

Psychiatric comorbidities in older adults with posttraumatic stress disorder: A systematic review

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Abstract

Background: Psychiatric comorbidity is high in adults with posttraumatic stress disorder (PTSD), with up to 90% having at least one additional condition, and two-thirds having two or more other diagnoses. With an increasing aging population in industrialized countries, knowing which psychiatric disorders frequently co-occur in older adults with PTSD can have implications to improve diagnosis and treatment. This systematic literature review explores the current empirical literature on psychiatric comorbidity in older adults with PTSD.

Method: Literature databases PubMed, Embase, PsycINFO, and CINAHL were searched. The following inclusion criteria were applied: research done since 2013, PTSD diagnosis based on diagnostic criteria according to Diagnostic and Statistics Manual-Fifth Edition, International Classification of Diseases—10th Revision (ICD-10), or ICD-11, and studies include individuals aged 60 years or older.

Results: Of 2068 potentially relevant papers identified, 246 articles were examined based on titles and abstracts. Five papers met the inclusion criteria and were included. Major depressive disorder and alcohol use disorder were the most frequently studied and diagnosed psychiatric comorbidities in older adults with PTSD.

Conclusions and implications: Screening for depression and substance use in older adults should include an assessment of trauma and PTSD. Additional studies in the general older adult population with PTSD and a broader range of comorbid psychiatric disorders are needed.

KEYWORDS

alcohol, anxiety, depression, older adults, personality disorder, posttraumatic stress disorder (PTSD), psychiatric comorbidity, substance abuse, trauma

Key points

- Major depressive disorder and alcohol use disorders are the most frequently studied and diagnosed psychiatric comorbidities in older adults with PTSD.
- Based on this, screening for trauma and PTSD should be included in older adults with depression and substance use

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- Qualitative epidemiological studies on psychiatric comorbidities, such as personality disorders, in older adults with PTSD are limited and needed.

1 | INTRODUCTION

Psychiatric comorbidity is high in adults with posttraumatic stress disorder (PTSD). Data from epidemiologic studies in general adult populations indicate that most individuals with PTSD meet the criteria for at least one other psychiatric disorder, and a substantial percentage have three or more other psychiatric diagnoses.^{1–3} Information on traumatic stress and PTSD in older adults (aged 60 and older) is important as the clinical presentation of PTSD may differ from younger or middle-aged adults.⁴ Unique developmental factors may impact the expression and experience of PTSD and concomitant disorders in older adulthood. With an increasing aging population in industrialized countries, knowing which psychiatric disorders frequently co-occur in older adults with PTSD has implications to improve mental health diagnosis and treatment.

General population surveys in 24 countries across six continents found that over 70% of adults are exposed to a potentially traumatic event at some point in their lives.⁵ Up to 90% of older adults have experienced at least one traumatic event in their lifetime, such as combat, physical or sexual assault, natural or man-made disasters, or life-threatening illness.^{6,7} Although lifetime exposure to potentially traumatic events among older adults is high, rates of PTSD are estimated at 2.6%, a rate lower than for middle-aged (5.2%) and young adults (4.3%).⁸

In one large representative sample of U.S. adults aged 18 years and older, those with PTSD had elevated odds of any mood disorder (i.e., Major Depressive Disorder (MDD; 52%),⁹ dysthymia, Bipolar I, and II), any other anxiety disorder (i.e., Generalized Anxiety Disorder (GAD; 40%),¹⁰ panic, agoraphobia without panic disorder, social anxiety (14.8%–46%)¹¹ and specific phobias), alcohol and drug abuse/dependence (2–4 times more likely),¹² and nicotine dependence, as well as features of suicidality such as self-injurious behaviors, suicidal ideation, and lifetime suicide attempts.^{13–15} PTSD is also associated with increased rates of personality disorders; 22%–24% of individuals with PTSD have a borderline personality disorder (BPD).^{16,17} In individuals with complex PTSD (cPTSD), BPD comorbidity was 79%.¹⁸ However, none of these aforementioned studies included a sufficient number of older adults or did not make specific age comparisons regarding the prevalence of psychiatric comorbidities.

Although one large epidemiological study in the U.S. found that nearly 80% of older adults with PTSD reported at least one comorbid disorder,¹⁹ there is no single review that synthesizes all published studies on psychiatric comorbidity in this population. Psychiatric comorbidity in older adults with PTSD seems to be understudied, under-recognized, and under-treated as opposed to psychiatric comorbidity in younger and middle-aged adults. Knowing which psychiatric disorders frequently co-occur in older adults with PTSD, can improve recognition, treatment, and prognosis.

In 2013, the criteria for PTSD changed considerably with the newest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).²⁰ That is, PTSD was relocated from the anxiety disorders to a new diagnostic category named 'Trauma and Stress or Related Disorders'.²¹ In addition, the subjective component to the definition of trauma was eliminated, there was a tightening of the definitions of trauma and exposure to it, an increase and rearrangement of the symptoms criteria, and additional criteria were added.²² The last systematic review on psychiatric comorbidities in older adults (veterans) with PTSD was published in 2019 by Kang et al²³ based on studies from 1980 to 2018. To date, there is no recent systematic review on PTSD and its psychiatric comorbidities using the latest DSM-criteria in a general older adult population. The objective of this systematic review was to explore the literature on psychiatric comorbidities in older adults (age ≥ 60 years) diagnosed with PTSD according to the DSM-5, International Classification of Diseases—10th Revision (ICD-10),²⁴ or ICD-11²⁵ diagnostic criteria.

2 | METHODS

The search was conducted in four databases: PubMed, Embase, PsycINFO, and CINAHL. The search strategy combined terms of three domains: (1) posttraumatic stress disorder; (2) age; and (3) psychiatric comorbidity. There were some specific limitations (e.g., only studies in 'human subjects' and 'English language'). The complete search strategy is provided in Appendix A. The selection process followed the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines for reporting systematic reviews. Search terms were applied to the titles and abstracts of articles.

Studies satisfying the following criteria were included: (1) articles used DSM-5 criteria, ICD-10, or ICD-11 codes; (2) specifically studied older adults (age ≥ 60 years) or results were described for older adults separately; (3) either cohort or cross-sectional studies; (4) PTSD was the primary diagnosis; and (5) comorbidity rates were given or could be calculated.

