance and re-experiencing were not [27]. Wang et al. were able to reproduce this pattern in a sample of Chinese earthquake survivors [28].

#### **3.2.1 QOL impairment in veterans with PTSD**

Statistics show that one in five veterans of Iraq and Afghanistan, suffers from PTSD. Military service can result in exposure to dangerous and traumatic situations and PTSD is higher among war veterans than among civilians [29,30]. In fact, according to a survey, 14% of the veterans of Iraq and Afghanistan met the criteria for a current PTSD diagnosis, compared to only 1% of the civilian population [30,31]. Up to 44% of veterans of Iraq and Afghanistan reported PTSD symptoms, making it the second most prevalent psychiatric diagnosis in war veterans after depression [32]. Lapierre et al. found that veterans of Iraq and Afghanistan with PTSD have lower life satisfaction and lower QOL than veterans without PTSD [32,33]. Moreover, diminished QOL was found not only in veterans with PTSD but also among their family members [34-37]. In an attempt to identify the domains of QOL impairment in PTSD, Zatzick et al. studied functional outcomes among male and female Vietnam veterans who participated in the National Vietnam Veterans Readjustment Study (NVVRS) [34,35]. In both analyses, the authors used a non-conventional QOL measurement method that did not meet our review inclusion criteria. However, it transpired that male veterans with PTSD demonstrated significant impairments in five of the six domains: diminished self-perception of well-being, compromised physical health, greater physical limitations, increased perpetration of violence, and higher unemployment rates, even after logistical models adjusted for the effects of comorbid psychiatric conditions and other medical disorders [34]. In female veterans, all six functional domains except for perpetration of violence were impaired [35]. Gender differences in QOL impairment in veterans have also been examined. The phenomenon of women involved in combat is fairly new and they now comprise approximately 14% of servicepersons deployed in combat. It has been suggested that PTSD not only affects twice as many women as men but also that women take longer to remit and have a remission rate half that of men [38], with women reporting a lower QOL than their male counterparts [23]. Furthermore, female veterans diagnosed with PTSD were shown to have experienced significantly more hostility and had more diminished QOL than female veterans without a PTSD diagnosis [39]. However, more research must be done to investigate the relationship between incidents of sexual assault related to PTSD and QOL given the high incidence of sexual assault experience by women in the military and the possible reason for them experiencing significantly more hostility [40]. In a department of Veterans Affairs medical center, Dobie et al. found that at least 21% of women who were screened positive for PTSD had reported a reduced QOL when compared to both female veterans without PTSD and male veterans with PTSD [41]. QOL impairment in PTSD is strongly correlated with the level and intensity of exposure to combat and hostility. Veterans directly deployed in the Gulf War scored lower in both physical and mental components of

the SF-36 when compared to veterans deployed to Germany in non-combat situations. Veterans with increased direct war exposure had significantly decreased physical QOL ratings. Furthermore, higher PTSD scores were predictive of diminished ratings in this domain [42]. Tsai et al. found that dysphoric arousal symptoms were most strongly associated with poorer physical HRQOL and that emotional numbing symptoms were most strongly associated with poorer mental HRQOL [43]. Interestingly, low mental or physical health QOL ratings in US military personnel-as measured by SF-36-before combat exposure significantly increased the risk of symptoms or diagnosis of PTSD after deployment [44]. These findings could help identify and inform potential interventions targeted at preventing new onset PTSD. Thus, screening and evaluating for mental and physical health using HRQOL and QOL measures can lead to early detection of military personnel who are potentially at risk for the development of PTSD after combat exposure. Interventions including primary, secondary, and tertiary prevention related to PTSD are of absolute necessity. In particular, resources allocated towards assessment during training prior to combat may reduce the development of PTSD in this sub-population.

### **3.2.2 QOL impairment in refugees with PTSD**

Refugees often face political violence, physical and psychological trauma as well as displacement from home, loss of livelihood, and separation from family and friends [45]. The prevalence of PTSD among certain refugee populations has been estimated to range between 25%-70%, with a relatively high rate of PTSD persisting even after resettlement [46], sometimes for years [47]. The various types of severe trauma that refugees experience lead to increased mental distress and lower quality of life [48]. Eisenman et al. found high rates of PTSD in Hispanic refugees relocating to Los Angeles with 54% reporting having experienced political violence associated independently with greater chronic pain, impaired physical functioning, and a decreased HRQOL [49]. Moreover, 83.7% of people who experienced traumatic war events and did not receive treatment had PTSD a decade after the war, with low QOL and high healthcare costs over time [50]. Female refugees with PTSD were found to have poorer QOL than their male counterparts [51]. Due to the variability in experiences of this specific group, it is recommended that further research explore the subtle nuances that encompass refugees.

