Post-traumatic stress disorder in older adults: a global collaboration on setting the future research agenda

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Lancet Healthy Longev 2025; 6: 100720

Published Online June 20, 2025
https://doi.org/10.1016/j.lanhl.2025.100720

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Post-traumatic stress disorder (PTSD) in later life poses a substantial burden on public health and social care systems. However, research in this population remains scarce. In this Personal View, we review the current state of research on PTSD and ageing, as presented by the On Traumatic Stress and Ageing: A Global Network task force, part of the Global Collaboration on Traumatic Stress. Evidence-based knowledge on PTSD in older (aged 60 years or older) trauma survivors was synthesised across four clinical domains: ageing mechanisms, assessment, treatment, and care. 142 publications were reviewed to integrate available evidence and establish consensus-based research priorities. The findings highlight the urgent need for high-quality research across all four domains on older trauma survivors. Future studies should focus on older under-represented groups, such as women; individuals with multiple comorbidities, including neurocognitive disorders; and populations in low-income and middle-income countries. Using standard diagnostic instruments, establishing clinically meaningful functional outcomes, and engagement of people with lived experience should be prioritised to be applied in future research.

Introduction

With increasing longevity, the number of older adults (aged 60 years or older) living with mental health conditions is expected to increase.[1] Improving older adults' mental health is a global public health and social care imperative, as articulated in WHO's comprehensive mental health action plan.[1]

Exposure to potentially traumatic events (eg, natural disasters, accidents, and sexual assault) can negatively affect mental health in individuals, including older adults. Over 70% of the general population is estimated to experience at least one potentially traumatic event during their lifetime.[2] Exposure to potentially traumatic events during early childhood has been shown to increase the risk of mental and physical disorders, including post-traumatic stress disorder (PTSD),[3] depression, substance abuse,[4] cardiovascular disease, diabetes,[5,6] and dementia,[7] during middle age and later life. Elucidating the underlying mechanisms of ageing and disease development is essential for informing preventive strategies. Given the global occurrence of potentially traumatic events, addressing PTSD as a public health concern is essential.

Diagnosing PTSD in older adults remains challenging because of its complex nature and ageing-related physiological and psychological changes.[8,9] PTSD often persists over time, with relapses triggered by life events such as retirement or bereavement.[10] An intermittent course of PTSD with relapses, including late-life exacerbation of symptoms, is common in older adults.[11] Some individuals show a delayed presentation of PTSD, with the symptoms manifesting decades after the potentially traumatic event.[10]

Global PTSD prevalence ranges from 3·9 to 7·4%,[2,12] with lower rates seen in older adults, possibly due to underdiagnosis, than in younger age groups.[13,14] These age-related differences might be attributable to evolving definitions and recognition of PTSD over time.[15] Many older adults show subthreshold symptoms; although they face substantial risks, they do not meet full diagnostic criteria. Avoidance symptoms are less prominent, whereas cognitive difficulties are more common, both of which contribute to frequent underdiagnosis, highlighting the need for precise assessment.[16,17]

Nevertheless, even when the diagnostic criteria for PTSD are not fully met, personalised trauma-focused therapies, such as prolonged exposure and eye movement desensitisation and reprocessing, have been shown to be feasible and acceptable in older adults.[18–20]

PTSD symptoms considerably affect older adults' access to and experience with care services in community and long-term care settings.[21] Many aspects of care delivery (eg, locked wards and home visits by professionals) can serve as trauma reminders, triggering PTSD. Cognitive impairment and dementia further increase trauma sensitivity and reactivity,[22] impairing people's ability to avoid triggers and regulate emotions.[23] To improve the outcomes in older adults with exposure to potentially traumatic events, care environments that prioritise safety are necessary.[24]

Trauma-informed care offers a framework that acknowledges the possibility for a history of exposure to potentially traumatic events in both care recipients and providers.[25] Practical strategies that could aid in the implementation of trauma-informed care into care services are described elsewhere.[26] Trauma-informed care reduces traumatic stress in people, enhances care quality, and reduces associated costs, staff burnout, and turnover.[27]

To enhance PTSD recognition efforts, support evidence-based interventions, and improve prognosis for older trauma survivors, in this Personal View we review the current understanding of PTSD in older adults by examining

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across four domains: ageing mechanisms, assessment, treatment, and care.

