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Quality of life in workplace trauma victims with Posttraumatic Stress Disorder: A systematic review

Qualité de vie chez les victimes d'un traumatisme au travail souffrant d'état de stress post-traumatique: une recension systématique des écrits

Sophie Lacerte[1,2], Sarah Bruyninx[2,3], Delphine-Émilie Bourdon[1,2] & André Marchand[1,2]
[Québec, Canada]

[1] Department of psychology, Université du Québec à Montréal, Montreal, Canada
[2] Trauma Studies Centre, Institut universitaire en santé mentale de Montréal, Montreal, Canada
[3] Department of psychology, Université du Québec à Trois-Rivières, Canada

Abstract: The impact of work-related posttraumatic stress disorder (PTSD) on quality of life (QoL) has not been well established. The purpose of this paper is to synthesize existing data from cross-sectional or longitudinal studies evaluating QoL in this particular population. In this systematic review, the PsycINFO, PubMed, and Pilots databases were searched using specific keywords, and the search yielded 28 studies from 1980 to 2014. Data extraction was systematically conducted by a pair of independent judges using a form created during a pilot test. The samples of the retrieved studies included the following populations: soldiers and veterans, emergency and protective service employees, transportation service workers, primary industry employees and utility workers. Poor QoL seems to be experienced by workplace trauma victims suffering from PTSD. Several areas of life are greatly affected by the presence of work-related PTSD. Longitudinal studies demonstrated significant improvements in QoL when PTSD workers participate in psychotherapy. Given the heterogeneity of the studies' design, participants, and QoL assessment and the low number of included studies, the generalizability of these conclusions is limited. However, this review identifies the limitations of existing QoL studies and suggests relevant recommendations for future research.
Keywords: posttraumatic stress disorder, workplace trauma, worker, quality of life, treatment, review.

Résumé : L'impact du développement de l'état de stress post-traumatique (ESPT) à la suite d'un événement traumatique survenu en milieu de travail sur la qualité de vie (QV) n'a pas été clairement établi. L'objectif du présent article est de synthétiser l'information existante à ce sujet provenant d'études au devis transversal ou longitudinal évaluant la QV. Une recension des écrits systématique entreprise à partir des bases de données PsycINFO, PubMed, et Pilots et de mots clés prédéterminés a permis de relever 28 articles publiés entre 1980 et 2014. Des juges indépendants ont extrait les informations pertinentes des articles sélectionnés en utilisant une grille testée *a priori*. Les études recensées incluent les populations suivantes : soldats et vétérans, employés des services d'urgence et de protection, employés des services de transport, ainsi que les employés des services publics et d'industrie de matière primaire. Une piètre QV a été démontrée auprès de toutes les victimes d'un événement traumatique au travail souffrant d'ESPT. De nombreuses sphères de vie semblent affectées par la présence du trouble mental. Les études longitudinales démontrent des améliorations à la QV lorsque les travailleurs participent à une psychothérapie pour l'ESPT. En raison de la grande diversité dans les devis, les participants, l'évaluation de la QV et le faible nombre d'études recensées, la généralisation des résultats obtenus est limitée. Toutefois, la recension a permis de déceler des lacunes des études existantes et propose des recommandations pertinentes pour les futures recherches.
Mots-clés : état de stress post-traumatique, événement traumatique au travail, travailleur, qualité de vie, traitement, recension des écrits.

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Posttraumatic stress disorder (PTSD) is a common stress reaction developed after experiencing a traumatic event that exposes one to an actual or threatened death, a serious injury or sexual violence (American Psychiatric Association [APA], 2013). Epidemiologic studies indicate that 8% to 20% of people exposed to a trauma will develop PTSD (Breslau et al., 1998; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Individuals affected by PTSD experience intrusive memories of the trauma and consistently attempt to avoid trauma-related cues. They manifest a persistent negative mood, altered thinking (e.g., persistent distorted self-blame), heightened arousal (e.g., sleeping difficulties, hypervigilance), and significant impairments to daily functioning (APA, 2013).

In recent decades, researchers have shown interest in examining the impact of the presence of PTSD on the sufferer's quality of life (QoL). Although no agreed-upon definition of QoL exists yet, the concept in mental health research can be broadly defined as how people live their daily lives with a mental disorder and how satisfied they are with their lives, their functioning and their resources (Katschning, 2006). Various terms are used by researchers to measure the general concept of QoL, depending on how it is conceptualized: happiness, life satisfaction, health status, functioning, disability, well-being, etc. Each of these specific terms is defined differently by researchers, but each intends to measure a person's QoL (Dupuis, Taillefer, Etienne, Fontaine, Boivin, & Von Turk, 2000).

Experts appear to agree, however, on using minimal requirements when assessing QoL. First, researchers acknowledge that QoL is, above all, an outcome of personal meaning; therefore, at minimum, a subjective assessment of QoL is necessary. Objective items can be added to gain a better understanding of a person's life situation (Holowka & Marx, 2011). Second, researchers seem to agree that QoL is a multidimensional construct encompassing various aspects of life, such as relationships, family roles, work or school, activities of daily living, leisure, finances, and health (Katschnig, 2006).