### **3.2.3 QOL in PTSD following acts of terrorism**

Acts of terrorism have a significant impact in precipitating PTSD. After the World Trade Center attacks on September 11, 2001 in New York City, PTSD was associated with reduced work productivity, increased workdays lost, and an increased utilization of healthcare, affecting individuals' QOL [52]. Subjects with PTSD obtained lower scores on all SF-36 subscales, with the largest notable difference being on emotional role scales [53]. QOL mental component scores were more directly correlated with the severity of PTSD on the Posttraumatic Symptom (PTS) scale, whereas impairment in the physical component of SF-36 was only loosely correlated with PTSD severity [54]. When compared to patients with PTSD from non-terrorist events, survivors of terrorist attacks obtained lower scores on bodily pain, emotional role, and mental health scales, pointing to possibly unique consequences of injury on QOL specific to victims of terrorist attacks [55,56].

### **3.2.4 QOL in PTSD following natural disasters**

Although a higher incidence of mental illness-especially PTSD-is seen following exposure to natural disasters, few studies examined QOL [56]. Following the catastrophic 1999 Taiwan

earthquake, the QOL of earthquake survivors with PTSD was found to be significantly inferior to that of survivors without PTSD. Along with physical illness, PTSD was independently correlated with a diminished QOL [57]. In a prospective study, Tsai et al. evaluated the relationship between the clinical course of posttraumatic stress symptoms (PTSS) and QOL among Taiwan earthquake survivors over a period of three years [58]. They found that the prevalence of PTSS had declined from 23.8% to 4.4% three years after the earthquake. However, patients with PTSS demonstrated a lower QOL for physical and mental components at both the six-month and three-year measurement after the earthquake. The QOL of the respondents varied with the degree of improvement of PTSS. Those with persistent PTSS and those with delayed onset of PTSS displayed the lowest QOL, while those in the recovery group displayed the highest. Similarly, following the 2004 South Asian earthquake and tsunami, Chou et al. found that greater psychiatric impairment in the setting of a natural disaster was associated with lower QOL [24]. Perhaps the lower QOL of survivors was due to indirect consequences of the event, such as financial concerns, change in housing situation, loss of loved ones, unemployment, unsanitary living conditions, and health related risk factors. However, more research must be done to investigate the relationship between these factors and the possible maintenance of protracted PTSD symptomatology.

### **3.2.5 QOL in PTSD following occupational incidents**

Jobs that involve disaster relief, such as firefighting, police work, and emergency relief work, carry a high risk of developing PTSD and subsequently low QOL. Yong et al. found that 5.4% of a random sample of firefighters in Taiwan had symptoms consistent with clinical PTSD, while a larger percentage showed subclinical PTSD [59]. In this two-stage survey, those with clinical PTSD reported the lowest QOL on all domains of SF-36 including physical and mental components, followed by those with subclinical PTSD, whereas healthy controls reported the highest QOL amongst the 412 firefighters [60]. Similarly, a Brazilian study also described a high prevalence of PTSD among ambulance workers. Out of 234 workers, 5.6% had PTSD, of whom 1.9% were female and up to 15% had subclinical PTSD. Those with PTSD reported impaired QOL on SF-36 in both the physical and mental components, whereas those with subclinical PTSD only showed impairment in the mental component. Those with PTSD as well as those with the highest impairment in QOL were more likely to be male, single, and young [60].

### **3.2.6 QOL in PTSD following exposure to violence or crime**

PTSD patients who have a history of violence, physical trauma, or crime experience high levels of depression, suicide attempts, and alcohol abuse as well as diminished QOL [61]. Female victims of intimate partner violence (IPV) with PTSD had low HRQOL compared to IPV victims without PTSD; both groups had significantly more impaired QOL than population norms. Multiple regression analyses indicate that the severity of PTSD is a significant statistical predictor of SF-36 mental composite scores (but not physical component scores), after controlling for depressive symptoms and the extent of physical and psychological abuse [62]. This outcome was replicated in multiple studies [5,63-64]. Kreiner et al. confirmed these findings by demonstrating that when comparing mobbing (psychological intimidation, or bullying) victims with PTSD to other mobbing victims, those with PTSD had higher levels of stress and depressive symptoms as well as decreased QOL, as measured by SF-36, particularly in terms of professed bodily pain [64]. The perceived threat to the life of the victim at the time of the injury was found to positively predict PTSD onset. The severity of injury was not found to be a predictor of impaired mental or physical HRQOL.

