Signs and symptoms of PTSD with age

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Chapter 1

Exploring physical markers of accelerated physical aging in the context of [chronic] PTSD: a systematic review and meta-analysis

Prepared in accordance with the author requirements for Aging & Mental Health
[Author guidelines available at:
https://www.tandfonline.com/action/authorSubmission?show=instructions&journalCode=camh20]

Abstract

Objectives: This review aimed to compare effect sizes between individuals with versus without post-traumatic stress disorder (PTSD) on: 1) biological indicators; 2) medical conditions; 3) mortality.

Eligibility criteria: Studies included were quantitative, investigated adults (18+) with PTSD and one of the outcomes, and compared to controls. Animal and qualitative studies were excluded.

Methods: PsychINFO, Embase, Medline, CINAHL and Cochrane library were searched. JBI critical appraisal checklist assessed risk of bias. Meta-analysis was conducted on biological indicators Cohens d, medical conditions frequencies and mortality hazard ratios. Heterogeneity and publication bias assessed. Protocol available at: https://www.crd.york.ac.uk/PROSPERO/view/CRD420251175171.

Results: 159 papers were included. Small-moderate significant effects for PTSD and: TNFα (d=0.28 [95%CI 0.07-0.49]); CRP (d=0.51 [95%CI 0.16-0.85]); triglycerides (d=0.25 [95%CI 0.03-0.46]). PTSD effect was also significant for angina (OR 2.17, 95%CI 1.15-4.09), heart disease (OR 1.48, 95%CI 1.01-2.15), myocardial infarction (OR 1.71, 95% CI 1.34, 2.18), stroke (OR 1.57, 95%CI 1.03-2.40), diabetes (OR 1.36, 95%CI 1.06-1.73), hyperlipidemia (OR 1.37, 95%CI 1.13-1.66) and hypertension (OR 1.45, 95%CI 1.26-1.66); but not mortality.

Limitations: Age, gender, race and other mental health conditions were not controlled for in all studies.

Clinical implications: Individuals with PTSD may have heightened risk of inflammation and disease.

Keywords: PTSD; Accelerated aging; Inflammation; Mortality; Physical health conditions

Introduction

Post-traumatic stress disorder (PTSD) is a mental health condition estimated to impact one in twenty adults in the UK, with over 30% of those reporting lifetime or chronic PTSD (NHS Digital, 2025). PTSD is characterised by symptoms of hyperarousal, re-experiencing, avoidance and negative thoughts or feelings (DSM-5, 2013; ICD-11 for Mortality and Morbidity Statistics, 2022; NICE, 2023).

Impacts of PTSD can be long-lasting in terms of symptoms and comorbidities (Xu et al., 2021). Sommer et al. (2021) highlighted physiological changes in cardiovascular, musculoskeletal, gastrointestinal, respiratory functioning and sleep. There is also evidence for cortical atrophy in brain areas pertinent to PTSD, such as the amygdala (Katrinli et al., 2020), and increased risk of dementia (Desmarais et al., 2020). This toll of stress on the body and the brain has been referred to as allostatic load (McEwan & Stellar, 1993; as cited in Juster & Misiak, 2023) and can be indicated by elevated levels of proinflammatory cytokines and metabolic markers.

Persistence of psychosomatic symptoms and increased allostatic load can age the body prematurely (Sommer et al., 2021). This is often referred to as 'accelerated aging' where the rate of biological aging, in terms of physical and cognitive health, is increased when compared with chronological age (Yang et al., 2021). As accelerated aging is thought to result from increased stress in the body, it has been associated with PTSD (Bourassa et al., 2023). Continual stress can impair the endocrine system and interfere with brain, cardiovascular, gastrointestinal and immune system functions (Yaribeygi et al., 2017), leading to increased health burden and shortened lifespan (Yang et al., 2021). Recently published reviews have explored cognitive impacts of PTSD (e.g. de Araujo Junior et al., 2024; Desmarais at al., 2020). This review will focus on investigating physiological impacts of chronic PTSD.

Lohr et al. (2015) systematically reviewed evidence for premature aging in PTSD, focusing on three areas (biomarkers, medical conditions and mortality). Biomarkers included inflammatory markers, oxidative measures and telomere length. Inflammation is thought to be influenced by psychological stress and has been linked to chronic diseases (Chavda et al., 2024; Juster & Misiak, 2023). Telomeres provide a

protective function on DNA and their shortening has been linked to disease (Razgonova et al., 2020). Medical conditions have been associated with worse outcomes and multimorbidity under stress (Vancampfort et al., 2017). Premature mortality has also been linked to adverse childhood experiences through chronic activation of the stress response, known as toxic stress (Oritz et al., 2022;Yu et al., 2022). Lohr et al. (2015) identified 32 papers which met their inclusion criteria for quantitative synthesis, meaning there was a low number of papers which contributed to each outcome. Accelerated aging has gained traction in research since this review; therefore, the current systematic review intends to provide an updated overview of research evidence in this area. It is hoped this could help to inform symptom trajectory in PTSD, as well as pathways for treatment and intervention.

Review Questions

This systematic review and meta-analysis will explore the following questions:

1. Is there a larger effect size for biological indicators in individuals with PTSD compared with controls?
2. Is there a greater risk/earlier onset of medical conditions in individuals with PTSD compared to controls?
3. Is the effect size for mortality increased in individuals with PTSD compared with controls?

Scope of Review

Table 1: Scope of Review

Population	Adults (18 or over)
Exposure	Post traumatic stress disorder (PTSD)

Comparison	Control (No PTSD diagnosis/normal ageing)
Outcome	Inflammation OR medical conditions OR mortality
Study Design	Quantitative – Analytical Cross Sectional/Observational

Eligibility Criteria

Inclusion Criteria

Population: The population of interest is adults aged 18 or older. Only human studies will be included.

Exposure: Papers will be included that investigate individuals with PTSD, as diagnosed by standardised, valid and reliable criteria.

Comparison: Papers should have a comparison or control group. This could include, but is not exclusive to, comparison of participants with and without a PTSD diagnosis, normal ageing or comparison of a younger and older group.

Outcomes: Outcomes followed the approach by Lohr et al. (2015), including biological indicators (inflammation, allostatic load and telomere length), medical conditions (cardiovascular conditions, metabolic conditions, hypertension and gastrointestinal ulcers), and mortality (length of life, longevity, life expectancy, oxidation, senescence and all-cause mortality).

Study Design: The research questions will be answered quantitatively by exploring effect sizes. Papers must be written in English. The search will only include papers since 2014, to update data summarised by Lohr et al. (2015).

Exclusion Criteria

Animal and qualitative studies will be excluded.

Materials and Methods

The review followed PRISMA guidelines for reporting SRs and MAs (Moher et al., 2009). See Appendix A for a checklist of steps completed. The protocol for this review was registered with Prospero in advance of completing this meta-analysis and is available at (https://www.crd.york.ac.uk/PROSPERO/view/CRD420251175171).

Information Sources

Initial searches of PsycINFO, Embase via Ovid, CINAHL, Medline via PubMed and Cochrane Library databases were conducted on 21st November 2025 to meet project timelines, before PROSPERO registration could be finalised. The PROSPERO registration (CRD420251175171) was completed on 27th January 2026. Following registration, all searches were rerun on the same day to ensure that no studies published in the interim were missed. Reference lists of included papers were also searched for relevant papers, most of which were already included. Additional papers were not sought due to number of results from primary searches.

Search Strategy

This review replicated the search strategy used by Lohr et al. (2015), omitting terms related to cognitive aging. The search strategy used was:

(PTSD OR post-traumatic stress OR posttraumatic stress) AND (aging OR ageing OR allostatic OR allostasis OR inflammation OR inflammatory OR longevity OR life expectancy OR length of life OR mortality OR mortalities OR oxidative OR oxidation OR senescence OR telomere OR telomeres OR vascular OR cardiovascular OR metabolic OR diabetes OR ulcer OR ulcers)

Major subject headings were also utilised. Appendix B contains the search strategy used for each database.

Selection Process

Duplicate results were removed before titles and abstracts were screened against eligibility criteria. The remaining papers were read in full and screened for inclusion. A second independent reviewer screened 10% of results for both title and abstract and full-text screening. An initial calibration check was conducted on the first 30 papers. Interrater agreement was 86.67% at calibration check, 82.05% for title and abstract screening, and 89.2% for full-text indicating high levels of agreement between reviewers (Covidence, 2025). Discrepancies were discussed to reach consensus, consulting a third reviewer where necessary. The process is illustrated in the PRISMA Flow Diagram (Figure 1; Page et al., 2021)

Extraction Process

Data was extracted independently by reviewer one after a calibration check from the second reviewer (k=10). Data extracted included title, author, year, study setting, study design, population and sample size, participant sex, mean age of sample and effect sizes, or mean and standard deviation, for inflammation and mortality. Where effect sizes were not available mean and standard deviation, correlation or regression coefficient were extracted. The Campbell Collaboration Effect Size calculator (https://www.campbellcollaboration.org/calculator/) was then used to calculate effect size. For medical conditions frequencies were extracted rather than effect size or mean and standard deviation. Authors were asked to provide any data required which was not available in published reports.

Risk of Bias

Risk of bias was assessed using the JBI Critical Appraisal Checklist for Case Control Studies (2020). Data was assessed by one reviewer, with a proportion checked by a second reviewer. Additional information was sought from study authors, where required, if information was unclear or unavailable in the study. Funnel plots

were produced together with relevant statistics to investigate whether results may be missing in a non-random fashion due to reporting bias. Sensitivity analysis was conducted for C-reactive Protein, stroke, diabetes and hypertension to assess robustness of the model. Certainty of findings were not formally assessed.

Strategy for Data Synthesis

Quantitative synthesis was undertaken to explore findings, with results presented in a summary table detailing key outcomes. Effect sizes in the form of Cohen's d were extracted or calculated for inflammatory cytokines, telomere length and markers of allostatic load, whilst hazard ratios were extracted for mortality. Adjusted effect sizes were preferentially extracted with unadjusted used when there was no alternative. Extracted data was used to run meta-analyses via *Meta-Essentials* (Suurmond, van Rhee & Hak, 2017). Random effects models were used. For medical conditions, frequencies of conditions for the PTSD group versus the control group were extracted. Inverse Variance method was used to calculate an odds ratio. Heterogeneity of models was analysed through Cochrane's Q, I^2 statistic and tau-squared.

Results

The search strategy generated 9501 results, with 2254 duplicates. 7247 papers were screened by title and abstract, with 918 included in full text review. Of these results, 30 could not be retrieved and 729 were excluded for the reasons detailed in Figure 1. Excluded results included papers investigating genetic pathways leading to association between PTSD and one of the three outcomes, such as Song et al. (2025), as well as studies investigating populations diagnosed with a physical health condition prior to PTSD diagnosis, for example Salas et al. (2024). For duplicate data, where multiple studies reported on the same sample, the most comprehensive, or highest quality paper was selected for inclusion. This left 159 included papers. Due to the

number of included results, the full reference list of included papers is available in Appendix C, and tables of study characteristics in Appendices D-F.

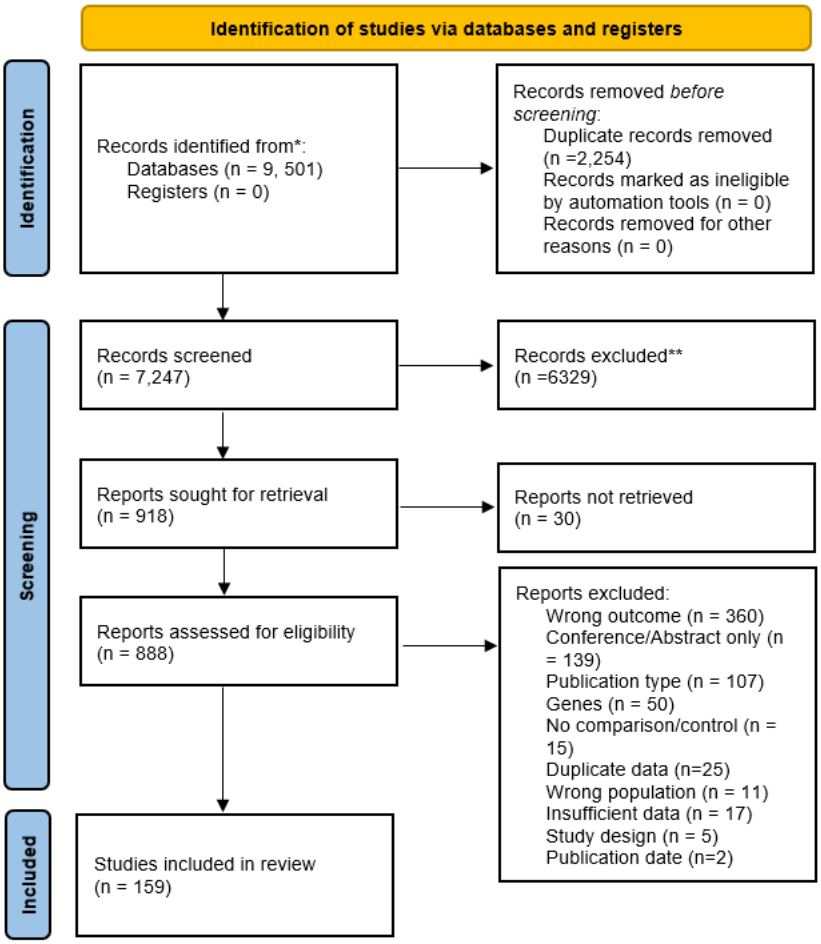


Figure 1: PRISMA Flow Diagram

Risk of Bias Assessment

A summary of the risk of bias assessment can be found in Appendix G. 42 papers were assessed as high quality and low risk of bias (indicated by none of the criteria being ranked as 'no' or 'unclear'). These papers were used for sensitivity analysis. Results where possible bias was indicated tended to be from comparability between case and control groups, use of alternative measures to assess PTSD, or unclear reporting of measurement of outcomes.

Outcomes

Biological Indicators

Inflammation

59 of the included papers discussed inflammation. This was further categorised into outcomes of inflammatory cytokines (k=40) and allostatic load (n=39). Inflammatory cytokines included C-Reactive Protein (CRP), Interleukin-1 beta (IL-1β), Interleukin-6 (IL-6) and Tumour Necrosis Factor Alpha (TNFα), as reported in Lohr et al. (2015). Allostatic load included total allostatic load, as well as metabolic markers of diastolic and systolic blood pressure, cortisol, triglycerides, norepinephrine and cholesterol (total cholesterol, high-density lipoprotein (HDL) and low-density lipoprotein (LDL)). Although Perkovic et al. (2021) and Ogawa et al. (2025) measured oxidative stress, different measures were used meaning data could not be meta-analysed.

Inflammatory cytokines

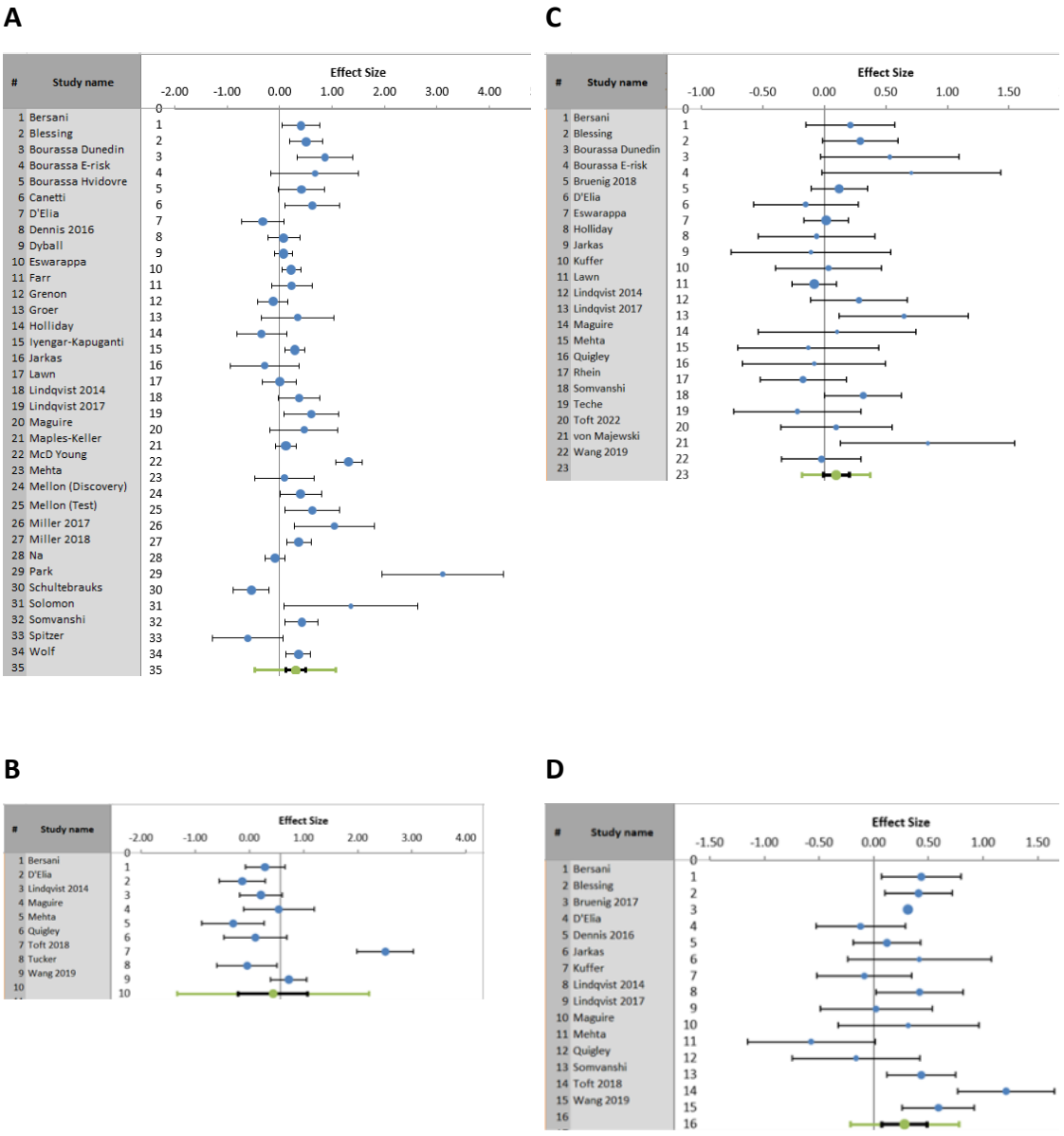
Table 2: Inflammatory Cytokines and PTSD

Marker	k	Effect Size (95% CI)	Cochrane's Q	I^2 (%)	τ^2	Egger Regression	Begg & Mazumdar
Combined	40	**0.25 (0.15, 0.36)**	398.78 p<.001	80.19	0.07	t=-1.14 (p=.256)	z=1.87 (p=.031)*
CRP	31	**0.31 (0.12, 0.49)**	194.49 p<.001	83.03	0.13	t=1.28 (p=.209)	z=1.85 (p=.032)*
IL- 1β	9	0.44 (-0.21, 1.08)	84.79 p<.001	90.56	0.51	t=-0.01 (p=.993)	z=-0.42 (p=.338)
IL-6	21	0.10	30.61 p=.080	31.39	0.02	t=1.68 (p=.108)	z=1.44 (p=.075)

		(-0.01, 0.21)					
TNFα	15	**0.28 (0.07, 0.49)**	43.46 p<.001	67.79	0.04	t=-0.33 (p=.749)	z=-0.94 (p=.174)

*p<.05 ; **bold** effect size indicates statistical significance

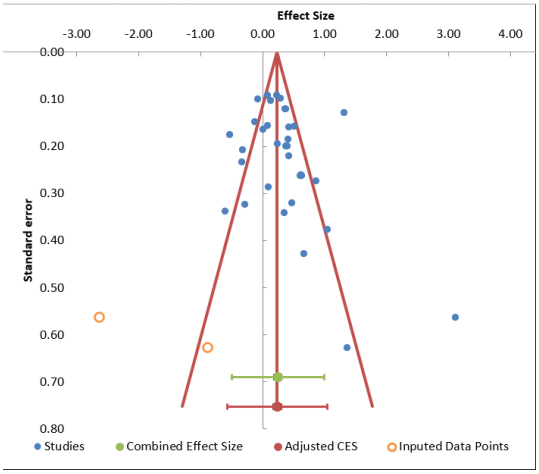
As displayed in Table 2, there was a small effect of 0.26 for PTSD and all four inflammatory markers combined. Small effects were also found for CRP (d=0.32) and TNFα (d=0.28), whilst effects were not significant for either interleukin. With the exception of IL-6, heterogeneity was substantial. Between study variance was low, other than for IL- 1β which had moderate between study variance. Figure 2 shows the distributions of effect sizes for each inflammatory cytokine.



A= CRP, **B=** IL- 1β, **C=**IL-6, **D=**TNFα

Figure 2: Forest Plots for Inflammatory Cytokines and PTSD

A



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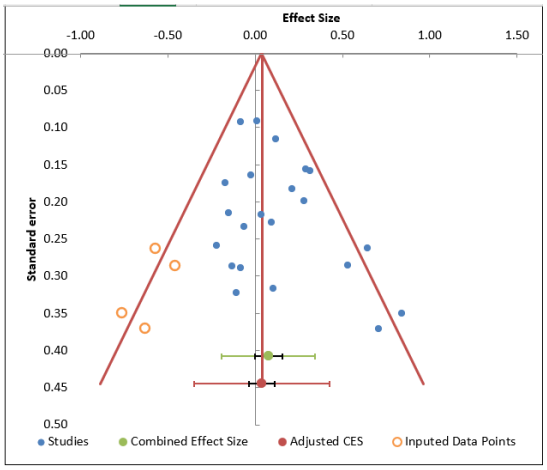
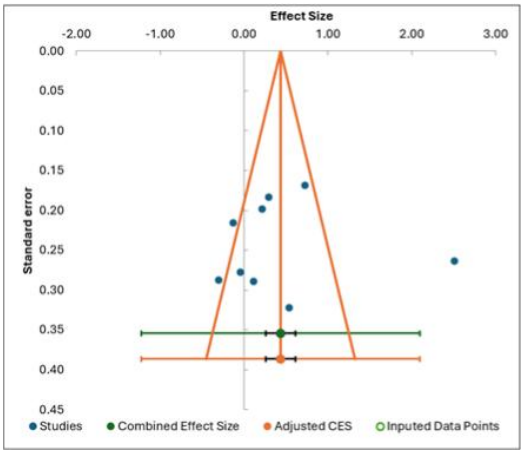
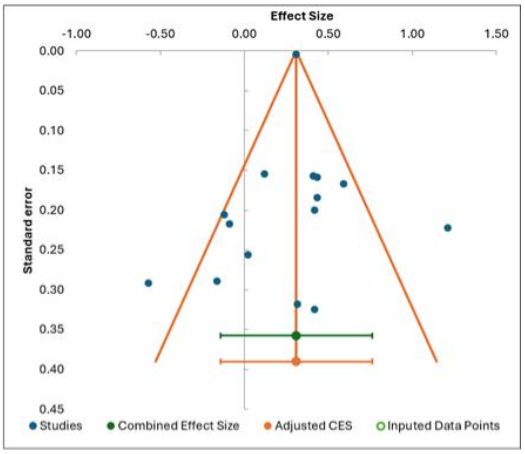


B



D



A= CRP, **B=** IL- 1β, **C=**IL-6, **D=**TNFα

Figure 3: Funnel Plots for Inflammatory Cytokines and PTSD

Figure 3 illustrates the funnel plot for each inflammatory cytokine. From visual inspection, plots appear symmetrical, however CRP and IL- 1β had an outlier to right, and IL-6 also shows slight weighting to the right. As illustrated in Table 2, all Egger's regression tests were insignificant. The Begg & Mazumdar's Rank correlation test was significant for CRP (z=1.91, p=0.028), indicating some evidence of publication bias. All other Begg & Mazumdar's tests were insignificant, indicating insufficient evidence to support publication bias.

As heterogeneity was high, and publication bias was significant for CRP, and approaching significance for IL-6, a sensitivity analysis check was conducted. Meta-analysis was re-run for CRP and IL-6 using only the highest quality papers (as described in risk of bias section). As presented in Table 3, sensitivity analysis revealed a moderate effect size for CRP (d=0.51). There was little impact on heterogeneity, however Begg & Mazumdar's rank correlation test was no longer significant . For IL-6 effect size, heterogeneity and publication bias remained statistically insignificant.

Table 3: Sensitivity Analysis for CRP and IL-6

Marker	k	Effect Size (95% CI)	Cochrane's Q	I^2 (%)	τ^2	Egger Regression	Begg & Mazumdar
CRP	13	**0.51 (0.09, 0.93)**	87.04 p<.001	86.21	0.22	t=-0.12 (p=.909)	z=-0.24 (p=.404)
IL-6	12	0.12 (-0.02, 0.27)	15.58 p=.112	35.82	0.02	t=1.05 (p=.323)	z=0.08 (p=.469)

Allostatic Load

Effect sizes and measures of heterogeneity and publication bias are presented in Table 4. PTSD was found to have small significant effects on DBP (d=0.33), SBP (d=0.28) and triglycerides (d=0.25). Effect size for total allostatic load bordered on significance (95% CI 0.00, 0.65). Confidence intervals were wide and, excluding norepinephrine and total allostatic load, heterogeneity was substantial. Between study variation was high for total cholesterol, but ranged from 0.0 to 0.11 for all other markers. Publication bias was significant on both tests for DBP, SBP, LDL and total cholesterol.

