



Post-traumatic stress disorder and depression comorbidity: severity across different populations

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Practice points

- Suffering a traumatic event is very common in our society and as much as 90% of the population may experience a traumatic event in their lifetime. Most people recover from a traumatic event and suffer no long-term difficulties; however, 8–12% may go on to develop post-traumatic stress disorder (PTSD).
- More than 50% of those diagnosed with PTSD also have depression. PTSD is very common in those who have been exposed to war, natural disaster and intimate partner violence when compared with the general population.
- PTSD and depression comorbidity develops as a delayed phenomenon in the latter part of the disease. Therefore, the timing of an assessment is a key factor that greatly affects the prevalence of PTSD and depression comorbidity.
- PTSD and depression comorbidity is often associated with greater levels of distress, symptomatology, social impairment, and occupational and global disability when compared with those who have been diagnosed with only one disorder (PTSD or depression).

SUMMARY This review evaluates the impact of post-traumatic stress disorder (PTSD) and depression comorbidity on symptom severity within and across different populations. A sequential series of searches on PTSD and depression comorbidity was conducted using the MEDLINE and PsychINFO databases. Articles were considered for inclusion in the study if their abstract appeared to furnish sufficient information that suggested that symptom severity was modulated by PTSD and depression comorbidity when compared with those with only one disorder (PTSD or depression). After a careful review of 180 abstracts, 13 articles were selected for this review to provide up-to-date information on PTSD and depression comorbidity, and symptom severity. Overall, this review provides strong support for PTSD and depression comorbidity as a modulating factor for symptom severity across different populations.

Suffering a traumatic event is very common in our society, as suggested by many previous studies [1–4]. Among the most commonly identified

sequelae of traumatic events are depression and post-traumatic stress disorder (PTSD). Approximately 50–90% of people experience a

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traumatic event in their lifetime; however, only 8–12% of people will go on to develop PTSD [3,5]. In the majority of cases (74%), PTSD persists longer than 6 months, and women have been found to suffer from PTSD symptoms longer than men [5]. An individual's vulnerability to PTSD depends upon the severity of trauma [6], childhood experiences, biological diathesis and comorbid factors such as personality disorders, substance abuse, medical illness or depression [7]. Vasterling *et al.* demonstrated that the clinical impact of PTSD extends well beyond the defined PTSD symptomatology boundary and has been associated with a higher risk of somatic symptoms and medical illnesses [8]. Thus, PTSD has a negative impact on an individual's occupational and psychosocial functioning. Also, the presence of PTSD predisposes individuals to comorbid depression [3,9–11].

Depression is a common mental illness that affects more than 20% of Americans at some point in their lifetime. Despite its high prevalence in the general population, depression still remains misunderstood, under-reported and largely untreated [12]. The direct and indirect impact of depression accounts for more than US\$100 billion per year, which is ranked second only to cancer [13,14]. Depression has been linked to multiple physical symptoms, unsatisfactory health status and functioning, poor prognosis, and increased medical utilization and costs [13,15]. PTSD with depression is very common in those who have been exposed to war [16,17], disaster [18] and intimate partner violence (IPV) [19], when compared with the general population [20].

Over 80% of PTSD cases are comorbid with other mental disorders or medical illnesses [21]. The most commonly reported PTSD comorbidities are anxiety, personality disorders, substance abuse, medical illness and depression [22–24]. The relationship between symptom severity and a dual diagnosis of PTSD and depression has been frequently studied in diverse populations such as the military, war victims, prisoners, teachers, victims of domestic violence and those affected by a natural disaster [25–28]; in particular, the impact of PTSD and depression comorbidity on symptom severity [2,29–37]. Although many previous studies conducted with traumatized populations have indicated adverse consequences of PTSD and depression comorbidity, including an increase in symptom severity, studies are not consistent about the

impact of PTSD and depression comorbidity on symptom severity, especially across different populations [36,37]. Beside PTSD and depression comorbidity, other factors associated with symptom severity are the type of trauma suffered, severity of trauma, number of traumatic events, past psychiatric history, post-trauma social support, peritraumatic emotional responses and peritraumatic dissociation [38].