Consequently, PTSD symptomatology was even more of a predictor of impaired QOL in blunt trauma injury than the extent of the injury itself [65]. Research on QOL in sexual abuse or assault PTSD survivors is very scarce due to the lack of studies that utilized QOL and HRQOL measures for this given population. Although the relationship between perceived threat and further development of PTSD symptomatology has been demonstrated repeatedly, further exploration of the specific mechanics behind this effect should be investigated.

### **3.2.7 QOL in PTSD comorbid with psychiatric disorders**

Psychiatric and medical comorbidities associated with PTSD are of great significance; however, their impact on QOL is poorly studied. Traumatic brain injury [66] and other medical comorbidities have recently gained more attention in PTSD treatment and research. The National Comorbidity Survey found that approximately 80% of patients with PTSD meet criteria for at least one other DSM disorder [67]; this rate of co-occurring mental health disorders is considerably high. Depression [68], alcoholism [69], substance abuse, and suicidality [68] commonly co-exist with PTSD, causing further decline in QOL [68]. Studies showed that the impact of comorbidity on QOL was more profound in the presence of multiple psychiatric disorders [70,71]. Predictors of lower QOL included being older, from an ethnic minority, and experiencing more severe depressive and anxiety symptoms [72]. The presence of PTSD was shown as an independent predictor of worse QOL and functioning [73,74]. Evidence is growing about the impact of PTSD and its comorbidities on health outcomes in general and QOL in particular [75].

## **3.3 Which PTSD Treatment Modalities Positively Influence QOL?**

PTSD often goes unrecognized and untreated for long periods, with as little as 4% of patients with clinical PTSD receiving accurate diagnoses [29]. The International Society of Traumatic Stress Studies practice guidelines postulate that misdiagnosis and inappropriate treatment is associated with a complex course that could further impair QOL [76]. One factor that might be contributing to either misdiagnosis or undetected diagnosis could be variation in the presentation of PTSD due to cultural factors. Specific research designs that investigate the effects of culture on the presentation of PTSD should include QOL measures to help differentiate manifestations of PTSD between diverse groups.

### **3.3.1 Psychotherapy**

PTSD treatment guidelines show the greatest support for several types of Cognitive-Behavioral Therapy (CBT) [76]. Trauma-focused CBT techniques, such as exposure, were shown to be effective in the treatment of PTSD with the exception of veterans with chronic combat-related PTSD [77], suggesting that complex trauma resulting from intense multiple episodic events is associated with poorer outcomes. Trauma-Focused Group Therapy (TFGT) and Person-Focused Group Therapy (PFGT) were found to be equally effective in improving QOL in a randomized study of male veterans with PTSD. Of the participants, 40% displayed clinically significant improvement from baseline [77]. Although trauma-based CBT has more long-term positive effects on PTSD symptoms and QOL, it is also associated with more dropouts and reduced compliance than non-trauma based therapies [78]. Alvarez et al. found that patients undergoing Cognitive Processing Therapy (CPT) reported more significant improvement in the psychological subscale of WHOQOL when compared to trauma-based CBT. There was no significant difference between the two with regards to the physical and social subscales [79]. Forbes et al. further established that the physical and



environmental subscales of WHOQOL, while showing a small initial improvement with CPT, deteriorated in the long term [80]. Further exploration using longitudinal research designs to test the efficacy of long standing CBT interventions to address these limits are needed. Furthermore, replication of intervention models that incorporate CPT in conjunction with other techniques may lead to promising long term outcomes. There are noticeable gender differences in coping techniques that restore QOL in PTSD. Women score higher on QOL measures following emotion-oriented and avoidance-oriented coping, whereas men had higher QOL following task-oriented coping [81]. These findings suggest the need to assess PTSD patients as a heterogeneous group in which various treatment modalities may be suited to particular settings. In addition to these findings, it is still important to consider the variability within gender groups. One suggestion is to examine the relative strengths within an individual's profile. Understanding an individual's coping techniques, as measured by a QOL scale, could inform the selection of an appropriate intervention for a given coping type.