Table 4: PTSD and Metabolic Markers

Marker	k	Effect size (95% CI)	Cochranes Q	I^2 (%)	τ^2	Egger Regression	Begg & Mazumdar
Cortisol	5	0.05	22.29	82.06	0.11	t=2.00	z=1.47

		(-0.55,0.65)	p<.001			(p=.139)	(p=.071)
DBP	14	**0.33** **(0.12, 0.53)**	33.16 p=.002	60.79	0.05	t=2.89 (p=.014)*	z=2.14 (p=.016)*
SBP	13	**0.28** **(0.06, 0.50)**	29.16 p=0.004	58.85	0.05	t=3.09 (p=.010)*	z=1.71 (p=.044)*
Triglycerides	14	**0.25** **(0.03, 0.46)**	75.97 p<.001	82.89	0.10	t= 0.26 (p=.798)	z=0.49 (p=.311)
Norepinephrine	2	0.06 (-1.27, 1.39)	0.91 p=.341	0.0	0.0	-	z=1.00 p=.159
HDL	14	-0.03 (-0.37, 0.31)	65.66 p<.001	80.20	0.10	t=0.95 (p=.359)	z=0.82 (p=.206)
LDL	12	0.06 (-0.09, 0.22)	20.77 p=.036	47.05	0.02	t= 2.63 (p=.025)*	z=2.33 (p=.010)*
Total cholesterol	13	0.62 (-0.76, 2.00)	251.32 p<.001	95.23	0.61	t=3.13 (p=.010)*	z=2.81 (p=.003)*
Total allostatic load	2	0.33 (0.00, 0.65)	0.03 p=.862	0.0	0.0	-	z=1.00 (p=.159)

*p<.05 ; **bold** effect size indicates statistical significance

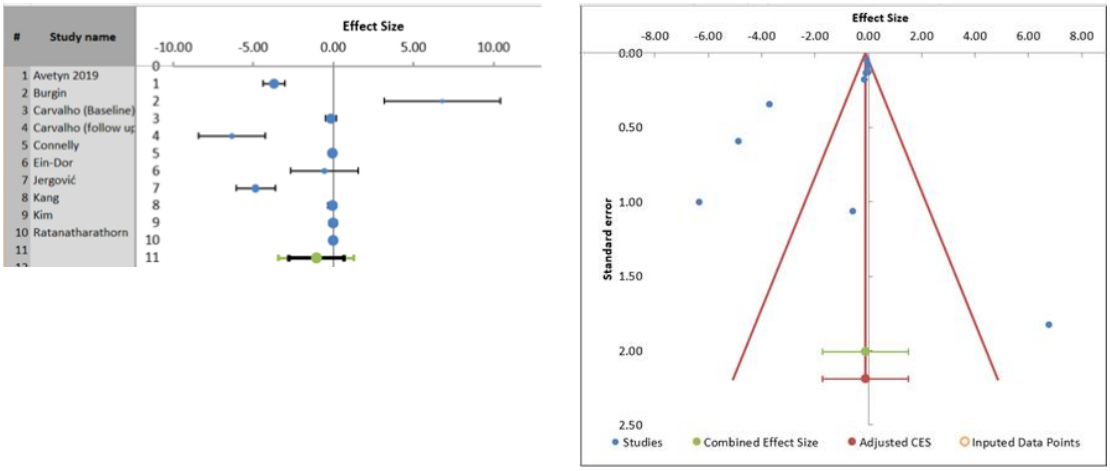
Sensitivity analysis was conducted for DBP , SBP, total cholesterol and LDL . None of the effects remained significant. Heterogeneity reduced for total cholesterol and LDL, and publication bias was no longer significant across markers, other than LDL.

Table 5: Sensitivity Analysis for DBP, SBP, Total Cholesterol and LDL

Marker	k	Effect size (95% CI)	Cochranes Q	I^2 (%)	τ^2	Egger Regression	Begg & Mazumdar
DBP	4	0.53 (-0.27,1.34)	9.52 p=.023	68.47	0.17	t=1.54 (p=.262)	z=1.36 (p=.087)
SBP	3	0.66 (-0.88, 2.20)	7.19 p=.027	72.18	0.28	t=2.05 (p=.289)	z=1.57 (p=.059)
Total Cholesterol	5	0.11 (-0.17, 0.38)	7.91 p=0.095	49.43	0.03	t=2.30 (p=.105)	z=0.49 (p=.312)
LDL	5	0.01 (-0.26, 0.28)	5.04 p=0.278	21.48	0.01	t=5.39 (p=0.012)*	z=2.45 (p=0.007)*

Telomere Length

A **B**



A= Forest plot for Telomere length, **B=** Funnel Plot for Telomere length

Figure 4: Plots for Telomere Length and PTSD

There were 10 effects for telomere length. The combined effect size for telomere length was -1.07 (se=0.76, 95% CI –2.78, 0.65) but was not statistically significant. Data was heterogeneous ($Q(9)=227.07$, $p<.001$; $I^2=96.04\%$; $\tau^2=0.50$), with lack of evidence for publication bias (Egger Regression: t= -1.75, p=0.118; Begg and Mazumdar Rank Correlation: z= -1.34, p=0.090; see Figure 4 for funnel plot).

Medical Conditions

Of the included papers, 116 reported outcomes related to medical conditions under the categories reported by Lohr et al. (2015; cardiovascular diseases, metabolic syndrome, hypertension and gastrointestinal ulcer). Conditions were grouped into these categories for ease of analysis. Data within studies was sufficient for meta-analysis, expanding on the narrative synthesis by Lohr et al. (2015).

Cardiovascular Conditions

Cardiovascular conditions included in the meta-analysis were angina, cardiovascular disease (CVD), dyslipidaemia, heart disease, heart failure, hyperlipidaemia, myocardial infarction (MI), obesity, stroke and transient ischemic attack (TIA). Table 6 describes the included conditions. Only 2 papers reported arrythmia, with no controls with the condition in Britvic et al. (2015). This significantly inflated effect size and was not representative of the general population so arrythmia was excluded from meta-analysis.

A meta-analysis was run on all other cardiovascular conditions. This revealed a significant combined odds ratio of 1.46 (95% CI 1.22, 1.73). In subgroup analyses each condition had an inflated combined odds ratio with presence of PTSD (see Table 6). Significant effects were found for angina, heart disease, MI and stroke. Data was significantly heterogeneous, with between study variability ranging from 0.04-0.39. Forest plots of variability in effect size and funnel plots illustrating publication bias can be found in Appendix H.

Table 6: PTSD and Cardiovascular Conditions

Condition	k	OR (95% CI)	Cochrane's Q	I^2 (%)	τ^2	Egger Regression	Begg & Mazumdar
Angina	7	**2.17** (**1.15, 4.09**)	34.30 p<.001	82.51%	0.39	t=-1.62 (p=0.165)	z= -0.15 (p=0.881)
CVD	9	1.31 (0.97, 1.76)	370.88 p<.001	97.84%	0.27	t=2.40 (p=0.047)*	z= -1.46 (p=0.144)
Dyslipidemia	9	1.20 (0.95, 1.53)	98.48 p<.001	91.88%	0.04	t= -1.01 (p=0.348)	z= 0.21 (p=0.835)

Heart Disease	13	**1.48** (**1.01, 2.15**)	214.10 p<.001	94.40%	0.14	t=2.21 (p=0.050)	z= 0.24 (p=0.807)
Heart Failure	10	1.30 (0.97, 1.73)	243.01 p<.001	96.30%	0.16	t= 2.03 (p=0.077)	z= 0.63 (p=0.531)
MI	17	**1.71** **(1.34, 2.18**)	47.70 p<.001	66.46%	0.08	t=0.57 (p=0.580)	z=0.58 (p=0.564)
Obesity	5	1.61 (0.84, 3.11)	325.42 p<.001	98.77%	0.19	t= 0.20 (p=0.851)	z= 0.98 (p=0.327)
Stroke	21	**1.57** (**1.03, 2.40**)	793.68 p<.001	97.48%	0.36	t=0.10 (p=0.920)	z=0.12 (p=0.904)
TIA	2	1.51 (0.11, 21.49)	23.48 p<.001	95.74%	0.08	-	z= -1.00 (p=0.317)

Bold indicates statistical significance, *p<.05

Metabolic Conditions

Metabolic conditions included metabolic syndrome (MetS), hyperlipidemia and diabetes mellitus), with effect sizes visualised in Appendix H. The effect sizes for PTSD with metabolic conditions combined, diabetes and hyperlipidemia were significant. Effect size for MetS was not significant and confidence intervals were wide. Heterogeneity measures were significant for all conditions. The funnel plots for metabolic conditions were fairly symmetrical (see Appendix H), however publication bias was significant for metabolic conditions combined and diabetes.

Table 7: PTSD and Metabolic Conditions

Condition	k	Effect size (95% CI)	Cochranes Q	I^2 (%)	τ^2	Egger Regression	Begg & Mazumdar
Combined	65	**1.37 (1.19, 1.57)**	4831.01 p<.001	98.68	0.12	t=0.55 (p=.581)	z=-2.12 (p=.034)*
Diabetes	47	**1.36 (1.10, 1.66)**	4100.30 p<.001	98.88	0.16	t=0.88 (p=.383)	z=-1.84 (p=.065)
Hyperlipidemia	13	**1.37 (1.13, 1.66)**	549.28 p<.001	97.82	0.07	t=-0.55, (p=.591)	z=-0.85 (p=.393)
MetS	5	1.36 (0.80, 2.32)	15.15 p=.004	73.60	0.11	t=-0.96 (p=.408)	z=-0.49 (p=.624)

Bold indicates statistical significance, *p<.05

As diabetes displayed significant heterogeneity and approaching significance for publication bias, a sensitivity analysis was conducted with only highest quality papers (k=12). This resulted in a significant odds ratio of 1.38 (95% CI 1.07, 1.79), with minimal

effect on heterogeneity measures (Q(11)=224.00, p<.001; I^2=95.09%, τ^2=0.03). Publication bias remained insignificant (z=1.37, p=.170).

Hypertension

48 results reported on hypertension. The effect of PTSD on hypertension was significant (OR 1.46 [95% CI 1.27, 1.69]). The distribution of effect sizes is presented in Figure 5. Heterogeneity was substantial (Q(48)=4965.21; I^2=99.05%) and between study variability was low (τ^2=0.16). The funnel plot appeared slightly asymmetrical (see appendix H), and Egger's regression was insignificant (t=-1.50, p=0.140) but Begg and Mazumdar's rank correlation test (z=3.29, p=.001) was significant.

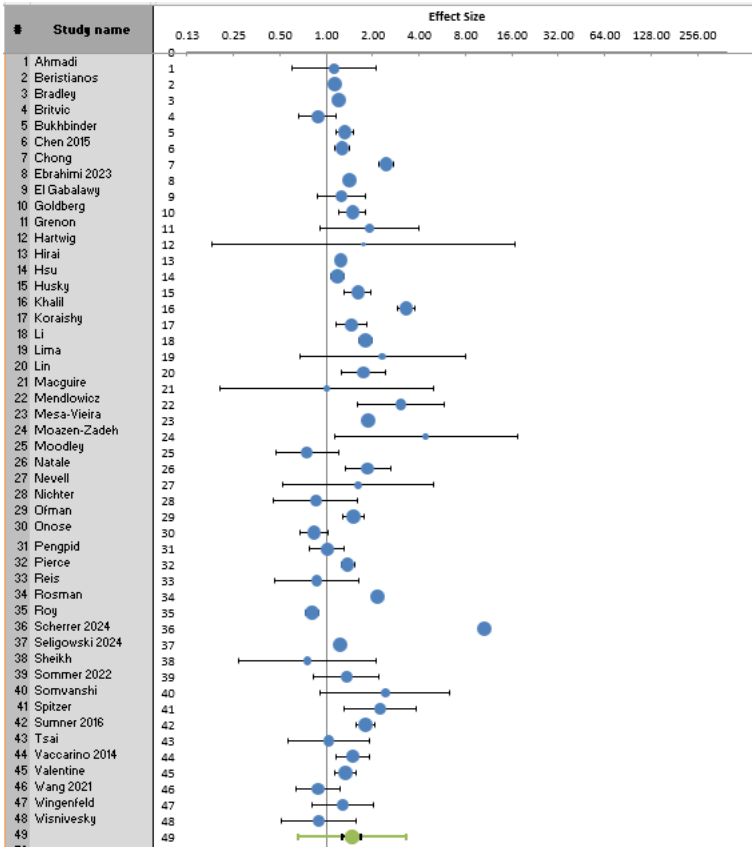


Figure 5: Forest Plot of Effect Sizes for Hypertension and PTSD

Sensitivity analysis with highest quality papers (k=12; Forest plot in Appendix H), revealed a significant moderate effect size (OR 1.35 [95% CI 1.12, 1.62]). However,

heterogeneity remained substantial (Q(11)=1447.73, p<.001; I^2=99.24%, τ^2=0.09). Publication bias was no longer significant (z=1.37, p=.170).

Gastrointestinal Ulcer

Four papers reported on gastrointestinal ulcer. The combined effect size was an odds ratio of 1.51 (95% CI 0.20, 11.52) with wide confidence intervals as illustrated in Figure 6.

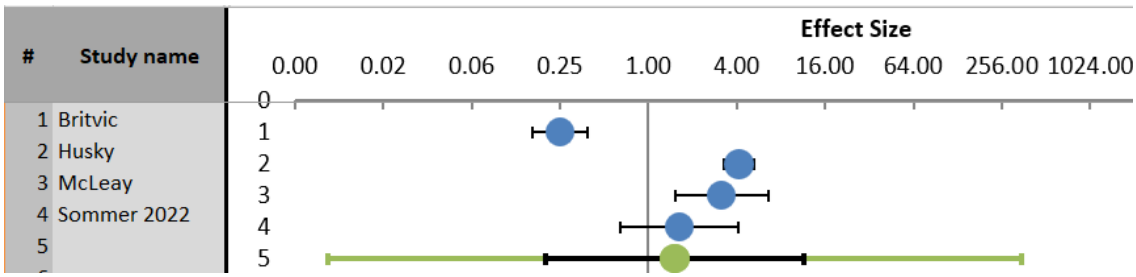


Figure 6: Forest Plot of Effect Sizes for Gastrointestinal Ulcer

Despite the limited number of studies, heterogeneity was substantial (Q(3)= 127.00, p<.001; I^2=97.64%; τ^2=2.52). Neither Egger Regression test (t= -0.56, p=0.633) nor the Begg and Mazumdar test (z= -0.68, p=0.497) indicated evidence for publication bias.

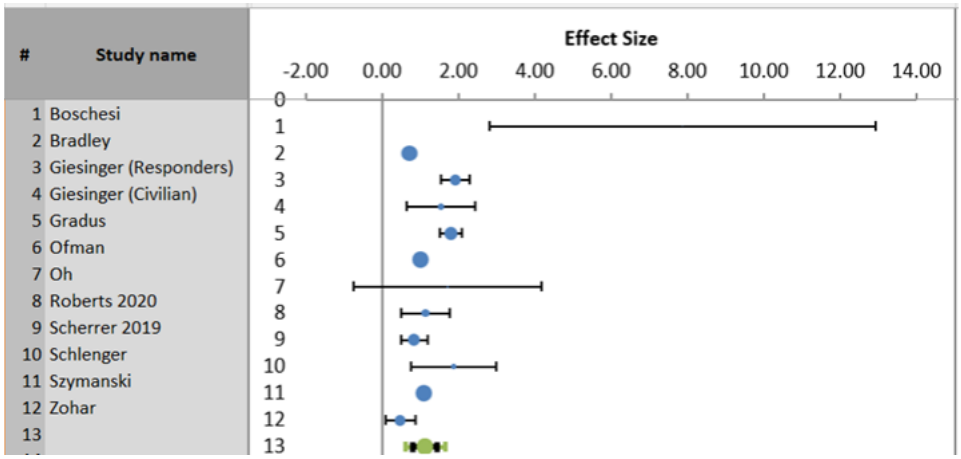
Mortality

11 papers reported all-cause mortality. Two results for all-cause mortality were available in Geisinger et al. (2020), one for civilians and one for responders to 9/11.

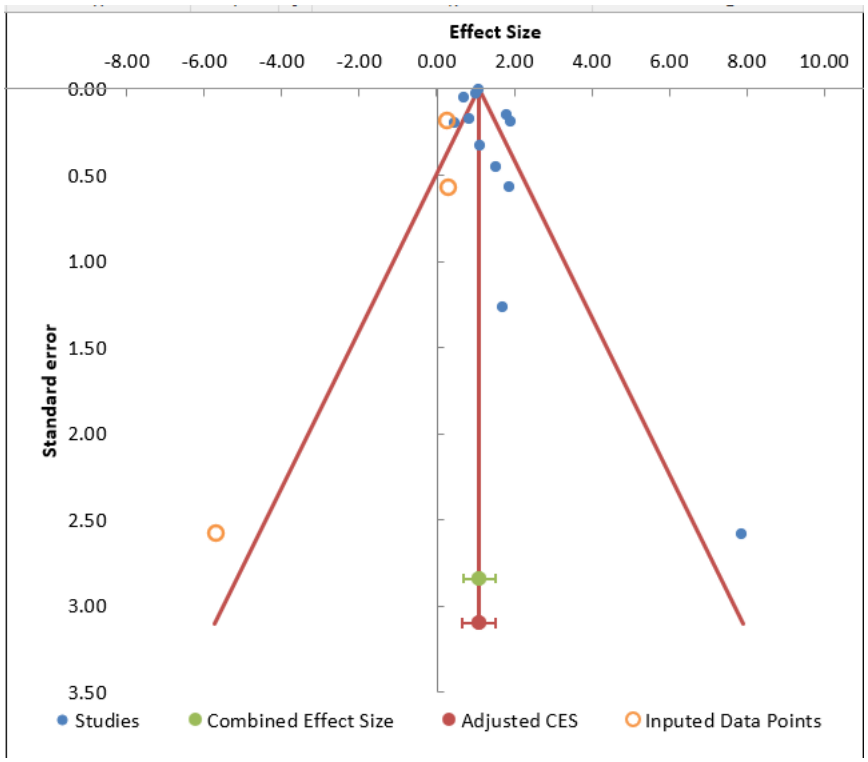
The combined effect for all-cause mortality was not significant (HR 1.12, 95% CI 0.80, 1.45; see Figure 7A for individual effect sizes). Heterogeneity was substantial (Q(11)=124.40, p<.001; I^2=91.16%), however between study variance was low (τ^2=0.03).

For publication bias, visual inspection of the funnel plot revealed slight asymmetry with studies pooling towards the right (as in Figure 7B). However, neither the Egger regression test (t=0.05, p=0.959) nor the Begg and Mazumdar's rank correlation test (z= 0.12, p=0.292) were significant.

A



B



A=Forest plot for all-cause mortality, **B**=Funnel plot for all-cause mortality

Figure 7: Plots for All-cause Mortality and PTSD

Discussion

Biological Indicators

Meta-analyses revealed small to moderate positive associations between PTSD and the included inflammatory cytokines. Of these, only CRP and TNFα were significant, with the same direction as the non-significant effects reported by Lohr et al. (2015). Conversely, lesser effects, lacking significant diversion from the null, were found for IL-1β and IL-6 compared to Lohr et al. (2015) who found significant moderate to large effects for these cytokines. Sensitivity analysis with high quality papers produced an insignificant effect for IL-6. This is surprising as IL-6 is most often cited amongst inflammatory cytokines as a predominant marker of disease, whilst levels of IL- 1β can be more variable and difficult to detect (Kany et al, 2019; Tylutka et al., 2024). In sensitivity analysis, there were three papers with negative effect and two with effect size near zero. The paper with largest negative effect size (Teche et al.,2017) proposed their findings resulted from the PTSD group being compared to trauma-exposed rather than healthy controls. Mehta et al. (2020) also had negative effects, with only three participants without trauma-exposure in the control group. However, Somvanshi et al. (2020) found a positive effect for IL-6 and PTSD in comparison to trauma-exposed controls. The current review did not compare effects between papers with trauma-exposed controls and those with healthy controls, which could be a future research direction.

PTSD had a positive moderate association with total allostatic load, however this did not reach statistical significance. Triglycerides were the only individual metabolic marker with significant effect. Total cholesterol appeared to be biased by the large effect in Farr et al. (2016), a paper evaluated as poorer quality by the JBI Critical Appraisal Checklist. When this study was omitted in sensitivity analysis the effect became non-significant. DBP and SBP were also insignificant in sensitivity analyses. Evidence suggests that PTSD can lead to chronic diseases through increased allostatic load (Juster & Misiak, 2024). Therefore, elevated triglycerides may be the most notable early signal of the physical impacts of PTSD. More high quality studies

could help elucidate the true effect between PTSD and allostatic load or specific metabolic markers.

PTSD was associated with a negative but non-significant effect on telomere length. This appeared to be due to the large positive effect found by Burgin et al. (2022). Participants were adults with experience of childhood residential care. Again, this could be a result of the trauma-exposed versus healthy control hypothesis; however, there are also numerous confounding factors such as parental instability, which has an evidenced association with shorter telomeres (Pickler et al., 2025). Lohr et al. (2015) reported a positive effect of PTSD and telomere length (d=0.76, 95% CI 0.25, 1.28), and that this entailed shorter telomere length. On further investigation, through looking at included studies such as Shalev et al. (2014) and Ladwig et al. (2013), it appeared that this was an inverse effect size whereby they were describing the relationship between PTSD and telomere shortening, rather than telomere length. With this in mind, the Lohr et al. results aligned with the current meta-analysis. This was also consistent with findings from other reviews in this area (e.g. Lockwood et al., 2022; Pousa et al., 2021).

Medical conditions

A positive association was found between PTSD and all medical conditions measured. Significant odds ratios were found for cardiovascular conditions, angina, MI, heart disease, and stroke; metabolic conditions, diabetes and hyperlipidemia; and hypertension. These findings coincided with those reported by Lohr et al. in that there was evidence for PTSD increasing incidence of all medical conditions measured. Addition of meta-analysis in the current study built upon findings by quantifying an effect size for each condition to map out the strength and statistical significance for each association.

The relationship between PTSD and somatic symptoms is not yet fully understood but evidence is emerging linking PTSD and medically unexplained symptoms (Ho et al., 2021), as well as PTSD and cardiovascular conditions (Padhi et al., 2024). Similarly, some evidence has been found that treatments for PTSD can reduce comorbid physical health

symptoms (van den Berk Clark et al., 2022). This therefore suggests that PTSD is associated with increased risk of medical conditions.

Mortality

An increased hazard ratio for all-cause mortality was demonstrated for PTSD in comparison to controls. This was consistent with findings by Lohr et al. (2015; HR [95% CI] 1.29 [1.11, 1.5]), however the effect in the current meta-analysis did not reach significance. This appeared to be due to Oh et al. (2022), Zohar et al. (2014) and Bradley et al. (2014). Both Oh et al. and Bradley et al. recruited cardiac patients, with PTSD being diagnosed in the year prior to cardiac investigation. In these cohorts, mortality may be equally likely in both groups due to ill-health. In Bradley et al. the PTSD group were also significantly younger. However, Zohar et al. was rated as high quality and tracked veterans, controlling for confounding factors in results. It is possible that PTSD can be linked to mortality through increased allostatic load and disease burden (Juster and Miliak, 2024), however more studies which control for confounding factors are needed to evidence this.

Heterogeneity of Results

Overall results of meta-analyses were largely heterogeneous, and steps taken to mitigate this (sub-analysis at condition level, restriction to studies with low risk of bias) often had limited impact upon heterogeneity. Data were frequently from US veteran, often older male, cohorts (e.g. Stellman et al., 2025), however the large number of studies included allowed for variation in gender, age and country, with Europe, South Africa, South America, Asia, Australia and other North American countries represented. Race and ethnicity have been found to mediate the relationship between PTSD and medical conditions (Cooper et al., 2014; Valentine et al., 2017). Similarly, different countries may vary in assessment criteria used to diagnose PTSD, for example the DSM-5 is commonly used but may be biased to western cultures (Patel et al., 2021). Mean age ranged from 19.16 years (Lee et al., 2019) to 72.5 years (Stellman et al., 2025), and gender ranged from fully male samples (e.g. Somvanshi et al., 2020)

to evenly mixed (e.g. Lin et al., 2019) to fully female (e.g. Ebrahimi et al., 2023). There were also different types of traumatic experiences sampled including combat, natural disaster, occupational, sexual assault and terrorism. The combination of these different characteristics may have increased heterogeneity.

Clinical Implications

From this meta-analysis there appears to be significant evidence to suggest that inflammation is higher in individuals with PTSD in terms of CRP, TNFα and triglycerides. Inflammation has been associated with chronic disease (Orlando & Mainous III, 2024; Pousa et al., 2021). This review found significant evidence indicating an association between PTSD and medical conditions measured, particularly cardiovascular conditions (angina, heart disease, MI and stroke) and hypertension. This highlights the need to consider physical health when conceptualising the difficulties experienced by individuals with PTSD or the possibility of PTSD in people who present with inflammatory biomarkers and comorbid medical conditions. Difficulties with PTSD may maintain or worsen physical health symptoms, and vice versa. Therefore, conceptualising both aspects could enhance treatment planning and effectiveness. This could be aided through comprehensive health screening, or perhaps development of a screening questionnaire that encompasses both mental and physical health indicators of PTSD, tracking changes in symptoms throughout treatment. Further research could focus on the trajectory of inflammatory markers or medical conditions to better understand the impact of PTSD or modelling the risk of increased physical markers given PTSD, and vice versa. Another direction may be to explore the impact of evidence-based PTSD treatments on levels of inflammatory biomarkers and medical conditions in individuals with a diagnosis of PTSD.