The main purpose of this study was to determine whether a dual diagnosis of PTSD and depression is associated with greater symptom severity compared with those who have been diagnosed with only one disorder (PTSD or depression) across different populations. Although there are many factors associated with symptom severity, including PTSD and depression comorbidity, there is no agreement in the literature on the generalizability of these factors across different populations. Therefore, the knowledge of population-specific findings would be more appropriate and helpful to address the clinical difficulties associated with PTSD and depression comorbidity in different populations.

Methods

A sequential series of searches on PTSD and depression comorbidity were conducted using the MEDLINE and PsychINFO databases. Key-words that were searched for included PTSD, symptom severity, comorbidity, depression, clinical or randomized or trial, workplace, mental health and psychological trauma. Literature searches were then filtered using the following limiting factors: age (19–65 years), publication date (1980 to December 2011), human study and English language to obtain appropriate and relevant articles. This search strategy was approved by a library scientist at St Michael's Hospital.

The literature search resulted in 180 relevant abstracts. Articles were considered for inclusion in the study if their abstract appeared to furnish sufficient information to examine whether symptom severity was modulated by PTSD and depression comorbidity, when compared with those with only one disorder (PTSD or depression). In this review, overall severity of PTSD and/or depression symptomatology represents the term symptom severity. Since this review focuses on the adult working population, research on children and adolescents was excluded from the study. Articles that did not meet the inclusion criteria or provided very

limited information about the impact of PTSD and depression comorbidity on symptom severity were excluded. In order to obtain reliable information from rigorously conducted research, only original research articles published in peer-reviewed journals were included. Thus, textbooks, book chapters, case reports, review articles and unpublished doctoral dissertations were excluded from the study.

All abstracts gathered from the search process were reviewed carefully using the inclusion and exclusion criteria decided upon by the authors. Inter-rater reliability for an article's inclusion in the review was determined by comparing the authors' independent judgments regarding a common set of 40 articles using the inclusion and exclusion criteria. Inter-rater reliability was assessed using Cohen's κ -coefficient, which indicated an acceptable level of inter-rater reliability ($\kappa = 0.75$). The remaining abstracts were equally divided among the authors, reviewed based on the inclusion and exclusion criteria, and subsequently presented to all authors to elicit any remaining disagreements. Any disagreements were resolved by a process of consensus. Based on the above methodology, a total of 13 articles met the inclusion criteria for this study. The relatively lower number of selected articles can be attributed to the strict inclusion criteria and the low number of publications covering this topic.

Results

Overall, there were six cross-sectional studies, three randomized controlled trials, three cohort studies and one case-control study. The greater number of cross-sectional studies is mainly due to a shorter duration and the low cost of the design as compared with randomized controlled trials or cohort studies. The relatively low numbers of randomized controlled trials and prospective cohort studies in this sample of reviewed articles can be attributed to the nature of the study design, involving a longer duration and greater financial cost to undertake these types of studies. Nevertheless, our included articles were based on a wide variety of study designs.

As listed in **Table 1**, 13 articles were reviewed and broadly categorized into the following two groups: articles supporting the impact of PTSD and depression comorbidity on symptom severity ($n = 9$); and articles not supporting this hypothesis ($n = 2$). This categorization was important for summarizing the relevant articles to focus on the study's goal.

Articles by Trief *et al.* [39] and Ginzburg *et al.* [25] were selected for the full review based on their abstracts but provided insufficient information about the impact of PTSD and depression comorbidity on symptom severity. The participants in these studies were associated with multiple comorbid illnesses; furthermore, these studies did not analyze specifically the impact of PTSD and depression comorbidity on symptom severity. Therefore, these two studies were excluded from this review.