### **3.3.2 Pharmacotherapy**

New research suggests that symptoms of PTSD may be mediated by different neurobiological mechanisms; thus, pharmacological interventions are currently aimed at targeting discrete symptom domains [2]. Several studies show that medication is superior to placebo in reducing the severity of PTSD symptom clusters, comorbid depression, and disability. However, research into the role of pharmacological agents in restoring QOL in PTSD is scant [29]. Rapaport et al. studied the effects of sertraline (a Selective Serotonin Reuptake Inhibitor–SSRI) on QOL and psychosocial functioning in PTSD patients [82]. The baseline study group had significantly impaired QOL scores, and treatment with sertraline was associated with significant improvements on all QOL assessment scales. In fact, 58% of those treated had achieved QOL scores within 10% of community norms at the end of a 12-week period. After 24-weeks of treatment, an additional 20% improvement was observed. Although discontinuation of the medication was associated with worsening of QOL measures, there was still an improvement from baseline. Similarly, Malik et al. tested another SSRI, fluoxetine, in a placebo-controlled randomized study on patients with PTSD [83]. QOL was assessed using SF-36 at baseline and after fluoxetine treatment. Treatment resulted in improvements in all components of SF-36, especially vitality, social functioning, and mental health components, when compared to baseline. This study demonstrated that considerable improvement in QOL could be achieved through pharmacological treatment. Schneider et al. found that patients treated with prolonged exposure plus paroxetine, an SSRI, experienced significantly greater improvement in QOL than patients treated with prolonged exposure plus placebo [84]. Second-generation antipsychotics are often used in patients with SSRI-resistant PTSD. However, Krystal et al. found that risperidone was not statistically superior to placebo in improving SF-36 QOL scores [85]. Schelling et al. investigated the effect of hydrocortisone administration to patients in the Intensive Care Unit (ICU) on the incidence of PTSD and the subsequent effects on QOL [86]. Cortisol is a biologic stress mediator, and researchers hypothesized that the administration of hydrocortisone would have a protective effect against the severe stress of the ICU. Patients who received hydrocortisone had a significantly lower incidence of PTSD and relatively higher scores on the mental health component of QOL, as measured by SF-36.

**Table 1. Research findings of QOL and PTSD studies**

<b>Reference</b>	<b>Measure</b>	<b>N</b>	<b>Design</b>	<b>Main Findings</b>
Malik et al. 1999 [83]	SF-36	16	Case-control	PTSD subjects reported greater impairment in baseline QOL compared to those with OCD or Major Depressive Disorder on several SF-36 domains. Compared to placebo, fluoxetine had significant positive effects on vitality, social functioning, and mental health.
Schelling et al. 1999 [86]	SF-36	27	Case-control	Following septic shock, the administration of hydrocortisone not only decreased the incidence of PTSD, but also improved the QOL of the survivors.
Butterfield et al. 2000 [40]	SF-36	90	Case-control	PTSD was associated with poor overall QOL as well as all SF-36 domains.
Michaels et al. 2000 [55]	SF-36	247	Longitudinal study	At 12-month follow-up following physical trauma, poor mental QOL scores were attributed to PTSD, depression, and substance abuse.
Proctor et al. 2001 [33]	SF-36	141	Case-control	QOL of the Gulf War-deployed veterans was lower compared with Germany-deployed veterans and the general U.S. population. PTSD and Major Depressive Disorder were associated with lower physical QOL scores.
Rapaport et al. 2002 [82]	SF-36 Q-LES-Q	359	Double-blind trial	Treatment of PTSD using sertraline resulted in a significant improvement in QOL (58% attained scores within 10% of Q-LES-Q community norms) that was sustained for more than one year. Sertraline discontinuation not only resulted in PTSD symptoms recurrence but also in worsening of QOL.
Laffaye et al. 2003 [62]	SF-36	70	Case-control	Female victims of Intimate Partner Violence (IPV) with PTSD experienced more QOL impairments on physical functioning, mental health, vitality, role limitations, and social functioning. After controlling for depression severity, physical and psychological abuse, PTSD predicted mental QOL but not physical QOL scores.
Dobie et al. 2004[41]	SF-36	1259	Retrospective – cohort	Screening positive for PTSD in female veterans was associated with more psychiatric disorders, substance abuse, exposure to domestic violence, and lower QOL compared to those who screened negative.
Chou et al. 2004 [24]	SF-36	4223	Retrospective-cohort	In earthquake survivors, PTSD symptoms of re-experiencing, avoidance and numbing, and arousal were negatively and significantly correlated with all SF-36 subscales.
Frayne et al. 2004	SF-36	4348	Case-control	Compared with women with depression alone or those with neither depression nor PTSD, women with PTSD had worse physical QOL scores on the physical functioning, role limitations, bodily pain, and energy/vitality domains.
Tsai et al.	SF-36	1756	Retrospective-	Individuals with persistent PTSD, three years after an earthquake, had the lowest