Members of the On Traumatic Stress and Ageing: A Global Network, including experts from the Global Collaboration on Traumatic Stress, reviewed evidence to guide research, policy, and practice on trauma care in older populations. Further, a research agenda was formulated through consensus discussions held in two online meetings (October, 2024, and January, 2025), during which search outputs and statements were critically reviewed.

Search strategy and selection criteria

We performed four separate literature reviews across the four selected domains in accordance with PRISMA guidelines. All searches were conducted from Jan 1 to 31, 2025 using peer-reviewed articles published in Embase, MEDLINE, and PsycInfo. For the treatment domain review, additional sources, namely, CINAHL, PILOTS, PTSDpubs, Cochrane Central Register of Controlled Trials (CENTRAL), and ClinicalTrials.gov and preprint services, such as bioRxiv, medRxiv, and PsyArXiv, were searched. At least two authors (ageing mechanisms: MBol, A-ND, BF, SF, and JR; assessment: DCDH, EC, and JO; treatment: DG-B, MBee, SZ; care: MC and JSW) independently reviewed abstracts and full text and extracted data in each domain.

Evidence on the relation between PTSD and neurobiological, molecular, physiological, and psychosocial mechanisms of ageing was searched using a combination of standardised query terms and keywords for PTSD and ageing (appendix pp 1–3). We focused on these mechanisms to highlight pathways that predisposed individuals to adverse health outcomes in old age. We referred to reviews and studies linking PTSD to ageing-related conditions, such as cardiovascular disease,[28,29] diabetes,[30,31] obesity,[32,33] dementia,[7] and other comorbidities.[34,35] Publication types such as books, commentaries, and conference abstracts were excluded during title and abstract screening. Studies were not excluded based on participant age as the target mechanisms likely unfolded across the life course.

A systematic review of validated assessment tools, based on diagnostic accuracy (sensitivity and specificity) for assessing trauma and PTSD in later life, was performed. Search terms included assessment, diagnosis, and relevant terms (appendix pp 4–8). Further, a systematic review was conducted to identify evidence-based interventions for PTSD in older adults using terms related to PTSD and trauma symptoms in this population (appendix p 9). Care practices for older trauma survivors were reviewed using the search terms presented in the appendix (p 10).

Inclusion criteria

No age restrictions were applied for the review on ageing mechanisms as processes contributing to morbidity and mortality can precede the manifestation of ageing-related symptoms. For ther other reviews individuals aged 60 years or older were included. PTSD was diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders (DSM) or ICD criteria or based on clinically significant PTSD symptoms. Subthreshold PTSD was diagnosed either using an objective diagnostic tool based on ICD or DSM or via clinical psychiatric or psychological investigation.

Further, only articles published in English were included. For the review of assessment modes, articles were included if the studies were restricted to participants explicitly verified to have (or have had) PTSD (to estimate sensitivity) or not to have (or have had) PTSD (to estimate specificity). Single-group studies (in which diagnostic status was determined post hoc), multigroup studies (in which people with and without PTSD were recruited separately; also referred to as two-gate or diagnostic case-control studies), and studies based on people diagnosed with PTSD were included.

For the review of treatment, articles were included if they reported randomised controlled trials (RCTs) regardless of treatment modality (pharmacological or non-pharmacological), with interventions compared to treatment-as-usual or other interventions, involving older people living in any setting (community, inpatient, or long-term care), and involving people who reported PTSD symptoms or other secondary outcomes.

For the review of care models, primary research, of any design, describing the current practice or the implementation of new trauma-informed care models in different care settings (eg, long-term, inpatient geriatric, or home-based settings) was included. Because trauma-informed care does not have a universally accepted operational definition, articles were included if the intervention or system of care was explicitly described as trauma informed or trauma aware.

To ensure the quality of included studies, domain-specific strategies were applied. Owing to the heterogeneity in methods, no uniform criteria were available for the review of ageing mechanisms. The quality assessment tool for diagnostic accuracy studies[36] (QUADAS-2) was used for the review of assessment modes; ratings were calculated by three independent reviewers (EC, JO, and DCDH), and a fourth reviewer (KAL) resolved discrepancies by consensus. The Cochrane risk-of-bias tool (RoB2[37]) for RCTs was used for the review of treatment options. Two independent reviewers (DG-B and SZ) assessed each study, and consensus was reached by two other reviewers (M Bee and VO). Owing to the availability of studies being scarce, a narrative review was performed for care models; no formal risk-of-bias assessment was conducted.