■ Supportive findings of impact of comorbidity

Nixon *et al.* presented their findings of a cross-sectional study conducted on women recruited from domestic violence assistance agencies and shelters [26]. Women who had experienced incidents of physical abuse 6 months prior to the assessment were included in the study. The Clinician-Administered PTSD Scale (CAPS) and the Structured Clinical Interview for DSM-IV (SCID) were implemented to make PTSD and depression diagnoses, respectively. Additional measures were used to assess preabusive functioning, frequency and severity of physical assault, injury, childhood and adult sexual abuse, or being a victim of interpersonal crimes. Out of 142 participants, 49% met the criteria for PTSD and depression comorbidity. The findings from this study suggest that participants with PTSD and depression comorbidity were more likely to have suffered from adult rape than the PTSD/no major depressive disorder (MDD) group. Moreover, the comorbid group also reported significantly more symptoms on the Post-traumatic Stress Diagnostic Scale (mean [M]: 34.37; $p < 0.001$), CAPS (M: 81.64; $p < 0.001$) and the Beck Depression Inventory (M: 32.22; $p < 0.001$) measures when compared with the PTSD/no MDD group. Hence, this study revealed that PTSD with depression results in a higher symptomatology and PTSD severity. However, these observations were limited by having a female-only population sample and also for establishing a cause-and-effect relationship by the cross-sectional design.

Similarly, the cross-sectional study conducted by Lipsky *et al.* [31] with 182 female victims of IPV utilized the Composite International Diagnostic Interview and the Center for Epidemiologic Studies-Depression Scale (CES-D) for PTSD and depression symptomatology assessment. Women with PTSD symptomatology were four-times more likely to be depressed when compared

Table 1. Summary of recent basic research on post-traumatic stress disorder and depression comorbidity.

| Status of the study | Author (year) | Study design/study population | Assessment measures (PTSD and depression) | Results/interpretation | Ref. |
|---------------------|-----------------------------------|----------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| S | Nixon <i>et al.</i> (2004) | Cross-sectional/domestic violence | CAPS, SCID, PDS, BDI-II | The PTSD with depression group reported significantly more symptoms on the PDS, CAPS and BDI-II measures compared with the PTSD/no MDD group | [26] |
| S | Lipsky <i>et al.</i> (2005) | Cross-sectional/IPV | CIDI, CES-D | Compared with women without PTSD, those with PTSD symptomatology were four-times more likely to have depressive symptoms. Furthermore, PTSD and depression comorbidity was significantly associated with higher depressive symptomatology | [31] |
| S | Taft <i>et al.</i> (2009) | Cross-sectional/victims of interpersonal trauma | CAPS, SCID-I, PDS, BDI-II | As compared with the PTSD-only group, the group with PTSD/MDD demonstrated more symptoms of PTSD and depression | [32] |
| S | Davidson <i>et al.</i> (1990) | Randomized controlled trial/war veterans | HDRS, SI-PTSD | Vietnam War veterans were more symptomatic and more severely affected in terms of depression and PTSD symptomatology. However, it was not clear why Vietnam War veterans showed significantly higher symptom severity compared with World War II veterans | [29] |
| S | Holtzzheimer <i>et al.</i> (2005) | Case-control/hospitalized inpatients | SCID-I, PSAS | The group with PTSD and depression comorbidity was more impaired, hostile and symptomatic, and had poorer treatment outcomes compared with those with depression without PTSD | [30] |
| S | Brady and Clary (2003) | Randomized controlled trial/patients from multicenter treatment site | CAPS-2, HDRS | PTSD and depression comorbidity had a modest incremental effect on baseline symptomatology and severity scale. The comorbid group responded well to sertraline treatment, but required a higher dose and a longer time to respond to treatment compared with the PTSD group | [33] |
| S | Green <i>et al.</i> (2006) | Randomized controlled trial/African-American and Latino women | PRIME-MD, CIDI, HDRS | Women with PTSD and depression comorbidity were significantly more impaired on all baseline measures, and had more severe symptoms throughout the 1-year follow-up period compared with the group without comorbidity | [2] |
| S | Momartin <i>et al.</i> (2004) | Cross-sectional/Bosnian refugees | CAPS, SCID-I | The group with PTSD and depression comorbidity manifested greater PTSD severity as well as higher levels of disability on global dysfunction, social impairment and occupational disability when compared with the pure PTSD and normal groups | [34] |
| S | Blanchard <i>et al.</i> (1998) | Prospective cohort/motor vehicle accident victims | CAPS, SCID-I, BDI | The group with PTSD and depression comorbidity was more subjectively distressed, suffered major role impairment and remitted less frequently over the 6-month follow-up when compared with the pure PTSD group | [35] |
| NS | Stein and Kennedy (2001) | Cross-sectional/IPV | CAPS, SCID-P, CES-D | The PTSD and PTSD with depression groups did not differ significantly from one another on the total CAPS or CES-D scores. Furthermore, no significant difference in overall functioning was detected between the PTSD and PTSD with depression groups | [36] |
| NS | Kehle <i>et al.</i> (2011) | Longitudinal/National Guard soldiers | CAPS, SCID-I | PTSD participants with additional comorbid diagnoses were not associated with an incremental decrease in functioning or quality of life when compared with those with PTSD diagnosis only | [37] |