Limitations

This meta-analysis offered a broad overview of the state of research in each of the three investigated areas. This included all relevant papers, without controlling for possible confounding factors. Risk of bias assessment of papers highlighted several papers with significant differences in age, gender or race between case and control groups.

Although some studies controlled for age (e.g. Hartwig et al., 2020), other studies had significant differences in age (e.g. von Majewski et al., 2023). In some of these cases, the absolute difference was slight, for example Oddone et al. (2014): PTSD group, (M(SD)= 31.6 (5.31) years), controls (28.15 (5.52) years). In other studies, the control group were of older age than the PTSD group (e.g. Jarkas van Vuren et al., 2025). Risks of inflammation (Zhang & Dhalia, 2024), medical conditions (Li et al., 2021) and mortality (Martinez-Gomez et al., 2024) have been found to increase with age, therefore ensuring this was controlled for across all studies could have strengthened interpretation of findings. However, in sensitivity analysis on CRP, IL-6, diabetes and hypertension with only well-matched case and control groups, there was not a significant difference in results.

Risk of bias assessment indicated 16 studies with significant differences in gender between case and control groups. Although some studies controlled for this by gender-matching controls (e.g. Roberts et al., 2016), other study designs fostered gender differences between cases and controls, such as Holliday et al. (2017) and Chong et al. (2025) who enlisted heterosexual couples with male veterans composing the PTSD group, and female, often non-veteran, controls. Gender is an important consideration given that it has been associated with different disease trajectories (Mauvais-Jarvis et al., 2020).

Some studies case-control matched by race (e.g. van den Heuvel et al., 2020), however thirteen studies indicated significant difference by race. Other studies, such as Moazen-Zadeh et al. (2016) did not report on race or ethnicity. Balancing groups by race could have helped to control for race as a mediator of increased medical conditions (Cooper et al., 2014; Valentine et al., 2017).

Moreover, depression has been linked to increased allostatic load (Juster & Miliak, 2024), inflammation (Yin et al., 2024), physical health conditions (Nichter et al., 2019)

and mortality (Zhang et al., 2023). Some studies, such as Nichter et al. (2019) included groups with major depressive disorder to control for depression as a confounding factor, however other studies did not (e.g. Dennis et al., 2015). Controlling for depression, and possibly other mental health conditions, could help to clarify whether the effects found are exclusive to PTSD.

Strengths

This review added to and built upon the findings by Lohr et al. (2015). The strength of results was enhanced through increasing numbers of results, assessing risk of bias and publication bias and adding additional meta-analysis for medical conditions. This gives additional robustness to these findings.

Future directions

Future studies could investigate the impact of race, gender and age on the association between PTSD and each of the three outcomes to identify whether these need to be controlled for. Similarly, future research could test how PTSD differs to other mental health conditions, such as depression which has also been associated with inflammatory markers and allostatic load. It would also be helpful to test the hypothesis suggested by Teche et al. (2017) that findings may vary between comparison with trauma-exposed versus health controls to further research in this area.

Conclusions

Overall, this meta-analysis found that some inflammatory markers and medical conditions were higher in individuals with PTSD in comparison to controls. For inflammation, significant effects were found for CRP, TNFα and triglycerides. For medical conditions, risk was significantly increased for angina, heart disease, MI, stroke, diabetes, hyperlipidemia and hypertension. This research strengthened findings by Lohr et al. (2015) by adding additional meta-analysis, expanding number of results and assessing risk of bias of papers and publication bias. Future studies could

investigate possible confounders of age, gender, race and other mental health conditions, or investigate differences between trauma-exposed and healthy controls.

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Declaration of Interests

There were no conflicts of interest reported for this review.

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Chapter 2

A mixed-methods exploration of staff experiences of trauma symptoms in older adults

Prepared in accordance with the author requirements for Aging & Mental Health
[Author guidelines available at:
https://www.tandfonline.com/action/authorSubmission?show=instructions&journalCode=camh20]

Plain Language Summary

Title – A mixed-methods exploration of staff experiences of trauma symptoms in older people.

Background

Older and younger people have been found to have different common symptoms of post-traumatic stress disorder (PTSD). Studies disagree about which PTSD symptoms are most common in older people.

Older people with PTSD get help from mental health services. Staff from these services can tell us more about PTSD symptoms in older people.

Aims and Questions

The aims of this study are:

- To add the views of staff into research
- To understand PTSD symptoms in older adults better
- To look at how PTSD is defined in older adults

Methods

Participants: Staff who work in older people's mental health services in Scotland took part. They had 2 or more years of experience.

Recruitment: We used posters and emails to tell staff about our study. We told staff how to take part.

Consent: We told staff about what they would have to do in the study and the data we would collect. Staff only took part if they agreed for us to collect their data.

Design of study: There were two options to take part in the study:

1. Survey only
2. Survey and focus group

For the survey **only**, staff were asked how common and important they felt PTSD symptoms were in older people with PTSD.

For the survey **and** focus group, staff did the survey first. Then, we had a focus group. We asked staff questions about PTSD symptoms in older people with PTSD.

Ethical Issues

We wrote about the things staff told us. To make sure people can't work out who took part in our study, we didn't report staff names or jobs. This is known as confidentiality. We asked staff to keep patient confidentiality. They did this by not sharing information that could help us work out who their patients are.

Results

- PTSD symptoms look different in older people
- Going to the doctor often for physical sensations, such as sore muscles or sore stomach, is quite common in older people with PTSD
- Staff use their skills to try to understand PTSD in older people
- It can be hard for older people to talk about PTSD

What will we do with our results?

Our study showed symptoms to look out for in older people with PTSD. This will help us to notice older people who might have PTSD. This means we can offer them help. Results will be published so that we can share them with a wider audience.

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Abstract

Background: Symptoms of post-traumatic stress disorder (PTSD) may present differently in adults over 65. Older people (OP) may use different terms and somatic symptoms to communicate difficulties, contributing to under-diagnosis of PTSD in OP. Experienced mental health clinicians could help identify differences in signs and symptoms of PTSD in OP, however the literature is lacking their perspective.

Aims: This project aims to increase knowledge and understanding of PTSD in OP, investigate PTSD criteria applicability for OP and add clinicians' perspective to the evidence base.

Methods: The study was a convergent parallel mixed-methods design. OP mental health clinicians across NHS Scotland completed a questionnaire and focus groups. The questionnaire focused on primacy of symptoms, based on the PTSD Checklist for DSM-5, and presence of comorbid medically unexplained symptoms. Focus group themes were identified using thematic analysis.

Results: Participants indicated variation in primacy of symptoms. Unwanted memories, and reminders were ranked highest, and irritability and harmful risk taking lowest. Somatic symptoms were moderately important. Themes were symptoms of trauma in OP, staff approaches to conceptualising PTSD and the older people's perspectives.

Practical Applications: Participants felt PTSD diagnostic criteria applies to OP but cautioned that rigid use could block access to treatment.

Keywords: PTSD; Older people; Clinicians; DSM-5; mixed-methods

Introduction

Post-traumatic stress disorder (PTSD) is indicated by symptoms of re-experiencing, avoidance, negative thoughts or feelings, and hyperarousal following experience of a traumatic event, lasting for over a month and not attributable to any other cause (DSM-5, 2013; ICD-11 for Mortality and Morbidity Statistics, 2022; NICE, 2023). These criteria are based on clinical presentations in younger adulthood, which may not apply in the same way to those older than 65 (Maercker, 2021; Pless Kaiser et al.,2019; Robertson et al., 2021). Some evidence suggests that PTSD symptom severity declines with age (Cook & Simiola, 2018; ICD-11 for Mortality and Morbidity Statistics, 2022), however, applying criteria founded on younger adults may fail to capture the intricacies of PTSD in older adulthood.

Rutherford and colleagues (2021) identified hyperarousal as the most pronounced PTSD symptom in adults aged 67 or older, whilst avoidance and negative thoughts or feelings were less prominent with age. In contrast, Maercker (2021) proposed persistence of avoidance and re-experiencing, particularly nightmares and memories, into older adulthood. Conversely, ICD-11 criteria (ICD-11 for Mortality and Morbidity Statistics, 2022) suggest decline in re-experiencing with age. Differences in PTSD symptoms between younger and older people are therefore indicated, but further investigation is needed to clarify the symptom profile.

Another difference between younger and older people may be how symptoms are interpreted or explained, which could impede application of PTSD criteria. Cook and Simiola (2018) reported that older people with PTSD are more likely to report cognitive difficulties and somatic complaints over mood related difficulties. These somatic symptoms can sometimes be referred to as medically unexplained symptoms, which are deemed to stem from psychological burden due to no physical cause being found (Royal College of Psychiatrists, 2015). Older people may solely seek physical health interventions for these symptoms, limiting opportunities to draw links between symptoms and experiences of trauma (Pless Kaiser et al., 2019). Self-stigma, differences in perceived need compared to younger adults, and knowledge of mental health terminology may also impact reporting of trauma related symptoms, leading to

inaccurate diagnoses (Mackenzie & Pankratz, 2022; Pless Kaiser et al., 2019; Rutherford et al., 2021). This further supports the need to examine how PTSD presents in older people to improve accuracy of diagnosis and intervention.

Given the limited literature on PTSD in older people, there are few studies exploring clinicians' perspectives. Both Pless Kaiser et al. (2019) and Maercker (2021) referenced 'clinical experience' for differences in PTSD symptoms observed clinically in older people. However, neither paper references any research literature exploring mental health clinicians' perspectives of PTSD presentation in older age. This highlights a gap in the evidence base, calling for the addition of clinicians' perspectives to offer insight into symptoms of PTSD in older adulthood.

Aims and Research Questions

The aims of this project are:

- To add clinicians' perspectives to research literature on PTSD in older people.
- To increase knowledge and understanding of trauma symptoms in older age.
- To investigate applicability of current DSM-5 criteria for PTSD to older people.

This project seeks to answer the following research questions:

1. In clinicians' experience, how does trauma present in the older people they work with?
2. Which signs and symptoms do clinicians view as the key symptoms for PTSD diagnosis in older people?
3. In clinicians' experience, do older people present with somatic complaints related to experiences of trauma?

Due to limited research and mixed findings, it is difficult to confidently hypothesise which PTSD symptoms will be more or less common in older people from a clinician's perspective. Therefore, this project will take an exploratory approach.

Materials and Methods

The protocol for this study is available in Appendix I.

Design: The study is a convergent parallel mixed-methods design, meaning quantitative and qualitative data were gathered simultaneously to offer richer context to the data (Reporting checklist available in Appendix J). Clinicians' experiences of working with older people who have experienced trauma was investigated quantitatively through a questionnaire and qualitatively through focus groups to provide additional context.

Participants: Clinicians working in older people's mental health (OPMH) settings across NHS Scotland were recruited. Participants self-selected whether to participate in the questionnaire only or questionnaire and focus group. The aim was to recruit to four focus groups, each with 2-6 participants. This has been evidenced to be sufficient to provide themes (Fugard & Potts, 2015; Guest et al., 2017). For the questionnaire an exploratory approach was taken, seeking to recruit as many participants as possible. A calculation of representativeness of the sample was intended following data collection; however, it was not possible to gather expected staff numbers across services.

Inclusion criteria: Participants were required to: i) be registered with a professional body; ii) be working in OPMH services within NHS Scotland; iii) have at least two years' experience working in OPMH services. The study included participants from inpatient and community settings.

Exclusion criteria: Participants were excluded if they: i) had less than two years' experience working in OPMH; ii) were not registered with a professional body; iii) were not employed by NHS Scotland.

Recruitment: Participants were recruited through poster advertisement and email. Channels included NHS email and networks, attending team meetings and social media interest groups. Study information and details on how to opt in were provided for both the questionnaire only or the questionnaire and focus groups. The recruitment period ran for 4 months, with reminder emails sent regularly throughout this period.

Materials and Measures:

The questionnaire was completed via Qualtrics and was constructed of demographic questions, including job role, health board, and clinical experience, as well as items about PTSD symptoms and somatic symptoms.

The list of PTSD symptoms was based upon the PTSD Checklist for DSM-5 (PCL-5, Weathers et al., 2013, as cited in Bressler et al., 2018). In this study, clinicians were asked to rate how frequently each symptom is observed in patients and its importance for diagnosis of PTSD in older people. No validated tool was identified for use in this way. The PCL-5 was chosen due to its high internal consistency (α=0.929) and reliability (ICC=0.944) when administered in the standardised way by mental health clinicians (Jiménez-Fernández et al., 2024). Moreover, the PCL-5 has versatility in its application to any population and reflects the four-cluster model (re-experiencing, avoidance, negative thoughts or feelings, and hyperarousal) in the detail required for this context. Previous versions (Bressler et al., 2018) and ICD-11 criteria did not. It was also more concise than the Clinician Administered PTSD Scale (Weathers et al., 2018) or DSM-5 criteria, minimising cognitive burden of ranking (Sauro et al., 2023). Items were adapted grammatically for this context (questionnaire sample available in Appendix K).

Somatic symptom items were based upon information produced by the Royal College for Psychiatrists (2015) on the most common medically unexplained symptoms and possible diagnoses given.

Research Procedures: Participants could opt to complete either the questionnaire only or the questionnaire and focus group.

Questionnaire only-

The questionnaire was accessed using the link or QR code on the email or poster.

Participants first reviewed study information (participant information, consent form, privacy notice and debrief form; see Appendix L for forms) before providing relevant demographic information (job role, health board, and clinical experience).

Next, participants rated the frequency that they observe PCL-5 symptoms in their clinical experience with older people with experience of trauma, selecting either 'routinely clinically observed' or 'rarely clinically observed'. Symptoms were then ranked in order of perceived importance in diagnosis of PTSD in older people. Participants were then asked to rate the degree to which they felt satisfied with the ranks assigned from 1 to 5 (1=low) and provided any additional comments on this. This approach of rating frequency and ranking importance allowed richer information to be gathered than one approach alone.

Participants were then asked about whether somatic symptoms are present in OP with experiences of trauma. Again, frequency of a list of somatic complaints was rated either 'rarely' or 'routinely clinically observed'. From this list, participants were asked to select the most frequently observed somatic symptom and make a judgement about where this would rank amongst previous rankings for the 20 PCL-5 symptoms. Participants could rank the somatic symptom from 1-22 (where 1=most and 21=least important, 22=not relevant). Participants again rated their confidence on rankings and provided any additional comments.

At the end of the questionnaire, participants were given opportunities to opt in to the prize draw and to receive a summary of results. Prizes were two £20 gift vouchers for questionnaire participants and two £50 gift vouchers for questionnaire and focus group participants.

Questionnaire and focus group-

Participants were instructed in the recruitment email and poster to email the lead researcher to opt into the questionnaire and focus group. Participants were then

provided with study information, including participant information sheet, consent form, privacy notice and debrief form (see Appendix L). A suitable date for focus group attendance was agreed through email and participant invitations were sent out at least a week in advance. Focus groups were formed of staff from different professional roles and localities. Focus groups ran online via video call.

Focus groups started with a brief introduction to the research, participants were given an opportunity to ask any questions before being directed to a link in the call chat where they could complete the questionnaire. The questionnaire was completed during the focus group to prime participants for following discussions.

After the questionnaire was completed, participants were offered a short break. Participants then discussed questions delving further into their experiences of working with older people who have experienced trauma. A written guide of questions was used to structure sessions (See Appendix M) and posted in the chat function of the call. Participants were also given the option to use the chat to respond. Any responses posted by participants were read out by the researcher to encourage further discussion.

Stakeholder Involvement: A draft of the participant information sheet and the questionnaire and focus group questions was sent to staff at the Glasgow Psychological Trauma Service for review to ensure the questionnaire was representative for those with lived experience and was trauma informed in its design. Feedback was incorporated prior to recruiting participants.

Health and Safety

Ethical Approval: Permission to proceed with this research was granted by the Medical Veterinary and Life Sciences (MVLS) ethics committee (No: 200240363) and NHS Research and Innovation (R&I Reference: GN25MH303; REC Reference: 25/NRS/0036; Please see Appendix N for approvals).

Research was conducted online through Qualtrics for the questionnaire and video call for the focus groups. Given the online format and staff participants, risk was predicted to be low. However, there is awareness of vicarious or secondary trauma for clinicians working with people who have experienced trauma (Sutton et al., 2022), therefore participation in this project had the potential to be distressing. Measures to minimise possible distress included: detailing what would be asked of participants in the participant information sheet; optional involvement in focus groups; and provision of support resources in the debrief form.

Analysis Plan

Given the exploratory nature of this project, data was analysed descriptively and visualised through charts and plots. Data was screened for any missing values or anomalies.

Friedman tests were used to find data parameters of rankings. The first Friedman test investigated clinicians' rankings of PTSD symptoms and the second was performed on rankings of somatic symptoms. Results of these indicated the degree of agreement in symptom rank. (Full data analysis plan can be found in Appendix O). Data analysis syntax file, clean data with identifiable data removed and data variable library are available online at (https://osf.io/nt2wb).

Thematic analysis was used to identify key themes of focus groups following Braun & Clarke (2006; as cited by Maguire & Delahunt, 2017). Given the exploratory nature of the project, an inductive approach was taken. This started with familiarisation with data. Data was then hand coded line-by-line to identify data-driven themes. These initial themes were then compiled and consolidated through discussion with supervisors to identify candidate main themes and subthemes. Themes were then refined by reviewing them against data to check coherence, and making adaptations where required to define final themes and sub-themes. Analysis was conducted mainly at the semantic level, focusing on participants' explicit accounts, while giving attention where

relevant to underlying meanings in the data. Included themes reflected both prevalence and conceptual importance. See Appendix P for reflexivity statement.

Results

49 questionnaire-only responses were received, with a further 12 participants completing both focus group and questionnaire. Of these 61 questionnaire responses, 17 were incomplete (10 responses had no usable data, 4 had only completed demographic questions, and 4 responses completed up to frequency of PTSD symptoms). The 14 responses which did not answer any investigative questions were omitted. A further 2 responses were omitted due to not meeting inclusion criteria, leaving 45 usable responses.

Table 8 shows the numbers of participants for each professional role and locality.

Table 8: Sample Demographics

Professional Role (n=45)		NHS Health Board (n=45)	
CBT Therapist	2	Ayrshire and Arran	3
Clinical Psychologist	30	Borders	2
Mental Health Nurse	9	Dumfries and Galloway	4
Psychiatrist	4	Fife	4
		Forth Valley	5
		Grampian	2
		Greater Glasgow and Clyde	13
		Highland	1

	Lanarkshire	7
	Lothian	2
	Orkney	1
	Tayside	1

The majority of participants were clinical psychologists (N=30), and allied health professionals were largely underrepresented. Participants represented a diverse range of NHS Scotland health boards. NHS Greater Glasgow and Clyde was most represented (N=13).

Length of experience working in OPMH services is shown in Figure 8. This ranged from 2 to more than 20 years, with 22 participants having 10 or more years' experience.

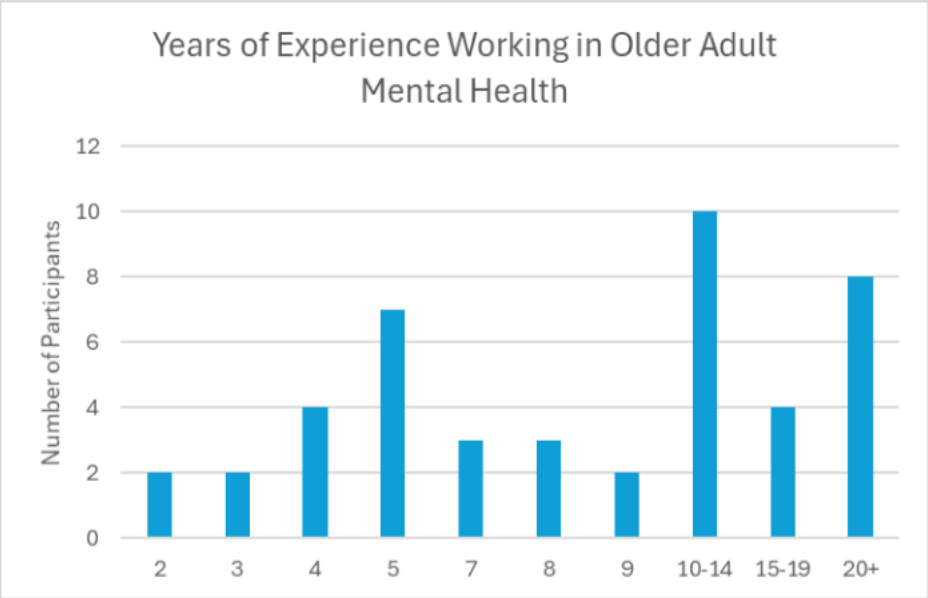

Figure 8: Years of Experience Working in OPMH

Table 9: Types of Training

Types of Training	Number of Participants
Acceptance Commitment Therapy for Trauma	1
Cognitive therapy for PTSD and Complex PTSD	5
Community Resilience Model	1
Compassion Focused Therapy	2
Developing Trauma-Enhanced Practice	1
EMDR	12
NES online learning	4
Nick Grey 2-day TF-CBT	7
Postgraduate in CBT	2
Prolonged exposure	3
Psychological therapy for trauma in older people	1
Safety and Stabilisation	5
Trauma-Focused CBT	13
No specific training	6

Table 9 summarises different training courses participants had attended relevant to working with older people who have experienced trauma. The most common was trauma-focused CBT training (N=13), followed by EMDR training (N=12). Other participants detailed elements of their training course in mental health nursing, clinical psychology or psychiatry that centred on trauma. These were not included in the table as they are completed as part of the professional role.

Questionnaire Data

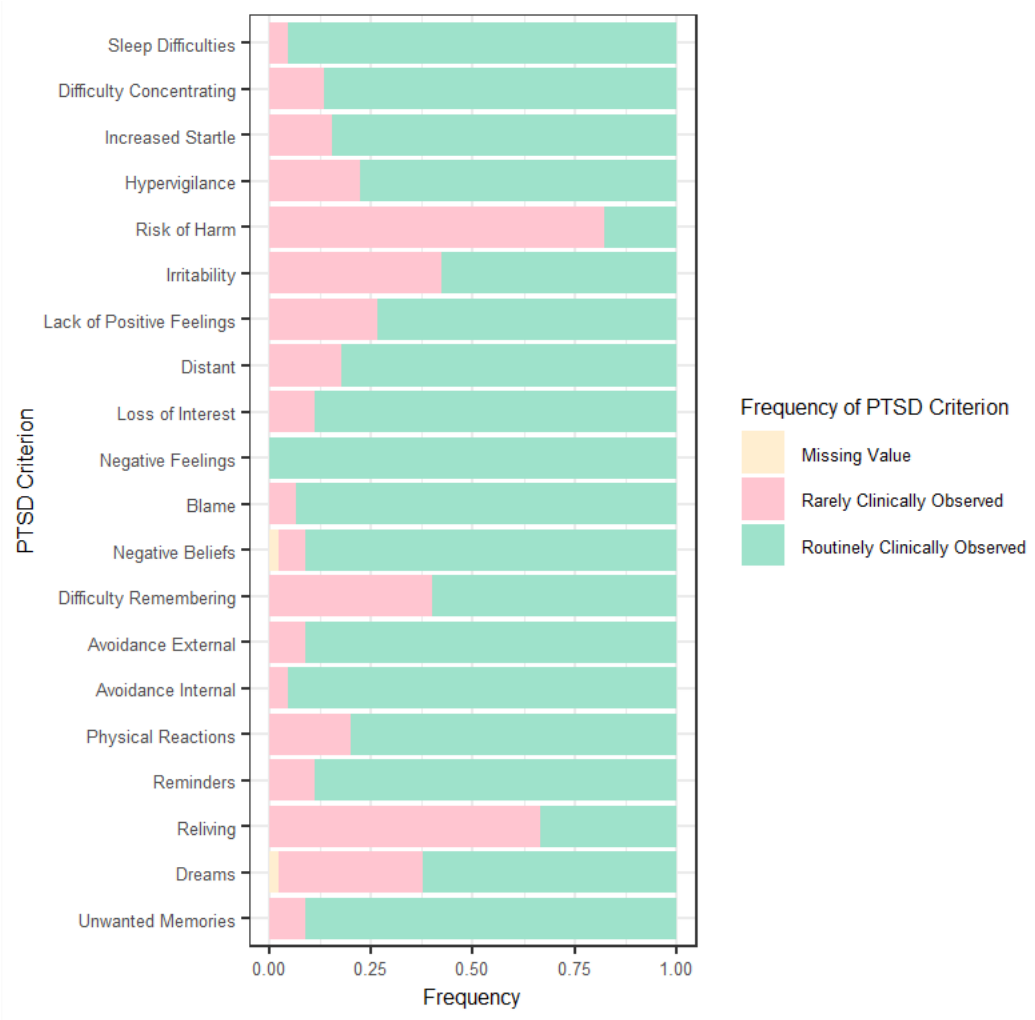

Figure 9: Frequency of PTSD Criterion

Figure 9 presents participant ratings for frequency of PTSD criterion. Routine frequency was indicated by the majority of participants for most of the criterion. Negative feelings had the highest level of agreement at 100% 'routinely clinically observed'. Sleep difficulties, blame and internal avoidance also had high levels of agreement for 'routinely clinically observed', with only two responses of 'rarely clinically observed' for each. Risk of harm and reliving were less supported as part of the standard presentation with only 17.78% (N=8) and 33.3% (N=15) respectively of responses describing them as 'routinely clinically observed'. Irritability and difficulty remembering were more contentious. 57.78% (N=26) of participants felt that irritability is routinely seen and 60% (N=27) felt that difficulty remembering is routinely seen. Participants reported in their

comments that an option between 'rarely' and 'routinely clinically observed' would have been helpful to better represent the frequency of some symptoms.