Ageing mechanisms

268 articles were identified, of which 31 were included following full-text review, supplemented by an additional 42 articles identified based on cross-referencing (mean age of participants=46·12 years; appendix pp 11–16). Studies were divided into the following three categories: systemic and molecular (n=49); brain structure and functioning (n=12); and psychosocial (n=12) mechanisms.

Systemic and molecular mechanisms

18 longitudinal studies, 12 cross-sectional studies, 12 narrative reviews, two systematic reviews, and five meta-analyses were identified. PTSD was associated with the acceleration of physiological, metabolic, cellular, and epigenetic ageing. In a longitudinal study, individuals with PTSD showed the most rapid biological ageing compared with those without PTSD or exposure to potentially traumatic events, based on the 18 biomarkers that constitute the pace-of-ageing clock.[38]

Mechanisms associated with accelerated ageing appeared to manifest in the immediate aftermath of trauma. When measured at the time of trauma, the measure of DNA methylation (DNAm) GrimAge, a mortality risk estimator used as a marker of accelerated epigenetic ageing, predicted the development of PTSD in the short term.[39] DNAm GrimAge was also associated with reduced volumes of two amygdala subregions (cortico-amygdaloid transition area and cortical and accessory basal nuclei). These regions, under typical conditions, are linked to healthy ageing.[39] In veterans with current PTSD, DNAm-based measures of epigenetic ageing, such as DunedinPACE, were associated with accelerated ageing at a rate of 4 months per year.[40] Studies examining the association of PTSD with epigenetic changes in DNAm and health outcomes showed that specific symptom clusters, rather than the overall PTSD severity, were strongly associated with epigenetic age,[41–43] with findings varying according to the epigenetic clock type used.[42] Furthermore, epigenetic age acceleration was linked to increased PTSD risk and severity in racially minoritised women.[44]

Aberrant leukocyte telomere length, a major hallmark of cellular senescence, was also reported in the early stages of PTSD in recently sexually assaulted young women (aged 18–45 years).[45] Leukocyte telomere length is an inherited biomarker influenced by paternal age at conception, and its involvement in accelerated ageing in PTSD implicates the role of genetic variation in telomere dynamics. Similar to DNA methylation markers, leukocyte telomere length was associated with specific symptom clusters in PTSD.[45,46] Evidence of the association of leukocyte telomere length with PTSD severity was inconclusive.[42–50] Studies on young veterans (mean age = 27 years) and former prisoners of war reported a reverse pattern of correlation, with PTSD severity associated with leukocyte telomere lengthening[47] or showing no association at all.[48,49] Conversely, studies on civilians[50–54] reported stronger negative correlations between PTSD severity and leukocyte telomere length in young and older participants of both sexes. The only exception was a cross-sectional study with an all-female participant set, in which PTSD was associated with shorter leukocyte telomere lengths only when comorbid with depression.[55] Although the association of DNAm epigenetic clock and leukocyte telomere length in ageing-related processes in PTSD has garnered interest, results are inconclusive; some studies suggest an indirect relationship intermediated by telomerase activity,[56] whereas others do not report any association.[49]

Metabolic syndrome (MetS) is another marker of accelerated ageing seen early in PTSD, especially in young people. A longitudinal study on young veterans revealed high MetS prevalence in those with PTSD, with risk and severity of MetS increasing proportionally to PTSD symptoms.[57] Moreover, previous meta-analyses indicated a MetS prevalence of approximately 40% in individuals with PTSD.[58–60] Accelerated epigenetic ageing and increased MetS prevalence potentially link PTSD to neuropathological ageing-related diseases and mortality risk factors.[58,59] Studies examining oral bacterial signatures in veterans with PTSD suggested that oral microbiota can link epigenetic ageing and MetS in this population.[61]

PTSD was associated with accelerated immunological ageing[62] in a longitudinal study on civilians (aged 18–83 years) of both sexes. Both a past-year and lifetime PTSD diagnosis were associated with parameters of immune ageing: differences in the CD8+ T cell population and a lower CD4:CD8 ratio. Other studies reported that PTSD leads to immune-mediated inflammatory dysregulation,[61,63–65] and the levels of inflammatory markers, such as C-reactive protein, interleukin 6, tumour-necrosis factor α, and killer cell lectin-like receptor G1 cells, were higher in individuals with PTSD than in healthy participants.[62,64,66]