BDI: Beck Depression Inventory; CAPS: Clinician-Administered Post-Traumatic Stress Disorder Scale; CES-D: Center for Epidemiologic Studies-Depression Scale; CIDI: Composite International Diagnostic Interview; HDRS: Hamilton Depression Rating Scale; IPV: Intimate partner violence; MDD: Major depressive disorder; NS: Nonsupportive article; PDS: Post-traumatic Stress Diagnostic Scale; PRIME-MD: Primary Care Evaluation of Mental Disorders; PSAS: Psychiatric Symptom Assessment Scale; PTSD: Post-traumatic stress disorder; S: Supportive article; SCID: Structured Clinical Interview for DSM-IV; SCID-P: Structured Clinical Interview for DSM-IV – Patient Edition; SI-PTSD: Structured Interview for Post-Traumatic Stress Disorder Symptoms.

with those without PTSD. Furthermore, PTSD and comorbid depression were significantly associated with higher depressive symptomatology ($M: 32.9$; $p < 0.001$). However, the study was compromised by a cross-sectional design and the lack of a definitive measure to diagnose PTSD. The traumatized study sample and the lack of

a PTSD diagnosis may have led to overestimation of PTSD and depression comorbidity. Likewise, Taft *et al.* examined the factors associated with PTSD and depression comorbidity in 162 female victims of interpersonal trauma [32]. The CAPS and the SCID-I were used for PTSD and depression diagnoses, respectively. Several

other measures were used for assessing these participants, such as the Physical Punishment Scale of Assessing Environments-III, the Sexual Abuse Exposure Questionnaire, the Conflict Tactics Scale, the Personal Beliefs and Reactions Scale, the Multiscale Dissociation Inventory, and the Post-traumatic Stress Diagnostic Scale. In this study, when compared with the PTSD-only group, the group with PTSD/MDD demonstrated more symptoms of PTSD ($M: 32.74$; $p < 0.001$) and depression ($M: 32.04$; $p < 0.001$). However, the findings may have been compromised by recall bias of the retrospective data collection as well as selection bias because of the specific traumatized study samples.

Davidson *et al.* presented the findings of a double-blind drug trial conducted on 46 World War II and Vietnam War (VN) veterans [29]. Various instruments, such as the Hamilton Depression and Anxiety Scales, the Newcastle Index, the Clinical Global Impression of Severity Illness, the Impact of Events Scale, the Symptoms Check List-90 and a structured interview, were used to assess the severity of symptoms and trauma, and PTSD/depression diagnoses. Their findings suggested that VN veterans were more symptomatic and severely affected in terms of depression ($M: 24.5$; $p < 0.05$) and PTSD ($M: 27.7$; $p \leq 0.02$) symptomatology when compared with the World War II veterans. Over time, comorbid disorders developed in both groups of veterans, with a high frequency of alcoholism, major depression and generalized anxiety disorder. Although PTSD and depression comorbidity was associated with severe symptoms in both groups of veterans, it was not clear why VN veterans showed significantly greater symptom severity when compared with World War II veterans with comorbidity. A possible explanation offered by Davidson *et al.* was that the difference in traumatic experiences may have contributed to greater severity in VN veterans.