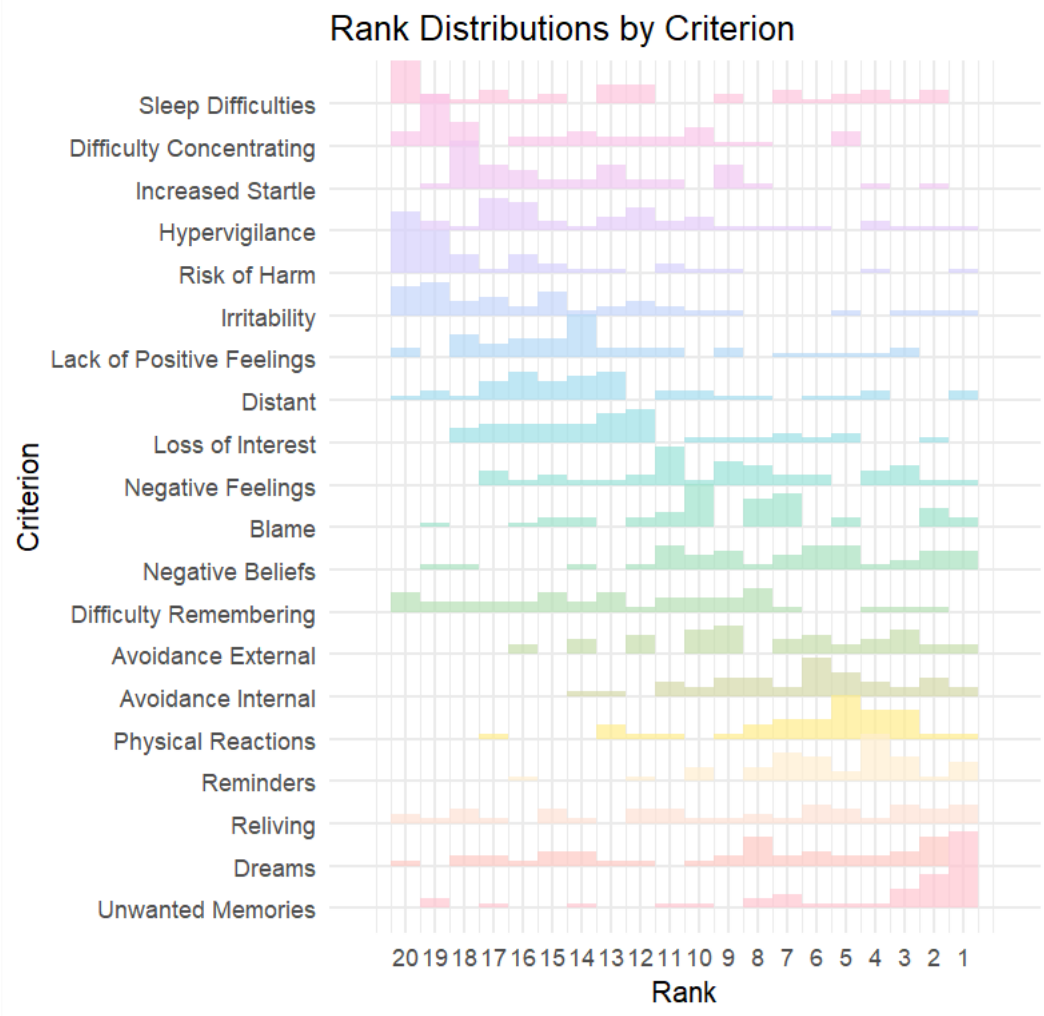

Figure 10: Ranking Distributions by Criterion

Symptoms were displayed in reverse to the order they are listed in Figure 10. The majority of symptoms were frequently ranked close to the original rank presented to participants, however, there were some exceptions. Risk of harm, dreams and irritability were commonly moved down in ranking. Risk of harm was in the majority of cases ranked of lowest importance, being ordered as symptom 19 or 20 by 48.78% of participants (n=20/41). Dreams had a mode rank of 8 (n=5) and 39% (n=16) of participants ranked irritability in 19th or 20th rank. There was lack of agreement for difficulty remembering, reliving and sleep difficulties. Difficulty remembering had peaks at 13, 15 and 20 (n=4 for each). For reliving, the density ridges are fairly flat, with slight

peaks at 1, 3 and 6 which indicate 4 participants assigning this rank, as opposed to 3 for ranks 2, 5, 11, 12, 15 and 18. Unwanted memories had the highest peak, ranked in first position by 39% (n=16) participants. External avoidance was one of the only symptoms not to have a peak at the rank it was originally presented to participants. Only 2 participants did not move its rank from 6th. External avoidance was frequently ranked 9^{th} (14.63%, n=6) or 10^{th} (12.2%, n=5).

Participants rated satisfaction with rankings of PTSD criteria items high overall, with a median and mean satisfaction score of 4 (SD=0.82). One participant did not give a rating for satisfaction. Despite high ratings of satisfaction for rankings of PTSD criteria, participants commented that symptoms were difficult to rank due to the number of symptoms, indiscernible differences in rank between some symptoms, variability between individuals and between different types of trauma, symptoms having relevance to other mental health diagnoses and being asked to use symptoms differently than clinical use.

A Friedman test was run to identify whether there was a significant difference in mean rank between each of the PTSD criterion. Results showed a significant difference in mean rank ($Q(19)=289.23$, $p<.05$), indicating trends in ranking of criterion.

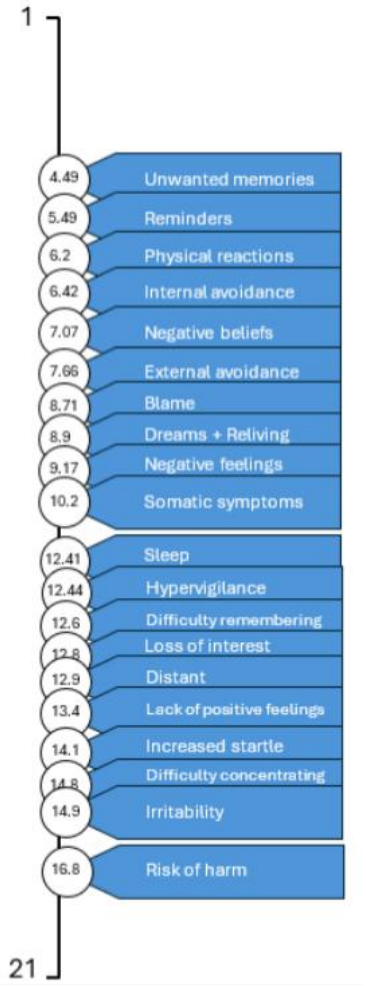

Figure 11: Mean Rank of PTSD Criterion

Figure 11 indicates the mean rank of each PTSD symptom. Post hoc analysis was conducted using a Nemenyi test for pairwise comparison of mean ranks (see Appendix Q). Several of these comparisons were significant. The crude pattern of results was that symptoms ranked higher significantly differed from those ranked lower. Mid-ranked symptoms, such as negative feelings and somatic symptoms significantly differed from the top-most and bottom-most symptoms.

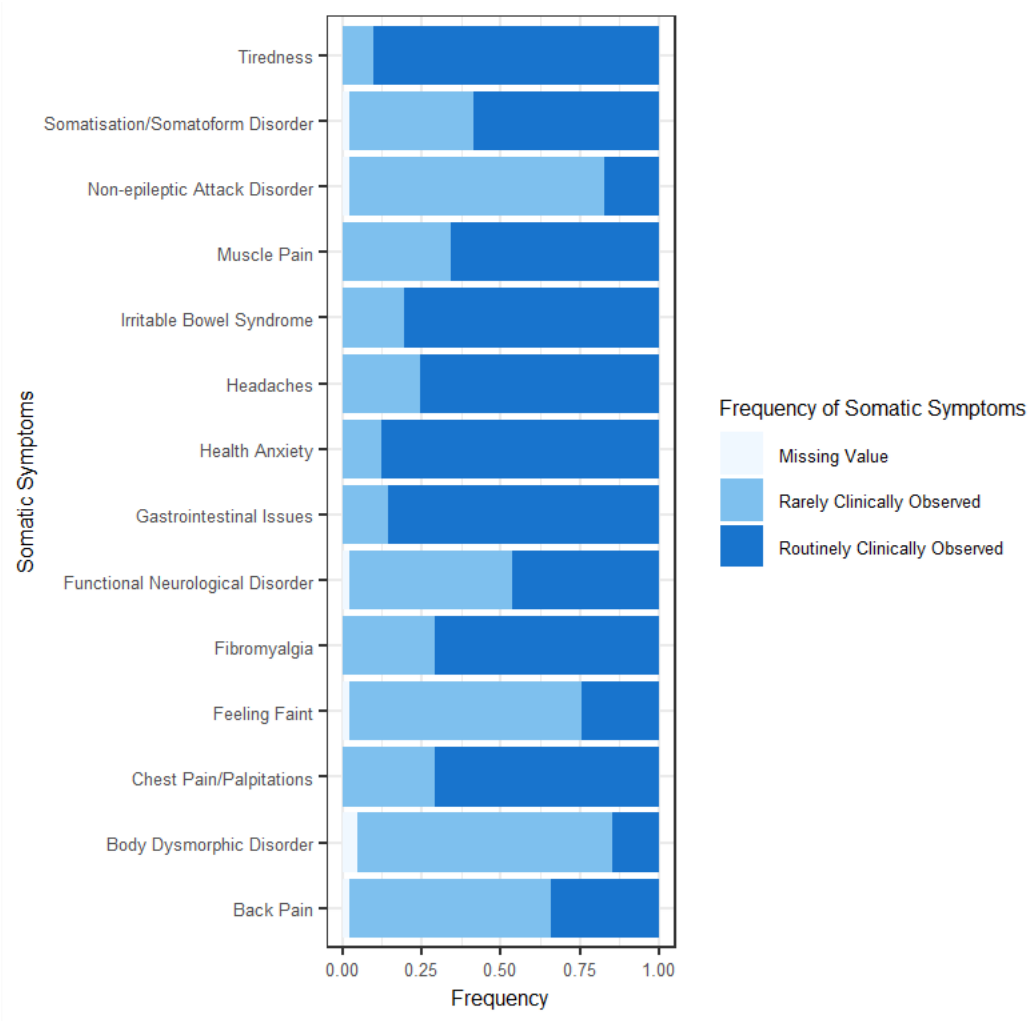

Figure 12: Frequency of Somatic Symptoms

Figure 12 illustrates the frequency that participants observe somatic symptoms in older people who have experienced trauma. Non-epileptic attack disorder (12.2%, n=5), feeling faint (24.4%, n=10) and body dysmorphic disorder (BDD) (17.1%, n=7) were less frequently reported as 'routinely clinically observed'. Tiredness (90.2%, n=37), irritable bowel syndrome (IBS; 80%, n=33), headaches (76%, n=31), health anxiety (87.8%, n=36) and gastrointestinal issues (85.4%, n=35) were more often reported as routinely observed. Functional Neurological Disorder (FND) was the most contentious, rated routinely clinically observed by 47.5% (n=19/40) and 'rarely clinically observed' by 52.5% (n=21). Appendix R displays how participants ranked the somatic symptom they viewed as most frequent against PTSD criteria.

Focus Group Data

Based upon transcripts for the four focus groups, initially more than 65 themes emerged from line-by-line coding. These were consolidated into three main themes and 13 subthemes.

Theme 1: Symptoms of trauma at older age

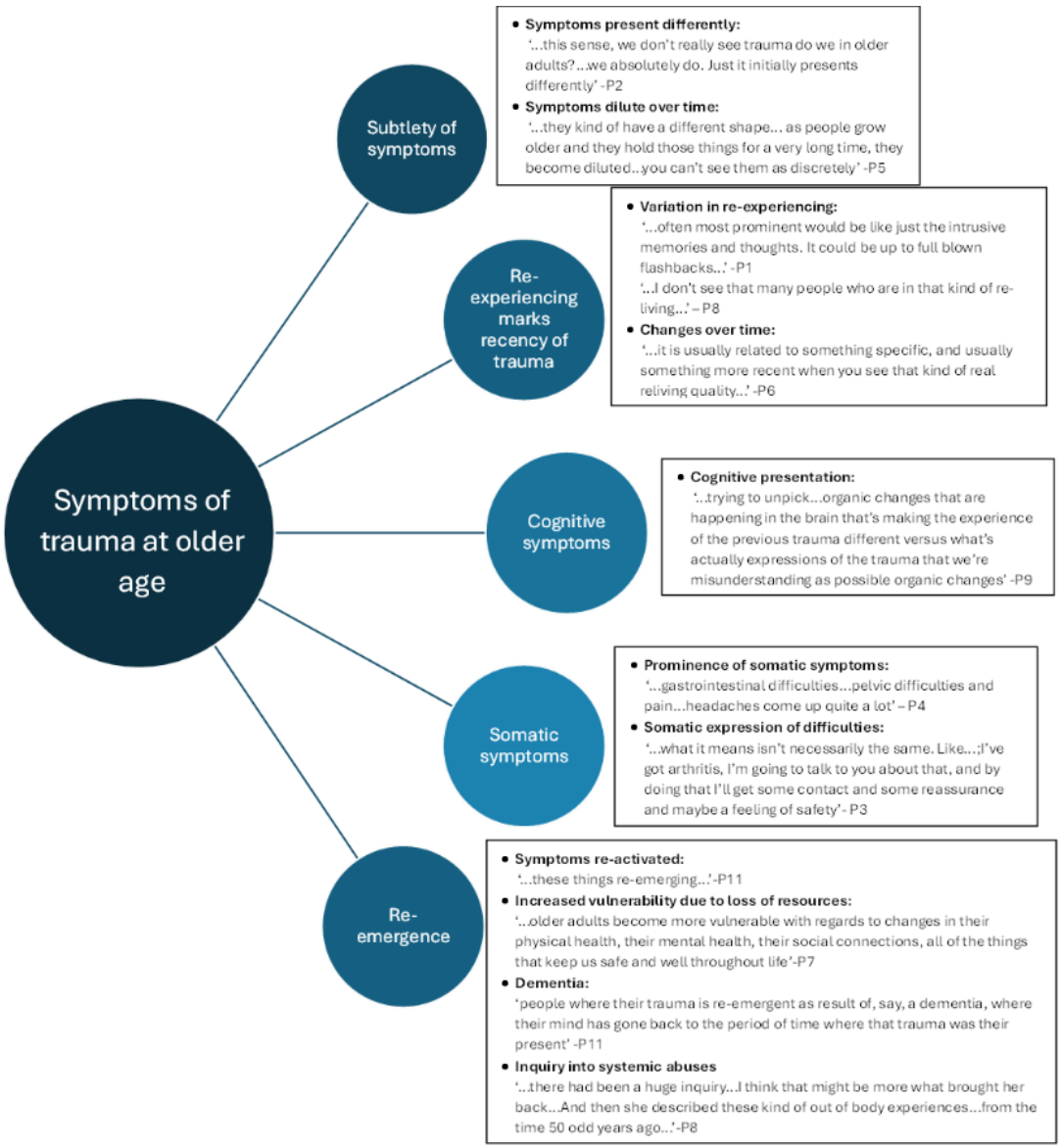

Figure 13: Theme 1: Symptoms of Trauma at Older Age

The first main theme was symptoms of trauma at older age. This theme reflected participants' views on the way trauma presents in older people over and above criteria symptoms (See Figure 13).

Participants indicated a subtlety of symptoms in older people with experiences of trauma. There was a notion that symptoms 'become diluted', meaning 'you can't see them as discretely' (P5). This suggests symptoms are less obvious and harder to recognise, which can lead to under-recognition of PTSD diagnosis in older people. Another subtheme was re-experiencing marks recency of trauma. Clinicians' opinions on the prevalence of re-experiencing in older people with experiences of trauma were mixed. One clinician viewed re-experiencing as 'most prominent' (P1), whilst others 'don't see that many who are...reliving' (P8). Re-experiencing, when present, was linked to 'something more specific' and 'more recent' (P6) and overall was viewed as less pronounced in older people with historical trauma. Again, this could make it more challenging for clinicians to recognise a diagnosis of PTSD.

Cognitive symptoms in older people with experience of trauma were noted by several participants. There was a notion that 'organic changes' in the brain could heighten the difficulties experienced as a result of trauma, but also that 'expressions of the trauma' could be misunderstood as organic changes (P9). This highlighted a need to investigate further to 'unpick' the factor(s) precipitating an older person's difficulties.

Similarly, somatic symptoms were viewed as common in trauma-experienced older people by many participants. Gastrointestinal difficulties and pain were mentioned most often. However, it is likely these symptoms could be misunderstood as it was indicated that 'what it means isn't necessarily the same' (P3). Somatic symptoms may be a means of expressing difficulties, which otherwise might be difficult to explain, providing a gateway to contact with a service, offering support, coping skills and a sense of safety.

Participants expressed a reactivation of difficulties in older age for people who have coped well with experiences of trauma throughout their life. This was conceptualised in the present study as 're-emergence'. Participants believed this to be a result of increased vulnerability due to 'changes in their physical health, their mental health,

their social connections (P7), dementia 'where the mind has gone back to the period of time when the trauma was their present' (P11), or inquiries into systemic abuses. These factors could make older people more likely to experience difficulties as a result of trauma.

Theme 2: Staff approaches to conceptualising PTSD at older age

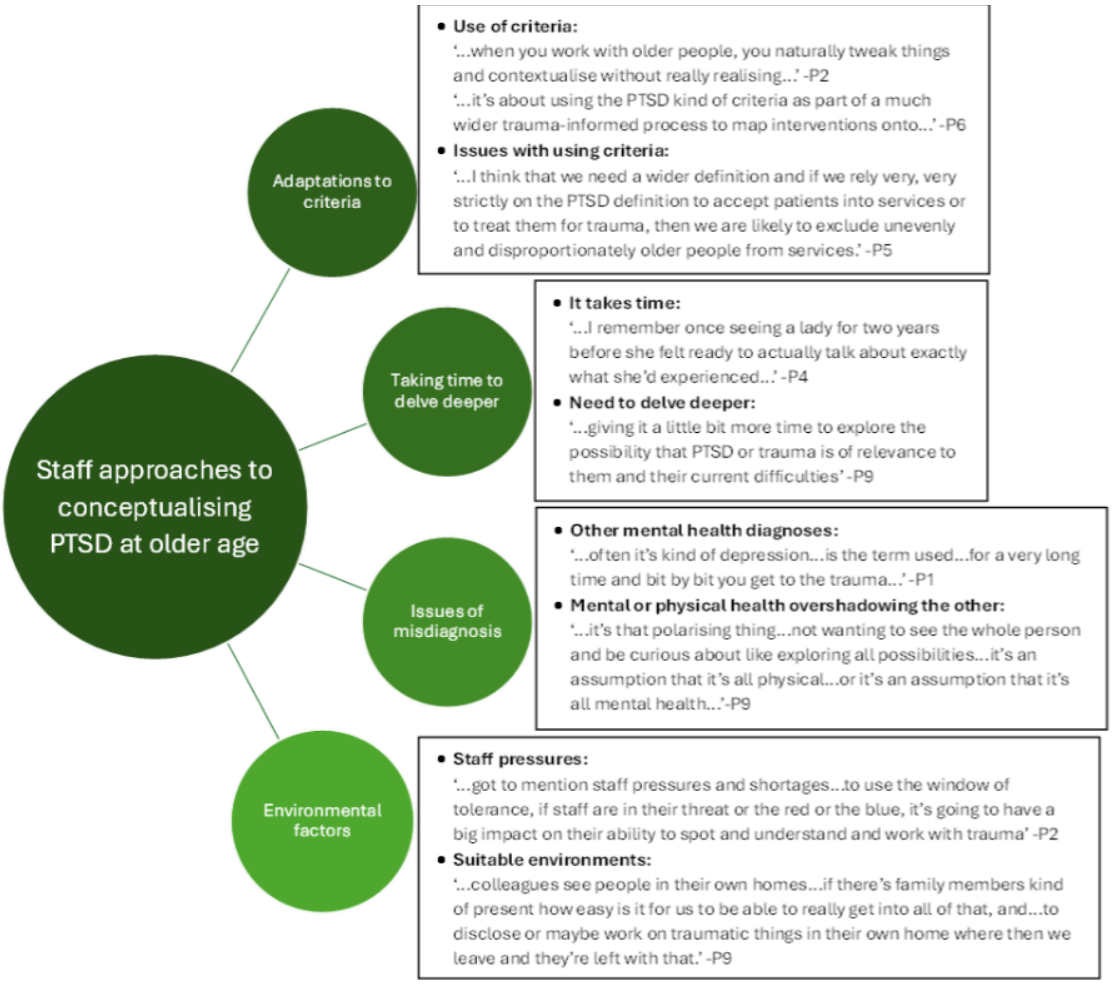

Figure 14: Theme 2: Staff Approaches to Conceptualising PTSD at Older Age

The second theme was staff approaches to conceptualising PTSD in older age, as detailed in Figure 14. This theme centred on clinicians' influence on the identification of PTSD in older people. Subthemes included facilitators and barriers to recognising PTSD.

Of the 12 focus group participants, nine responded directly that PTSD criteria do apply to older people with experiences of trauma. The other three did not directly respond. Participants communicated a sense that symptoms within the four clusters '...*do all show up, just whether they show up to the same proportion.'* (P10). As a result, clinicians make adaptations to criteria to recognise the specific experiences of trauma in older people. Participants highlighted a need to 'tweak' and 'conceptualise' (P2) criteria when working with trauma-experienced older people, and that overreliance on criteria is 'likely to exclude unevenly and disproportionately older people from services' (P5). Many participants suggested use of criteria and outcome measures to guide their thinking, but using a wider conceptualisation to better understand the client and the difficulties they present with.

Another way clinicians can aid recognition of PTSD in older people is taking time to 'delve deeper'. Many participants highlighted that older people may not mention traumatic experiences or view them as relevant. Therefore, 'giving a little bit more time' to explore trauma as a 'possibility' (P9) is required.

One barrier to recognising PTSD in older people is the issue of misdiagnosis. Participants reference other mental health conditions, such as depression and anxiety, that can present similarly to PTSD. Particularly if the trauma is historic, participants reported that patients can receive 'a different diagnostic label' (P9), that is then used to explain their difficulties for years to come. Similarly, 'polarising' between mental and physical health can mean we are not 'exploring all possibilities' (P9), and therefore the patient may not receive the most appropriate treatment.

Environmental factors can also lead to under-recognition of trauma in older people. 'Staff pressures' were believed to have an impact on 'ability to spot and understand and work with trauma' (P2). Similar unsuitable environments can prevent older people from having the opportunity to disclose trauma.

Theme 3: The perspective of older people

Figure 15: Theme 3: The Perspective of Older People

Figure 15 illustrates the third theme which emerged from focus groups around clinicians' views on the perspectives of older people. The focus of this theme was around why the older person themselves might not recognise their experience of trauma.

One sub-theme was searching for a medical/physical explanation. Participants highlighted that older people may have somatic symptoms and are 'not necessarily relating that to overall well-being and psychological health' (P7). Similarly, participants referenced stigma around mental health, with suggestion that a mental health explanation may be viewed as less legitimate than a physical explanation.

Older people may also not see the relevance of traumatic experiences to their current difficulties, particularly if the experiences are historic. Several participants expressed that from their experiences older people don't 'see trauma as being trauma' (P10), and the 'very significant traumas in their life they won't mention' (P12). This may mean that traumatic experiences are not given relevance in older people's descriptions of their difficulties.

Generational normalisation may also impact identification of traumatic experiences. Participants noted that older people were often made to feel that traumatic experiences were not 'significant' or 'happened to everyone' (P4), or they are 'expertly trained in… not sharing, and almost concealing, even from themselves' (P5). This means that often older people do not readily disclose traumatic experiences.

In a similar way, older people's previous experiences of service response may also impact on their likelihood of disclosing traumatic experiences. Participants spoke about societal norms, and how historically disclosure or evidence of traumatic experiences may have been managed differently by services. Participants highlighted the impact of societal views, such as in the case of domestic abuse 'people going back because that was the right thing to do, to be in a marriage' (P5) or how women's health and traumas around pregnancy and birth were 'listened to, addressed, handled' (P6). This may set an expectation about how services would respond in future and make older people less likely to speak out about these difficult experiences.

Appendix S contains a full list of quotes for each theme.

Discussion

How does trauma present in older people?

In response to the first research question, subtlety of symptoms emerged as a theme in the presentation of older people with trauma experiences. Symptoms may present more subtly when they have been present for a considerable time. Cole et al. (2024) found that negative beliefs can become more fixed and difficult to shift with further

temporal distance from trauma. Beliefs and patterns of behaviour may become part of the individual, making it difficult to differentiate personality traits from PTSD symptoms, which could lead them to present more subtlety. Moreover, if beliefs and behaviours have been adaptive, it is unlikely they will be given prominence by the individual in assessment, so clinicians will have to take time and use their expertise to unearth them.