Several studies have demonstrated the negative impact of PTSD on QoL in multiple spheres of life. PTSD patients report that they suffer from a variety of physical complaints, such as headaches, gastrointestinal problems, and pain (Pacella, Hruska, & Delahanty, 2013). PTSD has been associated with an increase in interpersonal, familial and marital conflicts (Brillon, 2010). Individuals with PTSD may show decreased productivity at work and absent themselves from work (Bolton et al., 2004, MacDonald et al., 2003). Furthermore, the association between PTSD and low QoL is supported by reviews (Holowka & Marx, 2011, Olatunji, Cisler, & Tolin, 2007).

Several studies have examined changes in QoL over time among PTSD sufferers. One recent study found that health-related QoL improved slightly two months after the first emergency consult for individuals presenting with posttraumatic stress symptoms. However, these patients' QoL scores were still below the norms (Senneseth, Alsaker, & Natvig, 2012). Most longitudinal studies have investigated the influence of a specific treatment for PTSD on QoL. A recent meta-analysis stated that cognitive-behavioral therapy (CBT) has a moderately strong effect on QoL among patients with anxiety disorders, including PTSD (Hofmann, 2014). Though much information is available on QoL among individuals suffering from PTSD caused by various types of trauma, data on the impact of work-related PTSD is not well established.

Workplace trauma

Workplace trauma is defined as a traumatic event that is associated with one's work duties or that occurs in one's work environment, including while working *off site* (Bolton, Holohan, King, & Wing, 2004; Penk, Debring, & Schutt, 2002). Examples of workplace trauma include physical or verbal assault, bullying, death of a colleague, combat in a war zone, rescue of a severely injured victim, and transport accidents. Epidemiological studies have demonstrated the high prevalence of traumatic events at work. The U.S. Bureau of Labor, for example, reported an annual rate of 5 violent crimes at

work per 1,000 employed persons (Harrell, 2011). Although some workplaces are associated with a high probability of exposure to a traumatic event because of the nature of the work tasks (e.g., soldiers, police officers, nurses; Bolton, et al., 2004), no worker is immune to experiencing such events.

The consequences of exposure to a traumatic event at work can differ from those associated with other types of trauma. Beliefs about safety at work can be uncertain following the traumatic event, and workers might blame their employer or even initiate judicial proceedings against their employer, thus contributing to increased post-traumatic anxiety (Hensel et al., 2010; Penk, Drebing, & Schutt, 2002). Workers tend to take sick leave or quit their jobs more often when a traumatic event has occurred in the workplace than when an event has occurred in their personal lives (Mason, 2002). Given that work constitutes a source of self-satisfaction and socialization and establishes a routine with a purpose for the day, being on sick leave can negatively affect the QoL of sufferers (Bolton et al., 2004). Moreover, sick leave implies compensation proceedings that can be harsh and time consuming (Hensel et al., 2010), contributing to the maintenance of post-traumatic symptoms and diminished QoL.

One study published in 2009 reviewed QoL in a particular population of individuals experiencing workplace trauma, veterans (Schnurr, Lunney, Bovin, & Marx, 2009). However, to our knowledge, no existing study has reviewed data on QoL among different types of workplace trauma victims. In addition, no existing study has reviewed changes in QoL over time (including treatment outcome studies) in this population.

Objectives

Therefore, the purpose of this systematic review is to synthesize and update the existing data on traumatized workers to address two main questions. First, how does experiencing workplace trauma-related PTSD affect QoL? Second, how does QoL evolve over time, with and without psychological treatments for PTSD, among the affected population? To address these questions, this review includes studies with cross-sectional and longitudinal designs and studies that take a multidimensional approach to subjective QoL, in accordance with our general definition of QoL.

Method

Selection of articles

We conducted an initial literature search to identify adequate search terms and key criteria for article selection. On November 28, 2014, the first author conducted an extensive search of the PsycINFO, PubMed, and Pilots databases. The search terms included the main terms used in the past decades to refer to the concept of QoL (Dupuis, 2000) and terms used to identify workplace trauma victims suffering from PTSD. The search terms were entered as keywords in the PsycINFO and Pilots databases and in the “Title/abstract” field for the PubMed database. We used the following search terms to search all of the databases: (quality of life OR well-being OR life satisfaction OR disability OR impairment OR functioning OR happiness) AND (PTSD OR posttraumatic OR post-traumatic) AND (work* OR occupation*). The work-related words are sensitive single terms used to locate studies evaluating work-related traumas or work-related PTSD. The search was limited to original articles published in English or French beginning in 1980 (the year PTSD was introduced into the DSM-III). The reference lists in the selected articles and reviews yielded by the database search were screened to identify other potentially relevant articles. The final sample was composed of 28 articles (see Figure 1).

The selection criteria were pre-determined. Studies were included if (a) they evaluated adult workers who were exposed to a traumatic event at the workplace, (b) PTSD diagnosis was assessed with a diagnostic interview or a questionnaire using a clinical cut-off score, and (c) QoL was assessed at least with subjective items that encompassed multiple domains of life. Studies in which QoL was evaluated only in terms of mental health status (e.g., presence/absence of mental disorders) were excluded according to our general definition of QoL. Dissertations retrieved from the database search were also included, but we excluded case study designs, non-original studies (e.g., reviews, comments), and those examining secondary traumatic stress, which is the clinical designation for PTSD symptoms acquired vicariously through caring for trauma victims.