Details of the studies' identification, screening, eligibility, and inclusion criteria are shown in Figure 1. Initially, the search returned 5394 hits. First, publications before 2013 were excluded, leaving 2509 articles. Second, duplicates were found using 'Find duplicates' in EndNote, and the remaining articles were checked by hand. In total, 195 articles were excluded as duplicates. Two reviewers separately performed study selection based on eligibility criteria (F.B., M.v.K.) and scrutinized the full-text versions of potentially relevant articles based on titles and abstracts. Next, data extraction and quality assessment were done by the same two authors independently. Any discrepancies were resolved with a third reviewer (S.S.). The following

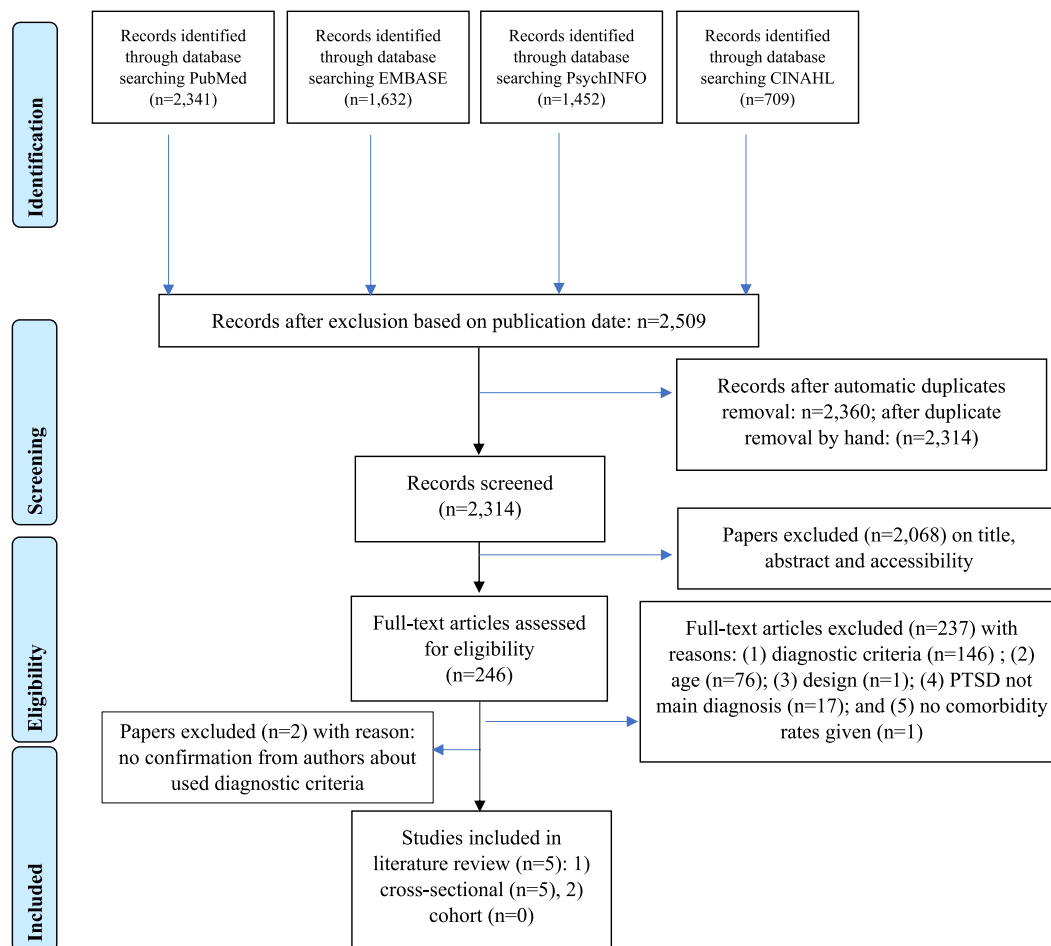


FIGURE 1 PRISMA flow chart documenting the search and screening process of studies.

information was extracted from each study: first author, year of publication, the study design (e.g. cross-sectional), population sampled, country, sample size, age range, male/female distribution, ethnicity, how selection/recruitment took place, and which measurement of PTSD was used. Relevant results were extracted, including the main findings of the study, including comorbidity rates. Data extraction was checked by the last author (S.S) and possible discrepancies were discussed within the study team.

The Newcastle-Ottawa Scale (NOS)²⁶ was used to assess study quality. For cross-sectional studies, an adapted version of the NOS was applied. Quality was checked independently by two authors (F. B., M.v.K.) and disagreement was discussed with a third author (S.S).

3 | RESULTS

Five full-text papers fulfilled the eligibility criteria for review.^{19,27–30} Table 1 provides the characteristics, comorbidity rates, results, and quality of the included studies. Four independent samples were included in these papers since Baird et al²⁷ and McLeay et al²⁸ studied the same population. In total, these four different samples included a total of 3501 participants, of which 988 participants

(28.2%) met the DSM-5 or ICD-11 diagnostic criteria of PTSD. The mean age across the four samples ranged between 67.6 and 73.2 years (range 60–88). Four studies were conducted using data from veteran populations, three from Australian Vietnam War veterans,^{27–29} and one from U.S. veterans.³⁰ One study used data from a representative sample of community-dwelling adults in the U.S.¹⁹ Four studies had a control group of participants without PTSD.^{27–30} All five studies had a cross-sectional design. PTSD symptoms were measured by different instruments which were either self-report or diagnostic interviews. Quality assessment of the five studies was sufficient (mean NOS score: 6.0; range 5–7; SD: 0.89). Two studies were qualitative good studies (NOS score 7–8)^{28,29} and three studies were qualitative satisfactory studies (NOS score 5–6) according to Abesig et al³¹ (see Table 2).^{19,27,30} Strengths of these studies are that all studies used validated measurement tools to measure PTSD, and the statistical tests were clearly described and appropriate. Limitations of the included studies are, besides the study design, the representativeness of the exposed cohort (four out of five studies used a selected study group),^{27–30} and none described whether the sample size was justified, the response rate, nor compared respondent and non-respondents, and three studies used self-report outcomes.^{19,27,30}

TABLE 1 Characteristics of studies, main findings, and comorbidity rate.

First author (year)	Sample characteristics					Selection/Recruitment	PTSD measures	Main findings	Comorbidity rate (%)	Study quality (total score NOS)
	Design	Criteria PTSD	Population	Sample size (N)	Age (mean, range, or minimum)	Male, %	Ethnicity			
Theal (2019)	Cross-sectional	DSM-5	Australian vietnam veterans	40		100%	Caucasian	PTSD group had significantly increased prevalence of MDD compared to control group.	PTSD (n = 20): Major depressive disorder (35.0%)	7
			PTSD	20	69.5 ± 3.4 (64–78)			Although there was a higher use of sleep medication in the PTSD group (52.5% vs. 26.3%) this was not significant, nor was there a significant difference in the number of nights medications were used.	No PTSD (n = 20): Major depressive disorder (5.0%)	
			No PTSD	20	70.4 ± 3.2 (65–79)			Daily caffeine and alcohol intake was comparable between groups, as was daytime napping. 85% of the PTSD group reported experiencing nightmares compared to only 20% of the control group.		
McLeay (2017)	Cross-sectional	DSM-5	Australian Vietnam veterans	214		100%	European (N = 102) indigenous Australian (N = 1) Other (N = 1) NR (N = 4) European (N = 103) NR (N = 3)	More participants with PTSD had smoked recently and the group had a higher mean pack-year history.	PTSD (n = 108): Risky or hazardous level or higher (49.1%) of alcohol consumption. Current smoker (13%), within 12 months (19%) or more than 12 months ago (82%). Depressive symptoms of moderate or greater degree (22.0%)	7
			PTSD	108	68.5 ± 4.1 (60–88)			Recruited by a veteran mental health unit websites newspaper advertisement word of mouth	Current smoker (13%), within 12 months (19%) or more than 12 months ago (82%). Depressive symptoms of moderate or greater degree (22.0%)	
			No PTSD	106	69.2 ± 4.2 (63–86)			Fewer in this group currently consumed alcohol; total alcohol. Use disorders identification test (AUDIT) scores were not significantly different, but more participants with PTSD were categorized as drinking at a risky or	No PTSD (n = 106): Risky or hazardous level or higher (30.0%) of alcohol consumption. Current smoker (7%),	