Systemic and molecular mechanisms related to ageing were previously linked to accelerated cellular senescence, indicated by shortened telomere length, which, in turn, was associated with accelerated ageing.[45,46] Additionally, individuals with PTSD were characterised by significantly higher DNAm-based epigenetic age acceleration than that observed in people without PTSD, which was significantly correlated with the concentrations of inflammatory and immune dysfunction markers, such as increased neutrophil and decreased T and B lymphocyte proportions.[67] Inflammatory biomarkers were longitudinally associated with MetS and advanced epigenetic age in young veterans with PTSD.[68]

Brain structure and functioning related mechanisms

Four longitudinal studies, three cross-sectional studies, two narrative reviews, one systematic review, and two meta-analyses on brain structure and function in people with PTSD were identified. Higher risk of developing dementia in individuals with PTSD coincided with changes in brain structure, such as hippocampal atrophy and alterations in cortex volume,[69,70] with higher levels of PTSD symptoms longitudinally linked to core ageing, Alzheimer's disease-related reductions in hippocampal volume, and changes in the hippocampal occupancy score ratio in men.[71]

Other PTSD-associated changes in the brain include reduced volumes in the amygdala, rostral middle frontal gyrus (involved in threat detection and memory formation), and medial orbitofrontal cortex (involved in emotional regulation).[69] White matter microstructural changes were reported in a sample of veterans with an average symptom duration of 30·95 years (SD = 15·61 years). PTSD symptom severity was significantly negatively correlated with

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measures of tract function in the left corticospinal tract and left inferior cerebellar peduncle—white matter pathways connecting central networks involved in cognition and affect.[72] Degraded neural integrity of the genu of the corpus callosum was linked to accelerated Hannum DNAm epigenetic ageing in young veterans with lifetime PTSD and was indirectly associated with impaired working memory.[73] A recent longitudinal cluster analysis of older veterans identified a subgroup with severe PTSD symptoms, who had the highest cortical amyloid deposition in regions typically susceptible to neurodegeneration (such as the frontal anterior, posterior cingulate, lateral parietal, and lateral temporal cortices). This subgroup also showed the lowest score in attention and executive functioning, greatest decline in everyday functional abilities, and subjective cognitive decline. Additionally, this subgroup had the highest levels of temporal tau deposition and the lowest hippocampal volume. Although cognitive improvement was observed over 1 year, PTSD severity remained linked to persistent deficits.[74]

PTSD symptoms in the older adult population were longitudinally associated with functional connectivity differences, specifically, reduced within-default mode network connectivity.[75] Such reductions are correlated with age-associated cognitive changes and disturbances in self-perception and consciousness in clinical samples of individuals with PTSD. Abnormal within-default mode network connectivity in individuals with PTSD might be associated with the early onset of MetS during adulthood, typically in those aged 30 to 49 years.[76] Altered connectivity between two posterior default mode network nodes, the angular gyrus and posterior cingulate cortex, was reported in young veterans with a current diagnosis of PTSD comorbid with MetS.[76]

Psychosocial mechanisms

Three longitudinal studies, two cross-sectional studies, two narrative reviews, one systematic review, and four meta-analyses psychosocial mechanisms were identified. Multiple studies have examined the role of psychiatric comorbidity in the association of PTSD with ageing-related outcomes. For example, in a longitudinal study with a 9-year follow-up period, a three-fold greater risk of death from cardiovascular disease, type 2 diabetes, or suicide was reported in women with severe PTSD symptoms and probable depression than in women with no exposure to potentially traumatic events or depression.[77] Data from the US Veterans Health Administration indicated that physical (eg, type 2 diabetes) and psychiatric conditions and poor health behaviours (eg, smoking and sleep disorders) that commonly co-occur with PTSD, fully explained the association of PTSD with incident cardiovascular disease.[78,79] Although the role of social support or related constructs, such as loneliness, among individuals with PTSD,[80,81] were not directly assessed in the identified studies, both loneliness and PTSD have been linked to elevated mortality risk.[82] Emerging evidence further links social isolation to markers of biological ageing,[79] even after adjusting for cardiovascular risks[83] and all-cause mortality.[84] Positive genetic correlations of C-reactive protein, an inflammatory biomarker linked to age-related diseases, with PTSD and socioeconomic status have been shown, with both household income and material deprivation (assessed using Townsend Deprivation Index) being associated with PTSD.[85]