2005[43]			cohort	mental QOL scores on all domains.
Schnurr et al. 2006 [6]	SF-36	325	Randomized clinical trial with one-year follow-up	At baseline, more severe PTSD symptom severity was associated with poorer QOL at baseline. Improvement in PTSD symptoms was associated with an improvement in QOL.
Wu et al. 2006 [57]	SF-36	405	Retrospective-cohort	Earthquake survivors with psychiatric disorders, especially PTSD or Major Depression had lower QOL across all domains. Economic problems persisting long-term was shown to affect QOL.
Kiely et al. 2006 [65]	SF-36	319	Prospective-cohort	Following traumatic injury, physical QOL scores showed improvement over time, whereas mental QOL scores did not. Both were still below community norms at 1 and 6 months. The presence of PTSD symptoms at one month predicted low mental QOL scores at 6 months.
Alsaker et al. 2006 [63]	SF-36	87	Retrospective-cohort	Compared with a random sample of 2,444 Norwegian women from the general population, domestic violence survivors at women's shelters experienced lower scores on all QOL domains.
Chen et al. 2007 [59]	SF-36	410	Retrospective-cohort	QOL was lower in firefighters with PTSD or major depression compared with those experiencing subclinical symptoms of similar diagnoses and asymptomatic individuals. No differences were detected in mental QOL scores between PTSD and subclinical PTSD.
Carlsson et al. 2006	WHOQOL	63	Prospective-cohort	In individuals with a history of torture, having few social contacts was a significant predictor of low QOL. Post-migratory potentially modifiable factors such as social relations and occupation are associated with emotional distress and QOL.
Araya et al. 2007 [51]	WHOQOL	1193	Retrospective-cohort	Trauma reduced QOL directly and indirectly as mediated by mental distress even after adjusting for living conditions. QOL and mental distress influenced by coping strategies and social support of directly, and indirectly as moderated by gender.
Johansen et al. 2007	WHOQOL	70	Prospective - cohort	In survivors of non-domestic violence, PTSD predicted lower QOL. Compared to those without PTSD symptoms, individuals scoring as 'probable' or 'risk level' for PTSD experienced lower QOL scores on physical health, psychological health, social relationships and environmental.
Ponsford et al. 2008	SF-36	113	Case-control	QOL was lower post-orthopedic trauma on all domains at 1 and 2 year follow up. Physical QOL scores improved at 2 years with no change in mental QOL. PTSD, depression, anxiety and pain, predicted the outcome.
Kreiner et al. 2008 [64]	SF-36	20	Retrospective-cohort	Compared to those without PTSD diagnosis in individuals exposed to mobbing, PTSD patients had higher levels of stress and depressive symptoms, and worse QOL.
LeardMann	SF-36	5410	Retrospective-	After adjusting for variables, a mental QOL score below the 15 <sup>th</sup> percentile was

