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Post-traumatic stress disorder (PTSD) symptoms in later life

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Research Portfolio Abstract

Objectives: Around three in four older adults report exposure to at least one traumatic event, however, only a small proportion develop PTSD. Making a PTSD diagnosis in later life can be challenging for a number of reasons, including underreporting of trauma history and misattribution of symptoms to a physical illness. Research on PTSD in older adults remains scarce and little is known about complex factors involved in the experiences of PTSD. The primary objective of this thesis was to investigate factors relevant to the development and maintenance of PTSD in later life. A systematic review was conducted with the aim of summarising and critically appraising literature on the relationship between delirium, a hypothesised risk factor for PTSD, and subsequent PTSD symptoms in older hospital inpatients. The systematic review also explored the relationship between age and PTSD following hospital discharge. An empirical study was designed to examine the predictive utility of emotion regulation strategies, cumulative trauma exposure, group identifications and socioeconomic deprivation on current PTSD symptoms in older adults. These factors were hypothesised to influence the experience of PTSD in later life based on findings from younger adult populations.

Method: A systematic search strategy across five electronic databases identified eight studies which met the eligibility criteria. A cross-sectional study recruited an opportunistic sample of 88 older adults in receipt of psychological treatment for common mental health disorders. Study participants provided basic demographic information and completed self-report measures of traumatic events, emotion

regulation difficulties, PTSD symptoms and group identifications. Socioeconomic deprivation was determined with the Scottish Index of Multiple Deprivation (SIMD).

Results: Five of the eight studies included in the systematic review found that delirium was associated with PTSD symptoms, either at follow-up or during hospital stay. Three of the eight studies additionally investigated the relationship between age and PTSD symptoms in patients with and without delirium. Two of the three studies found that older age was associated with less PTSD symptoms after hospital discharge. The empirical study found that limited access to emotion regulation strategies and cumulative trauma exposure significantly contributed to PTSD symptoms in older adults, explaining a high proportion of variance (58%) in PTSD scores. Contrary to expectations, group identifications and socioeconomic deprivation did not add further predictive value to the model.

Conclusion: The systematic review suggested that the prevalence of PTSD after hospital discharge is higher than in general population and appears to be associated with in-hospital delirium. Older age was indicated as a protective factor for PTSD following a hospital stay. However, the available literature is considerably heterogenous, with a small number of studies and significant limitations. Findings from the empirical paper suggest that limited access to emotion regulation strategies may be a vulnerability factor in the development and maintenance of PTSD symptoms in older adults. There also appears to be a dose-response relationship between cumulative trauma exposure and severity of PTSD symptoms in later life. Clinical implications of these findings for working with older adults are discussed. These include the importance of designing prevention and early interventions

services for older adults at risk of PTSD, comprehensive screening for PTSD symptoms and further development of psychological interventions specifically targeting emotion regulation strategies.

Lay Summary

This thesis explores the experience of post-traumatic stress disorder (PTSD) symptoms in later life. Around three in four older adults report witnessing at least one traumatic event at some point in their life, however, only a small proportion suffer with long-term psychological consequences, such as PTSD. Symptoms of PTSD include, for example, re-experiencing the traumatic event as flashbacks and nightmares, avoidance of people, places and situations which trigger trauma, and constant feelings of being 'on edge'. Diagnosing PTSD in older adults can be challenging for clinicians as the symptoms are easily misperceived as a sign of physical illness or not discussed by patients due to feelings of shame or stigma. There is not enough research on PTSD in later life therefore the main objective of this thesis was to investigate what factors are relevant to the development and maintenance of PTSD in older adults.

This thesis reviewed published studies on the relationship between delirium during hospital admission and later PTSD symptoms. Older adults are at an increased risk of delirium and delirium was previously found to be a risk factor for PTSD. The review also investigated whether the person's age contributes to the risk of PTSD after hospital discharge. Five of the eight studies included in the systematic review found that delirium was associated with PTSD symptoms, either at follow-up or during hospital stay. Three of the eight studies looked at the relationship between age and PTSD symptoms in patients with and without delirium. Two of the three studies found that older age was associated with less PTSD symptoms after hospital discharge.