Assessment

We identified 40 studies in which the utility of a PTSD screening or diagnostic instrument was investigated in older adults (mean age ≥60 years, appendix p11).[86–125] Only seven (18%) studies were conducted with participants from either the general population or primary care settings. More than half (22 [56%] of 40) of the studies were conducted on military veterans. In the past 10 years, 14 studies reported the diagnostic accuracy of assessment in older adults. Of these 14 studies, the DSM-5-based diagnostic instrument (table) was evaluated only in seven studies. Of the seven studies, US military veterans were the investigated population in six studies. No PTSD screening or diagnostic instruments have been validated for older adults with cognitive dysfunctions or dementia. An ICD-based PTSD diagnostic or screening instrument (ie, the International Trauma Questionnaire ICD-11) was used only in a single study. In 17 studies, the PTSD instruments for older adults were assessed in non-English-speaking samples. DSM-5-based instruments validated for use in older adults include the Clinician-Administered PTSD Scale for DSM-5, recognised as the gold standard for assessing current and lifetime PTSD, the PTSD Checklist for DSM-5, and the Primary Care PTSD Screen (PC-PTSD).

Treatment

Ten RCTs were identified.[126–135] Sample sizes were small, ranging from ten to 191 participants (appendix p 17). Most studies reported data on feasibility and acceptability, and only one study assessed clinical effectiveness. Two trials included people with subthreshold PTSD only (defined as present PTSD symptoms but not fulfilling all five required diagnostic criteria). In most studies, the nature of trauma was specified, including war or military-related trauma (n=4), interpersonal trauma (ie, sexual or domestic violence), trauma associated with natural disasters, Holocaust survival, or political detention. Two studies did not provide details of trauma exposure.[129,132] Five trials included only male participants, one included only female participants, and the remainder recruited both sexes.

All studies except for two[132,135] assessed PTSD symptoms. The most common secondary outcome was depressive symptoms, followed by anxiety, and quality of life. The interventions tested included narrative exposure therapy (n=4), spiritually focused psychotherapy (n=1), collaborative care (n=1), trauma-focused cognitive behaviour therapy (n=1), internet-delivered cognitive behaviour therapy (n=1), life review therapy (n=1), and physical activity counselling (n=1). Overall, trauma-focused psychological interventions

were associated with a reduction in the number of PTSD and depressive symptoms. However, evidence for PTSD symptom reduction was limited because of the small number and low quality of studies.

The study that investigated physical activity counselling reported improvements in both physical activity and psychological health after intervention.[135] Control groups varied across trials; most included a waiting-list control, usual care, relaxation training, supportive groups, psychoeducation, or person-centred therapy. The effectiveness and safety of pharmacological treatments were not evaluated in any of the trials. Risk-of-bias assessments indicated concerns in terms of the quality of randomisation, selective reporting, and small sample sizes. No evidence of publication bias was found.

Care

Nine studies reported across ten publications, which examined the implementation of trauma-informed care into care settings (appendix pp 18–20), were identified. Despite widespread implementation of trauma-informed care in different settings among mental health institutions and hospitals,[136] the implementation of trauma-informed care in community or home care settings for older adults was not assessed in any of the studies. A case series showed that implementing trauma-informed care in geriatric hospital wards could enhance care safety and trauma symptom management.[137,138]

Six studies, including five qualitative case studies, examined trauma-informed care implementation in long-term care settings.[139–143] These studies highlighted the importance of respect, trust, and empathy in effective trauma-informed care delivery and also noted that emotional demands, suboptimal working conditions, and inadequate training hinder implementation. One quantitative study conducted in a long-term care home showed the utility of routine trauma screening and revealed that over half of new residents with a trauma history had supportable needs.[144] Two studies showed the value of training and support among care professionals to help them identify trauma-related needs. Despite scarce primary research on care models for older trauma survivors, several reviews and commentaries provide recommendations for implementing trauma-informed care in long-term care settings. For example, Robertson and colleagues[145] offer specific recommendations for trauma-informed home visits.

Position statements

Despite numerous studies on PTSD in older adults across the four key domains, high-quality research on this population remains scarce. Most studies use unrepresentative samples, often including younger individuals while excluding those with cognitive or somatic comorbidities, despite the high prevalence of chronic conditions among older adults, thereby limiting relevance. Additionally, research gaps persist in diverse settings, particularly among women, individuals with physical or cognitive impairments (especially in long-term care), and older adults in low-income and middle-income countries. Consequently, the applicability of the collected evidence to clinical practice is limited, highlighting the need for more inclusive and representative research.