Focus groups also highlighted a theme of re-emergence. Participants indicated that PTSD can re-emerge as a result of loss of resources, dementia or systemic abuse inquiries. Construal level theory (Trope & Liberman, 2003, 2010 as cited by Helm & Reyna, 2018) hypothesises that psychological distance alters representation of an event. With temporal or hypothetical distance, that is reduced likelihood of an event occurring, events become less detailed or more abstract. This could explain subtlety to symptom presentation and re-emergence in older people who have experienced trauma. For older people who have experienced early life trauma, temporal distance from the original trauma is increased, so representations, and in turn symptoms, may be more abstract. Additionally, distance may be altered through other means, for example death of the perpetrator reducing likelihood of recurrence. However, with the loss of resources, dementia and systemic abuse inquiries both temporal and hypothetical distance could be reduced causing symptoms to re-emerge.

A theme that emerged from focus groups was issues of misdiagnosis. Participants voiced experiences of clients who had been misdiagnosed with depression, generalised anxiety, health anxiety, personality disorder and bipolar disorder. Pless Kaiser et al. (2019) also recognised vulnerability to misdiagnosis in older people with PTSD as 'symptoms may mirror other conditions'. This study identified many factors which can contribute to this, including subtlety of symptoms, service pressures, lack of suitable environments to disclose trauma, and physical manifestations such as somatic and cognitive symptoms. Recognition of the relevance of trauma and generational normalisation may also make older people less likely to indicate that they have experienced a traumatic event. Moreover, older people may be more familiar with medical systems and seek a medical answer. This can result in older people with PTSD not receiving evidence-based treatment. For example, in Rutherford et al. (2021) none

of the 53 participants with chronic PTSD were receiving first-line treatment. This further supports the need, identified in focus groups, to adapt criteria and take more time to delve deeper to explore the possibility of trauma with older people.

Key signs and symptoms

Exploratory analysis to address research question 2 revealed that in clinician's experience of working with older people, the key and most frequent signs and symptoms of trauma are unwanted memories, negative feelings, blame and internal avoidance. This was in-keeping with the prominent symptoms Maercker (2021) proposed. These factors serve as targets for interventions, such as TF-CBT and EMDR, which have been evidenced for PTSD (Schrader & Ross, 2021; NICE, 2023). Clinician's may therefore be primed to the significance of these symptoms in their recognition of PTSD and recollection of experiences of working with it.

Lower frequency and importance were reported for risk of harm, dreams, irritability and external avoidance symptoms in older people with experiences of trauma. Risk of harm might be explained by a general reduction in risk taking with age (Nolte & Hannoch, 2024; Willoughby et al., 2021). A reason for this could be risk outweighing reward. Expected utility theory (von Neumann & Mortgenstern, 1944 as cited by Helm & Reyna, 2018) poses that logical decisions are made by weighing the expected reward against the expected loss. For older people there may be more risks and vulnerabilities which outweigh propensity for risk-taking. Similarly, dual process theories posit that decision making can occur by fast type 1 processes or slower more deliberate type 2 processes (Helm & Reyna, 2018). At older age decision-making is more often ruled type 2 processes (Li, Tang & Liu, 2025), leading to less impulsivity and risk taking. Older people also display less reward sensitivity than adolescents and young adults (Melo et al., 2023), again reducing the perceived benefit of risk-taking. Alternatively, older people may engage in less obvious risk behaviours, such as smoking or pushing themselves physically and causing accidental injury (Willoughby et al., 2021). Dreams may be less prominent or important in older people due to poorer sleep quality, where the dream state may not be reached or remembered (Kocevska et al., 2021; Li et al., 2022). Older people may also attribute

poor sleep to other causes, such as physical pain or discomfort or weaker bladder (Schlögl et al., 2022). External avoidance of social and medical situations has been found to be lower in older people (Wuthrich and Mohlman, 2024), however, similar to risk taking, external avoidance may take a more subtle form, making it more difficult to detect.

There was lack of agreement for difficulty remembering, reliving and sleep difficulties. One explanation for lack of consensus on difficulty remembering and sleep difficulties might be due to these difficulties increasing in frequency with normal aging (Folville et al., 2022; Kocevska et al., 2021; Li et al., 2022). Similarly, if trauma symptoms have been long-standing these might not be a deviation from the norm for the person, so may not be reported. Reliving symptoms as an indicator of recency emerged as a sub-theme from focus groups. Therefore, older people who experienced trauma earlier in life may not frequently re-experience, whereas those who experienced trauma more recently may more frequently re-experience.

Somatic Symptoms

Pless Kaiser et al. (2019) indicated that from clinical experience older people with experiences of trauma frequently present with somatic complaints. The current study supported this: clinicians reported finding that somatic symptoms were relatively frequent and important to consider in their patients. Similarly, gastrointestinal issues were routinely clinically seen by 85.4% of participants in the questionnaire and remarked on by multiple participants at focus group. Tiredness, headaches, IBS and health anxiety were also 'routinely clinically observed' by the majority of participants. However, participants noted variation between individuals, increased physical symptoms with normal aging and somatic expression of trauma at younger ages. Some participants also noted that older people may find somatic expression of difficulties easier than talking about emotions or thoughts, aligning with research by Cook and Simiola (2018). This led to mixed rankings of importance for the most frequent somatic symptoms, yet notably none of the participants ranked somatic symptoms in the bottom two ranks or as irrelevant. Therefore, in answer to research question 3, in

clinicians' experiences older people can present with somatic symptoms related to trauma, highlighting a need to consider the possibility of trauma in older people who present regularly to services with somatic complaints.

Limitations

One of the limitations to this study was the procedure for ranking PTSD criteria without a validated ranking tool. The PCL-5 was chosen, as it reflects DSM-V criteria, despite the ICD-11 being the standard criteria used in Scotland (NHS Education for Scotland, 2023). ICD-11 criteria was not selected as it only covers 3 clusters and did not offer symptoms in enough detail for the current purpose. The PCL-5 was shorter than other measures, such as the CAPS-5, however still contained 20 items. This is likely to have impacted on cognitive load as discernibility between some ranks, such as middle ranks, was negligible. This could offer an explanation why 14 participants did not complete the questionnaire . In addition, PCL-5 criteria were presented in the order that clinicians would normally encounter them. There may therefore have been an effect of initial order, which could have been eliminated by counterbalancing. As a result interpretation was cautious and focused more on anomalies.

The phrase 'experience of trauma' was used in this study to explore experiences of older people who may have a different diagnosis or may not meet full PTSD criteria. However, participants gave an overview of multiple types of trauma, which may have made ranking symptoms more difficult in instances where symptoms of different trauma types contrast. Future studies could investigate different types of trauma.

Despite attempts to boost recruitment, participant numbers were low for both the questionnaire and focus group. Due to staff availability and competing demands, low numbers meant focus group participants were matched by availability rather than mixing professional groups and health boards as intended. This limited the diversity in the groups.

Conclusions

In conclusion, clinicians working with trauma-experienced older people showed different levels of agreement in the frequency that PTSD symptoms are observed and their importance. Unwanted memories, negative feelings, blame and internal avoidance were among the PTSD symptoms clinicians viewed frequently and deemed important in the diagnosis of PTSD in older people. Risk of harm, dreams, irritability and external avoidance were of lower importance and frequency to clinicians thinking about how PTSD presents in this population. Somatic symptoms were deemed somewhat important and presented relatively frequently in the presentation of trauma at older age. PTSD symptoms may be under recognised or misinterpreted by both clinicians and the older person themselves. For clinicians there is need to adapt criteria and take time to delve deeper and explore the possibility of trauma. For the individual seeking a medical explanation, not recognising the relevance of trauma, generational normalisation and previous responses from services can make them less likely to present traumatic experiences as a contributing factor. Overall, clinicians felt that PTSD criteria do apply to the older person, provided it is used as part of a wider formulation and not relied upon too strictly.

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Appendices

Appendix A: PRISMA Reporting Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Title
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Abstract
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Introduction
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Introduction
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Appendices

Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable,	Methods

		details of automation tools used in the process.	
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Methods
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Methods
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Methods
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Methods
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Methods
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Methods
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Methods

Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Methods
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Methods – not utilised
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Results
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Results
Study characteristics	17	Cite each included study and present its characteristics.	Appendix
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Appendix
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Results/Appendix
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Appendices
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and	Results

		measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Results
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Results/Appendices
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Results/Appendices
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Not presented
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion
	23b	Discuss any limitations of the evidence included in the review.	Discussion
	23c	Discuss any limitations of the review processes used.	Discussion
	23d	Discuss implications of the results for practice, policy, and future research.	Discussion
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods

	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Methods
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Not Applicable
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Financial Support
Competing interests	26	Declare any competing interests of review authors.	Declaration of Interests
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Methods and Appendices

Appendix B: Search Strategy

PsychINFO

PTSD

1 exp *Posttraumatic Stress Disorder/
2 ((post traumatic or posttraumatic) adj4 disorder*).tw.
3 PTSD.tw.
4 1 or 2 or 3

Inflammation

5 exp inflammation/
6 exp Biological markers/
7 (allostatic OR allostasis OR inflammation OR inflammatory).tw.
8 6 or 7 or 8

Mortality

9 exp Aging/ or exp Physiological Aging/
10 exp Life Expectancy/
11 exp "Death and Dying"/
12 exp Oxidative Stress/
13 (aging OR ageing OR longevity OR life expectancy OR length of life OR mortality OR mortalities OR oxidative OR oxidation OR senescence).tw.
14 9 or 10 or 11 or 12 or 13

Medical Conditions

15 exp Telomeres/
16 exp Cerebrovascular Disorders/ or exp Cardiovascular Disorders/ or exp Cerebrovascular Accidents/ or exp Blood Pressure/
17 exp Cardiovascular Risk/ or exp Cardiovascular Health/
18 exp Metabolic Syndrome/
19 exp Diabetes/
20 exp Gastrointestinal Ulcers/
21 (telomere OR telomeres OR vascular OR cardiovascular OR metabolic OR diabetes OR ulcer OR ulcers).tw.
22 15 or 16 or 17 or 18 or 19 or 20 or 21

Combined Searches

23 8 or 14 or 22
24 4 and 23
25 Limit 24 to human
26 limit 25 to english language
27 limit 26 to yr=”2014-Current”

CINAHL

PTSD

1 (MH "Stress Disorders, Post-Traumatic+")

2 "PTSD"
3 1 or 2

Inflammation

4 (MH "Inflammation+")
5 (MH "Biological Markers+")
6 XB ((allostatic OR allostasis OR inflammation OR inflammatory))
7 4 or 5 or 6

Mortality

8 (MH "Aging+")
9 (MH "Longevity")
10 (MH "Life Expectancy+")
11 (MH "Oxidative Stress")
12 XB ((aging OR ageing OR longevity OR life expectancy OR length of life OR mortality OR mortalities OR oxidative OR oxidation OR senescence))
13 8 or 9 or 10 or 11 or 12

Medical Conditions

14 (MH "Telomere")
15 (MH "Cardiovascular Diseases+") OR (MH "Cardiovascular Risk Factors+")
16 (MH "Cerebrovascular Disorders+") OR (MH "Stroke+")
17 (MH "Blood Pressure+")
18 (MH "Metabolic Syndrome X+")
19 (MH "Diabetes Mellitus+")
20 (MH "Ulcer")
21 XB ((telomere OR telomeres OR vascular OR cardiovascular OR metabolic OR diabetes OR ulcer OR ulcers))
22 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21

Combined Searches

23 7 or 13 or 22
24 3 and 23
25 24 (**Limiters** - Publication Date: 20140101-20250631; English Language; Human)

EMBASE

PTSD

1 exp *posttraumatic stress disorder/
2 ((post traumatic or posttraumatic) adj4 disorder*).ti,ab,kw.

3 PTSD.ti,ab,kw.
4 1 or 2 or 3

Inflammation

5 exp inflammation/
6 exp biological marker/

7 (allostatic OR allostasis OR inflammation OR inflammatory). ti,ab,kw

8 5 or 6 or 7

Mortality

9 exp premature aging/ or exp aging/

10 exp longevity/

11 exp life expectancy/

12 exp oxidative stress/

13 (aging OR ageing OR longevity OR life expectancy OR length of life OR mortality OR mortalities OR oxidative OR oxidation OR senescence).ti,ab,kw

14 9 or 10 or 11 or 12 or 13

Medical Conditions

15 exp telomere/

16 exp cardiovascular disease/ or exp cardiovascular risk/

17 exp cerebrovascular disease/ or exp cerebrovascular accident/

18 exp blood pressure/

19 exp metabolic syndrome x/

20 exp diabetes mellitus/

21 exp digestive system ulcer/

22 (telomere OR telomeres OR vascular OR cardiovascular OR metabolic OR diabetes OR ulcer OR ulcers).ti,ab,kw

23 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22

Observational Studies

24 exp clinical study/ or exp cohort analysis/ or case control.ab,ti. or case-control.ab,ti. or ((case or cases) and (control or controls)).ab,ti. or cohort study.ab,ti. or cohort analysis.ab,ti. or follow up study.ab,ti. or follow-up study.ab,ti. or observational study.ab,ti. or longitudinal.ab,ti. or retrospective.ab,ti. or cross sectional.ab,ti. or questionnaire.ab,ti. or questionnaires.ab,ti. or survey.ab,ti. or epidemiological study.ab,ti.

[search filter for observational studies (Avau, Van Remoortel, & De Buck, 2021), adapted with syntax updates]

25 exp "review"/

26 letter.pt.

27 editorial.pt.

28 or/25-27

Combined Searches

29 8 or 14 or 23

30 4 and 24 and 29

31 limit 25 to (human and english language and yr="2014-Current")

32 31 not 28

Medline/PubMed

PTSD

1 (post traumatic stress disorder[MeSH Major Topic])
2 (PTSD[Title/Abstract])
3 ((post traumatic[Title/Abstract] OR posttraumatic[Title/Abstract]) adj4 disorder*[Title/Abstract])
4 ((PTSD[Title/Abstract]) or (post traumatic stress disorder[MeSH Major Topic])) or (((post traumatic[Title/Abstract] OR posttraumatic[Title/Abstract]) adj4 disorder*[Title/Abstract]))

Inflammation

5 inflammation[MeSH Major Topic]
6 biological markers[MeSH Major Topic]
7 (allostatic[Title/Abstract] OR allostasis[Title/Abstract] OR inflammation[Title/Abstract] OR inflammatory[Title/Abstract])
8 ((inflammation[MeSH Major Topic]) or (biological markers[MeSH Major Topic])) or ((allostatic[Title/Abstract] OR

allostasis[Title/Abstract] OR inflammation[Title/Abstract] OR inflammatory[Title/Abstract]))

Mortality

9 (premature aging[MeSH Major Topic]) or (aging[MeSH Major Topic])
10 longevity[MeSH Major Topic]
11 life expectancy[MeSH Major Topic]
12 oxidative stress[MeSH Major Topic]
13 (aging[Title/Abstract] OR ageing[Title/Abstract] OR longevity[Title/Abstract] OR life expectancy[Title/Abstract] OR length of life[Title/Abstract] OR mortality[Title/Abstract] OR mortalities[Title/Abstract] OR oxidative[Title/Abstract] OR oxidation[Title/Abstract] OR senescence[Title/Abstract])
14 (((((premature aging[MeSH Major Topic]) or (aging[MeSH Major Topic])) or (longevity[MeSH Major Topic])) or (life expectancy[MeSH Major Topic])) or (oxidative stress[MeSH Major Topic])) or ((aging[Title/Abstract] OR ageing[Title/Abstract] OR longevity[Title/Abstract] OR life expectancy[Title/Abstract] OR length of life[Title/Abstract] OR mortality[Title/Abstract] OR mortalities[Title/Abstract] OR oxidative[Title/Abstract] OR oxidation[Title/Abstract] OR senescence[Title/Abstract]))

Medical Conditions

15 telomere[MeSH Major Topic]
16 (cardiovascular disease[MeSH Major Topic]) or (cardiovascular risk[MeSH Major Topic])
17 (cerebrovascular disease[MeSH Major Topic]) or (cerebrovascular accident[MeSH Major Topic])
18 blood pressure[MeSH Major Topic]
19 metabolic syndrome[MeSH Major Topic]
20 diabetes mellitus[MeSH Major Topic]
21 digestive system ulcer[MeSH Major Topic]
22 (telomere[Title/Abstract] OR telomeres[Title/Abstract] OR vascular[Title/Abstract] OR cardiovascular[Title/Abstract] OR metabolic[Title/Abstract] OR diabetes[Title/Abstract] OR ulcer[Title/Abstract] OR ulcers[Title/Abstract])
23 (((((((telomere[MeSH Major Topic]) or ((cardiovascular disease[MeSH Major Topic]) or (cardiovascular risk[MeSH Major Topic]))) or ((cerebrovascular disease[MeSH Major Topic]) or (cerebrovascular accident[MeSH Major Topic]))) or (blood pressure[MeSH Major Topic])) or (metabolic syndrome[MeSH Major Topic])) or (diabetes mellitus[MeSH Major Topic])) or (digestive system ulcer[MeSH Major Topic])) or ((telomere[Title/Abstract] OR telomeres[Title/Abstract] OR vascular[Title/Abstract] OR cardiovascular[Title/Abstract] OR metabolic[Title/Abstract] OR diabetes[Title/Abstract] OR ulcer[Title/Abstract] OR ulcers[Title/Abstract]))

Combined Searches

24	((((inflammation[MeSH Major Topic]) or (biological markers[MeSH Major Topic])) or ((allostatic[Title/Abstract] OR allostasis[Title/Abstract] OR inflammation[Title/Abstract] OR inflammatory[Title/Abstract]))) or ((((((premature aging[MeSH Major Topic]) or (aging[MeSH Major Topic])) or (longevity[MeSH Major Topic])) or (life expectancy[MeSH Major Topic])) or (oxidative stress[MeSH Major Topic])) or ((aging[Title/Abstract] OR ageing[Title/Abstract] OR longevity[Title/Abstract] OR life expectancy[Title/Abstract] OR length of life[Title/Abstract] OR mortality[Title/Abstract] OR mortalities[Title/Abstract] OR oxidative[Title/Abstract] OR oxidation[Title/Abstract] OR senescence[Title/Abstract]))))) or ((((((((telomere[MeSH Major Topic]) or ((cardiovascular disease[MeSH Major Topic]) or (cardiovascular risk[MeSH Major Topic]))) or ((cerebrovascular disease[MeSH Major Topic]) or (cerebrovascular accident[MeSH Major Topic]))) or (blood pressure[MeSH Major Topic])) or (metabolic syndrome[MeSH Major Topic])) or (diabetes mellitus[MeSH Major Topic])) or (digestive system ulcer[MeSH Major Topic])) or ((telomere[Title/Abstract] OR telomeres[Title/Abstract] OR vascular[Title/Abstract] OR cardiovascular[Title/Abstract] OR metabolic[Title/Abstract] OR diabetes[Title/Abstract] OR ulcer[Title/Abstract] OR ulcers[Title/Abstract]))))
25	((PTSD[Title/Abstract]) or (post traumatic stress disorder[MeSH Major Topic])) or (((post traumatic[Title/Abstract] OR posttraumatic[Title/Abstract]) adj4 disorder*[Title/Abstract])) and ((((((inflammation[MeSH Major Topic]) or (biological markers[MeSH Major Topic])) or ((allostatic[Title/Abstract] OR allostasis[Title/Abstract] OR inflammation[Title/Abstract] OR inflammatory[Title/Abstract]))) or ((((((premature aging[MeSH Major Topic]) or (aging[MeSH Major Topic])) or (longevity[MeSH Major Topic])) or (life expectancy[MeSH Major Topic])) or (oxidative stress[MeSH Major Topic])) or ((aging[Title/Abstract] OR ageing[Title/Abstract] OR longevity[Title/Abstract] OR life expectancy[Title/Abstract] OR length of life[Title/Abstract] OR mortality[Title/Abstract] OR mortalities[Title/Abstract] OR oxidative[Title/Abstract] OR oxidation[Title/Abstract] OR senescence[Title/Abstract]))))) or ((((((((telomere[MeSH Major Topic]) or ((cardiovascular disease[MeSH Major Topic]) or (cardiovascular risk[MeSH Major Topic]))) or ((cerebrovascular disease[MeSH Major Topic]) or (cerebrovascular accident[MeSH Major Topic]))) or (blood pressure[MeSH Major Topic])) or (metabolic syndrome[MeSH Major Topic])) or (diabetes mellitus[MeSH Major Topic])) or (digestive system ulcer[MeSH Major Topic])) or ((telomere[Title/Abstract] OR telomeres[Title/Abstract] OR vascular[Title/Abstract] OR cardiovascular[Title/Abstract] OR metabolic[Title/Abstract] OR diabetes[Title/Abstract] OR ulcer[Title/Abstract] OR ulcers[Title/Abstract]))))
26	25 Filters: **English, Humans, from 2014-2025**

Cochrane Library

1 (Title, abstract, key word) PTSD AND (Title, abstract, keyword) mortality

2 (Title, abstract, key word) PTSD AND (Title, abstract, keyword) inflammation

3 (Title, abstract, key word) PTSD AND (Title, abstract, key word) AND physical health disorder

Appendix C: Included Papers Reference List

List of included papers available at: https://osf.io/kmyu2

Appendix D: Study Characteristics for Biological Indicators

Study	N	Population	Sex	Mean Age ± SD	PTSD Diagnostic and Assessment Methods	Study Design	Main outcomes measured
Avetyan et al. (2019)	90 (49 control, 41 PTSD)	Armenian combat veterans	100% male	Control 43.5 ± 9.4 years, PTSD 46.4 ± 7.63 years	DSM-IV, CAPS	Case-control study	Telomere length
Bersani et al. (2016)	121(56 PTSD, 65 control)	US combat veterans	100% male	PTSD 33.91± 8.43, controls 32.81 ± 8.4yrs	CAPS, DSM-IV	Cross-sectional observational	Pro-inflammatory cytokines
Blessing et al. (2017)	166 (83 PTSD, 83 control)	US OIF and OEF veterans	100% male	PTSD 33.0 ± 7.7, control 32.5 ± 8.0yrs	CAPS, DSM-IV, SCID	Cross-sectional observational	Metabolic conditions, pro-inflammatory cytokines
Bourassa et al. (2025)	1389 E-Risk Study (113 PTSD), 927 Dunedin Study (145 PTSD), 796 Hvidovre (PTSD 199)	Members of the E-Risk, Dunedin or Hvidovre Hospital studies	E-risk 47.2% male, Dunedin 50.5% male, Hvidov	E-risk: 18 yrs, Dunedin: 38yrs, Hvidovre: 58.13 ± 20.8 yrs	E-Risk: DIS for DSM-5, Dunedin: DIS for DSM-IV, Hvidovre: ICD-10 code	E-risk: longitudinal twin study, Dunedin: longitudinal,	Pro-inflammatory cytokines

			re 47.5% male			Hvidovre: retrospective observational	
Bruenig et al. (2018)	299(159 PTSD, 140 control)	Australian veterans of the Vietnam war	100% male	68.82 ± 4.2 years	CAPS-5, DSM-5	Cross-sectional observational	Pro-inflammatory cytokines
Bruenig et al. (2017)	299 (159 PTSD, 140 control)	Australian veterans of the Vietnam war	100% male	68.82 ± 4.2 years	CAPS-5, DSM-5	Cross-sectional observational	Pro-inflammatory cytokines
Burgin et al. (2022)	130(29 PTSD)	Swiss Study for classification and goal-attainment in child welfare and juvenile-justice institutions	30.8% female	26.5 ± 3.5 years	CTQ, SCID5-CV	Cross-sectional	Telomere length
Canetti et al. (2014)	92(19 PTSD, 73 no control)	Israeli citizens exposed to active rocket and terrorist attacks	46.7% male	45.8 ± 12.08 years	PSS-SR, DSM-IV	Cross-sectional observational	Pro-inflammatory cytokines
Carvalho et al. (2022)	103(63 PTSD, 60 HC)	Victims of sexual assault, Brazil	100% female	Controls 28.13 ± 7.37, PTSD 24.3 ± 6.62yrs	CAPS-5, DSM-5	Longitudinal	Telomere length
Connolly et al. (2018)	453(272 lifetime PTSD)	US veterans	65.1% male	52.49 ± 10.78 years	CAPS, DSM-IV	Cross-sectional study	Telomere length

Dennis et al. (2016)	167(85 PTSD, 82 No PTSD)	Young adults (US)	47.9% f	29.78 ± 5.53 years	CAPS, DSM-IV, DTS, TLEQ	Cross-sectional	Pro-inflammatory cytokines
Dennis et al. (2014)	220 (103 PTSD, 117 no PTSD)	US military veterans recruited for YoungHost study	47.3% female	PTSD: 30.49 ± 5.48 years, control: 27.9 ± 5.52 years	CAPS, DTS	Cohort study	Metabolic markers
D'Elia et al. (2022)	98(58 PTSD, 40 control)	Victims of sexual assault recruited from Brazil	100% female	26.3 ± 7.2 years	CAPS, DSM-5	Case control study	Pro-inflammatory cytokines
de Vries et al. (2017)	94 (49 PTSD, 45 HC)	Outpatients with civilian trauma	72,3% female	PTSD 46 ± 10.4yrs, HC 46.6 ± 10 yrs	DSM-IV, SCID-I	Cross-sectional	Metabolic markers
Dyball et al. (2023)	1111 (973 no PTSD, 138 PTSD)	UK ADVANCE cohort (study investigating long-term effects if sustaining physical combat injury)	100% male	Median 33 (IQR 30-37) years	PCL-C, DSM-IV	Cross-sectional observational	Pro-inflammatory cytokines, Metabolic markers
Edmondson et al. (2018)	440 (92 PTSD)	data from Phase 2 of the US multisite Masked Hypertension Study	38% male	52.1 ± 9.9 years	PCL-C, DSM-IV	Longitudinal cohort	Metabolic markers