TABLE 1 (Continued)

TABLE 1 (Continued)

First author (year)	Sample characteristics				Selection/Recruitment			PTSD measures	Main findings	Comorbidity rate (%)	Study quality (total score NOS)
	Design	Criteria PTSD	Population	Sample size (N)	Age (mean, range, or minimum)	Male, %	Ethnicity				
Moye (2022)	Cross-sectional	DSM-5	United States veterans	2717	69.4 ± 5.6	85%	Caucasian	PTSD checklist for DSM-5 (PCL-5)	The most prevalent index trauma in the full PTSD group was combat exposure (32.5%), physical assault (12.5%), sexual Assault (7.5%), and life-threatening illness or injury (5.0%).	Full PTSD (n = 68): Lifetime Major depressive disorder (62.5%) Alcohol use disorder (63.4%) Drug use disorder (17.5%) Nicotine use disorder (32.5%)	5
			Full PTSD	68	70.8 ± 7.7	91.6%	80%				
			Subthreshold PTSD	262	73.2 ± 8.2	96.5%	79.9%				
			No/Minimal PTSD	2387			86.5%				
									The most prevalent traumas in the subthreshold PTSD group were combat exposure (18.1%), life-threatening illness or injury (9.3%), exposure to sudden accidental death (8.3%), and physical assault (6.9%).	Non-suicidal self-injury (5.0%) Suicide attempt (10.0%) Current Major depressive disorder (37.5%) Generalized anxiety disorder (30.0%) Alcohol use disorder (12.5%) Drug use disorder (15.4%)	
									Veterans with subthreshold PTSD were more likely than those with no/minimal PTSD symptoms to screen positive for lifetime MDD, AUD, DUD,	Suicidal ideation (20.0%) Suicidal intentions (5.0%) Subthreshold PTSD (n = 262): Lifetime Major depressive disorder (27.5%)	

TABLE 1 (Continued)

First author (year)	Design	Criteria PTSD	Sample characteristics			Selection/ Recruitment	PTSD measures	Main findings	Comorbidity rate (%)	Study quality (total score NOS)
			Population	Sample size (N)	Age (mean, range, or minimum)	Male, %	Ethnicity			
								NSSI, and SA; current MDD, GAD AUD, DUD, and suicidal ideation; and to have ever and currently use mental health treatment.	Alcohol use disorder (60.6%) Drug use disorder (25.1%) Nicotine use disorder (26.1%) Non-suicidal self-injury (3.4%) Suicide attempt (6.4%) Current Major depressive disorder (14.7%) Generalized anxiety disorder (8.8%) Alcohol use disorder (13.8%) Drug use disorder (13.4%) Suicidal ideations (16.3%)	
								Veterans with full PTSD were more likely than those with no/ minimal PTSD symptoms to screen positive for lifetime DUD, AUD, NSSI, and SA; current MDD, GAD, suicidal ideation and intent; and to have ever and currently use mental health treatment.	Suicidal intentions (2.0%) No/Minimal PTSD symptoms (n = 2387): <i>Lifetime</i> Major depressive disorder (7.1%) Alcohol use disorder (36.9%) Drug use disorder (8.4%) Nicotine use disorder (19.0%) Non-suicidal self-injury (0.7%) Suicide attempt (0.9%) Current Major depressive disorder (2.7%) Generalized anxiety disorder (2.1%) Alcohol use disorder (7.5%) Drug use disorder (6.0%) Suicidal ideations (4.4%) Suicidal intentions (0.3%)	

(Continues)

3.1 | Psychiatric comorbidity rates in PTSD

Table 3 indicates which comorbid psychiatric disorders have been studied, and the comorbidity range in percentages. The most frequently reported comorbid psychiatric disorder in older adults with PTSD was MDD (four out of five studies; 80.0%) with a comorbidity range of 14.7%–62.5%,^{19,28–30} and alcohol use disorder (AUD) (four out of five studies; 80.0%) with a comorbidity range of 12.5%–63.4%.^{19,27,28,30} Next, nicotine use disorder was reported in three studies (3/5 = 60.0%) with a comorbidity range of 13.0%–32.5%.^{27,28,30} GAD and drug use disorder were found in two studies (2/5 = 40.0%); comorbidity ranges for GAD ranged from 8.8% to 30.0%^{19,30} and for drug use disorder was 10.4%–25.1%.^{19,30} Other anxiety disorders were studied in only one article (1/5 = 20.0%) with a different comorbidity rate depending on the type of disorder (e.g., comorbidity for agoraphobia was 5.0%).¹⁹

Personality disorders,¹⁹ eating disorders,¹⁹ and suicide rates³⁰ were all examined in only one study (1/5 = 20.0%). The comorbidity

range of antisocial personality disorder was 4.0% while the comorbidity range of BPD was 28.0%.¹⁹ The comorbidity rate of eating disorders was 2.8%.¹⁹ Among older adults with full PTSD, 5% reported non-suicidal self-injury, 10% made a suicide attempt, 20% reported suicidal ideation, and 5% had suicidal intent.³⁰ Among patients with subthreshold or partial PTSD, 3.4% reported non-suicidal self-injury, and 6.4% committed a suicide attempt. 16.3% had suicidal ideations, and 2.0% had suicidal intentions.³⁰

4 | DISCUSSION

Five empirical papers on psychiatric comorbidity rates in older adults with PTSD were found. Only one was done in the general civilian population,¹⁹ most (80%) were done in veterans.^{27–30} Relatively little research on psychiatric comorbidity in older adults with PTSD has utilized samples from women. The most frequently studied comorbidities in older adults with PTSD were MDD and AUD. In addition,

TABLE 3 Psychiatric comorbidity in older adults with PTSD.