Literature on PTSD and ageing mechanisms is highly heterogeneous with respect to study designs, trauma types (eg, sexual abuse, combat, and child maltreatment), timing (age of trauma often unknown), and PTSD assessment tools (eg, Clinician-Administered PTSD Scale for DSM-5 and PTSD Checklist for DSM-5). These variations lead to methodological inconsistencies, limiting the comparability

	DSM or ICD version	Sample population
BPSSS	DSM-IV	General older adult population[120]
CAPS-1	DSM-III	Veterans,[93] veterans and POWs[115]
CAPS-5	DSM-5	Veterans[90]
CIDI 3.0 PTSD subscale	DSM-IV	Veterans[123]
Dutch PTSD Scale	DSM-III	Veterans[91]
IES	DSM-III	POWs and veterans,[88] POWs,[94] veterans,[103] survivors of war-related trauma[111]
IES-R German version Japanese version French version Greek version	DSM-IV	Individuals who experienced a cardiac event,[114] earthquake, arsenic poisoning, or metro attack,[118] patients discharged from the intensive care unit,[121] patients with cancer[98]
ITQ	ICD-11	General older adult population[108]
MMPI	DSM-III	POWs, veterans with PTSD, and patients with psychiatric conditions who are veterans,[94] POWs[99]
MMPI-2 Pk	DSM-III	POWs and veterans[88]
M-PTSD	DSM-III	Veterans,[87] POWs and veterans,[88] POWs, veterans with PTSD, and patients with psychiatric conditions who are veterans,[94] POWs,[99] POWs and veterans[117]
PCL-C	DSM-IV	Patients of general medicine and psychiatric hospitals,[92] individuals who were exposed to a hurricane,[102] veterans[106]
PCL-M Portuguese version	DSM-IV	Veterans (currently working as peacekeepers),[105] veterans,[112] veterans[119]
PCL-S Japanese version	DSM-IV	Patients who require primary care,[86] veterans,[87] individuals exposed to earthquake, individuals exposed to a nuclear power plant incident, and Fukushima evacuees,[95,124] individuals who were exposed to a hurricane[100]
PCL-5 German version	DSM-5	Veterans,[107,110] patients in the intensive care unit[125]
PC-PTSD Korean version	DSM-IV	Veterans[96]
PC-PTSD-5	DSM-5	Veterans[109,113,116]
PTSS-10	DSM-III-R	Patients in the intensive care unit[125]
PTSS-14	DSM-IV	Patients in the intensive care unit[125]
PTSS Scale	DSM-IV	Patients who require primary care[101]
SCID PTSD subscale	DSM-III	POWs and veterans[117]
SIPS	DSM-IV	Veterans[96]
SRIP	DSM-IV	General population,[104] survivors of war-related trauma[111]
SQD	DSM-IV	Individuals who were exposed to an earthquake[89]
TSI	DSM-III	Individuals placed in a Swiss institution as children[97]

BPSSS=Brief Post-traumatic Stress Screening Scale. CAPS=Clinician-Administered PTSD Scale. CIDI=Composite International Diagnostic Interview. DSM=Diagnostic and Statistical Manual of Mental Disorders. IES=The Impact of Event Scale. ITQ=International Trauma Questionnaire. MMPI=Minnesota Multiphasic Personality Inventory. M-PTSD=Mississippi Scale for Combat-Related Post-traumatic Stress Disorder. PCL=PTSD Checklist. PC-PTSD=Primary Care PTSD Screen. POW=prisoner of war. PTSD=post-traumatic stress disorder. PTSS=post-traumatic stress scale. PTSS Scale=Post-traumatic Stress Syndrome Scale. SCID=Structured Clinical Interview for DSM-IV. SIPS=Single-Item Post-traumatic Stress Disorder Screener. SQD=Screening Questionnaire for Disaster Mental Health. TSI=Trauma Symptom Inventory.