Ein-Dor et al. (2020)	88(20 PTSD)	Israeli ex-prisoners of war	100% male	63.6 ± 3.7 (Range: 61-77) years	PTSD-I, DSM-IV	Prospective longitudinal	Telomere length
Eswarappa et al. (2019)	566 (398 no PTSD, 170 chronic PTSD)	US veterans from Mind your heart study	97% male	59.3 ± 11.7 years	DSM-IV, PCL	Prospective cohort study	Pro-inflammatory markers, metabolic markers
Farr et al. (2016)	158 (PTSD score: no PTSD, 37 partial PTSD, 40 PTSD)	Adults recruited from the greater Boston area	47.5% male	45.7±3.5 years	UCLA PTSD scale, SCID, DSM-IV	Cross-sectional and longitudinal	Pro-inflammatory cytokines, metabolic markers
Grenon et al. (2016)	214 (147 no PTSD, 67 PTSD)	US veterans Affairs Medical Center	95% male	No PTSD: 69 ± 9, PTSD: 68 ± 6 years	PCL, DSM-IV	Observational cross-sectional	Metabolic markers, pro-inflammatory cytokines
Groer et al. (2014)	52(11 High/Moderate PTSD, 41 Low)	US active-duty soldiers participating in Bold Quest at Camp Atterbury	98% male	25 (range 19-42) years	PCL-M, CES	Cross-sectional	Pro-inflammatory cytokines

Hieda et al. (2019)	28(14 control, 14 PTSD)	Veterans' health affairs North Texas Health Care System	100% female	control 36.3 ± 10.3, PTSD 43.9 ± 11.6yrs	CAPS-5, DSM-5	Observational cross-sectional	Metabolic markers
Holliday et al. (2017)	42(14 PTSD) for CRP, 41 (13 PTSD) for IL-6	Couples (with at least one member who served in OEF/OIF/OND) recruited from the greater Pittsburgh area	52.5% male	Males: 30.88 ± 5.49, females: 29.91 ± 5.24 years	CAPS	Observational cross-sectional	Pro-inflammatory cytokines
Iyengar-Kapuganti (2022)	1012 (No PTSD 888, 120 PTSD)	US World Trade Center (WTC) Health Program	83.1% male	51.37 ± 6.03 years	PCL-S, DSM-IV, PSS	Longitudinal Cohort study	Metabolic markers, pro-inflammatory cytokines
Jansen van Vuren et al. (2025)	209(114 PTSD)	South African SHARED ROOTS study	100% female	PTSD: median40.93 (IQR 38.77, 43.09); controls 47.31 (44.35, 50.28)	DSM-5, CAPS-5, LEC-5	Cross-sectional, matched case-control study	Allostatic load
Jarkas et al. (2025)	64 (14 HC, 31 non-dissociative PTSD, 19 dissociative PTSD)	Canadian participants recruited via the Operational Stress Injury clinic	73.4% male	Dissociative PTSD: 47.16 ± 1.70yrs, non-dissociative PTSD: 48.90 ± 1.54yrs, HC: 52.86 ± 2.12 yrs Range (33–63)	CAPS, DSM-5, DSPS, LEC, CTQ	Observational, cross-sectional	Pro-inflammatory cytokines

Jergović et al. (2014)	47(30 PTSD, 17 HC)	Croatian combat veterans	100% male	PTSD 45.9 ± 1.12, HC 47.2 ± 1.71	ICD-11, CAPS	Cross-sectional	Telomere length
Kang et al. (2020)	213 (111 no PTSD, 102 PTSD)	US OIF/OEF veterans	100% male	No PTSD 33.17 ± 8.69, PTSD 33.66 ± 8.17	CAPS, DSM-IV, SCID	Cross-sectional	Telomere length
Kibler et al. (2018)	54 (14 PTSD)	premenopausal American women	100% female	30 ± 8 years	TLEQ, CAPS, SCID DSM-IV	Cross-sectional	Metabolic markers,
Kim et al. (2017)	242(122 PTSD, 120 control)	South Korean veterans of the Vietnam war	100% male	PTSD 62.99 ± 3.4, Control 62.94 ± 4.41	DSM-IV, CAPS	Cross-sectional	Telomere length
Kuffer et al. (2020)	85 (42 control, 43 PTSD)	Participants recruited as part of a wider study on sleep abnormalities (US)	51% male	control 30.48 ± 8.26yrs, PTSD 30.63 ± 6.63yrs	CAPS, DSM-IV	Observational cross-sectional	Pro-inflammatory cytokines
Lawn et al. (2023)	CRP (n=1092), IL-6 (n=628)	US Nurses' health study II	100% female	43.4 ± 4.6 years	BTQ, short screening scale for PTSD, MHI	Longitudinal	Pro-inflammatory cytokines
Lee et al. (2019)	136 (25 PTSD)	Undergraduates at Northeastern university (USA)	Not reported	19.16 ± 1.25 years	THQ, PCL-5, DSM-5	Cross-sectional observational	Metabolic markers
Lindqvist et al. (2017)	61(31 PTSD and 30 control)	US war veterans from OIF/ OEF	100% male	control30.8 ± 5.6 yrs, PTSD 31.2 ± 5.5 yrs	CAPS, DSM-IV	Cohort replication study	Pro-inflammatory cytokines

Lindqvist et al. (2014)	102(51 PTSD, 51 control)	US war veterans from OIF/OEF	100% male	TEC 33.7 ± 9.0 yrs, PTSD 34.1 ± 8.7 yrs	SCID DSM-IV, CAPS	Cross-sectional observational	Pro-inflammatory cytokines
Maguire et al. (2021)	40(20 controls, 20 PTSD)	US participants recruited by Discovery Life Sciences	47.5% male	control 39.0 ± 2.6yrs, PTSD 41.5 ± 11.0yrs	CAPS-5, DSM-5, PCL-5	Case-control pilot study	Metabolic markers, pro-inflammatory cytokines
Maples-Keller et al. (2022)	493 (365 PTSD, 128 other psychiatric diagnosis)	US veterans post 9/11	67.7% male	40.50 ± 9.70 years	CAPS-5, PCL-5, LEC, CTQ	Retrospective cohort study	Pro-inflammatory cytokines
McD Young et al. (2021)	299(159 PTSD, 140 no PTSD)	Australian veterans of the Vietnam war	100% male	68.82 ± 4.2 years	CAPS-5	Observational cohort study	Pro-inflammatory cytokines, Metabolic markers
Mehta et al. (2020)	56 (18 PTSD)	Grady Memorial Hospital patients (US)	100% female	Range: 21-65 years	SCID, DSM-IV	Cross-sectional observational	Pro-inflammatory cytokines
Mellon et al. (2019)	Discovery group: 103(52 PTSD, 51 CEC), Test	US veterans from OEF/OIF	100% male	Discovery (PTSD: 34.02 ± 8.69, CEC 33.69 ± 9.03),	SCID DSM-IV, CAPS-IV	Cross-sectional case-control	Pro-inflammatory cytokines,

	group: 62(31 PTSD, 31 CEC)			Test: (PTSD 31.23 ± 5.45, CEC 30.61 ±5.66)		observational study	metabolic markers
Miller et al. (2017)	32 (16 PTSD, 16 control)	Veterans recruited through Omaha Medical Center (US)	100% male	PTSD 67.0 ± 2.8 yrs, control 67.8 ± 1.6 yrs	CAPS-5	Cross-sectional observational	Pro-inflammatory cytokines
Miller et al. (2018)	286(163 PTSD, 123 no PTSD)	US Military veterans deployed on post-9/11 operations to Iraq and/or Afghanistan	88.5% male	32.08 ± 8.36 years	CAPS, DSM-IV, TLEQ	Cross-sectional observational	Pro-inflammatory cytokines
Moazen-Zadeh et al. (2017)	100 (50 PTSD, 50 control)	Iranian veterans of the Iran-Iraq war	100% male	Median PTSD 49 (IQR 41-73), control 52(40-70)	Diagnosis by military psychiatrist (DSM-IV)	Case-control study	Metabolic markers
Na, Kim & Park (2017)	507(139 PTSD, 368 control)	Korean firefighters	100% male	PTSD 41.39 ± 7.28yrs, control 37.67 ± 8.32yrs	IES-R	Cross-sectional	Pro-inflammatory cytokines
Oddone et al. (2014)	222(102 PTSD, 120 control)	US military veterans	57% male	PTSD 31.6 ± 5.31yrs, control 28.15 ± 5.52 yrs	CAPS, DSM-IV	Cross-sectional observational	Metabolic markers
Ogawa et al. (2025)	165(68 PTSD, 97 HC)	Japanese patients with PTSD and healthy controls	99% female	PTSD 39.2 ± 10.1, HC 37.6 ± 13.8	DSM-IV, PDSQ	Cross-sectional, observational	Pro-inflammatory cytokines,

							Metabolic markers
Palmer et al. (2021)	1120 (115 PTSD)	US veteran data from CPRS database	51.8% male	PTSD 41.7 ±8yrs, Control 39.3 ±8.6yrs	DSM-5	Retrospective cohort study	Metabolic markers
Park et al. (2017)	28(14 PTSD, 14 control)	US OEF/OIF/OND Veterans	89% male	PTSD 34.4 ± 1.7 yrs, control 32.2 ± 1.5 yrs	CAPS-IV, PCL-M	Case-control study	Metabolic markers, pro-inflammatory cytokines
Quigley et al. (2025)	48(24 PTSD, 24 without)	Australian older adults with PTSD	64.6% female	PTSD 56.2 ± 6.9yrs, control 56.8 ± 5.7 yrs	CAPS-5	Case-control study	Pro-inflammatory cytokines
Ratanatharathorn et al. (2023)	1868(238 PTSD, 294 HC, 834 TEC, 62 Dep, 265 Tr+Dep, 175 PTSD+Dep)	US Nurses' Health Study II (2008 sub-study)	100% female	51.26 ± 7.32 years	BTQ, short screening scale for PTSD, DSM-IV	Cross-sectional	Telomere length
Rhein et al. (2024)	67(35 PTSD)	Patients at the University Hospital Erlangen (Germany)	80.6% female	39.6 ± 14.5 years	PCL-5, LEC-5	Explorative	Pro-inflammatory cytokines

Schultebraucks et al. (2020)	473 (PTSD 36, no PTSD 437)	US active-duty army personnel	11.8% female	25.73 ± 5.92 years	PCL-5	Prospective longitudinal cohort	Pro-inflammatory cytokines
Solomon et al. (2017)	57 (31 resilient, 23 delayed, 3 chronic)	Israeli veterans	81% male	Not reported (42 years since end of war)	PTSD-I, DSM-IV	Prospective longitudinal	Metabolic conditions, inflammation
Somvanshi et al. (2020)	162(81 PTSD, 81 TEC)	US veterans deployed to Afghanistan/Iraq	100% male	no PTSD 32.29 ± 7.6, PTSD 33.20 ±8.12	DSM-IV, SCID, CAPS, PCL-4	Cross-sectional	Metabolic markers, Pro-inflammatory cytokines
Spitzer et al. (2020)	3119(61 PTSD, HC 1420, TEC 1638)	Study of Health in Pomerania (SHIP), Germany	51.9% female	53.6 ± 15 (range 25-86) years	SCID, DSM-IV	Longitudinal	Pro-inflammatory cytokines
Talbot et al. (2015)	94(44 chronic PTSD, 50 control)	US VA medical center patien ts	50% female	30.44 ± 7.39 (Range: 20-50) years	CAPS, DSM-IV SCID	Cross-sectional observational	Metabolic markers
Teche et al. (2017)	60(30 PTSD, 30TEC)	Patients at Hospital de Clínicas de Porto Alegre, Brazil	83% female	PTSD 42.6 ± 10.0, TEC 42.7 ± 9.6	DSM-IV, DTS	Case-control	Metabolic mar kers, Pro-inflammatory cytokines

Thayer et al. (2016)	197(90 PTSD)	based on the study sample assembled by Healing Hearts (US)	73% female	44.1 ± 10.3 years	SCID, DSM-IV	Cross-sectional observational	Allostatic load
Toft et al. (2018)	108(39 PTSD)	patients recruited from a high-threshold psychiatric center in Norway	71% female	Females 38.98 ± 11.31, males 49.06 ± 9.36 years	ICD-10 code	Longitudinal observational	Pro-inflammatory cytokines
Toft, Bramness & Lien (2022)	80(33 PTSD)	patients recruited from a high-threshold psychiatric center in Norway	81.8% female	Female: 38 ± 10.3, Males: 48 ± 8.4 years	ICD-10 code	Longitudinal observational	Pro-inflammatory cytokines
Tucker et al. (2025)	60 (19 PTSD)	Survivors of Oklahoma City bombing	54.7% male	PTSD 47 yrs, control 42 yrs	DIS, DSM-IV, IES-R	Cross-sectional observational	Metabolic markers, pro-inflammatory cytokines
Vaccarino et al. (2021)	275(212 no PTSD, 34 late-onset, 29 chronic PTSD)	Vietnam Era Twin Registry, US veterans	100% male	68 years	SCID, DSM-IV	Longitudinal cohort	Metabolic markers
Van den Heuvel et al. (2020)	216(110 PTSD, 106 TEC)	South African SHARED ROOTS study	100% female	43.8 ± 13.3 years	SCID, DSM-5, CAPS-5, LEC-5	Longitudinal cohort	Metabolic markers

von Majewski et al. (2023)	38(24 PTSD, 14 HC)	German trauma-exposed persons	85% female	PTSD 38.48 ± 12.62, HC 29.67 ± 9.48 years	ICD-10, Essen trauma inventory	Cross-sectional	Metabolic markers, pro-inflammatory cytokines
Wang et al. (2019)	189(51 PTSD, 136 no PTSD)	survivors of Wenchuang earthquake in 2008, China	65% female	48.8 ± 7.6 (Range: 21–70) years	PCL-S	Cross-sectional	Pro-inflammatory cytokines
Weggen et al. (2021)	39 (19 HC, 10 PTSD placebo condition, 10 PTSD experimental condition)	US citizens self-reporting PTSD symptomatology	68.8% female	18-35 years	PCL-5, DSM-5, CAPS-5	Cross-sectional experimental	Metabolic markers
Wingenfeld et al. (2014)	613(199 current PTSD, 100 lifetime not current, 314 no PTSD)	US Mind Your Heart Study	94% male	NO PTSD 59.8 ± 12.1, current PTSD 57.4 ± 11, lifetime57.4 ± 10 yrs	CAPS, DSM-IV, PCL	Cross-sectional observational	Metabolic markers
Wolf et al. (2020)	Baseline: 309 (198 PTSD), follow-	US military veterans	93.5% male	At baseline: 32.04 ± 8.40 years	CAPS, DSM-IV	Longitudinal	Pro-inflammatory cytokines

	up: 111 (56 PTSD)						

PTSD= post-traumatic stress disorder

Diagnostic Tools: BTQ=Brief Trauma Questionnaire; CAPS= Clinician administered PTSD scale; CES= Combat exposure scale; CIDI= Composite international diagnostic interview; CTQ=Childhood trauma questionnaire; DIS= Diagnostic interview schedule; DSM= Diagnostic Statistical Manual; DSPS=Dissociative sub-type of PTSD scale; DTS= Davidson Trauma Scale; ICD= International Classification of Disorders; IES-R= Impacts of events scale-revised; LEC=Life events checklist; MHI= Mental health inventory; PCL=PTSD Checklist (PCL-C=civilian; PCL-M=military; PCL-S=short form); PDSQ= Psychiatric diagnostic screening questionnaire; PSS-SR = PTSD symptoms scale- self-report ; PTSD-I= PTSD inventory; SCID=structured clinical interview for DSM (SCID-5-CV= Clinician version); THQ= Trauma history questionnaire; TLEQ= Traumatic life events questionnaire

Pro-inflammatory cytokines: CRP= C-reactive protein; IL-1β= Interleukin 1 beta; IL-6= Interleukin 6; TNF-α= Tumour necrosis factor alpha

Metabolic markers: CVD= cardiovascular disease; DBP= diastolic blood pressure; HDL= High-density lipoprotein; LDL=low-density lipoprotein; MetS= Metabolic Syndrome; SBP= systolic blood pressure; TC= total cholesterol; TG= triglycerides

Participants: CEC= combat exposed controls; Dep= Depression; HC= healthy controls; TEC= trauma-exposed controls; Tr= trauma exposure; CPRS= Computerised Patient Record System; OEF= operation enduring freedom; OIF=operation Iraqi freedom; OND= operation new dawn

Statistics: CI= confidence interval; DF= degrees of freedom; IQR= interquartile range; M= mean; npp= non-parametric p-value; SD= standard deviation; SE= standard error

(Table with additional extraction information available at: https://osf.io/6q2cx/files/8wqfn

Appendix E: Study Characteristics for Medical Conditions

Study	N	Population	Sex	Mean Age ± SD	PTSD Diagnostic and Assessment Methods	Study Design	Main outcomes measured
Adams & Allwood (2024)	35788	US World Trade Center responders	62.3% male	42.24 ± 11.02 years	PCL-S, DSM-IV	Longitudinal	Metabolic conditions, CVD risk
Ahmadi et al. $(2018)^{a}$	246 (50 PTSD, 196 without)	US veterans who underwent clinically indicated contract-enhanced cardiac computed tomography angiography (CTA) during 2008–2010	12% female	63 ± 10 years	DSM-IV ICD codes, PCL-M, CAPS	Retrospective cohort	CVD risk
Angleman et al. (2021)	87 (7 PTSD)	Firefighters on the special operations team in Boward County, Florida	93.1% male	40.4 (range 24-61) years	PCL-C score>44, DSM-IV	Cross-sectional	CVD risk
Beristianos et	138341 (4041 PTSD, 134,300 control)	US Department of Veterans Affairs	97% male	PTSD: 64.4 ±8.8 years, control: 67.9±8 years	ICD-9 code	Retrospective cohort	CVD risk

al. (2016)[a]		National Patient Care Database 2000-2011					
Brackbill et al. (2014)[a]	12107 non-injured (1,160 with PTSD)	US survivors of 9/11 from world trade health registry	60% male	48% aged 25-44 years	PCL	Longitudinal	Medical conditions
Bradley et al. (2014)[a]	116488 (14,918 with PTSD)	US Veterans Affairs electronic health records	97.3% male	Median PTSD: 61.9 years, control: 63.7 years	ICD-9 code	Observational	Medical conditions
Britvić et al. (2014)[a]	1326 (501 PTSD 825 control)	Croatian combat veterans	100% male	47.5 ± 6.6 years	ICD-10, SCID (DSM-IV)	Case-control	Medical conditions
Bukhbinder et al. (2020)[a]	10255 (3746 PTSD)	US South Central Veterans Affairs (VA) Healthcare Network	100% male	Over 65s	ICD-9 code	Retrospect-ive cohort	Medical conditions

Burg et al. (2017)	194319 (69,583 PTSD)	US OIF/OEF/OND veterans	85% male	Median 27.9 years	ICD-9 codes	Retrospective cohort	Hypertension
Caceres et al. (2019)	547 (200 PTSD)	Sexual minority women in Chicago Health and Life Experiences of Women study	100% female	18-75 years	Scores >4 on short screening scale for PTSD	Cohort study	Metabolic conditions, hypertension
Chen et al. (2024)	65 (37 PTSD)	US trauma exposed women	100% female	31.45 ± 8.92 years	LEC-5, CAPS-5, DSM-5	Cross-sectional	CVD risk
Chen et al. $(2015)^a$	26085 (5217 PTSD)	Sample from National Health Insurance Database in Taiwan	79.1% female	36.65 ± 12.76 years	ICD-9 code	Case control study	CVD risk
Chong et al. $(2024)^a$	106 427 (1435 PTSD, 104992 no PTSD)	Sample from Boston Mass General Brigham Biobank	55% female	Median 60 (IQR 47-71)	ICD-10 code (F43.1)	Cohort study	CVD risk
Cooper et al. (2014)	24719 (10601 PTSD)	US veteran's affairs outpatient care for depression	89.8% male	Over 55s	ICD-9 code 309.81	Cohort study	CVD risk

de Faria Cardoso et al. (2022)	53 (25 PTSD)	Brazilian women who had experienced pregnancy loss	100% female	18-47 years	DSM-5, PCL-5	Observational prospective cohort study	CVD risk
Dennis et al. $(2014)^{a}$	220 (103 PTSD, 117 no PTSD)	US military veterans recruited for YoungHost study	47.3% female	PTSD: 30.49 ± 5.48 years, control: 27.9 ± 5.52 years	CAPS, DTS	Cohort study	Metabolic conditions
Dyball et al. (2023)	1111 (973 no 138 PTSD)	UK ADVANCE cohort (study investigating long-term effects if sustaining physical combat injury)	100% male	median 33 (IQR 30-37) years	PCL-C, DSM-IV	Cohort study	CVD risk
Ebrahimi et al. $(2023)^{a}$	398,769 (132,923 PTSD, 265,846 control)	US National Veterans Electronic Health Records from 1st Jan 2000-31st Dec 2017	100% female	77.2% aged 18-49 years	ICD-9/10 codes	Retrospective longitudinal cohort study	Medical conditions
Ebrahimi et al. $(2024)^{a}$	208 092 (50% with PTSD)	US National Veterans Electronic Health Records from 1st Jan 2000-31st Dec 2019	100% female	39.13 ±11.67 years	ICD 9/10 codes	Retrospective longitudinal cohort study	CVD risk

El-Gabalawy et al.(2018)[a]	3157 (384 no trauma, 2078 trauma exposed, 289 partial PTSD, 182 full PTSD)	National Health and Resilience in Veterans Study (NHRVS), nationally representative survey of U.S. adult veterans between October-December 2011	89.9% male	64.1% 60+ years	PCL-S, DSM-IV	Cross-sectional study	Medical conditions
Gaffey et al. (2022)[a]	507(240 PTS, 267 control)	US veterans who served in support of OEF/OIF/OND and enrolled in Veterans Affairs (VA) care	90.5% male	PTSD: 30.66 ± 9.83, control 32.96 ± 10.87 years	ICD-9 code	Prospective cohort study	CVD risk
Gibson et al. (2018)	2,789,264 (346,192 PTSD)	US Veterans Affairs (VA) National Patient Care Database	4% male	Males: 67. 83 ± 8.81, females 62.64 ± 8.03 years	ICD-9 code 309.81	National retrospective cohort study	Metabolic conditions, CVD risk
Gilsanz et al. (2017)	49 859 (no trauma 15316, trauma no PTSD 25085, 9458 various levels PTSD)	US Nurses Health Study (NHS II)	100% female	34.75 ± 4.64 years	BTQ, short screening scale for DSM-IV	Longitudinal cohort study	CVD risk

Goldberg et al. $(2014)^a$	5574 (PTSD: no= 4,965, subthreshold = 170, full = 439)	Vietnam Era Twin Registry	100% male	61 years	CIDI, DSM-IV	Cohort study	Medical conditions
Grenon et al. $(2016)^a$	214 (147 no PTSD, 67 PTSD)	US Veterans Affairs Medical Center (VAMC) records	95% male	PTSD: 68 ± 6, no PTSD 69 ± 9 years	PCL, DSM-IV	Observational cross-sectional	Medical conditions
Hartwig et al. $(2020)^a$	18(9 PTSD, 9 age-matched controls)	Patients at the Atlanta VA Hospital	72.2% male	PTSD: 59 ± 2yrs, control: 60 ± 1yrs	DSM criteria	Experimental	Hypertension, metabolic conditions
Hirai et al. $(2022)^a$	19590 (4170 PTSD)	Fukushima Health Management Survey	39.7% male	62.5 ± 10.6 years	PCL-S	Prospective cohort	Diabetes mellitus
Hoekstra et al. (2025)	528(308 PTSD)	Outpatient data from the Netherlands MOPHAR study (Monitoring Outcomes of	56.8% female	37.83 ± 11.9 years	PCL-5, DSM-5, CTQ-SF	Cross-sectional	Metabolic conditions

		Psychopharmacotherapy)					
Holmstrup et al. (2020)	61 (8 PTSD)	Young adults recruited from Slippery Rock University, US	47.5% female	Males 27± 8 years, females 24 ± 6 years	PCL-C	Cross-sectional observational	CVD risk
Hsu et al. $(2023)^a$	5273 PTSD, 21092 controls	Taiwan National Health Insurance Research Database (NHIRD)	24.7% male	34.08 ± 15.16 years	ICD-9 code	Longitudinal	Hypertension, diabetes mellitus
Husky et al. $(2018)^a$	22138 (20733 no PTSD, moderately severe PTSD 501, severe PTSD 614)	French general population	56% female	Aged 18-99 years	CIDI-SF	Cross-sectional	Medical conditions
Iyengar-Kapuganti $(2022)^a$	1012 (No PTSD 888, 120 PTSD)	US World Trade Center (WTC) Health Program	83.1% male	51.37 ± 6.03 years	PCL-S, DSM-IV, PSS	Longitudinal Cohort study	Hypertension, Metabolic syndrome
Jacob, Haro & Koyanagi	7403 (222PTSD)	2007 Adult Psychiatric Morbidity Survey (APMS), England	51.5% female	46.3 ± 18.6 years	TSQ, DSM-IV	Cross-sectional	Medical conditions