Comorbid psychiatric disorder	Comorbidity range (%) in older adults (≥60 years) with posttraumatic stress disorder	Number of studies reporting comorbid disorder
Anxiety disorder		
Agoraphobia	5.0%	1
Generalized anxiety disorder	8.8%–30.0%	2
Panic disorder	11.3%	1
Social phobia	9.4%	1
Specific phobia	12.0%	1
Eating disorder	2.8%	1
Mood disorder		
Dysthymia	16.4%	1
Major depressive disorder	14.7%–62.5%	4
Personality disorder		
Antisocial personality disorder	4.0%	1
Borderline personality disorder	28.0%	1
Schizotypal personality disorder	18.4%	1
Substance use		
Alcohol use (disorder)	12.5%–63.4%	4
Drug use (disorder)	10.4%–25.1%	2
Nicotine use (disorder)	13.0%–32.5%	3
Suicide		
Non-suicidal self-injury	3.4%–5.0%	1
Suicide attempt	6.4%–10.0%	1
Suicidal ideations	16.3%–20.0%	1
Suicidal intentions	2.0%–5.0%	1

these two psychiatric disorders also had the highest comorbidity rates.

4.1 | Major depressive disorder (MDD)

MDD was the most frequently studied comorbidity in PTSD (14.7%–62.5%)^{19,28–30} with equivalent comorbidity rates of 33%–52.3% in older adults (veterans)²³ and with equivalent comorbidity rates of 52% in a general adult population.⁹ This is in line with research from a community-based sample of men aged 50 and older, indicating that veteran status was not associated with increased odds of depressive symptoms.³² Rather, reported comorbidity rates seem to depend on the degree of presence of the disorder. For example, Moyer et al³⁰ divided older participants with PTSD into two distinct groups those with full and subthreshold PTSD, and found lower comorbidity rates (14.7%) in those with subthreshold PTSD. The highest comorbidity rate of MDD, 62% was found in their lifetime full PTSD group. Moyer et al³⁰ were the only one of the five studies in this review that made the distinction between full and subthreshold PTSD. When not taking subthreshold PTSD into account, the subsequent lowest comorbidity rate was 22.0%.²⁸ Also, although gender was not included in this study, research in a non-clinical sample of soldiers, found that higher levels of combat exposure were more strongly associated with depression and PTSD symptoms in women compared to men.³³

4.2 | Alcohol use disorder (AUD)

In addition to MDD, comorbidity rates of AUD were the most studied comorbid disorder in older adults, with comorbidity rates ranging from 12.5% to 63.4%.³⁰ This comorbidity rate seems to be even higher than comorbidity rates of comorbid PTSD and substance use disorder (SUD) (including alcohol use disorder) found by Kang et al²³ in older adults (veterans) (1.9%–11.3%). The comorbidity rate also seems to be higher compared to SUD in a general adult population (14.8%–46.0%).¹⁰ The incidence of AUD in older adults is fairly high (1%–3%); however, diagnosis is often underestimated, and data collection is incomplete and sparse.³⁴ The self-medication hypothesis often used to explain the connection between PTSD and SUD, postulates that drugs and alcohol provide powerful short-term antidotes to pain associated with symptoms of PTSD.³⁵ Older adults may be more inclined to utilize alcohol to mask or cope with their PTSD symptoms. Thus, healthcare providers should be aware of potential underlying trauma in older adults who abuse alcohol, drugs, or prescribed medications.

4.3 | Nicotine use disorder (smoking)

Nicotine use disorder was the third most studied psychiatric disorder with comorbidity rates ranging between 13.0% and 32.5%.^{27,28,30} In 2020, an estimated 12.5% of U.S. adults currently smoked

cigarettes.³⁶ Of U.S. adults aged 65 years or older, 9.0% smoked cigarettes in 2020 which is lower compared with percentages found in older adults with PTSD. According to research by Durai et al,³⁷ older veterans with PTSD symptoms were significantly more likely to report current smoking, and had a higher prevalence of mental distress, death wishes, and suicidal ideation.³⁸ This is in line with the findings of this review. Indeed, it has been suggested that some individuals with PTSD may smoke to overcome emotional numbing, one of the core features of PTSD.³⁹

4.4 | Generalized anxiety disorder (GAD) and drug use disorder

GAD and drug use disorder in older adults with PTSD were studied in two (2/5 = 40.0%) of the included papers.^{19,30} Comorbidity of GAD in older adults varied from 8.8% to 30.0%^{19,30} which seems to be higher than reported by Kang et al²³ (14%–15%). Other anxiety disorders were studied in only one article (1/5 = 20.0%) with a different comorbidity rate depending on the type of disorder (e.g., comorbidity for agoraphobia was 5.0%).³⁰ A comprehensive review of anxiety in older adults,⁴⁰ found that specific phobias and GAD have the largest prevalence estimates. This is in line with findings in this review where specific phobia was found to be comorbid in 12.0% and rates of GAD ranged between 8.8% in those with subthreshold PTSD, and 30.0% in individuals with full PTSD.³⁰ Comorbidity rates of drug use disorder ranged from 10.4% to 25.1%.^{19,30} This comorbidity rate seems to be higher than the comorbidity rates of SUD and PTSD previously found by Kang et al²³ (1.9%–11.3%). Although drug abuse and addiction generally decline with age, drug use disorders remain protracted in traumatized populations when there is additional co-occurring psychopathology.⁴¹ Substance abuse has been under-identified among older adults for decades.⁴² While illicit drug use typically declines after young adulthood, nearly 1 million U.S. adults aged 65 and older meet criteria for a SUD in 2018.⁴³ More research and clinical attention is needed on drug abuse in older adults.

4.5 | Personality disorders, suicidal ideations, intentions and attempt, and eating disorders

Comorbidity rates of personality disorders, suicidal ideations, intentions and attempt, and eating disorders in older adults with PTSD have been studied in one out of five articles (20.0%). Personality disorders often co-occur in PTSD (comorbidity rate 22%–26% in adults).⁴⁴ The current finding of only one study investigating the comorbidity rate of personality disorders in older adults with PTSD is disappointing. Core features, such as disturbed interpersonal relationships and emotional dysregulation, can persist into old age, contributing to a high disease burden, including psychosocial impairment and elevated suicide risk.⁴⁵ BPD is the most common personality disorder in older adults (28.0%),¹⁹ and has an important relationship with trauma, including those with BPD having a

vulnerability to developing PTSD.⁴⁶ Other personality disorders found to frequently co-occur in older adults with PTSD are schizotypal (18.4%), and antisocial (4.0%) disorders.¹⁹

In general, psychiatric disorders increase the risk of suicide completion and attempt in older adults. For example, one in every six older adults who kills themselves has a comorbid anxiety disorder (including PTSD) along with depression.⁴⁷ Suicidal behavior is a critical problem among older adults and traumatized populations, including war veterans. Veterans, and older adults in general, are less likely to seek care and more likely to act successfully on suicidal thoughts. Therefore, screening for comorbid disorders, timely diagnosis, and effective intervention are imperative.¹⁵ Suicide prevention in older adults should broaden its focus and pay attention to conditions that may be relevant in older age, including screening for trauma and PTSD.