Table: **Summary of validated PTSD instruments in older adults (Mean$_{age}$ ≥60 years)**

Panel: **Summary of recommendations for future research on post-traumatic stress disorder in older adults**

Overarching
- Include heterogeneous representative older populations
- Use high-quality studies
- Use standardised diagnostic instruments
- Assess functional outcomes
- Include experienced professionals

Ageing mechanisms
- Apply study designs with repeated assessments of PTSD symptoms and biological variables to investigate reverse causality
- Focus on pre-disease processes such as the association of PTSD with autoimmune diseases

Assessment
- Investigate psychometric validity of PTSD measures based on Diagnostic and Statistical Manual of Mental Disorders-5 or ICD-10 criteria

Treatment
- Investigate the cost-effectiveness of interventions and how treatments can be integrated within health-care services
- Establish effectiveness and safety of pharmacological treatments

Care
- Focus on improving the identification and management of trauma-related needs
- Study effectiveness of trauma-informed care implementation
- Investigate effective implementation strategies

PTSD=post-traumatic stress disorder.

of findings across studies. Of the identified empirical studies, 44% were cross-sectional and 56% were longitudinal. Increased emphasis on longitudinal or prospective designs, in addition to using a causal framework, can aid in understanding the aetiology of ageing mechanisms in PTSD.

Most evidence on the mechanisms underlying PTSD and ageing focuses on systemic and molecular pathways, typically captured by various physiological, metabolic, cellular, and epigenetic markers that reflect overall biological ageing status.

Research on imaging biomarkers for ageing in PTSD is scarce, unlike the studies on general ageing, for which several biomarkers are available. Similarly, few studies have explored psychosocial pathways, focusing mainly on psychiatric comorbidities like depression, with scarce evidence on physical health, health behaviours, and social support.

As ageing mechanisms do not operate in isolation, future studies that examine the interplay of candidate pathways across biopsychosocial and health behaviour pathways[146] would advance the understanding of causal mechanisms.

The evidence linking PTSD to major ageing-related diseases highlights the need for increased clinical efforts to detect cardiovascular disease, metabolic conditions, and dementia in individuals with PTSD. Inflammatory markers such as C-reactive protein and MetS are key targets for intervention to reduce PTSD-related morbidity and mortality. Epigenetic clock assessments represent a promising tool for monitoring cellular ageing and evaluating the effectiveness of interventions aimed to slow ageing in individuals with PTSD. Early signs of accelerated cellular ageing associated with PTSD, even in young individuals, highlight the need for timely intervention to prevent future health problems, particularly neurodegenerative diseases.

Most studies with older adult participants assessed instruments based on earlier versions of the DSM such as DSM-III. However, these studies are still relevant as the key diagnostic criteria for PTSD that shape current understanding were established based on the findings from these studies. Recent studies[90,107,109,110,113,116,125] have validated the use of the Clinician-Administered PTSD Scale for DSM-5, the Primary Care PTSD Screen, and PTSD Checklist for DSM-5 self-report instruments for assessing PTSD in older adults. However, these DSM-5-based instruments were mostly validated in older adult military veteran participants and thus generalisability to civilians is limited. Only the International Trauma Questionnaire was validated in older civilians. Therefore, further studies are required to validate the use of PTSD screening and diagnostic tools in the general older adult population, particularly across diverse clinical and cultural settings.

Although trauma-focused psychological interventions showed some efficacy in reducing the symptoms of depression and PTSD among older survivors, the number of RCTs in this population is scarce. No studies focused on the cost-effectiveness or clinical effectiveness of pharmacotherapy. Furthermore, nearly half of the studies focused on war or military trauma. Thus, these findings cannot be translated to civilians and people with non-war-related trauma.

Despite scarce evidence, regulations in the USA mandate trauma-informed care implementation in skilled nursing facilities[147] based on the hypothesis that potentially traumatic events substantially impact older adults' care, with trauma-informed care models offering potential benefits. Care providers need training on long-term effects, assessment methods, response skills, and mental health pathways pertaining to trauma. In the absence of formal guidelines for delivering trauma-informed care in care settings,[9,147–149] we propose recommendations to guide policy and practice (appendix pp 21–22).[150]

Collaborating with individuals with lived experience of trauma enhances the quality, relevance, and applicability of mental health research and practice. Integrating their insights with scientific knowledge improves outcomes.[151,152] However, no studies in older adults have incorporated such collaboration.

A large body of empirical literature that includes older adults with PTSD, particularly from the US Veterans Health Administration or other methodologically robust studies that include community-residing older US veterans, is available.[10,122,153] Although many of these studies were not

identified in the current literature searches, these studies are relevant for understanding PTSD and other trauma effects in older adulthood.

Recommendations for future research

We present key recommendations, aligned with the relevant WHO Guidelines on Integrated Care for Older People and person-centred assessment for older adults,[1] to guide interventional and clinical practice for older adults with exposure to potentially traumatic events and PTSD (panel).