(2018)[a]							
Khalil et al. (2025)[a]	84343 (939 PTSD)	US Mass General Brigham Biobank	58.6% female	Median 55 (IQR 38-67) years	ICD-10 code	Longitudinal observational	CVD risk
Koraishy et al. (2022)[a]	2266 (373 PTSD, 208 Depression, 1893 no PTSD)	US World Trade Centre responders	8.2% female	53.1 ± 8.52 years	PCL	Longitudinal cohort study	Medical conditions
Korinek et al. (2020)	2447 (130 PTSD)	Vietnam Health and Aging Study	51.2% female	Aged 60+, mean age 70.3yrs	PCL-C	Retrospective cohort	CVD risk, hypertension
Krantz et al. (2024)	49656 (2201 PTSD, 47455 control)	Data from US Army Study to Assess Risk and Resilience in Service members (Army STARRS) Historical Administrative Data Study (HADS)	86% male	Median 25 (IQR 22-31) years	ICD-9	Longitudinal retrospective cohort study	Hypertension, CVD risk

Li et al. (2017)[a]	30002 (delayed 2139, remitted 2901, chronic 1 749, no PTSD 23213)	US World Trade Center Health Registry	63% male	25+; 61.6% aged 45-64	PCL-S	Observational longitudinal cohort study	Medical conditions
Lima et al. (2018)[a]	271 (32 PTSD)	Myocardial Infarction and Mental Stress Study 2 (MIMS2), US	50.8% male	Control 50.9 ± 6.6, PTSD 50.25 ± 7.6 years	SCID, DSM-IV, PCL-C	Cross-sectional observational, with experimental componentsectional observational	Metabolic conditions, CVD risk
Lin et al. (2019)[a]	4765 (953 PTSD, 3812 control)	Longitudinal Health Insurance Database 2005, Taiwan	50.2% female	PTSD 36.93 ±13.18, control 49.15 ± 14.97 years	ICD-9 code or psychiatrist diagnosis with DSM-5	Retrospective cohort	Hypertension, Metabolic Conditions
Maguire et al. (2021)[a]	40(20 controls, 20 PTSD)	US participants recruited by Discovery Life Sciences	47.5% male	control 39.0 ± 2.6, PTSD 41.5 ± 11.0 years	CAPS-5, DSM-5, PCL-5	Case-control pilot study	Hypertension, Metabolic Conditions
McLeay et al. (2017)[a]	214(108 PTSD, 106 trauma-exposed control)	Australian Vietnam war veterans	100% male	Control 69.2 ± 4.2yrs, PTSD 68.5 ± 4.1yrs	diagnosis by psychiatrist, CAPS-5	Retrospective cohort	Medical conditions

Mellman et al. (2015)	136 (42 PTSD)	US urban residing young adult African Americans	54.4% female	22.9 ± 4.6yrs	CAPS, DSM-IV	Cross-sectional	Metabolic conditions
Mendlowicz et al. $(2023)^{a}$	320 (47 PTSD)	Brazilian participants in CAMELIA (Cardio-Metabolic-Renal Family) Project	59.1% female	39.07 years	PCL-C, DSM-IV	Retrospective cohort	Hypertension
Mesa-Vieira et al. $(2024)^{a}$	1,009,113 (12,662 PTSD, 996,451 control)	South Africans with health insurance coverage between 1 January 2011 and 15 March 2020	51.8% female	39.3 ± 15.2yrs	ICD-10	Longitudinal cohort study	Medical conditions
Miller-Archie et al. $(2014)^{a}$	36899 (5265 PTSD)	US World Trade Center health registry	36.5% female	93.35% aged 25-64	PCL-S. PSS	Prospective cohort study	Metabolic conditions

Moazen-Zadeh et al. (2017)[a]	100 (50 PTSD, 50 control)	Iranian veterans of the Iran-Iraq war	100% male	Median PTSD 49 (IQR 41-73), control 52(40-70)	Diagnosis by military psychiatrist (DSM-IV)	Case-control study	Medical conditions
Moodley et al. (2023)[a]	312(139 PTSD, 173 control)	South African SHARED ROOTS project	75.3% female	Median 48.31 (IQR 36.99-56.69)	LEC-5, DSM-5, CAPS-5	Cross-sectional	Hypertension, Metabolic conditions
Natale et al. (2023)[a]	1520 (154 PTSD)	US World Trade Center rescue and recovery workers	28.42% female	56.32 ± 7.95yrs	PCL-17	Cross-sectional	Medical conditions
Nevell et al. (2014)[a]	52(26 PTSD and 26 control)	Detroit Neighborhood Health Study, US	73% female	PTSD 49 ± 10, control 51± 8.2	CAPS, DSM-IV	Case-control study	Hypertension, CVD risk
Nichter et al. (2019)[a]	2732 (MDD 141, PTSD 40, PTSD/MDD 60, control=2491)	The National Health and Resilience in Veterans Study, US	92% male	60.3±15years	PCL-S, DSM-IV	Cross-sectional observational	CVD risk, Metabolic conditions

Nishimi et al. $(2022)^{a}$	228367 (58567 PTSD, 64395 other psychiatric diagnoses, control 105405)	US Veterans Affairs Corporate Data Warehouse	89.5% male	60.6 ± 16.3 years	ICD-9/10 codes	Retrospective cohort	CVD risk, Metabolic conditions
Noble et al. (2023)	49 (29 PTSD)	Trauma-exposed individuals assigned female at birth (based in US)	90% female	31.58 ± 9.64 years	LEC-5, CAPS-5, PCL-5	Cross-sectional	CVD risk, Metabolic conditions
Nobles et al. (2016)	12746 (918 PTSD)	National Survey of American Life (NSAL) (50) and National Comorbidity Survey Replication (NCS-R)	59.3% female	44.3 years	WMH-CIDI, DSM-IV, PCL-4	Cross-sectional observational	Medical conditions
Oddone et al. (2014)	222(102 PTSD, 120 control)	US military veterans	57% male	PTSD 31.6 ± 5.31, control 28.15 ± 5.52 years	CAPS, DSM-IV	Cross-sectional observational	Hypertension, Metabolic conditions
Ofman et al. $(2018)^{a}$	25678 (PTSD 3280, control 22398)	US Veterans Affairs National Patient Care Database and regional healthcare databases	98.8% male	65.5 ± 10.3 years	ICD-9	Retrospective cohort	Medical conditions

Onose et al. $(2015)^a$	3611 (543 PTSD)	The Japanese CHART-2 study of CVD patients	26.5% female	PTSD 68.2 ± 10.9, control 66.6 ± 11.4 years	EIS-R	Multicentre observational	Medical conditions
Palmer et al. (2021)	1120 (115 PTSD)	US veteran data from CPRS database	51.8% male	PTSD 41.7 ±8yrs, Control 39.3 ±8.6yrs	DSM-5	Retrospective cohort study	Metabolic conditions
Pengpid & Peltzer $(2021)^a$	5059 (238 PTSD)	baseline data from the Health and Ageing in Africa: A Longitudinal Study of an INDEPTH Community	53.6% female	62.4 ± 13.1 years	Breslau 7-item scale for PTSD	Longitudinal cohort study	Medical conditions
Perkovic et al. (2024)	120 (62 PTSD, 58 control)	Croatian veterans of the homeland war	100% male	Median PTSD 57 (IQR 49-67), control 56 (50-66) yrs	SCID, DSM-5, ICD-10	Case-control study	Metabolic conditions
Pierce et al. $(2024)^a$	36,309 (34530 control, 1779 PTSD)	US National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III)	56.3% female	46 years	DSM-5, AUDADIS-5	Cross-sectional	CVD risk

Reis et al. $(2023)^a$	374 (control 131, PTSD 59, MDD 65, PTSD+MDD 119)	US veteran Microbiome Project	82.1% male	47.4 ± 13.6 years	SCID, DSM-5, PCL-5	Observational cross-sectional	Hypertension
Remch et al. $(2018)^a$	5971 (1250 PTSD)	US World Trade Center-Heart study	82.8% male	51 years	PCL-C, DSM-IV	Observational prospective cohort study	CVD risk
Roberts et al. (2015)	54 282 (14914 HC, 25308 TEC, 4752 1-3 symptoms PTSD, 2868 4/5 symptoms PTSD, 1897 6/7 symptoms)	The US Nurses' Health Study II	100% female	24-42 years	Brief trauma interview, Breslau's 7-item brief screening scale PTSD, DSM-IV	Longitudinal cohort study	Metabolic conditions
Roer et al. $(2023)^a$	4,049,218 (PTSD 7852, control 4,041,366)	Norwegian Patient Registry	68.4% female	PTSD 37.8 ± 11.5, control 44.7 ± 15.9 years	ICD-10 codes	Retrospective cohort study	Medical conditions
Rosman et al. $(2019)^a$	988090(275,961 PTSD, 712,129 no PTSD)	US Veterans Health Administration (VHA) roster of	87.8% male	30.29 ± 9.19 years	ICD-9, DSM-IV	Prospective cohort study	Medical conditions

		OEF/OIF/OND veterans					
Roy et al. $(2015)^a$	8248(1712 PTSD)	Veterans Affairs Pacific Islands Health Care System (VAPIHCS) outpatient administrative records	95% male	No PTSD 65 ± 11.1, PTSD 59 ± 8.0 years	ICD-9	Retrospective cohort	CVD risk
Ryklief et al. $(2022)^a$	416(220 PTSD, 196 TEC)	The South African SHARED ROOTS project	74.6% female	43.5 ± 13.3 years	DSM-5, CAP-5. LEC-5, CTQ	Longitudinal cohort	CVD risk, metabolic conditions
Salas et al. (2024)	23161(3959 mild, 15612 moderate, 3590 severe PTSD)	US Veterans Health administrative medical record data	88% male	70% >50 years	ICD 9/10 codes, PCL-IV/5, DSM-IV/5, SCID	Cross-sectional	Medical conditions
Scherrer et al. $(2024)^a$	10002 (7878 PTSD, 2124 control)	US Veterans Health Administration data	87.2% male	18-80 years	ICD9/10 codes, PCL-IV/ 5	Retrospective cohort	Metabolic conditions, mortality

Seligowski et al. $(2024)^a$	118827 (6155 PTSD, 112672 no PTSD)	US Mass General Brigham Biobank research program	43.8% male	median 56 years	ICD-9 codes	Observational cohort	Hypertension, Metabolic conditions
Seligowski et al. (2022)	80 (33 PTSD)	US patients with T2D as part of Grady Trauma Project	100% female	50.6 ± 9.9yrs (range 21-65yrs)	TEI, CAPS, DSM-IV	Cross-sectional observational	CVD risk
Serier et al. (2024)	4105(3001 no, 164 remitted, 431 current subthreshold, 509 current PTSD)	Vietnam era veterans as part of Health ViEWS (US Department of Veterans Affairs Cooperative Studies Program)	100% female	67.4 ± 5.8 years	CIDI 3.0, DSM-IV	Cross-sectional observational	Metabolic conditions
Serier et al. (2025)	9871 (1381 PTSD)	veterans serving During the Vietnam Era [HealthViEWS])	58.4% male	Males 61.9 ± 3,1yrs, Females 67.4 ± 5.8yrs	CIDI 3.0, DSM-IV	Cross-sectional observational	Hypertension
Shamilova et al. (2025)	55 (12 PTSD)	Ukrainian refugees living in dormitories from Sopot Center for Integration and Support for Foreigners (Poland)	100% female	49.0 ± 14.2yrs	PCL-5, LEC-5, DSM-5	Cross-sectional observational	Hypertension

Sheikh et al. $(2024)^{a}$	137 (17 PTSD, 120 no PTSD)	Emory Twin Follow-up Study (from 2016-2019) with US veterans of the Vietnam war	100% male	68.5 ± 2.5yrs	SCID, DSM-IV, PTSDSS	Twin-study	CVD risk
Søegaard et al. $(2022)^{a}$	109 (58 PTSD, 51 no PTSD)	Norwegian Study of Health Outcome after Trauma (SHOT-study)	61.4% female	40.44 ± 11.11 years	SCID DSM-IV	Cross-sectional	Metabolic conditions
Solomon et al. (2017)	57 (31 resilient, 23 delayed, 3 chronic PTSD)	Israeli veterans	81% male	Not reported (42 years since end of war)	PTSD-I, DSM-IV	Prospective longitudinal	Metabolic conditions
Sommer et al. $(2022)^{a}$	2941 (No PTSD 2268, Remitted 118, New onset 380, Persistent/recurrent 87)	Data from the 2002 Canadian Community Health Survey for Mental Health and Well-being – Canadian Forces supplement	81% male	Average age ranged from 33-36 years	WHO-CIDI	Longitudinal observational cohort	Medical conditions
Somvanshi et al. $(2020)^{a}$	162(81 PTSD, 81 TEC)	US veterans deployed to Afghanistan/Iraq	100% male	no PTSD 32.29 ± 7.6, PTSD 33.20 ±8.12	DSM-IV, SCID, CAPS, PCL-4, ETI	Cross-sectional	Medical conditions

Song et al. (2019)	136 637 (11162 PTSD),	Swedish National Patient Register	37.5% male	Median 35 (IQR 24-46)	ICD-9/10	Case-control cohort study	CVD risk
Spitzer et al. $(2020)^{a}$	3119(61 PTSD, HC 1420, TEC 1638)	Study of Health in Pomerania (SHIP), Germany	51.9% female	53.6 ± 15 (range 25-86) years	SCID, DSM-IV	Longitudinal	CVD risk, metabolic conditions
Stellman et al. (2025)	507 (159 high PTSD score, 307 low PTSD score, 41 no PTSD)	US veterans of the Vietnam war	100% male	72.5 years	PCL	Prospective cohort	CVD risk, Metabolic conditions
Sumner et al. $(2016)^{a}$	(15178 HC, 24714 TEC, 4706 1-3 PTSD symptoms, 2817 4/5 symptoms, 1881 6/7 symptoms	US Nurses' Health Study II	100% female	35 ± 4 years	BTQ, Breslau 7-item short screening scale DSM-IV	Longitudinal cohort study	CVD risk, Metabolic conditions
Tsai & Chen $(2017)^{a}$	1527(54 PTSD)	NYC HANES study (2013–2014)	60% female	20-29: 8.5%; 30-39: 22.9%; 40-49: 36.2%;50-59: 11%; 60+: 21.4%	Self-report through survey	Epidemiological cross-sectional	Medical conditions
Vaccarino et al. $(2014)^{a}$	4340 (no PTSD 3424, subthreshold 541, PTSD 375)	Vietnam Era Twin Registry, US veterans	100% male	≤39 years	DIS, DSM-III	Longitudinal twin-study	Medical conditions

Vaccarino et al. (2021)	275(212 no PTSD, 34 late-onset, 29 chronic PTSD)	Vietnam Era Twin Registry, US veterans	100% male	68 years	SCID, DSM-IV	Longitudinal cohort	CVD risk (Metabolic conditions also reported duplicating Vaccarino et al. (2014)
Valentine et al. $(2017)^a$	9861 no PTSD, PTSD 819-828 (as some missing data)	Data from the US Collaborative Psychiatric Epidemiology Surveys	51% female	Mean age ranged from 37-46.9 years by race	WHM-CIDI, DSM-IV	Cross-sectional observational	Medical conditions
Vidal et al. (2019)	9842 (640 PTSD)	US Collaborative Psychiatric Epidemiology Surveys dataset	53% female	18-65 years	CIDI, DSM-IV	Cross-sectional observational	CVD risk
Wang et al. $(2021)^a$	4316(1079 PTSD)	Data from the NHIRD study (derived from the Taiwan NHI program)	100% male	PTSD 36.05 ± 14.11, without 36.73 ±14.28 years	ICD-9 code	Retrospective cohort	Medical conditions
Wingenfeld et	613(199 current PTSD, 100 lifetime not current, 314 no PTSD)	US Mind Your Heart Study	94% male	NO PTSD 59.8 ± 12.1, cu rrent PTSD 57.4 ± 11, lifetime57.4 ± 10 years	CAPS, DSM-IV, PCL	Cross-sectional observational	Medical conditions

al. (2014)[a]							
Wisnivesky et al. (2024)[a]	232(75 PTSD, 157 no PTSD)	US World Trade Center workers	25% female	PTSD 54.8 ± 9.5yrs, no PTSD 56.1± 7.6yrs	SCID, DSM-5, PCL-5	Observational cohort	Metabolic conditions, hypertension
Wolf et al. (2016)[a]	1355 (902 PTSD)	US Army or Marine Corps veterans OEF/OIF	51.7% female	37.86 ± 9.96 years	SCID, DSM-IV, LEC-IV	Longitudinal	Metabolic conditions
Yu et al. (2021)[a]	29012 (5102 PTSD)	US World Trade Center Health Registry	65.7% male	18+ years	PCL-S, DSM-IV	Longitudinal	CVD risk

a= Included in meta-analysis

PTSD= post-traumatic stress disorder; MDD=major depressive disorder

Diagnostic Tools**: AUDADIS**=alcohol use disorder and associated disabilities interview schedule; **BTQ**=Brief Trauma Questionnaire; **CAPS**= Clinician administered PTSD scale; **CGI**= clinical global impression; **CES**= Combat exposure scale; **CIDI**= Composite international diagnostic interview; **CTQ**=Childhood trauma questionnaire; **DIS**= Diagnostic interview schedule; **DSM**= Diagnostic Statistical Manual; **DSPS**=Dissociative sub-type of PTSD scale; **DTS**= Davidson Trauma Scale; **ICD**= International Classification of Disorders; **IES-R**= Impacts of events scale-revised; **LEC**=Life events checklist; **MHI**= Mental health inventory; **PCL**=PTSD Checklist (PCL-C=civilian; PCL-

M=military; PCL-S=short form); **PDSQ**= Psychiatric diagnostic screening questionnaire; **PSS-SR** = PTSD symptoms scale- self-report ; **PTSD-I**= PTSD inventory; **SCID**=structured clinical interview for DSM (SCID-5-CV= Clinician version); **THQ**= Trauma history questionnaire; **TLEQ**= Traumatic life events questionnaire

Medical Conditions: **CAD**=coronary artery disease; **CDI**= Coronary distensibility; **CHF**= congestive heart failure; **CTA**=cardiac computed tomography angiography; **CVD**=cardiovascular disease; **DVT**= deep vein thrombosis; **HD**= heart disease; **MACE**=major adverse cardiovascular events, **MetC**=cardiometabolic dysfunction; **MetS**=metabolic syndrome; **MI**=myocardial infarction; **TIA**=transient ischemic attack

Metabolic markers: **CVD**= cardiovascular disease; **DBP**= diastolic blood pressure; **HDL**= High-density lipoprotein; **LDL**=low-density lipoprotein; **MetS**= Metabolic Syndrome; **RMSSD**=root mean of successive differences; **SBP**= systolic blood pressure; **SDNN**=standard deviation of normal-to-normal beats; **TC**= total cholesterol; **TG**= triglycerides

Participants: **CEC**= combat exposed controls; **Dep**= Depression; **HC**= healthy controls; **TEC**= trauma-exposed controls; **Tr**= trauma exposure; **CPRS**= Computerised Patient Record System; **OEF**= operation enduring freedom; **OIF**=operation Iraqi freedom; **OND**= operation new dawn

Statistics: **AUC**=area under the curve; **CI**= confidence interval; **DF**= degrees of freedom; **HR**=hazard ratio; **IQR**= interquartile range; **M**= mean; **OR**=odds ratio (**AOR**=adjusted odds ratio); **PY**= person years; **ROC**=receiver operating characteristics; **SD**= standard deviation; **SE**= standard error

(Table with additional extractions available at: https://osf.io/6q2cx/files/7xfkc

Appendix F: Study Characteristics for Mortality

Study	N	Population	Sex	Mean Age ± SD	PTSD Diagnostic and Assessment Methods	Study Design	Main outcomes measured
Boschesi et al. (2023)	ICD code data: 502422 (47 PTSD)	UK Biobank data	56.6.% female	Median 57 (IQR 50-62) years	UK Biobank Mental Health Questionnaire (based on CIDI-SF and DSM-IV), ICD-10 code	Longitudinal cohort study	All-cause morality
Bradley et al. (2014)	116488(14917 PTSD, no PTSD 101571)	US Veterans Affairs electronic health records	97.3% male	median age: PTSD 61.9, no PTSD 63.7	ICD-9 code	Observational cohort study	All-cause mortality
Giesinger et al. (2020)	63666 (29270 responders-2702 PTSD, 34396 civilians – 3987 PTSD)	World Trade Center Health Registry (US)	61.1% male	Mean age at 9/11: 40.4 ± 10.4 years	PCL-S, DSM-IV	Longitudinal cohort	All-cause mortality
Gradus et al. (2015)	512101 (3786 PTSD)	Danish psychiatric clinic patients (1 Jan 1995-31 Dec 2011)	60% female	54% aged 31-55 years	ICD-10	Cohort study	All-cause mortality

Ofman et al. (2018)	25678 (3280 PTSD)	US Veterans Affairs National and regional databases	98.8% male	65.5 ± 10.3 years	ICD-9	Retrospective cohort study	All-cause mortality
Oh, Park & Song (2022)	22611 (24 pre-existing PTSD, 28 new PTSD)	National Health Insurance Service database, South Korea	62.8% male	62.1± 15.2 years	ICD-10 codes	Retrospective cohort	All-cause mortality
Roberts et al. (2020)	51 602 (8890 HC, 13385 TEC, PTSD: 12513 1-3 symptoms, 4359 4-5 symptoms, 1926 6-7 symptoms, 10,529 with comorbid depression)	US Nurses Health Study II (PTSD sub-group)	100% female	53.3 (Range 43-64) years	short-screening scale for PTSD, DSM-IV	Prospective cohort study	All-cause mortality
Scherrer et al. (2019)	4178 (2519 PTSD, 1659 no PTSD)	US Veterans Health Affairs (VHA) electronic medical record data	87% male	50.1 ± 11 years	ICD-9, PCL, SCID DSM-IV	Retrospective cohort	All-cause mortality
Schlenger et al. (2015)	1,632 Theater veteran (174 PTSD), 716	US national Vietnam veterans'	99% male	In 1987: 41.5 years	Semi-structured diagnostic protocol for DSM-	Longitudinal study	All-cause mortality

	Vietnam war-era veterans (6 PTSD)	readjustment study (1987-2011)			III (completed by psychiatrist)		
Szymanski et al. (2021)	8812373 (862,239 PTSD)	Data from US Veterans Affairs corporate data warehouse	88.3% male	14.7% 18-34, 23.3% 35-54, 42.9% 55-74, 19.1% 75-115	ICD-9 code	Retrospective cohort study	All-cause mortality
Zohar & Fostick (2014)	4914(2457 PTSD, 2457 no PTSD)	Israeli veterans	100% male	50 years	DSM-IV	Observational cohort	All-cause mortality

PTSD= post-traumatic stress disorder

Diagnostic Tools**: CIDI**= Composite international diagnostic interview (CIDI-SF= short-form version); **ICD**= International Classification of Disorders; **PCL**=PTSD Checklist (PCL-C=civilian; PCL-M=military; PCL-S=short form); **SCID**=structured clinical interview for DSM

Participants: **HC**= healthy controls; **TEC**= trauma-exposed controls

Statistics: **AHR**= adjusted hazard ratio; **CI**= confidence interval; **HR**= Hazard ratio; **IQR**= interquartile range; **M**= mean; **PY**= person-year; **SD**= standard deviation

(Table with additional extractions available at: https://osf.io/6q2cx/files/udqvx)

Appendix G: Risk of Bias of Included Papers

Study	1	2	3	4	5	6	7	8	9	10
Adams & Allwood (2024)	Y	Y	Y	Y	Y	Y	Y	Unclear	Y	Y
Ahmadi et al. (2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Angleman et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Unclear	Y	Y
Avetyan et al. (2022)	Y	Y	N	Y	Unclear	Y	Unclear	Y	NA	Y
Beristianos et al. (2016)	N	Unclear	Y	Y	Y	Y	Y	Y	Y	Y
Bersani et al. (2016)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Blessing et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Boschesi et al. (2023)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Bourassa et al. (2025)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Brackbill et al. (2014)	N	Y	Y	Y	Y	Unclear	Y	N	Y	Y
Bradley et al. (2014)	Y	N	Y	Y	Y	Y	Y	Unclear	Y	Y
Britvic et al. (2014)	N	N	Y	Y	Y	N	Y	Y	Y	Y
Bruenig et al. (2018)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Bruenig et al. (2017)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Bukhbinder et al. (2020)	Y	Unclear	Y	Y	Y	Y	Y	Y	Y	Y
Burg et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bürgin et al. (2022)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Caceres et al. (2019)	Y	Y	Y	Y	Y	Y	Unclear	Unclear	Y	Y
Canetti et al. (2014)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Carvalho et al. (2022)	Y	N	Y	Y	N	Y	Y	Y	Y	Y
Chen et al. (2024)	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Chen et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Chong et al. (2025)	Y	N	Y	Y	Y	Y	Y	Y	Y	Unclear
Connelly et al. (2018)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Cooper et al. (2014)	N	Unclear	Y	Y	Y	Y	Y	Y	Y	Y
de Faria Cardoso et al. (2022)	Y	Y	Y	Y	Y	N	N	Y	Y	N
D'Elia et al. (2022)	Y	N	Y	Y	Y	Y	Y	Y	NA	Y
Dennis et al. (2014)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Dennis et al. (2016)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
de Vries et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dyball et al. (2023)	Y	Y	Y	Y	Y	Y	Y	Unclear	Y	Y
Ebrahimi et al. (2023)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ebrahimi et al. (2024)	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Edmondson et al. (2017)	Y	Y	Y	Y	Y	Unclear	Unclear	Y	Y	Y
Ein-Dor et al. (2020)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
El-Gabalawy et al. (2018)	Y	Unclear	Y	Y	Y	Y	Y	Y	Y	Y
Eswarappa et al. (2019)	Y	Unclear	Y	Y	Y	Y	Y	Y	Y	Y
Farr et al. (2015)	Y	N	Y	Unclear	Y	Y	Y	Y	NA	Y
Gaffey et al. (2021)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Gibson et al.(2018)	Y	Unclear	Y	Y	Y	Y	Y	Y	Y	Y
Giesinger et al. (2020)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Gilsanz et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Unclear	Y	Y
Goldberg et al. (2014)	N	Y	Y	Y	Y	Y	Y	Unclear	Y	Y
Grenon et al. (2016)	Y	N	Y	Y	Y	Y	Unclear	Y	Y	Y
Gradus et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Groer et al. (2015)	Unclear	N	Y	Y	Y	N	N	Y	NA	Y
Hartwig et al. (2020)	Y	Y	Y	Y	Y	Y	Unclear	Unclear	Unclear	Y
Hieda et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y