Any comorbid eating disorder has been reported in 2.8% of older individuals with PTSD. Recent studies validate the importance of assessing trauma and PTSD in treating eating disorders. A relationship between eating disorders, particularly bulimia nervosa and binge eating disorder, and trauma have been reported in various studies.⁴⁸ For example, Mitchell et al⁴⁹ reported that the relationship between PTSD and disordered eating, food addiction, and being overweight in older male veterans was mediated by the suppression of expressions of fear, hostility, guilt, and sadness, underscoring a specific link between trauma, problems in emotional expression and disordered eating. While studies on eating disorders in older adults are sparse,⁵⁰ this seems relevant to be further explored in older survivors with PTSD.

4.6 | Hypotheses to explain levels of comorbidity

Different hypotheses have been suggested to explain the high levels of comorbidity of PTSD with other psychiatric disorders. High rates may simply be an epiphenomenon of diagnostic criteria for these disorders.⁵¹ A high degree of symptom overlap can make diagnosis difficult and contribute to the underdiagnosis of PTSD, particularly when trauma histories are not specifically obtained.⁵² For example, depression (i.e., sleep disturbance, poor concentration) and other anxiety disorders (i.e., panic attacks, avoidance) have high symptom overlap with PTSD. Because of PTSD's symptom overlap with MDD, it is not surprising that these two disorders are highly comorbid. In addition, there is evidence that preexisting MDD is a risk factor for the development of PTSD, while at the same time, the traumatic experience is a risk factor for the development of depression.^{53,54} Furthermore, PTSD and depression instrument severity scores tend to be highly intercorrelated.⁵⁵

There are several barriers to diagnosing PTSD in older adults that may complicate the diagnostic process. For example, older individuals and/or clinicians may misattribute some PTSD symptoms to normal aging processes. Additionally, Lenze et al⁵⁶ list other barriers, such as tendencies for older adults to minimize symptoms, use different language to describe symptoms (e.g., 'concerns' rather than

worry), attribute symptoms to physical illnesses and conditions, and have difficulty remembering or identifying symptoms. This raises an important issue in the construct validity of diagnostic tools.

4.7 | Clinical implications

Older trauma survivors with PTSD are often not recognized or diagnosed by healthcare professionals.⁵⁷ There are several reasons for this including older survivors may minimize or deny exposure to trauma, misattribute trauma symptoms to somatic complaints and seek help in primary care clinics rather than mental health departments. Indeed, older adults with PTSD frequently visit medical specialists but are rarely treated by mental health professionals, or receive antidepressant treatment from their general practitioner.⁵⁸ Relatedly, healthcare professionals may not be trained to assess or recognize trauma histories in older adults, leading to inaccurate diagnosis and inappropriate administration of psychotherapy, pharmacotherapy, and other interventions. Another explanation might be that trauma-sensitive care and treatment of traumatic stress are not always guaranteed in healthcare. Older adults may not be aware of the potential negative consequences of exposure to trauma and therefore may not disclose this information unless specifically asked. Unrecognized trauma effects could have negative implications for older adults' physical and emotional health, treatment, and recovery.⁵⁹ Similar to some younger adults, older adults may present to a mental health provider with limited awareness that their current difficulty might be related to past trauma. In general, older adults do not often utilize mental health services. Discomfort discussing personal problems with a professional is a predominant predictor of why older adults with mood and anxiety disorders do not seek help.⁶⁰ When focusing on older adults with severe mood or anxiety disorders, it was not stigma or discomfort which predicted non-use, but a lack of belief that mental health was contributing to their difficulties.⁶⁰

Healthcare practitioners should assess their older patients for exposure to potentially traumatic events as well as its effects, including PTSD. Such screening is particularly important for high-risk groups that likely have experienced trauma, whether in the remote past (e.g., veterans, survivors of childhood maltreatment) or more recently (e.g., those identified in rape crisis centers or elder abuse contexts). Relatedly when healthcare providers screen for depression and substance use in older adults, they should also include a validated assessment tool for trauma and PTSD.

Psychiatric comorbidities may not only complicate assessment and diagnosis in older adults with PTSD but likely makes treatment potentially more complicated and longer. While PTSD in older adults is an important treatment target, it may also interfere with the treatment of other disorders. For example, comorbid PTSD among depressed older patients is associated with increased illness burden, poorer prognosis, delayed response to depression treatment, and higher dropout.⁶¹ When primary care practitioners and mental health specialists work collaboratively, older adults with depression but

without PTSD also improved faster, and treatment gains were maintained longer.⁶² Thus, it seems that older survivors with comorbid PTSD and depression may need more intense treatment or longer follow-ups. Treating both PTSD and the comorbid disorder at the same time may also increase quality of life.^{63–66} Understanding psychiatric comorbidity can be used to guide targeted interventions for older adults as well as guide treatment development.

4.8 | Limitations

Despite the sufficient quality of the five identified studies, the generalization of findings is somewhat limited. First, most of the literature has focused on male veterans, and Caucasians, making it hard to generalize to civilians, non-White populations, and women. Second, the studies often did not study the full range of comorbidities known to be common in PTSD, which might have biased findings. Third, most studies were limited by a focus on a single traumatic event type (e.g., combat), reliance on non-random or convenience samples, and/or placement of all adults aged 60 and older to one category potentially losing differences related to cohort experiences and developmental factors. Fourth, the number of oldest older adults were underrepresented. Individuals aged 75 and older are needed in future studies, and then fine-grained analyses on young-old (65–74 years), middle-old (75–84 years), and old-old (85 years and older) should be conducted to further advance understanding of PTSD and psychiatric comorbidity.

4.9 | Conclusion

The results of this systematic review show frequent reported psychiatric comorbidities in older adults with PTSD with MDD and AUD as the most prevalent. Screening for depression and substance use in older adults seems relevant in the assessment of trauma and PTSD. Since the introduction of DSM-5, epidemiological studies on psychiatric comorbidities in PTSD in the general older adult population are still insufficient as only one study was found. To improve prognosis in the current aging population, these are urgently needed.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available.

ETHICS STATEMENT

Not applicable.