Data extraction

Based on Cochrane's recommendations (Higgins & Green, 2008), data extraction was systematically conducted by the same pair of independent judges who selected the articles. The judges included psychology graduate and undergraduate students trained in this procedure. We developed a data extraction form specific to this review, pilot-tested it on two randomly selected studies, and refined it accordingly. A pair of judges independently completed the form for all of the included articles and the extracted data were then compared. Discrepancies in the extracted data were discussed between the judges until a resolution was reached. The level of inter-rater reliability was good; the mean of agreement was 90.62%.

The extracted data included (a) study description (country, study design, and groups), (b) sample characteristics (sample size, age, gender, type of work, and type of workplace trauma), (c) assessment of PTSD diagnosis (type of measurement, DSM version used), (d) assessment of QoL (term employed, definition, and measurement), (e) psychotherapy for PTSD (type, duration), and (f) QoL results (descriptive data, QoL and PTSD correlations, between-group differences, and changes from pre- to post-treatment and at follow-ups). Most of the reviewed studies included both participants with PTSD and those with a partial diagnosis or no PTSD; therefore, we decided to report the comparative results between those groups and to add these data to the body of evidence on the association between PTSD and QoL. Because the study designs, participants, QoL assessments, and PTSD treatments varied markedly, we focused on describing the studies, their results, and their limitations and on qualitative synthesis rather than meta-analysis.

Results

Characteristics of reviewed studies

Table 1 describes the characteristics of the reviewed studies, which were divided into four categories according to the type of work: public transportation employees (n = 2), primary industry workers and utility workers (n = 4), emergency and protective services (n = 4), and active soldiers or veterans (n = 18).

Methods and participants. Twenty-one reviewed studies were cross-sectional. Most of the studies had a prospective design (n = 23), were conducted in the USA (n = 18) and included a comparison group (n = 21), such as participants with no PTSD, a partial diagnosis of PTSD or a wait-list condition in treatment studies. Sample sizes varied between 33 and 10,132, with nearly half of the study samples (n = 13) containing fewer than 200 participants. With the exception of two studies evaluating exclusively female workers, women represented on average 10.7% of the sample in gender-mixed studies (n = 11). The mean age was 42.5 years. Half of the studies evaluated PTSD using a clinical interview. PTSD diagnosis was based on either the DSM-III / DSM-III-R criteria (n = 8) or on the DSM-IV / DSM-IV-TR criteria (n = 19).

QoL assessment. A variety of terms relating to QoL were used in the reviewed articles, including some studies that examined more than one construct simultaneously: functioning (n = 9), disability (n = 7), health-related QoL (n = 7), well-being (n = 7), life satisfaction (n = 2), and overall QoL (n = 3). Only four studies provided an operationalized definition of the concept being assessed (Kashdan, Julian, Merritt, & Uswatte, 2006; North et al., 2002), including the WHO's international definitions of general QoL and disability (Dekel, Solomon, & Bleich, 2004; Jakle, 2009). The remaining studies briefly described the contents of the measurement instrument or the questionnaire scales, providing little information about what was actually measured and so, contributing to the confusion regarding QoL data. The studies assessed QoL using interviews (n = 2), self-reported questionnaires (n = 22), or customized questions (n = 4). The variety of questionnaires used by the studies reflects the heterogeneity typically observed in the assessment of QoL. However, three-quarters of the studies used reliable and valid questionnaires with good psychometric qualities (e.g., World Health Organization (WHO) questionnaires, the Short-Form Survey (SF-36), the Sheehan Disability Scale (SDS), the Quality of Life Inventory (QOLI), and the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q)).

PTSD treatment. The reviewed studies evaluated the efficacy of CBT (n = 3), eye movement and desensitization reprocessing (EMDR; n = 1) or an activity-based intervention called nature adventure rehabilitation (n = 1). The mean duration of treatments was 45.8 sessions.

QoL in workplace trauma victims with PTSD

The results for QoL among workplace trauma victims with PTSD are carefully described below using the precise term(s) employed by the author(s) of each study to reflect the appropriate QoL construct measured. The results are presented by type of workplace, considering that different types of traumatic events are experienced in different work environments and can lead to different consequences. No direct comparisons of QoL results could be made between studies on work-related PTSD because of the heterogeneity of the methods used to evaluate QoL.

Transportation service employees. Only two articles on public transportation employees were retrieved. Both are part of a larger study investigating PTSD among the following Stockholm public transportation system employees: ticket collectors, service staff, and underground and long-distance drivers (Högberg et al., 2008; Nardo et al., 2011). The employees were recruited if they had been victims of a physical assault at work or if they had witnessed a "person-under-train" accident. Nardo et al. (2011) reported that PTSD sufferers showed higher social disability and lower overall well-being than their non-PTSD colleagues, thus demonstrating an association between PTSD and QoL.

Högberg et al. (2008) tracked employees who developed PTSD and received five sessions of EMDR. Assessments were performed at baseline, post-treatment, and 8-month and 35-month follow-up. The authors concluded that post-treatment changes in PTSD symptoms and well-being are stable over time. However, at the 35-month follow-up, a significant change in the disability measure finally appeared. The authors noted, "it seems as real life changes have a longer onset than the changes in symptomatic experience". The results also showed that work capacity significantly improved after treatment for those in remission; 25% were working during the pre-treatment period and 83% at the 35-month follow-up. Unfortunately, the authors did not verify whether this improvement in work capacity was associated with other improved outcomes (e.g., PTSD, disability, and well-being).