et al. 2009			cohort	associated with >3 times increased likelihood of having new-onset symptoms or diagnosis of PTSD and a physical QOL score below the 15 <sup>th</sup> percentile was associated with >2 times increased likelihood of having new onset symptoms or diagnosis of PTSD.
Polusny et al. 2011 [66]	WHOQOL	2677	Longitudinal study	Soldiers with a history of concussion/MTBI were more likely than those without to report post-deployment post-concussive symptoms and poorer psychosocial outcomes. However, after adjusting for PTSD symptoms, concussion/MTBI was not associated with post-deployment symptoms or outcomes
Doctor et al. 2011 [27]	SG, TTO, VAS	184	Cross-sectional	Arousal and anxiety and depressive symptoms were the strongest predictors of lower quality-of-life scores. Avoidance and re-experiencing of trauma were not predictive of reduced quality of life.
Kehle et al. 2011[25,66]	SAS-SR NQOLS	348	Longitudinal study	Overall quality of life was negatively associated with having a diagnosis of PTSD. An examination of effect sizes revealed that PTSD had a larger association with disruptions in social functioning and quality of life than sub-threshold PTSD, depressive disorders, other anxiety disorders, and alcohol and drug disorders.
Krystal et al. 2011[85]	SF-36 BLSI	247	Randomized controlled trial	Risperidone was found not to be statistically superior to placebo on QOL (SF-36Vor BLSI) in treatment-seeking veterans with antidepressant-resistant military-related PTSD.
Alvarez et al. 2011 [79]	WHOQOL-BREF	197	Prospective cohort	Among male veterans seeking treatment at a Veterans Health Administration PTSD program, there was no significant difference for physical or social quality of life between patients undergoing Cognitive Processing Therapy and those undergoing trauma-focused group treatment as usual.
Evren et al. 2011 [69]	SF-36	156	Retrospective cohort	Among alcohol-dependent men with lifetime PTSD, a history of childhood emotional abuse contributes to impairment of QoL through its relationship with dissociation.
Aversa et al. 2012 [7]	SF-36	943	Longitudinal study	Analyses conducted using hierarchical linear modeling indicated that PTSD and depressive symptoms differentially affected the various HRQoL domains.
Westphal et al. 2011 [26]	SF-12	321	Cross-sectional	Among 321 trauma-exposed low-income, urban, predominantly Hispanic adults, logistic regression analyses showed that although patients with past PTSD function significantly better than patients with current PTSD, they experienced persisting deficits in mental health-related quality of life compared to trauma-exposed patients who never developed PTSD.
Serralta-Colsa et al. 2011 [53]	VAS SF-36 TOP	58	Case-control	In a study involving victims of terrorist attacks, strong association was found between the presence of symptoms associated to depression, anxiety and PTSD and worse QoL (p<0.001).
Zdjelarević	WHOQOL-	126	Cross-sectional	Among families of Croatian war veterans, the highest level of satisfaction was

et al. 2011 [37]	BREF			found in wives of the most seriously affected invalids of war (M=3.77; sd=0.741), followed by the wives of deceased soldiers (M=3.5; sd=0.697), while the lowest quality of life results were found in wives of veterans suffering from PTSD (M=3.12; sd=0.608).
Wang et. al.2012 [28]	SF-36	326	Cross-sectional	In a sample of Chinese earthquake survivors, dysphoric arousal factor was uniquely associated with external measures of physical health-related quality of life, and the emotional numbing factor displayed the strongest independent association with external measures of psychosocial quality of life relative to the other PTSD factors.
Schneier et al. 2012 [84]	Q-LES-Q	37	Randomized controlled trial	Adult survivors of the World Trade Center attack of September 11, 2001, with PTSD who were treated with prolonged exposure plus paroxetine experienced significantly greater improvement in quality of life (incidence rate ratio=1.4, 95% CI=1.10–1.82) during 10 weeks of combined treatment than patients treated with prolonged exposure plus placebo.
Huijts et al. 2012[47]	WHOQOL-BREF	335	Cross-sectional	In traumatized refugees in the Netherlands, Path analysis suggested a model in which PTSD symptoms ( $\beta=-.61$ , $p<.001$ ), social support seeking ( $\beta =.12$ , $p< .05$ ), and emotion-focused coping ( $\beta= .13$ , $p< .01$ ) have a direct effect on quality of life.
Forbes et al. 2012 [80]	ADAS WHOQOL	59	Randomized controlled trial	In treatment-seeking veterans with military-related PTSD receiving CPT, a small initial improvement in the WHOQOL Physical and Environmental subscales at post-treatment was followed by a subsequent commensurate deterioration at 3 month follow-up.
Tsai et al. 2012 [43]	SF-12	233	Case-control	PTSD symptoms were independently and differentially associated with physical and health-related quality of life. Dysphoric arousal symptoms were most strongly associated with poorer physical health-related quality of life, and emotional numbing symptoms were most strongly associated with poorer mental health-related quality of life.