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REFERENCES

- Galatzer-Levy IR, Nickerson A, Litz BT, Marmar CR. Patterns of lifetime PTSD comorbidity: a latent class analysis. *Depress Anxiety*. 2013;30(5):489–496. <https://doi.org/10.1002/da.22048>
- Qassem T, Aly-ElGabry D, Alzarouni A, Abdel-Aziz K, Arnone D. Psychiatric co-morbidities in post-traumatic stress disorder: detailed findings from the adult psychiatric morbidity survey in the English population. *Psychiatr Q*. 2021;92(1):321–330. <https://doi.org/10.1007/s11126-020-09797-4>
- Van Minnen A, Zoellner LA, Harned MS, Mills K. Changes in comorbid conditions after prolonged exposure for PTSD: a literature review. *Current Psychiatric Reports*. 2015;17(3):1–16. <https://doi.org/10.1007/s11920-015-0549-1>
- Böttche M, Kuwert P, Knaevelsrud C. Posttraumatic stress disorder in older adults: an overview of characteristics and treatment approaches. *Int J Geriatr Psychiatry*. 2012;27(3):230–239. <https://doi.org/10.1002/gps.2725>
- Benjet C, Bromet E, Karam EG, et al. The epidemiology of traumatic event exposure worldwide: results from the World Mental Health Survey Consortium. *Psychol Med*. 2016;46(2):327–343. <https://doi.org/10.1017/s0033291715001981>
- Glaesmer H, Kaiser M, Braehler E, Freyberger HJ, Kuwert P. Post-traumatic stress disorder and its comorbidity with depression and somatisation in the elderly – a German community-based study. *Aging Ment Health*. 2012;16(4):403–412. <https://doi.org/10.1080/13607863.2011.615740>
- Pietrzak RH, Goldstein RB, Southwick SM, Grant BF. Psychiatric comorbidity of full and partial posttraumatic stress disorder among older adults in the United States: results from wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *Am J Geriatr Psychiatry*. 2012;20(5):380–390. <https://doi.org/10.1097/JGP.0b013e31820d92e7>
- Reynolds K, Pietrzak RH, Mackenzie CS, Chou KL, Sareen J. Post-traumatic stress disorder across the adult lifespan: findings from a nationally representative survey. *Ame J Geriatr Psychiatry*. 2016;24(1):81–93. <https://doi.org/10.1016/j.jagp.2015.11.001>
- Rytwinski NK, Scur MD, Feeny NC, Youngstrom EA. The co-occurrence of major depressive disorder among individuals with posttraumatic stress disorder: a meta-analysis. *J Trauma Stress*. 2013;26(3):299–309. <https://doi.org/10.1002/jts.21814>
- Milanak ME, Gros DF, Magruder KM, Brawman-Mintzer O, Frueh BC. Prevalence and features of generalized anxiety disorder in Department of Veteran Affairs primary care settings. *Psychiatr Res*. 2013;209(2):173–179. <https://doi.org/10.1016/j.psychres.2013.03.031>
- Collimore KC, Carleton RN, Hofmann SG, Asmundson GJ. Post-traumatic stress and social anxiety: the interaction of traumatic events and interpersonal fears. *Depress Anxiety*. 2010;27(11):1017–1026. <https://doi.org/10.1002/da.20728>
- McCauley JL, Killeen T, Gros DF, Brady KT, Back SE. Posttraumatic stress disorder and co-occurring substance use disorders: advances in assessment and treatment. *Clin Psychol Sci Pract*. 2012;19(3):283–304. <https://doi.org/10.1111/cpsp.12006>
- Pietrzak RH, Goldstein RB, Southwick SM, Grant BF. Prevalence and Axis I comorbidity of full and partial posttraumatic stress disorder in the United States: results from wave 2 of the national epidemiologic survey on alcohol and related conditions. *J Anxiety Disord*. 2011;25(3):456–465. <https://doi.org/10.1016/j.janxdis.2010.11.010>
- Oquendo MA, Echavarría G, Galfalvy HC, et al. Lower cortisol levels in depressed patients with comorbid post-traumatic stress disorder.