Primary industry workers and utility workers. Articles evaluating primary industry workers and utility workers (n = 4) were assigned to the same category because of the similarities in the traumatic events that these workers experienced. Employees working in a primary industry such as steel, oil or mining were recruited if they had witnessed a work-related fatality, i.e., the death of one of their colleagues. Utility worker samples were predominantly individuals who had participated in restoration and clean-up in the aftermath of the 2001 World Trade Center terrorist attack. The

participants had undertaken life-threatening tasks or had witnessed terrifying images (e.g., dead bodies, victims with significant injuries).

The studies demonstrated that employees who developed PTSD presented mild disability at work and in their social and family lives (Evans, Giosan, Patt, Spielman, & Difede, 2006; Evans, Patt, Giosan, Spielman, & Difede, 2009). In fact, utility workers who developed PTSD seemed to be approximately seven times more likely to experience significant disability than their colleagues without PTSD (Stellman et al., 2008). Disability was associated with PTSD severity, age and ethnicity (with older and Hispanic workers at greater risk). Additionally, utility workers with PTSD symptoms (subclinical or full criteria) who had significant disability reported experiencing higher levels of anger than their asymptomatic coworkers (Evans et al., 2006; Evans et al., 2009). This result demonstrates that anger can be a central feature of the posttraumatic response in populations who witness atrocities such as terrorist attacks.

A dose-response association between PTSD severity and disability was observed: individuals with partial PTSD demonstrated an intermediate level of difficulties relative to the full PTSD and non-PTSD groups (Evans et al., 2006; Evans et al., 2009). Another study of primary industry employees who witnessed a work-related fatality showed the same dose-response association in PTSD severity and well-being and life functioning assessments (Blake, Lating, Sherman, & Kirkhart, 2014). Interestingly, no significant differences among full, partial and non-PTSD groups were found with respect to employment duration, suggesting that those who experience PTSD symptoms and diminished QoL continue to work despite major difficulties. The authors concluded that employment longevity or work productivity may not be a reliable marker of normative levels of well-being or of life functioning in industry workers.

Emergency and protective service workers. The study samples included firefighters and rescue and ambulance workers (n = 4). The traumatic events that they experienced were associated with rescue and recovery efforts following a terrorist attack (North et al., 2002) or an earthquake (Ozen & Sir, 2004). No information regarding the type of traumatic event was revealed in the other selected studies (Berger et al., 2007; Chen et al., 2007). Poor scores on QoL measures were obtained from participants in all of the studies. Ozen and Sir (2004) observed that PTSD was weakly but significantly associated with poor life satisfaction and that the latter was associated with increased anxiety, depressive symptoms, and decreased productivity at work. Moreover, employees with PTSD reported higher levels of work overload stress, criticism resulting from poor performance, and a tense relationship with superiors and coworkers relative to their asymptomatic colleagues (Chen et al., 2007; North et al., 2002). Employees with PTSD also reported less pride in their jobs and lower rates of job satisfaction (North et al., 2002).

In terms of functional impairment, the majority (83%) of firefighters with PTSD demonstrated more impairment in various life spheres than the few (15%) without PTSD (North et al., 2002). PTSD was associated with poorer relationships with friends (Ozen & Sir, 2004), stronger perceptions of current physical problems (e.g., cardiovascular and skin problems), and higher rates of psychosocial stressors (e.g., financial, family, marital, and parenting problems) (Chen et al., 2007). Satisfaction with income was surprisingly lower among PTSD sufferers than among non-PTSD workers despite the similar income levels reported by both groups. This result shows that PTSD negatively affects one's perception of a situation, suggesting that responses to self-report questionnaires may reflect more negative perceptions than "reality" would indicate. Chen et al. (2007) observed that firefighters suffering from either PTSD or MD scored significantly lower on QoL measures than those with subclinical PTSD or MD. However, another study found that workers with partial PTSD showed results similar to those observed in the asymptomatic group (Berger et al., 2007).

Active soldiers and veterans. Eighteen studies of QoL among veterans or active soldiers suffering from PTSD were retrieved. They experienced traumatic events such as fighting in a war zone, being assaulted with a weapon, being severely injured, being exposed to a toxic substance, experiencing transport accidents, and witnessing comrades' injuries or deaths. Across all of the studies, several QoL domains were greatly affected by the presence of PTSD, such as relationships, family roles, leisure, activities of daily living, work, school, finances, and physical and mental health (Barrett et al., 2002; Bleich & Solomon, 2004; Dekel et al., 2004; Jakle, 2009; Kehle et al., 2011; Mancino et al., 2006; Pietrzak, Goldstein, Malley, Johnson, & Southwick, 2009; Richardson, Long, Pedlar, & Elhai, 2008; Schnurr et al., 2003; Schnurr, Hayes, Lunney, McFall, & Uddo, 2006). One study showed that the occupational sphere was the most impaired compared with social functioning and activities of daily living (e.g., hygiene, sleep, sex). The occupational domain was also the strongest predictor of global disability (Bleich & Solomon, 2004).