Holtzheimer *et al.* presented their findings of a case-control study conducted on hospitalized inpatients [30]. All psychiatric inpatients who were admitted to the Harborview Medical Center (WA, USA) between 1996 and 2000 were screened for PTSD and depression. A total of 4182 hospitalized patients with depression were initially identified and later 587 (14%) patients with PTSD were matched with 587 depressed patients without PTSD. Both groups were appropriately matched in terms of age, gender, race, year of admission, diagnosis and substance abuse. At

the time of admission, there were no significant differences between these two groups in terms of symptom severity. However, at the time of discharge, the PTSD with depression group had significantly higher scores on the Psychiatric Symptoms Assessment Scale ($M: 13.16$; standard deviation (SD): 8.72) than the depressed group without PTSD ($M: 9.81$; SD: 6.87). According to this study, patients with PTSD and depression comorbidity were more impaired, depressed and hostile at the time of discharge compared with those who were diagnosed with depression without PTSD ($p < 0.0001$). These findings also suggest that PTSD and depression comorbidity is associated with a poorer outcome during hospitalization. However, the study was compromised by a retrospective chart review design and missing data, which accounted for the variability in sample size among the different comparisons, and the lack of definitive measures to diagnose PTSD and depression. Similarly, Brady and Clary conducted a double-blind, randomized controlled trial with 395 adult participants who were enrolled from outpatient clinics [33]. Among these participants, 194 were randomized to the treatment group, while the remaining participants were randomized to the placebo group. Several measures, such as the CAPS part 2, the Clinical Global Impression of Severity, the Impact of Event Scale, the Davidson Trauma Scale, the Hamilton Depression Rating Scale and the Quality of Life Enjoyment and Satisfaction Questionnaire, were used in the assessment of these participants. Approximately 32.9% ($n = 130$) participants were diagnosed with PTSD and depression comorbidity. Results from the study imply that PTSD and depression comorbidity has a modest incremental effect on baseline depression symptomatology ($M: 23.6$; SD: 7.9) and PTSD severity scores ($M: 76.9$; SD: 16.6). This study demonstrated that patients with comorbidity responded well to sertraline treatment; however, when compared with the PTSD group they required higher doses of sertraline and took longer to respond to treatment. This study elucidated the impact of comorbidity on symptom severity and treatment response. The main caveat to this study is that it was not originally designed as a study of comorbidity with adequate sample size and power.

Green *et al.* presented a study on PTSD and depression comorbidity conducted on African-American and Latino women recruited from county health and social service agencies [2]. Various measures were used to diagnose PTSD

and depression along with their severity. Among 427 MDD participants, only 267 participants completed the baseline clinical interview. These participants were then randomly assigned to antidepressant medication, cognitive behavioral therapy or referred to community mental health services. The findings from Green *et al.* suggested that women with PTSD and depression comorbidity were significantly more impaired on baseline measures of clinical symptoms and functioning, including greater anxiety and depression, as well as poorer physical and social functioning, when compared with those with depression. The primary finding of the study was that PTSD did not affect the outcome for depression treatment; however, the group with PTSD and depression comorbidity demonstrated higher levels of impairment on baseline depression ($M: 19.21$; $p < 0.01$) and PTSD symptoms ($M: 11.98$; $p < 0.01$), which remained higher at the end of study when compared with those with depression.