- Neuropsychopharmacology*. 2003;28(3):591-598. <https://doi.org/10.1038/sj.npp.1300050>
15. Sher L, Stanley BH, Posner K, et al. Decreased suicidal ideation in depressed patients with or without comorbid posttraumatic stress disorder treated with selective serotonin reuptake inhibitors: an open study. *Psychiatr Res*. 2012;196(2-3):261-266. <https://doi.org/10.1016/j.psychres.2011.11.010>
 16. Frías Á, Palma C. Comorbidity between post-traumatic stress disorder and borderline personality disorder: a review. *Psychopathology*. 2015;48(1):1-10. <https://doi.org/10.1159/000363145>
 17. Sareen J, Stein M, Friedman M. Posttraumatic Stress Disorder in Adults: Epidemiology, Pathophysiology, Clinical Manifestations, Course, Assessment, and Diagnosis. Up to Date [online]; 2018.
 18. Ford JD, Courtois CA. Complex PTSD and borderline personality disorder. *Borderline Personality Disord Emot Dysregulation*. 2021;8(1):1-21.
 19. Fox R, Hyland P, McHugh Power J, Coogan AN. Patterns of comorbidity associated with ICD-11 PTSD among older adults in the United States. *Psychiatr Res*. 2020;290:290. <https://doi.org/10.1016/j.psychres.2020.113171>
 20. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. American Psychiatric Publishing.
 21. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. American Psychiatric Publishing; 2013.
 22. Pai A, Suris AM, North CS. Posttraumatic stress disorder in the DSM-5: controversy, change, and conceptual considerations. *Behav Sci*. 2017;7(1):7. <https://doi.org/10.3390/bs7010007>
 23. Kang B, Xu H, McConnell ES. Neurocognitive and psychiatric comorbidities of posttraumatic stress disorder among older veterans: a systematic review. *Int J Geriatr Psychiatry*. 2019;34(4):522-538. <https://doi.org/10.1002/gps.5055>
 24. World Health Organization. International Statistical Classification of Disease and Related Health Problems. 10th ed.
 25. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. 11th ed.
 26. Wells GA, Shea B, O'Connell, et al. The Newcastle-Ottawa Scale (NOS) for Assessing the Quality of Nonrandomised Studies in Meta-Analyses; 2000.
 27. Baird T, McLeay S, Harvey W, Theal R, Law D, O'Sullivan R. Sleep disturbances in Australian Vietnam veterans with and without posttraumatic stress disorder. *J Clin Sleep Med*. 2018;14(5):745-752. <https://doi.org/10.5664/jcsm.7096>
 28. McLeay SC, Harvey WM, Romaniuk MN, et al. Physical comorbidities of post-traumatic stress disorder in Australian Vietnam War veterans. *Med J Aust*. 2017;206(6):251-257. <https://doi.org/10.5694/mja16.00935>
 29. Theal R, McLeay S, Gleeson S, et al. Comparison of sleep patterns in Vietnam Veterans with and without posttraumatic stress disorder using wrist actigraphy. *J Clin Sleep Med*. 2019;15(5):725-732. <https://doi.org/10.5664/jcsm.7762>
 30. Moye J, Kaiser AP, Cook J, Pietrzak RH. Post-traumatic stress disorder in older U.S. Military veterans: prevalence, characteristics, and psychiatric and functional burden. *Am J Geriatr Psychiatry*. 2022;30(5):606-618. <https://doi.org/10.1016/j.jagp.2021.10.011>
 31. Abesig J, Chen Y, Wang H, Sompo FM, Wu IXY. Newcastle-Ottawa Scale adapted for cross-sectional studies. *PLOS ONE*. 2020;15(6):e0234348. <https://doi.org/10.1371/journal.pone.0234348.s002>
 32. Gould CE, Rideaux T, Spira AP, Beaudreau SA. Depression and anxiety symptoms in male veterans and non-veterans: the Health and Retirement study. *Int J Geriatr Psychiatry*. 2015;30(6):623-630. <https://doi.org/10.1002/gps.4193>
 33. Luxton DD, Skopp NA, Maguen S. Gender differences in depression and PTSD symptoms following combat exposure. *Depress Anxiety*. 2010;27(11):1027-1033. <https://doi.org/10.1002/da.20730>
 34. Caputo F, Vignoli T, Leggio L, Addolorato G, Zoli G, Bernardi M. Alcohol use disorders in the elderly: a brief overview from epidemiology to treatment options. *Exp Gerontol*. 2012;47(6):411-416. <https://doi.org/10.1016/j.exger.2012.03.019>
 35. Khantzian EJ. The self-medication hypothesis of substance use disorders: a reconsideration and recent applications. *Harv Rev Psychiatry*. 1997;4(5):231-244. <https://doi.org/10.3109/10673229709030550>
 36. Centers for Disease Control and Prevention. Current Cigarette Smoking Among US Adults Aged 18 Years and Older; 2022. <https://www.Cdc.Gov/tobacco/campaign/tips/resources/data/cigarette-smoking-inunited-states.html>
 37. Durai UNB, Chopra MP, Coakley E, et al. Exposure to trauma and posttraumatic stress disorder symptoms in older veterans attending primary care: comorbid conditions and self-related health status. *J Am Geriatr Soc*. 2011;59(6):1087-1092. <https://doi.org/10.1111/j.1532-5415.2011.03407.x>
 38. U.S. Department of Veterans Affairs. PTSD and Problems with Alcohol Use. https://www.ptsd.va.gov/understand/related/problem_alcohol_use.asp.%202007
 39. Cook J, Jakupcak M, Rosenheck R, Fontana A, McFall M. Influence of PTSD symptom clusters on smoking status among help-seeking Iraq and Afghanistan veterans. *Nicotine Tob Res*. 2009;11(19):1189-1195. <https://doi.org/10.1093/ntr/ntp123>
 40. Wolitzky-Taylor KB, Castriotta N, Lenze EJ, Stanley MA, Craske MG. Anxiety disorders in older adults: a comprehensive review. *Depress Anxiety*. 2010;27(2):190-211. <https://doi.org/10.1002/da.20653>
 41. Balan S, Widner G, Shroff M, van den Berk-Clark C, Scherrer J, Price RK. Drug use disorders and post-traumatic stress disorder over 25 adult years: role of psychopathology in relational networks. *Drug Alcohol Depend*. 2013;133(1):228-234. <https://doi.org/10.1016/j.drugalcdep.2013.04.030>
 42. Kuerbis A, Sacco P, Blazer DG, Moore AA. Substance abuse among older adults. *Clin Geriatr Med*. 2014;30(3):629-654. <https://doi.org/10.1016/j.cger.2014.04.008>
 43. National Institute on Drug Abuse (NIDA). Substance Use in Older Adults Drugfacts. <https://nida.nih.gov/publications/drugfacts/substance-use-in-older-adults-drugfacts.%202020>
 44. Snoek A, Nederstigt J, Ciharova M, et al. Impact of comorbid personality disorders on psychotherapy for post-traumatic stress disorder: systematic review and meta-analysis. *Eur J Psychotraumatol*. 2021;12(1):1929753. <https://doi.org/10.1080/20008198.2021.1929753>
 45. Bangash A. Personality disorders in later life: epidemiology, presentation and management. *BJPsych Adv*. 2020;26(4):208-218. <https://doi.org/10.1192/bja.2020.16>
 46. Pagura J, Stein MB, Bolton JM, Cox BJ, Grant B, Sareen J. Comorbidity of borderline personality disorder and posttraumatic stress disorder in the US population. *J Psychiatr Res*. 2010;44(16):1190-1198. <https://doi.org/10.1016/j.jpsychires.2010.04.016>
 47. Voshaar RO, Van Der Veen DC, Kapur N, Hunt I, Williams A, Pachana NA. Suicide in patients suffering from late-life anxiety disorders; a comparison with younger patients. *Int Psychogeriatrics*. 2015;27(7):1197-1205. <https://doi.org/10.1017/s1041610215000125>
 48. Brewerton Timothy D. Eating disorders, trauma, and comorbidity: focus on PTSD. *J Treat and Prev*. 2007;15(4):285-304. <https://doi.org/10.1080/10640260701454311>
 49. Mitchell KS, Porter B, Boyko EJ, Field AE. Longitudinal associations among posttraumatic stress disorder, disordered eating, and weight gain in military men and women. *Am J Epidemiol*. 2016;184(1):33-47. <https://doi.org/10.1093/aje/kwv291>
 50. Mulchandani M, Shetty N, Conrad A, Muir P, Mah B. Treatment of eating disorders in older people: a systematic review. *Syst Rev*. 2021;10(1):1-20. <https://doi.org/10.1186/s13643-021-01823-1>