More severe PTSD was associated with more diminished psychosocial QoL (Richardson et al., 2008; Schnurr et al., 2006), and more comorbid depressive symptoms were associated with poorer well-being and health-related QoL among PTSD workers (Jakle, 2009; Mancino et al., 2006; Richardson et al., 2008). However, Bleich and colleagues (2004) observed the same degree of global disability between PTSD-only veterans and those with comorbidities, such as depressive disorder, anxiety disorder or even schizophrenia. Among the protective factors associated with QoL, age (being older) and religious attendance were identified (Jakle, 2009). Zatzick et al. (1997; 1997) found no sex differences in the well-being of veterans suffering from PTSD.

When comparing QoL between groups, researchers have observed that PTSD veterans show significantly poorer health-related QoL or functioning than their comrades with subclinical PTSD (Kehle et al., 2011; Pietrzak et al., 2009) and their non-PTSD comrades (Barrett et al., 2002; Dobie et al., 2004; Koenen, Stellman, Sommer, & Stellman, 2008; Richardson et al., 2008). In fact, veterans with PTSD appeared to be two to nine times more likely to experience poor health-related QoL than their colleagues without PTSD (Dobie et al., 2004). Moreover, Kashdan et al. (2007) demonstrated substantially lower emotional well-being (the frequency of positive affects relative to negative affects) and psychological well-being (the degree of satisfaction of basic relatedness, autonomy and competence needs) among veterans with PTSD than among a non-PTSD group. The authors described how PTSD may be related to negative QoL within a cognitive-behavioral model, explaining the conditioned association between the triggering of trauma-related stimuli and aversive bodily responses (e.g., intense anxiety). Such an individual becomes hypervigilant to these stimuli, and thus, minimal cognitive resources remain to process positive experiences. Additionally, avoidance behaviors diminish opportunities to participate in pleasant activities, suggesting a direct link with poor QoL (Kashdan et al., 2006). These explanations are consistent with another study that revealed a significant association between QoL and DSM-IV avoidance/numbing and arousal clusters but not with the re-experiencing of symptoms (Mancino et al., 2006).

In examining the course of QoL over time, a 14-year follow-up study of veterans showed that persistent PTSD was associated with lower levels of family functioning, more smoking and drinking, and less life satisfaction and happiness (Koenen et al., 2008). However, the results appeared more encouraging when the victims were receiving psychotherapy for PTSD. Significant improvements in health-related QoL, overall life satisfaction and functioning were observed among PTSD patients following problem-solving treatment (Ahmadizadeh et al., 2010) and participation in an inpatient program (Johnson, Fontana, Lubin, Corn, & Rosenheck, 2004). Improvements remained significant up to 6 years after the treatment, but the authors noted that most veterans remained unemployed. Furthermore, Gelkopt et al. (2013) concluded that an activity-based intervention called nature adventure rehabilitation was effective in reducing PTSD symptoms and improving QoL (the fulfillment of basic emotional, social and physiological needs). Schnurr et al. (2003; 2006) found significant improvements in the health-related QoL of participants following either trauma-focused or present-centered group therapy. The researchers analyzed changes in PTSD symptoms and health-related

QoL throughout treatment and detected synchronous effects of change in both outcomes from baseline to the 12-month post-test. Thus, symptom improvement was associated with improvement in health-related QoL.

Discussion

Synthesis of results

To our knowledge, this work presents the first review of QoL among workers with work-related PTSD. Regarding our first objective, poor QoL appear to be reported in all of the reviewed studies and in several life spheres: occupational, social, familial, health, and daily activities. Moreover, the association between PTSD and QoL among workers appears to be well established. Individuals with partial PTSD demonstrated intermediate difficulties relative to workers with full PTSD and those without PTSD. These results are similar to those of studies on civilian victims of personal trauma (e.g., Breslau, Lucia, & Davis, 2004; Holowka & Marx, 2011). These conclusions, however, should be interpreted with caution due to the heterogeneity of the methods used to evaluate QoL and the low number of studies examined. Our review included studies that used a variety of terms to describe and evaluate QoL (e.g., functioning, well-being,), and these terms were not systematically and adequately defined by the authors.

One study found that the occupational was the most impaired domain among PTSD veterans, exceeding impairment to social functioning and everyday personal functioning (Bleich & Solomon, 2004). Because the trauma occurred in the workplace, individuals may experience more prominent PTSD symptoms while working and may avoid specific tasks or even the workplace because of the potential triggering effects of trauma-related stimuli (Bolton et al., 2004). Because working occupies two-thirds of the time in our daily lives (Penk, Drebing, & Schutt, 2002), it is unsurprising that PTSD workers perceived the occupational domain as the most impaired. In contrast to the findings on veterans, Blake and colleagues (2014) found that a majority of primary industry workers were still employed despite the presence of PTSD, suggesting that the occupational domain was only slightly impaired among this population. Thus, different work environments may affect work-related QoL in different ways. For example, the VA administration has its own employment regulations pertaining to combat-related traumas. Bleich et al. (2004) noted that their sample represented severely ill PTSD patients and advocated for the recognition of their disability. Indeed, the desire to seek compensation may influence responses to self-report questionnaires, particularly on items related to occupational functioning (Ray, 2014).