A cross-sectional study conducted by Momartin *et al.* on 126 Bosnian refugees resettled in Australia disclosed the difficulties and disabilities associated with PTSD and depression comorbidity [34]. The participants were recruited from the larger Bosnian community residing in Sydney, Australia, with the help of the Bosnian Resource Centre and a snowball sampling technique. The CAPS and a semi-structured interview (SCID-I) were used for PTSD and depression diagnoses, respectively. Other measures of functional impairment, such as the Short Form Health Survey (SF-36) and the Quality of Life Enjoyment and Satisfaction Questionnaire, were also utilized. The authors' findings suggest that the PTSD with depression group manifested greater PTSD severity (Pearson $\chi^2 = 4.5$; degrees of freedom = 1; $p < 0.05$), as well as higher levels of disability on global dysfunction, social impairment and occupational disability when compared with the pure PTSD and normal groups. Although the reports of trauma could be biased by using retrospective information, the overall findings were statistically significant and were consistent with previous findings. Similarly, the longitudinal study conducted by Blanchard *et al.* on motor vehicle accident victims demonstrated that the group with PTSD and depression was more subjectively distressed in terms of PTSD ($M: 78.9$; $p < 0.0001$) and depression ($M: 21.9$; $p = 0.0001$) symptomatology when compared with the pure PTSD group [35]. The

study also analyzed the effects of depression on the short-term natural history of motor vehicle accident victims with PTSD, which revealed that, when compared with the pure PTSD group, the comorbid group was less likely to remit over the 6-month follow-up period.

■ Nonsupportive findings impact of comorbidity

The study conducted by Stein and Kennedy on female victims of IPV could not detect a significant difference between PTSD and PTSD with depression groups in terms of PTSD severity [36]. All of the participants were victims of physical and/or sexual abuse by an intimate partner and were recruited from the agencies that provided services to the victims of domestic abuse and from community medical clinics. CAPS was used to assess PTSD and its severity while the PTSD module of the SCID was used to measure the presence of PTSD and depression. Other instruments, such as the Impact of Event Scale-Revised and the revised version of the Conflict Tactics Scale, were also used to assess the severity of PTSD and IPV.

The findings from this study imply that the severity of IPV was strongly correlated with PTSD and depression symptoms ($r = 0.84$; degrees of freedom = 37; $p = 0.001$), but the severity of IPV was not predictive of comorbidity. Surprisingly, the PTSD and the PTSD with depression groups did not differ significantly from one another on total CAPS ($M: 74.3$; SD: 18.5) or CES-D ($M: 39$; SD: 8.3) scores. Furthermore, no significant differences in occupational functioning and disability levels were detected between the PTSD and the PTSD with depression groups. However, the generalizability of these findings may have been limited by the small sample size, study design, and the selection bias caused by selecting participants from agencies and community medical clinics.

Similarly, the study conducted by Kehle *et al.* with National Guard soldiers indicated that PTSD sufferers with additional comorbid diagnoses did not demonstrate an incremental decrease in functioning or quality of life when compared with those with PTSD diagnosis only [37]. All of the participants ($n = 348$) were drawn from the Readiness and Resilience in National Guard Soldiers study [40] and completed a number of measures including CAPS and SCID-I, as well as self-report measures of their social adjustment and quality of life 6–12 months

post-deployment. The findings from this study indicated that the number of diagnoses was associated with decreased social functioning ($F[2, 341] = 28.95$; $p < 0.001$) and quality of life ($F[2, 341] = 25.49$; $p < 0.001$). Further analysis in those diagnosed with PTSD revealed that additional diagnoses were not associated with further impairments in total social functioning or overall quality of life. However, it was not designed as a PTSD and depression comorbidity study; as a result, the number of participants in the comorbid group was low and this may have reduced the power of the study to detect differences between the groups.

Discussion

This review evaluated the impact of PTSD and depression comorbidity on symptom severity in various populations. Overall, the majority of the studies included in this review provide strong support for the assertion that PTSD and depression comorbidity is a modulating factor for symptom severity across different populations. Furthermore, the levels of symptom severity (measured by the CAPS, Beck Depression Inventory, CES-D, Post-traumatic Stress Diagnostic Scale and Hamilton Depression Rating Scale) for the group with PTSD and depression comorbidity are consistently higher than for the group with only one disorder (PTSD or depression) across different populations.