Hirai et al. (2022)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Hoekstra et al. (2025)	Unclear	N	Y	Y	Y	Y	Y	Y	NA	Y
Holmstrup et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Holliday et al. (2017)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Howard et al. (2018)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Hsu et al. (2024)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Husky et al. (2018)	Y	Y	Y	Unclear	Y	Y	Y	Unclear	NA	Y
Iyengar-Kapuganti (2022)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Jacob, Haro & Koyanagi (2018)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Jansen van Vuren et al. (2025)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Jarkas et al. (2025)	Y	Y	N	Y	Y	Y	Y	Y	NA	Y
Jergović et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Kang et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Khalil et al. (2025)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Kibler et al. (2018)	Unclear	N	Y	Y	Y	Y	Y	Y	NA	Y
Koraishy et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Korinek et al. (2020)	Y	Y	Y	N	Y	Y	Y	Y	NA	Y
Krantz et al. (2024)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Küffer et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Lawn et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lee et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Li et al. (2018)	Unclear	N	Y	Y	Y	Y	Y	Y	NA	Y
Lima et al. (2018)	Y	N	Y	Y	Y	Y	Y	Y	NA	Y
Lin et al. (2019)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Lindqvist et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y

Lindqvist et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Maguire et al. (2021)	Y	Y	Y	Y	Y	N	N	Y	NA	Y
Maples-Keller et al. (2022)	Y	Y	Y	Y	Unclear	N	N	Unclear	NA	Y
McD Young et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
McLeay et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Mehta et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Mellman et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Mellon et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Mendlowicz et al. (2023)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Mesa-Vieira et al. (2024)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Michopoulos et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Miller-Archie et al. (2014)	Unclear	Unclear	Y	Y	Y	Y	Y	N	NA	Y
Miller et al. (2017)	Y	Y	Y	Y	Y	Unclear	Unclear	Y	NA	Y
Miller et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Moazen-Zadeh et al. (2016)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Moodley et al. (2023)	N	N	Y	Y	Y	N	N	Y	NA	Y
Na et al. (2017)	Y	N	Y	Y	Y	Y	Y	Y	NA	Y
Natale et al. (2023)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Nevell et al. (2014)	Y	Y	Y	Y	Y	N	N	Y	NA	Y
Nichter et al. (2019)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Nishimi et al. (2022)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Noble et al. (2023)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Nobles et al. (2017)	Y	N	Y	Y	Y	Y	Y	Unclear	NA	Y
Oddone et al. (2014)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Ofman et al. (2018)	Y	N	Y	Y	Y	Y	Y	Unclear	Y	Y
Ogawa et al. (2025)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y

Oh, Park & Song (2022)	Unclear	Unclear	Y	Y	Y	Y	Y	N	Y	Y
Onose et al. (2015)	N	N	Y	Y	Y	Y	Y	Unclear	NA	Y
Palmer et al. (2022)	N	N	N	Y	Y	Y	N	Y	NA	Y
Park et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Pengpid & Peltzer (2021)	Y	Y	Y	Y	Y	Y	Y	Unclear	NA	Y
Perković et al. (2021)	Y	Y	Y	Y	Y	Y	N	Y	NA	Y
Pierce et al. (2024)	Y	Y	Y	Unclear	Y	Y	Unclear	Y	NA	Y
Quigley et al. (2025)	Y	Y	Y	Y	Y	Unclear	Unclear	N	NA	Y
Ratanatharathorn et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Rhein et al. (2024)	Unclear	Unclear	Y	Y	Y	Unclear	Unclear	Y	NA	Y
Reis et al. (2023)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Remch et al. (2019)	Y	Unclear	Y	Y	Y	Y	Y	Unclear	Y	Y
Roberts et al. (2016)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Roberts et al. (2020)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Roer et al. (2023)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Rosman et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Roy et al. (2015)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Ryklief et al. (2022)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Salas et al. (2023)	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Scherrer et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Scherrer et al. (2024)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Schlenger et al. (2015)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Schutlebraucks et al. (2020)	Y	N	Y	Y	Y	Y	N	Y	NA	Y
Seligowski et al. (2025)	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Seligowski et al. (2022)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Serier et al. (2024)	Y	Y	Y	Unclear	Y	Y	Y	Unclear	NA	Y

Serier et al. (2025)	Y	Y	Y	Unclear	Y	Y	Y	Unclear	NA	Y
Shamilov et al. (2024)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Unclear
Sheikh et al. (2024)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Søegaard et al. (2022)	Y	Y	Y	Y	N	Y	Y	Y	NA	Y
Solomon et al. (2017)	Unclear	Unclear	Y	Y	Y	Unclear	Unclear	Y	NA	Y
Sommer et al. (2022)	Y	N	Y	Unclear	Y	Y	Y	Y	NA	Y
Somvanshi et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Song et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Spitzer et al. (2020)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Spitzer et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Stellman et al. (2025)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Sumner et al. (2016)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Szymanski et al. (2021)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Talbot et al. (2016)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Teche et al. (2017)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Thayer et al. (2018)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Toft et al. (2018)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Toft et al. (2022)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Tsai & Shen (2017)	N	N	Y	Unclear	Y	Y	Y	Unclear	NA	Y
Tucker et al. (2025)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Vaccarino et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Vaccarino et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Valentine et al. (2018)	Y	Unclear	Y	Unclear	Y	Y	Y	Unclear	NA	Y
van den Heuvel et al. (2020)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Vidal et al. (2019)	Unclear	Unclear	Y	Unclear	Y	Y	Y	Unclear	NA	Y
von Majewski et al. (2023)	Y	N	Y	Y	Y	Y	Y	Y	NA	Y

Wang et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wang et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Weggen et al. (2021)	Y	Y	Y	Y	Y	N	N	Y	NA	Y
Wingenfeld et al. (2016)	N	N	Y	Y	Y	Y	Y	Y	NA	Y
Wisnivesky et al. (2024)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Wolf et al. (2017)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Wolf et al. (2021)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Wolfe (2017)	Y	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Yu et al. (2021)	Unclear	Unclear	Y	Y	Y	Y	Y	Y	NA	Y
Zohar et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y

1= Were the groups comparable other than the presence of disease in cases or the absence of disease in controls?
2=Were cases and controls matched appropriately?
3=Were the same criteria used for identification of cases and controls?
4=Was exposure measured in a standard, valid and reliable way?
5=Was exposure measured in the same way for cases and controls?
6=Were confounding factors identified?
7=Were strategies to deal with confounding factors stated?
8=Were outcomes assessed in a standard, valid and reliable way for cases and controls?
9=Was the exposure period of interest long enough to be meaningful?
10=Was appropriate statistical analysis used?

Appendix H: Additional Forest and Funnel Plots

Additional plots for biological indicators are available at: https://osf.io/6q2cx/files/jrsvz

Additional plots for medical conditions are available at:https://osf.io/sme3n

Appendix I: Approved Major Research Project Proposal Protocol

Available at: https://osf.io/nt2wb/files/fwy2p

Appendix J: Mixed Methods Reporting Checklist

Based on Mixed Methods Design Journal Article Reporting Standards (available at: https://apastyle.apa.org/jars/mixed-methods)

Title	Reported (Y/N)
- Refrain from using words that are either qualitative (e.g. 'explore', 'understand') or quantitative (e.g. 'determinants', 'correlates') because mixed methods stands in the middle between qualitative and quantitative research. - Reference the mixed methods, qualitative methods and quantitative methods used.	Y – title updated to reference mixed methods
Abstract	
- Indicate the mixed methods design, including types of participants or data sources, analytic strategy, main results/finding and major implications/significance - Specify the type of mixed methods used - Consider using one keyword that describes the type of mixed methods design used and one that describes the problem addressed - Describe your approach(es) to inquiry and, if relevant, how intersecting approaches to inquiry are combined when this description will facilitate the review process and intelligibility of your paper. If your work is not grounded in a specific approach(es) to inquiry or your approach would be too complicated to explain in the allotted word count, however, it would not be advisable to provide explication on this point in the abstract.	Y Y Y Not fully within the word count
Introduction	
Research questions	
- This section may convey barriers in the literature that suggest the need for both qualitative and quantitative data	Y
Study objectives/aims	
- State three types of research objectives/aims/goals: qualitative, quantitative, and mixed methods. Order these goals to reflect the type of mixed methods design used. - Describe the ways or approaches to inquiry were combined, as it illuminates the objectives and mixed methods rationale (e.g., descriptive, interpretive, feminist, psychoanalytic, postpositivist, critical,	Y Y-exploratory

postmodern, constructivist, or pragmatic approaches).	
Method	
Research Design Overview	
- Explain why mixed methods research is appropriate as a methodology given the paper's goals. - Identify the type of mixed methods design used and define it. - Indicate the qualitative approach to inquiry and the quantitative design used within the mixed methods design type (e.g., ethnography, randomized experiment). - If multiple approaches to inquiry were combined, describe how this was done and provide a rationale (e.g., descriptive, interpretive, feminist, psychoanalytic, postpositivist, critical, postmodern, constructivist, or pragmatic approaches), as it is illuminating for the mixed method in use. - Provide a rationale or justification for the need to collect both qualitative and quantitative data and the added value of integrating the results (findings) from the two databases.	Y Y Y Y Y
Participants	
- When data are collected from multiple sources, clearly identify the sources of qualitative and quantitative data (e.g., participants, text), their characteristics, and the relationship between the data sets, if there is one (e.g., an embedded design). - State the data sources in the order of procedures used in the design type (e.g., qualitative sources first in an exploratory sequential design followed by quantitative sources), if a sequenced design is used in the mixed methods study. - Because multiple sources of data are collected, separate descriptions of samples are needed when they differ. A table of qualitative sources and quantitative sources is helpful. This table could include type of data, when data were collected, and from whom. This table might also include study aims/research questions for each data source and anticipated outcomes of the study. In mixed methods research, this table is often called an "implementation matrix." - Rather than describe data as represented in numbers versus words, it is better to describe sources of data as open-ended information (e.g., qualitative	N/A Y N/A Y

interviews) and closed-ended information (e.g., quantitative instruments). - Because mixed methods research includes qualitative research, and reflexivity is often included in qualitative research, we recommend statements as to how the researchers' backgrounds influence the research.	Y- in Appendices
Participant Recruitment	
- Describe the qualitative and the quantitative sampling in separate sections. - Relate the order of the sections to the procedures used in the mixed methods design type. - Discuss the recruitment strategy for qualitative and quantitative research separately.	N/A – same methods Y N/A
Data Collection	Y
Data Analysis	
- Devote separate sections to the qualitative data analysis, the quantitative data analysis, and the mixed methods analysis. This mixed methods analysis consists of ways that the quantitative and qualitative results will be "mixed" or integrated according to the type of mixed methods design used (e.g., merged in a convergent design, connected in explanatory sequential designs and in exploratory sequential designs).	Y
Validity, Reliability and Methodological Integrity	
- Indicate methodological integrity, quantitative validity and reliability, and mixed methods validity or legitimacy. Further assessments of mixed methods integrity are also indicated to show the quality of the research process and the inferences drawn from the intersection of the quantitative and qualitative data.	N
Results	
- Indicate how the qualitative and quantitative results were "mixed" or integrated (e.g., discussion; tables of joint displays; graphs; data transformation in which one form of data is transformed to the other, such as qualitative text, codes, themes are transformed into quantitative counts or variables). - In mixed methods research, the Findings section typically includes sections on qualitative findings, quantitative results, and mixed methods results. This section should mirror the type of mixed methods design in terms of sequence (i.e., whether quantitative strand or qualitative strand comes first; if both are gathered at the same time, either	N Y – themes from questionnaire comments

qualitative findings or quantitative results could be presented first).	
Discussion	
- Typically, the Discussion section, like the Method and Findings/Results, mirrors in sequence the procedures used in the type of mixed methods design. It also reflects on the implications of the integrated findings from across the two methods.	Y

Appendix K: Questionnaire Sample

Available at: https://osf.io/2xmdr/files/xnb4z

Appendix L: Participant information

Copies of the participant information for the questionnaire only are available as follows:

- Participant information sheet: https://osf.io/yugwh
- Consent form: https://osf.io/wgmkz

Copies of participant information for the questionnaire and focus group are available as follows:

- Participant information sheet: https://osf.io/2xmdr/files/yjzm2
- Consent form: https://osf.io/2xmdr/files/92u3k

The debrief form is available at: https://osf.io/2xmdr/files/f5sha

Appendix M: Focus Group Topic Guide

Available at: https://osf.io/2xmdr/files/chtk2

Appendix N: Approvals

Appendix N1: MVLS Ethics Approval

Dr Alexander Fradera

MVLS College Ethics Committee

Project Title: Exploring staff experiences of trauma symptoms in older people

Application No: 200240363

The College Ethics Committee has reviewed your application and has agreed that there is no objection on ethical grounds to the study.

We are happy therefore to approve the project, subject to the following conditions

- Project end date as stipulated in original application.

- The data should be held securely for a period of ten years after the completion of the research project, or for longer if specified by the research funder or sponsor, in accordance with the University's Code of Good Practice in Research:

(http://www.gla.ac.uk/media/media_227599_en.pdf)

- The research should be carried out only on the sites, and/or groups or datasets as defined in the application.

- Any proposed changes in the protocol should be submitted for reassessment, except when it is necessary to change the protocol to eliminate hazard to the subjects or where the change involves only the administrative aspects of the project. The Ethics Committee should be informed of any such changes.

- You should submit a short end of study report within 3 months of completion.

Yours sincerely

Terry Quinn

FWSO, FESO, MD, FRCP, BSc (hons), MBChB (hons)

College of Medicine, Veterinary & Life Sciences

School of Cardiovascular and Metabolic Health

New Lister Building, Glasgow Royal Infirmary

Glasgow G31 2ER

terry.quinn@glasgow.gla.ac.uk

Tel – 0141 201 8519

The University of Glasgow, charity number SC004401

Dr Terry Quinn

Appendix N2: IRAS Approval

Coordinator/administrator: Euan Rennie
Telephone Number:
E-Mail: euan.rennie@nhs.scot
Website: https://www.nhsggc.org.uk/about-us/professional-support-sites/research-innovation

Research & Innovation
Gartnavel Royal Hospital
Admin Building, Level 2
1055 Great Western Road
Glasgow, G12 0XH
Scotland, UK

02/07/2025

Claire Grossart
NHS Education Scotland
90 Byres Road
Glasgow
G12 8TB

NHS Greater Glasgow & Clyde Approval:
Patient Identification Centre

Dear Claire

Study Title:	Exploring staff experiences of trauma symptoms in older adults
Chief Investigator:	Claire Grossart
Sponsor	University of Glasgow
R&I reference:	GN25MH303
REC reference:	25/NRS/0036
Protocol no: (including version and date)	v3.3 10.02.2025

I am pleased to confirm that **Approval** has been granted for NHS Greater Glasgow & Clyde to act a **Patient Identification Centre (PIC)** for the above study.

Conditions of Approval

1. During the Life span of the study the GG&C R&I Management Office requires the following information:
    i. Any amendments – Substantial or Non Substantial – that may change the workload of GG&C as a PIC.
    ii. Notification of Trial/study end.

Please add this approval to your study file as may be subject to audit and monitoring.

Your personal information will be held on a secure national web-based NHS database.

I wish you every success with this research study.
Yours sincerely

Euan Rennie
Senior Research Administrator

Appendix N3: Permission to proceed to recruitment without local PIC Agreements

Fw: Exploring staff experiences of trauma symptoms in older adults (GN25MH303) - PIC Approval

From: Conway, Sandi <sandi.conway@nhs.scot>
Sent: 15 July 2025 14:39
To: Claire Grossart <claire.grossart2@nhs.scot>; Alastair Wilson <alastair.wilson@glasgow.ac.uk>
Cc: Rennie, Euan <euan.rennie@nhs.scot>
Subject: RE: Exploring staff experiences of trauma symptoms in older adults (GN25MH303) - PIC Approval

Dear Claire and Alastair,

I hope this email finds you well.

As the study-wide reviewer for your trial, I just wanted to confirm that there is no need for you to complete the PIC agreement, and you can disregard the approval letter that was issues.

This trial is considered a **GR-only trial**, so no local checks or agreements are required.

This applies to all sites across Scotland, which can proceed without any local approvals.

Please rest assured that receiving the agreement and letter does not impact you in any way, nor will it affect the progress or validity of your trial.

If you have any questions at all, feel free to get in touch, best of luck with your trial

Best wishes,
Sandi Conway
Research Facilitator
NHS Greater Glasgow & Clyde
Research & Innovation
Gartnavel Royal Hospital
Admin Building
Level 2
1055 Great Western Road
Glasgow,G12 0XH
Scotland, UK

NHS Delivering better health

Appendix O: Data Analysis

Full data analysis plan available at: https://osf.io/2xmdr/files/bdr3e

Data analysis syntax file available at: https://osf.io/2xmdr/files/56vah

Cleaned quantitative data file available at: https://osf.io/2xmdr/files/wxcna

Data library available at: https://osf.io/2xmdr/files/s527d

Appendix P: Reflexivity Statement

I am a trainee clinical psychologist, aligned to the older adult population and therefore have an interest in advancing research in this area. As part of my role, I have worked on placement in older adult mental health settings in my first and third year. This means I have an understanding of being part of the group I am researching. I also have a pre-existing relationship with some of the participants as they are some of my colleagues. Through my experience I have developed my own views and opinions on the current research topic. During my research I considered how these aspects may impact on my neutrality as a researcher. In focus groups, I tried to stick closely to written guide of questions and allow participants to fill the discussion space. I tried to keep my input minimal but was aware I was offering non-verbal communications, such as smiles and nods. In quieter groups, I offered more prompting to allow the discussions to evolve. I was aware of belonging to a particular professional group and tried to be conscious of not privileging the perspectives of clinical psychologists over those of other professional groups. I kept a reflexive diary to track my own assumptions and views and their impact on data collection. When analysing data and collating themes, I reflected upon how my experiences might influence my interpretations. I checked my interpretations back against transcripts to ensure themes were representative of the data gathered from clinicians, and not endorsed by my own experience or views. I also aimed to minimise bias through discussions with and feedback from my supervisors. I hope that this will allow this research to truly reflect clinicians' experiences of working with older adults with a diagnosis of PTSD.

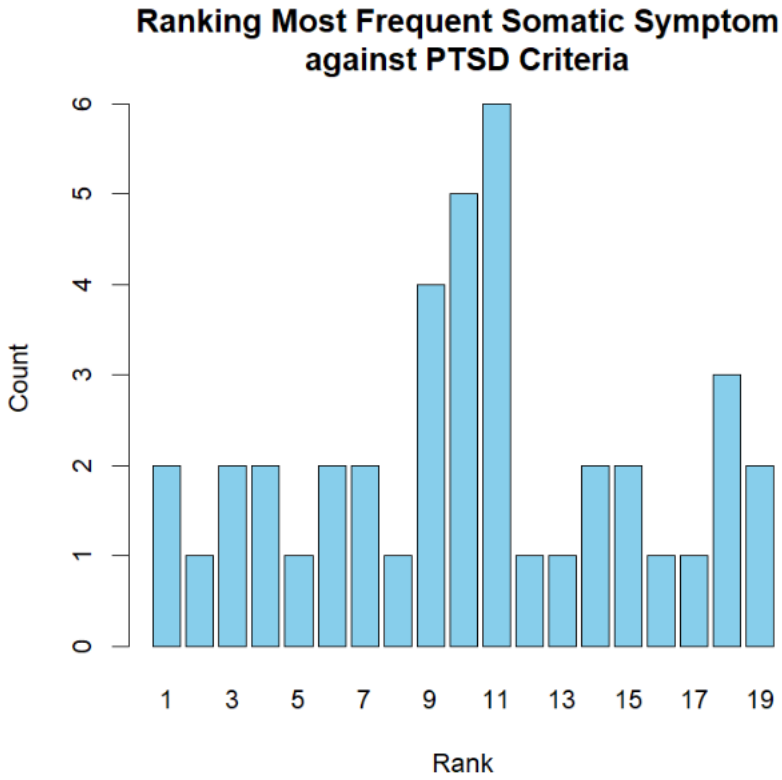
Appendix Q: Nemenyi Pairwise Comparisons

	Unwanted Memories	Dreams	Reliving	Reminders	Physical Reactions	Internal Avoidance	External Avoidance	Difficulty Remembering	Negative Beliefs	Blame	Negative Feelings	Loss of Interest	Distant	Lack of Positive Feelings	Irritability	Risk of Harm	Hypervigilance	Increased Startle	Difficulty Concentrating	Sleep	Somatic Symptom
Unwanted Memories	**4.488**																				
Dreams	0.08392	**8.902**																			
Reliving	0.08392	1	**8.902**																		
Reminders	1	0.4946	0.4946	**5.488**																	
Physical Reactions	0.99918	0.8714	0.8714	1	**6.195**																
Internal Avoidance	0.99603	0.9369	0.9369	1	1	**6.415**															
External Avoidance	0.64115	1	1	0.98396	0.9991	0.9999	**7.659**														
Difficulty remembering	8.6e-08***	0.3177	0.3177	8.4e-06***	0.00015***	0.00034***	0.02004*	**12.63**													
Negative Beliefs	0.91156	0.998	0.998	0.99971	1	1	1	0.00341**	**7.073**												
Blame	0.12897	1	1	0.61215	0.93111	0.97134	1	0.22847	0.99956	**8.707**											
Negative Feelings	0.04391*	1	1	0.34268	0.75059	0.85262	0.99985	0.46558	0.98907	1	**9.171**										
Loss of Interest	4.7e-08***	0.2598	0.2598	5.0e-06***	9.3e-05***	0.00022***	0.01416*	1	0.00228**	0.18202	0.39543	**12.76**									
Distant	2.6e-08***	0.209	0.209	2.9e-06***	5.8e-05***	0.00014***	0.00989**	1	0.00151**	0.14275	0.33007	1	**12.88**								
Lack of Positive Feelings	1.8e-09***	0.0708	0.0708	2.8e-07***	6.8e-06***	1.7e-05***	0.00193**	1	0.00024***	0.043811*	0.12897	1	1	**13.39**							
Irritability	6.2e-13***	0.00083***	0.00083***	1.3e-10***	5.7e-09***	1.8e-08***	6.1e-06***	0.97708	4.4e-07***	0.00041***	0.00210**	0.9875	0.9938	0.99989	**14.88**						
Risk of Harm	1.9e-13***	3.5e-07***	3.5e-07***	1.7e-13***	3.7e-13***	7.5e-13***	6.3e-10***	0.15762	2.4e-11***	1.4e-07***	1.2e-06***	0.1997	0.2491	0.52387	0.9971	**16.76**					
Hypervigilance	2.2e-07***	0.423	0.423	1.9e-05***	0.00031***	0.00070***	0.03403*	1	0.00633**	0.3177	0.58283	1	1	1	0.9474	0.10452	**12.44**				
Increased Startle	4.8e-11***	0.0123	0.01228*	1.1e-08***	3.5e-07***	9.7e-07***	0.00018***	0.99995	1.7e-05***	0.00683**	0.02622*	1	1	1	1	0.10452	0.99964	**14.05**			
Difficulty Concentrating	8.3e-13***	0.00108**	0.00108**	1.9e-10***	8.4e-09***	2.6e-08***	8.4e-06***	0.98396	6.2e-07***	0.00054***	0.00268**	0.9917	0.996	0.99995	1	0.99537	0.96073	1	**14.8**		
Sleep	2.5e-07***	0.4371	0.4371	2.1e-05***	0.00034***	0.00076***	0.03628*	1	0.00683**	0.33007	0.59752	1	1	1	0.9423	0.09902	1	0.99956	0.95661	**12.4**	
Somatic Symptom	0.00229**	1	1	0.04196	0.19172	0.2959	0.94198	0.95369	0.67719	0.99995	1	0.9091	0.8701	0.6083	0.04587*	7.9e-05***	0.97023	0.23768	0.05788	0.98	**10.17**

*p<.05, **p<.01, ***p<.001

Mean rank is reported in bold along the diagonal

Appendix R: Ranking of Participant Percieved Most Frequent Somatic Symptom against PTSD Criteria



Appendix S: Full list of Focus Group Quotes

The full list of focus group quotes is available online at:
https://osf.io/2xmdr/files/jmf79