Regarding our second objective, one longitudinal study revealed that QoL appeared to worsen over time among PTSD workers who received no specialized treatment. All of the studies evaluating PTSD patients following therapy observed significant improvements in QoL. However, most of these studies evaluated the military population; thus, the generalizability of these results is limited. Various types of therapy were offered in the reviewed studies, indicating that different types of therapy for PTSD can improve QoL. Furthermore, Schnurr and colleagues (2006) demonstrated that changes in PTSD are synchronous to changes in QoL during psychotherapy. Regarding work-related QoL, mixed results have been observed among workers following PTSD treatment. Whereas most veterans remain unemployed immediately after PTSD treatment, transportation employees show significant improvements in work capacity 35 months post-treatment. Thus, work capacity seems to increase only gradually. Work environments may also contribute to explaining these results; employment regulations can differ across work environments and may influence workers' perceptions of work capacity. For example, a worker who is allowed to modify some of his work tasks during psychotherapy treatment may have better perceptions of his work capacity than a worker who is not allowed to work until he can perform work tasks in full. Nevertheless, combat-related traumas have been shown to be associated with less treatment-related change than other types of trauma (Bradley, 2005).

Limitations of the review

The present literature review assesses data across studies to estimate, more accurately than can be done in a single study, the impact of the development of PTSD or PTSD treatment on QoL among workplace trauma victims. Thus, the main limitation of this review, as with any review, is that the outcome definitions and evaluations differ across studies. In addition, the literature search was limited to published articles retrieved from databases and did not include research reports or other unpublished manuscripts. We limited our selection to articles that examined QoL using a subjective and multidimensional approach, which may have limited the data collection. However, these inclusion criteria reduced the heterogeneity in the population under study and in the methods used to evaluate QoL. Despite the limitations that restrict the applicability of our results, several strategies were incorporated to increase the validity of the review: we identified selection criteria in advance of the review process, applied a rigorous selection process, used a systematic review method (based on Cochrane's recommendations) that can be replicated in future updates, and reviewed each study to carefully interpret the results.

Recommendations for future studies

The following recommendations are based on the methodological flaws or lack of particular data observed in the reviewed studies. First, certain types of workers were underrepresented in this review (e.g., transportation services employees), and others were absent (e.g., management employees, health care workers). Therefore, studies of other types of workers are necessary to fully investigate the population exposed to a workplace trauma. It would also be interesting to include workers from different workplaces in a single study. Adequate comparison of PTSD and QoL outcomes among employees in diverse work environments could then be performed. Additionally, we strongly suggest that PTSD diagnosis be assessed using an interview format to reduce false positive or false negative diagnoses derived from self-report questionnaires.

Regarding QoL assessment, it is essential that authors clearly state how they conceptualize QoL using either a personal definition or one from a known institution (e.g., WHO). The lack of definitions noted in this review is astonishing considering the current confusion in this research domain. Researchers should explain their reasons for choosing particular terms related to QoL (e.g., functioning, well-being) and the measures used. Moreover, we discourage researchers from employing the various terms related to QoL as synonyms. These suggestions will greatly assist readers in better understanding and interpreting QoL results (Angermeyer & Kilian, 2006). Moreover, QoL can be assessed using a multimethod approach by adding multiple and unstudied domains (e.g., religious attendance). In addition to subjective evaluation, other types of assessment can be added (e.g., evaluations from family and friends or from professionals such as psychiatrists; supplementary objective measures of life situation). Interview-based measures are also recommended in QoL assessment to promote clinical judgment in investigating the qualitative details related to QoL and to identify when a participant over- or underreports symptoms for secondary gain purposes (particularly in the veteran population) or because of the presence of certain psychological states such as major depression (Holowka & Marx, 2011).

Furthermore, future research should assess the associations between sociodemographic data (e.g., gender) and QoL, the differential effects of diverse QoL domains on PTSD (to weigh their importance relative to one another), and the associations between QoL domains and PTSD symptom clusters. In addition, work-related QoL seems to be an important outcome for workplace trauma victims, and future research could document job satisfaction, relationships with superiors and colleagues, number of days of sick leave/unemployment since the trauma, and modification of work tasks. Because the occupational domain was the most impaired domain, perceived work capacity and return to work may be relevant outcomes in treatment studies. More research is needed to assess prospectively the change in QoL over time, with or without PTSD treatment. Comparing different

types of treatment and their impact on QoL could be interesting. Researchers could also carefully examine the evolution of QoL throughout treatment strategies and in relation to the improvements of other outcomes (e.g., PTSD severity). These results may help clinicians improve treatment efficacy among this population.