*Notes: SF-36: Short Form (36) Health Survey; SF-12: Short Form (12) Health Survey; Q-LES-Q: Quality of Life Enjoyment and Satisfaction Questionnaire; WHOQOL: World Health Organization Quality of Life; WHOQOL-BREF: World Health Organization Quality of Life-abbreviated version; VAS: Visual Analogue Scale; SG: Standard Gamble; TTO: Time Trade-Off; SAS-SR: Social Adjustment Scale-Self Report; NQOLS: Navy Quality of Life Survey; BLSI: Boston Life Satisfaction Inventory; TOP: Trauma Outcome Profile; ADAS: Abbreviated Dyadic Adjustment Scale OCD: Obsessive Compulsive Disorder*

#### **4. DISCUSSION AND FUTURE DIRECTIONS**

Different populations experience PTSD differently, making drawing firm conclusions about QOL in PTSD indeed challenging. Moreover, the definition and diagnostic criteria of PTSD itself evolved over the years since their inception in 1980. QOL instruments often cover different constructs. Due to the diversity of life traumas, PTSD symptom permutations leading to impairments of functioning and QOL could be overwhelmingly heterogeneous. Nevertheless, this review points to the unfavorable effect that PTSD can have on QOL, based on multidimensional constructs that include social, psychosocial, and physical aspects.

Several studies in different populations have repeatedly shown women to be more affected than men by PTSD, with a diminished QOL [22,39,40]. War veterans, especially those with combat-related PTSD, experience significantly chronic and impaired QOL [42]. It has also been shown that those with lower QOL prior to combat exposure are more likely to develop PTSD and further impair their QOL. Furthermore, PTSD symptomatology was found to be a greater predictor of impaired QOL in various subtypes of traumatic injuries than the severity of the injury itself. While the specific subtypes of traumatic injuries are known to have varying effects in QOL outcome, the exact explanations of why these observations occur is still limited in the literature and further exploration is needed. This knowledge would fill in the gap and provide a more thorough understanding of why perceived threat to safety of a particular trauma has a larger effect than the actual outcome itself.

PTSD has been shown to be an independent risk factor for significant loss of perception of wellbeing in an individual [65]. Patients suffering from PTSD tend to be greater utilizers of healthcare [52,87] and have been shown to be more likely to experience longer hospital stays [87]. They have also demonstrated higher occurrences of readmission for mental illnesses or substance abuse after being released. A possible solution to this issue could be to have more resources to subsidize interventions for individuals that meet criteria for PTSD. This could result in more cost and time effective treatments and eventually reduce the recidivism of healthcare services.

PTSD patients, especially those from ethnic minorities such as African Americans, Hispanics, and Asians, often do not seek psychiatric services [88]. Hence, it is important to screen appropriately, identify those at risk, and treat them in a timely manner. Furthermore, there is an increasing responsibility for clinicians to gain multicultural competency and be informed of the tendency for certain ethnic groups to avoid utilizing psychiatric services. Consequently, this places ethnic minorities and other marginalized groups at greater risk of being undiagnosed and therefore maintaining symptomatology that decreases their QOL. In addition, the adequate use of QOL and HRQOL screening instruments that have been normed, modified, and validated for varying populations is crucial to providing the highest quality services to a wider range of people.

Limited QOL-measured studies in individuals who developed PTSD as a result of sexual abuse or sexual harassment remain an area of concern. Similarly, there is a large gap in the literature examining measured QOL of individuals with histories of childhood trauma. Although this review did not include persons under the age of 18, this important sub-group deserves representation in the research to help advocate for treatment.

Interventional research designed specifically to improve on QOL is fairly limited. This is particularly relevant with the expansion of PTSD treatment interventions across disciplines

including exposure therapy, EMDR, and relaxation training [89]. Mindfulness might also have potential in this regard. Psychotherapy such as Cognitive Processing Therapy, Trauma-based therapies and other forms of patient-centered, non-trauma based therapies, and psychopharmacological interventions such as SSRIs and augmentation strategies [77-78,81], need to be investigated in depth to determine their relative effectiveness, predictors of response, impact on quality of life especially over long time periods in order to inform treatment decisions.

## **5. CONCLUSION**

Overall, QOL is seriously compromised in those suffering from PTSD with distinct patterns of impairment in various PTSD populations. Psychotherapy using CBT is effective in improving QOL in PTSD sufferers. Preliminary evidence shows that pharmacological therapy, especially SSRIs, could potentially have a positive effect on QOL. Further research is needed to identify the PTSD treatments that best improve QOL in varying populations. Therefore, a patient's QOL should be the ultimate goal of a clinician when working with a detrimental disorder like PTSD.

## **CONSENT**

Not applicable.

## **ETHICAL APPROVAL**

Not applicable.

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## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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