51. Keane TM, Kaloupek DG. Comorbid psychiatric disorders in PTSD. Implications for research. *Ann N Y Acad Sci.* 1997;821(1 Psychobiology):24-34. <https://doi.org/10.1111/j.1749-6632.1997.tb48266.x>
52. Brady KT, Killeen TK, Brewerton T, Lucerini S. Comorbidity of psychiatric disorders and posttraumatic stress disorder. *J Clin Psychiatry.* 2000;61(7):22-32.
53. Ljubic D, Peitl MV, Peitl V, Ljubic R, Filipovic B. Posttraumatic stress disorder and depression as comorbid disorders. *Psychiatr Danub.* 2009;21(3):415-419.
54. O'Donnell ML, Creamer M, Pattison P. Posttraumatic stress disorder and depression following trauma: understanding comorbidity. *Am J Psychiatr.* 2004;161(8):1390-1396. <https://doi.org/10.1176/appi.ajp.161.8.1390>
55. Elhai JD, de Francisco Carvalho L, Miguel FK, Palmieri PA, Primi R, Frueh BC. Testing whether posttraumatic stress disorder and major depressive disorder are similar or unique constructs. *J Anxiety Disord.* 2011;25(3):404-410. <https://doi.org/10.1016/j.janxdis.2010.11.003>
56. Lenze EJ, Wetherell JL, Andreescu C. *Anxiety disorders.* In: Coffey CE, Cummings JL, George MS, Weintraub D, eds. *The American Psychiatric Publishing Textbook of Geriatric Neuropsychiatry.* American Psychiatric Publishing:499-516.
57. Van Zelst WH, de Beurs E, Beekman AT, Deeg DJ, van Dyck R. Prevalence and risk factors of posttraumatic stress disorder in older adults. *Psychother Psychosom.* 2003;72(6):333-342. <https://doi.org/10.1159/000073030>
58. Van Zelst WH, de Beurs E, Beekman AT, van Dyck R, Deeg DD. Well-being, physical functioning, and use of health services in the elderly with PTSD and subthreshold PTSD. *Int J Geriatr Psychiatry.* 2006; 21(2):180-188. <https://doi.org/10.1002/gps.1448>
59. Cook JM, Simiola V. Trauma and aging. *Curr Psychiatr Rep.* 2018; 20(10):93. <https://doi.org/10.1007/s11920-018-0943-6>
60. Byers AL, Arean PA, Yaffe K. Low use of mental health services among older Americans with mood and anxiety disorders. *Psychiatr Serv.* 2012;63(1):66-72. <https://doi.org/10.1176/appi.ps.201100121>
61. Cambell DG, Felker BL, Liu CF, et al. Prevalence of depression-PTSD comorbidity: implications for clinical practice guidelines and primary care-based interventions. *J Gen Intern Med.* 2007;22(6):711-718. <https://doi.org/10.1007/s11606-006-0101-4>
62. Hegel MT, Unutzer J, Tang L, et al. Impact of comorbid panic and posttraumatic stress disorder on outcomes of collaborative care for late-life depression in primary care. *Am J Geriatr Psychiatry.* 2005; 13(1):48-58. <https://doi.org/10.1176/appi.ajgp.13.1.48>
63. Flory JD, Yehuda R. Comorbidity between post-traumatic stress disorder and major depressive disorder: alternative explanations and treatment considerations. *Dialogues Clin Neurosci.* 2015;17(2): 141-150. <https://doi.org/10.31887/dcns.2015.17.2/jflory>
64. Gielkens EM, Turksma K, Kranenburg LW, et al. Feasibility of EMDR in older adults with PTSD to reduce frailty and improve quality of life. *Clin Gerontol.* 2022;1-11. <https://doi.org/10.1080/07317115.2022.2114397>
65. Shapiro R, Brown LS. Eye movement desensitization and reprocessing therapy and related treatments for trauma: an innovative, integrative trauma treatment. *Practice Innovations.* 2019;4(3): 139-155. <https://doi.org/10.1037/pri0000092>
66. Valiente-Gómez A, Moreno-Alcázar A, Treen D, et al. EMDR beyond PTSD: a systematic literature review. *Front Psychol.* 2017;8:1668. <https://doi.org/10.3389/fpsyg.2017.01668>

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APPENDIX A

Complete search strategy

PubMed

S1: "Mental Disorders" [Mesh] OR "psychiatric" [tiab] OR "psychiatric disorder*" [tiab] OR "psychiatry" [tiab] OR "psychological distress" [tiab] OR "mood disorder*" [tiab] OR "anxiety disorder*" [tiab] OR "substance use disorder*" [tiab] OR "personality disorder*" [tiab] OR "depression" [tiab] OR "alcohol abuse" [tiab] OR "suicide" [tiab] OR "psychosis" [tiab] OR "psychotic*" [tiab]
 S2: "comorbidity" [Mesh] OR "comorbidit*" [tiab] OR "co-morbid*" [tiab] OR "prevalence" [tiab] OR "epidemiolog*" [tiab] OR "descriptive*" [tiab]
 S3: "Aged" [Mesh] OR "elder*" [tiab] OR "aged*" [tiab] OR "older adult*" [tiab] OR "late-life" [tiab] OR "ageing" [tiab]
 S4: "Stress Disorders, Post-Traumatic" [Mesh] OR "ptsd" [tiab] OR "posttraumatic stress*" [tiab] OR "posttraumatic-stress disorder*" [tiab] OR "post traumatic stress disorder*" [tiab]
 S5: "Brain Injuries, Traumatic" [Mesh]
 S6: #1 AND #2 AND #3 AND #4 NOT #5
 S7: limit S6 to 'Humans' and 'English' (filters)
 09/06/2022 → 2341 hits

Embase

S1: (mental disorders or psychiatric or psychiatric disorder* or psychiatry or psychological distress or mood disorder* or anxiety disorder* or substance use* or personality disorder* or depression or alcohol abuse or suicide or psychosis or psychotic*).mp.
 S2: (comorbidity or comorbidit* or co-morbid* or prevalence or epidemiolog* or descriptive).mp.
 S3: (aged or elder or aged* or older adult* or late-life or ageing).mp.
 S4: (stress disorder, post-traumatic or ptsd or posttraumatic stress* or posttraumatic-stress disorder* or post traumatic stress disorder*).mp.
 S5: brain injuries, traumatic.mp.
 S6: (1 AND 2 AND 3 AND 4) NOT 5
 S7: limit S6 to (human and English language)
 09/06/2022 → 1632 hits

CINAHL

S1: "Mental Disorders" OR "psychiatric" OR "psychiatric disorder*" OR "psychiatry" OR "psychological distress" OR "mood disorder*" OR "anxiety disorder*" OR "substance use disorder*" OR "personality disorder*" OR "depression" OR "alcohol abuse" OR "suicide" OR "psychosis" OR "psychotic*"
 S2: "comorbidity" OR "comorbidit*" OR "co-morbid*" OR "prevalence" OR "epidemiolog*" OR "descriptive*"
 S3: "Aged" OR "elder*" OR "aged*" OR "older adult*" OR "late-life" OR "ageing"
 S4: "Stress Disorders, Post-Traumatic" OR "ptsd" OR "posttraumatic stress*" OR "posttraumatic-stress disorder*" OR "post traumatic stress disorder*"
 S5: "Brain Injuries, Traumatic"
 S6: #1 AND #2 AND #3 AND #4 NOT #5
 S7: limit S6 to 'Humans' and 'English' (filters)
 09/06/2022 → 1632 hits

S5: "brain injuries, traumatic"

S6: S1 AND S2 AND S3 AND S4 NOT S5

S7: limit S6 to 'Humans' and 'English' (filters)

09/06/2022 → 709 hits

PsycInfo | APA

S1: "Mental Disorders" OR "psychiatric" OR "psychiatric disorder*" OR "psychiatry" OR "psychological distress" OR "mood disorder*" OR "anxiety disorder*" OR "substance use disorder*" OR "personality disorder*" OR "depression" OR "alcohol abuse" OR "suicide" OR "psychosis" OR "psychotic"

S2: "comorbidity" OR "comorbidit*" OR "co-morbid*" OR "prevalence" OR "epidemiolog*" OR "descriptive"

S3: "Aged" OR "elder*" OR "aged*" OR "older adult*" OR "late-life" OR "ageing"

S4: "Stress Disorders, Post-Traumatic" OR "ptsd" OR "posttraumatic stress*" OR "posttraumatic-stress disorder*" OR "post traumatic stress disorder"

S5: "brain injuries, traumatic"

S6: S1 AND S2 AND S3 AND S4 NOT S5

S7: limit S6 to 'English' (filters)

09/06/2022 → 1452 hits