Considering the findings from the aforementioned studies, it is reasonable to argue that the adverse consequences of PTSD and depression comorbidity are found across all traumatized populations. In particular, a dual diagnosis of PTSD and depression is consistently associated with greater symptom severity compared with a diagnosis of only one disorder (PTSD or depression) across different populations. One possible explanation for the greater symptom severity in the PTSD and depression comorbidity group may be selection bias; samples were recruited from domestic violence assistance agencies, shelters, agencies providing services to victims of domestic abuse, war veterans and community health clinics. Conducting research in sites associated with social adversity can potentially be linked with higher levels of PTSD, depression and comorbidity symptomatology when compared with the general population. Compared with the general population, the greater symptom severity in these traumatized populations can be attributed to the presence of multiple risk

factors, such as childhood trauma, the number of traumas or the nature of the trauma, which may have a synergistic effect on the symptom severity. It is also possible to argue that lower psychosocial support and past mental health problems in these traumatized populations may have contributed to the greater symptom severity when compared with the general population.

Although the studies conducted by Nixon *et al.* [26], Taft *et al.* [32], Holtzheimer *et al.* [30], Lipsky *et al.* [31], Brady and Clary [33], Momartin *et al.* [34] and Green *et al.* [2] in different populations indicated greater symptom severity in the groups with PTSD and depression comorbidity when compared with the groups with only one disorder (PTSD or depression), the study conducted by Stein and Kennedy [36] with female victims of IPV and the study conducted by Kehle *et al.* [37] with the National Guard soldiers could not detect the adverse consequences of PTSD and depression comorbidity on symptom severity. Although these two studies reported no adverse consequences of PTSD and depression comorbidity on symptom severity, their levels of symptom severity for the group with PTSD and depression comorbidity were comparable with those studies that reported a significant impact of PTSD and depression comorbidity on symptom severity. It is possible that the findings reported by Stein and Kennedy [36] and Kehle *et al.* [37] may have been compromised by small sample sizes and methodological differences, including the time elapsed between the traumatic exposure and data collection. For example, Stein and Kennedy reported their findings based on 44 participants who had extricated themselves from their abusive relationship from 4 weeks to 2 years prior to enrollment in the study [36]. The small sample size may have decreased the power of the study to detect a difference between the PTSD group and the PTSD with depression comorbidity group in terms of symptom severity. Similarly, the findings of Kehle *et al.* were based on a small number of PTSD participants ($n = 23$) [37]. Kehle *et al.* suggested the possibility of a 'floor effect' in the PTSD participants, in which comorbid diagnoses do not cause further impairment. Furthermore, other additional factors, such as the type of trauma, severity of trauma, number of traumatic events, past psychiatric history or post-trauma social support, may account for these observed variations.

The findings of this current article have important clinical implications. This article indicates that PTSD and depression comorbidity is often

associated with greater symptom severity when compared with only one disorder (PTSD or depression). Since similar findings were reported in the majority of the studies included in this review, this article may extend the generalizability of this concept across different populations. Therefore, the presence of PTSD and depression comorbidity may serve as a risk factor to identify potential candidates that may develop greater symptom severity later on. If these vulnerable individuals could be identified ahead of time, an appropriate treatment could be directed to reduce symptom severity and its consequences. The aforementioned findings are important for clinical practitioners in the management of PTSD and depression comorbidity since early detection of vulnerable individuals may avoid future complications and long-term disability. These findings may also assist in formulating future guidelines for treatment strategies in PTSD and depression comorbidity and reduce the financial burden to insurance companies.

Conclusion & future perspective

Overall, the results of this literature review provide strong support for the assertion that PTSD and depression comorbidity is a modulating factor for symptom severity across different populations. The fact that similar associations have been observed in various diverse populations supports and strengthens the assertion of a relationship between PTSD and depression comorbidity and symptom severity. Furthermore, this review indicates that the levels of symptom severity

associated with PTSD and depression comorbidity are consistently higher than those in groups with only one disorder (PTSD or depression) across different populations. The consistency observed in the levels of symptom severity across different populations could be attributable to the traumatized sample population.

Future research on this topic should address some of the limitations reported in the selected studies by using a stronger study design, a larger sample size and a longer follow-up period. Future studies may also like to control other additional factors, such as the type of trauma sufferers, severity of trauma, number of traumatic events, past psychiatric history or post-trauma social support, which may have some role in the observed variations among different studies.

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