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Figure 1. *Flow chart*

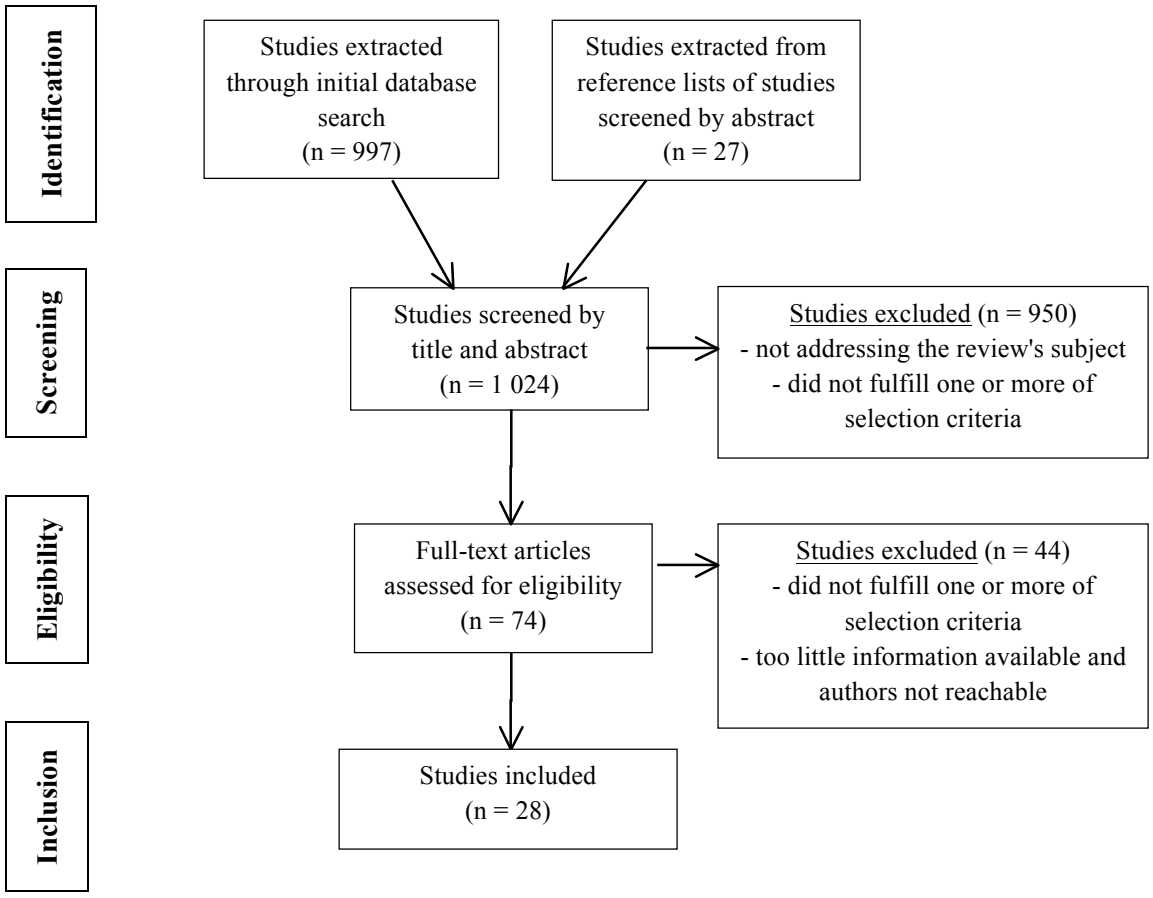

Table 1

Characteristics of reviewed studies

Authors	Design; Country	Total *n* (% of female)	Mean age (SD)	Comparison group(s)	Type of event	Assessment of PTSD	QoL concepts	QoL assessment	Treatment
Transportation services employees									
Högberg, et al. (2008)	P, Tx; Sweden	51 (30.0%)	43.0 (9.0)	-	Physical assault; Person-under-train accident	SCID-I; DSM-IV	WB; Disability	WHO-10; SDI	EMDR, 8 weeks, 5 sessions
Nardo, et al. (2011)	P, CS; Sweden	33 (20.0%)	42.3 (8.82)	No-PTSD	Physical assault; Person-under-train accident	SCID-I; DSM-IV	WB; Disability	WHO-10; SDI	n/a
Primary industries workers and utility workers									
Blake, et al. (2014)	P, CS; USA	89 (12.4%)	55.6 (8.4)	No-PTSD, partial PTSD	Witnessing coworkers' death	PCL-C; DSM-IV	WB; functioning	POAMS	n/a
Evans, et al. (2006)	P, CS; USA	626 (4.0%)	44.7 (9.4)	No-PTSD, partial PTSD	Terrorism aftermath	CAPS; DSM-IV	Disability	SDS	n/a
Evans, et al. (2009)	P, CS; USA	842 (4.4%)	45.4 (9.8)	No-PTSD, partial PTSD	Terrorism aftermath	CAPS; DSM-IV	Disability	SDS	n/a
Stellman, et al. (2008)	P, CS; USA	10,132 (12.7%)	42.1 (9.1)	No-PTSD	Terrorism aftermath	PCL; DSM-IV	Disability	SDS	n/a
Emergency and protective services workers									
Berger, et al. (2007)	P, CS; Brazil	180 (0%)	32.4 (n/a)	No-PTSD, partial PTSD	n/a	PCL-C; DSM-IV	HRQOL	SF-36	n/a
Chen, et al. (2007)	P, CS; Taiwan	432 (0%)	36.4 (7.1)	No-PTSD, partial PTSD	n/a	DRPST; DSM-IV	HRQOL	SF-36	n/a
North, et al. (2002)	P, CS; USA	181 (2.8%)	38.5 (7.9)	No-PTSD	Terrorism aftermath	DIS; DSM-III-R	Functioning	DIS-Disaster Supplement	n/a
Ozen & Sir (2004)	P, CS; Turkey	44 (0%)	29.7 (1.9)	No-PTSD	Natural disaster	CAPS; DSM-III-R	Life Satisfaction	Q-LES-Q	n/a