Most research has been conducted in high-income countries. Future research should be conducted with a representative, heterogeneous, older population including civilians, those aged 75 years and older, women, individuals from ethnic minorities, individuals with cognitive impairment, those residing in long-term care, people with non-English speaking backgrounds, and people from low-income and middle-income countries. High-quality studies, including prospective cohorts, RCTs, and controlled time-series studies are needed to investigate the outcome of PTSD on ageing mechanisms and PTSD treatment and interventions over time. Use of comprehensive measures of trauma (eg, type, timing, and frequency) and standard diagnostic instruments is recommended. Assessment of functional outcomes (eg, quality of life, activities of daily living, instrumental activities of daily living, frailty, compression of morbidity and disability, and hospitalisation and institutionalisation), as well as indicators of positive well-being (eg, life satisfaction and social integration) and structural determinants such as health literacy, availability of low-cost or no-cost health-care coverage, and discrimination (including ageism), would also contribute to the existing literature and aid in identifying potentially at-risk subpopulations. Additionally, people with lived experience should be involved at all stages of research; input should be gathered not only from trauma survivors but also their relatives, supporters, and professionals directly involved in care.

Despite the widespread use of longitudinal study designs in the literature, repeated assessments of both PTSD and putative mechanisms over timeframes appropriate to the outcome of interest can better inform causal inference by allowing tests of bidirectionality as well as causal models of the linkages among PTSD, candidate mediators, and disease onset. Although PTSD is associated with accelerated biological ageing, fundamental ageing processes such as epigenetic age acceleration and metabolic dysregulation might increase vulnerability to PTSD, emphasising the need for studies on reverse causality.

PTSD appears to underlie several pre-disease processes that might increase vulnerability to a broader and more nuanced set of phenotypes, such as accelerated cognitive decline and dementia, in addition to the well-established associations with severe, immune-mediated, age-related diseases. Therefore, prospective studies evaluating the role of PTSD in autoimmune diseases are essential.[154]

The psychometric validity of PTSD measures in civilian older adults should be assessed. Research should focus on older adults with PTSD and comorbid cognitive impairments and assess measures based on the DSM-5 or ICD-10, paying close attention to the characteristics of the traumatic events.

Large-scale RCTs are essential to establish the clinical effectiveness of interventions for treating older survivors. Future trials should establish the effectiveness and safety of pharmacological treatments, with careful consideration to polypharmacy, long-term use of psychiatric medications, and possible side-effects. The cost-effectiveness of interventions and how treatments can be integrated within health-care services need to be addressed.

High-quality research is required to inform strategies for improving the identification and management of trauma-related needs and to investigate the effects of trauma-informed care implementation on various outcomes in care environments, including home, community, tertiary, and long-term care. Further research should address barriers and facilitators to implementation to identify effective strategies for enhancing the safety and accessibility of care for older trauma survivors.

In conclusion, this study underscores the need for more inclusive, methodologically rigorous research on PTSD in older adults across ageing, assessment, treatment, and care domains. Current evidence is limited by unrepresentative samples and methodological inconsistencies, reducing its clinical applicability. Future studies should prioritise diverse older populations, standardised tools, and functional outcomes. Integrating lived experience and cross-disciplinary collaboration will be key to advancing research and improving care.

Contributors

SS: conceptualisation of the review; writing, review, and editing of the manuscript. VO: conceptualisation of the review, selection of studies, data extraction, data analysis, data quality, and writing. MO: conceptualisation of the review, and writing and review of the manuscript. MBee, MBok, M Bol, MC, EC, A-ND, BF, SF, DG-B, DCDH, JO, KAL, LOL, AMar, IO, CWEMQ, JR, SZ: selection of studies; data extraction; data analysis; data quality; writing, review, and editing of the manuscript. JMC: writing, review, and editing of the manuscript. XC, GCvD, MMG, MH, AMae, SRT, JSW: review and editing of the manuscript. All authors critically reviewed and approved the final version of the manuscript.

Declaration of interests

We declare no competing interests.

Acknowledgments

MC was supported by a National Health and Medical Research Council Investigator Grant (GNT 1194084). MH is the Director of Phoenix Australia. The work was also supported by the grant K01AG070279 awarded to KAL from the National Institute on Aging (NIA) at the National Institutes of Health (NIH). This content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH's NIA. The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

During the preparation of this work, the authors used ChatGPT to reduce the word count of the manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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