Authors	Design; Country	Total *n* (% of female)	Mean age (SD)	Comparison group(s)	Type of event	Assessment of PTSD	QoL concepts	QoL assessment	Treatment
Veterans and active soldiers									
Ahmadizadeh, et al. (2010)	P, Tx; Iran	60 (n/a)	42.4 (4.6)	Wait list	War	Clinical interview; DSM-IV-TR	HRQOL	SF-36	Problem solving, 15 bi-weekly sessions
Barrett, et al. (2002)	P, CS; USA	3,695 (n/a)	n/a	No-PTSD	War	PCL-M; DSM-III-R	HRQOL	SF-36	n/a
Bleich, et al. (2004)	P, CS; Israel	294 (2.5%)	40.9 (10.3)	-	War	PTSD Inventory; DSM-IV	Disability	Homemade questionnaire	n/a
Dekel, et al. (2004)	P, CS; Israel	120 (0%)	n/a	-	War	Clinical Interview; DSM-IV	Disability	Homemade semi-structured interview	n/a
Dobie, et al. (2004)	P, CS; USA	1,259 (100%)	45.9 (15.9)	No-PTSD	War	PCL-C; DSM-IV	HRQOL	SF-36	n/a
Gelkopf, et al. (2013)	P, Tx; Israel	68 (0%)	37.1 (n/a)	Wait list	War; Severe injury; witnessing comrades' injury or death	Clinical interview; n/a	Overall QoL; functioning	Human Services Scale; Homemade quest.	Nature Adventure Rehabilitation, one year, weekly
Jakle (2009)	R, CS; USA	472 (0%)	51.0 (10.3)	-	War	CAPS; DSM-IV	Overall QoL	WHOQOL-BREF	n/a
Johnson, et al. (2004)	R, Tx; USA	51 (0%)	42.7 (2.3)	-	War	CAPS; DSM-III	Functioning	Homemade questionnaire	Inpatient therapy, 32 hr/week, 4 months
Kashdan, et al. (2006)	P, CS; USA	74 (0%)	54.87 (n/a)	No-PTSD	War	MS-CR, Clinical interview; DSM-III	WB	WBS; PANAS; BPNS	n/a
Kehle et al. (2011)	P, CS; USA	348 (13.0%)	31.3 (9.5)	No-PTSD, Partial PTSD	War	CAPS; DSM-IV-TR	Functioning; Overall QoL	SAS-SR; NQOLS	n/a
Koenen, et al. (2008)	P, Long; USA	1,377 (0%)	n/a	No-PTSD	War	PTSD Symptom Frequency Scale; DSM-III-TR	Functioning	Psychiatric Epidemiology Research Instrument	n/a

Authors	Design; Country	Total *n* (% of female)	Mean age (SD)	Comparison group(s)	Type of event	Assessment of PTSD	QoL concepts	QoL assessment	Treatment
Mancino, et al. (2006)	P, CS; USA	95 (5.3%)	52.2 (4.9)	-	War	CAPS; DSM-IV	WB	QWB-SA	n/a
Pietrzak, et al. (2009)	P, CS; USA	557 (10.8%)	33.8 (n/a)	No-PTSD, partial PTSD	War	PCL-M; DSM-IV	Functioning	PDS	n/a
Richardson, et al. (2008)	R, CS; Canada	125 (0%)	41.5 (8.1)	No-PTSD	War; physical assault; transport accident; toxic substance exposure	CAPS; DSM-IV	HRQOL	SF-36	n/a
Schnurr, et al. (2003; 2006)	P, Tx; USA	360 (0%)	50.7 (3.7)	-	War	CAPS; DSM-IV	HRQOL; Life Satisfaction	SF-36; QOLI	trauma-focused or present-centered group therapy, 12 months
Zatzick, et al. (1997a)	R, CS; USA	1,200 (0%)	n/a	No-PTSD	War	MS-CR; DSM-III	WB; functioning	Homemade	n/a
Zatzick, et al. (1997b)	R, CS; USA	432 (100%)	n/a	No-PTSD	War	MS-CR; DSM-III	WB; functioning	Homemade	n/a

Notes. R = Retrospective. P = Prospective. CS = Cross-Sectional. Tx = Treatment. Long = Longitudinal. n/a = Not available. SD= Standard deviation. SCID-I = Structured clinical interview for DSM-IV axis I disorders. PCL-C = PTSD checklist civilian version. PCL-M = PTSD checklist military version. CAPS = Clinician-administered PTSD scale. DRPST = Disaster-related psychological screening test. DIS = Diagnostic Interview Schedule. MS-CR = Mississippi scale for combat-related PTSD. WB = Well-being. HRQOL = Health-related quality of life. WHO-10 = World health organization ten well-being index. SDI = Social disability index. POAMS = Psychotherapy Outcome Assessment and Monitoring System. SDS = Sheehan disability scale. SF-36 = Medical outcomes study short form - 36 items. Q-LES-Q = Quality of life enjoyment and satisfaction questionnaire. WHOQOL-Bref = World health organization quality of life assessment - BREF. WBS = Well-Being Scale. PANAS = Positive and Negative Affect Schedule. BPNS = Basic Psychological Needs Scale. SAS-SR = Social adjustment scale-self-reported. NQOLS = Navy quality of life survey. QWB-SA = Self-administered quality of well-being scale. PDS = Psychosocial difficulties scale. QOLI = Quality of life inventory.