To explore the experience of PTSD in later life further, we investigated a number of factors, which were previously found to contribute to PTSD in younger adults, including the experience of multiple traumatic events, the use of strategies to manage distressing emotions, a sense of belonging to social groups, and levels of deprivation. Eighty-eight older adults took part in this study and answered questionnaires about each of those factors. The study found that older adults who do not have effective ways of managing their emotions and those who have witnessed multiple traumatic events are more likely to report more severe symptoms of PTSD.

We hope that the findings of this thesis will raise the awareness of PTSD in later life and will contribute to the development of a wider range of support and information services available to older adults who are at risk of PTSD. We also hope that our results will help in informing the future design of early intervention and prevention services, e.g. a creation of follow-up clinics assessing both physical and emotional well-being in older adults following hospital discharge. Our findings also suggest that psychological interventions which focus on helping older adults develop strategies to better manage their emotions may be particularly useful in the treatment of PTSD.

The relationship between delirium and post-traumatic stress disorder (PTSD) symptoms in older people: a systematic review

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The relationship between delirium and post-traumatic stress disorder (PTSD) symptoms in older people: a systematic review

Highlights

- The experience of delirium during hospital admission may be a risk factor to PTSD, however, the causal mechanism is yet to be understood.
- Older patients may be less likely to experience PTSD after hospital admission.
- In order to improve patient outcomes, clinicians should be aware of the potential emotional consequences of delirium and offer a thorough assessment and treatment as appropriate.

Objectives: Delirium is a serious neuropsychiatric syndrome which is common among older hospital inpatients. Delirium has been described as a frightening experience and has been hypothesised to be a risk factor for PTSD. The aim of this review is twofold: (1) to summarise and critically appraise literature on the relationship between delirium and subsequent PTSD in older hospital inpatients, and (2) to explore the relationship between age and post-delirium PTSD.

Method: Electronic databases, i.e. Web of Science, EMBASE, PsychINFO, Medline and CINAHL, were searched to identify published studies according to inclusion and exclusion criteria. No time limits were applied.

Results: Eight studies were eligible, with a total of 1106 patients with delirium and 1080 patients without delirium, either at the start of the study or follow-up. The prevalence rates ranged from 14 – 100% for delirium and 0 –

46% for PTSD, irrespective of delirium status. Five of the eight studies found that delirium was associated with PTSD symptoms, either at follow-up or during hospital stay. Three of the eight studies additionally investigated the relationship between age and PTSD symptoms in patients with and without delirium. Two of the three studies found that older age was associated with less PTSD symptoms after hospital discharge, however, due to methodological differences, these results could not be combined.

Conclusion: The prevalence of PTSD following hospital discharge is higher than in general population and appears to be associated with in-hospital delirium. Older age was indicated as a protective factor for PTSD after hospital discharge. However, the literature is considerably heterogenous, with a small number of studies and significant limitations. Future studies exploring the relationship between delirium and subsequent PTSD will inform clinical practice, including prevention and early intervention services, as well as information and support available to at-risk patients, their families and carers.

Keywords: delirium; hospital patients; old age; post-traumatic stress disorder; PTSD

Introduction

Delirium is an acute disorder of fluctuating nature, caused by a medical condition, and characterised by inattention, altered consciousness and impaired cognition [1]. Delirium is particularly prevalent among older hospital inpatients, affecting between 14 – 87% of admissions depending on the hospital setting [2]. Disturbances in thought processes and perceptual abnormalities, although not a core feature of

delirium, are likely to have adverse psychological effects [3]. Patients affected by delirium may show increased suspiciousness, hallucinations, and delusions of persecutory nature, which are likely centred around themes of impeding danger in the immediate environment [4]. These threatening experiences have been shown to be anxiety inducing [5] and consequently it was suggested that delirium can be traumatising in the long term and may result in post-traumatic stress disorder (PTSD) [6].

Previous reviews have attempted to investigate psychological consequences of delirium from a broader perspective, with inconclusive results in relation to PTSD risk [3,7,8]. These reviews, however, presented several limitations, including a predominant focus on intensive care unit (ICU) patients [3,7], and inclusion of a small number of studies directly investigating the relationship between delirium and subsequent PTSD.

Nouwen et al. [3] concluded that there was insufficient evidence to suggest that ICU delirium leads to poorer emotional outcomes, including PTSD risk. However, their review included three studies which directly investigated the impact of delirium on PTSD symptoms post-ICU discharge, with the remaining studies evaluating delusional memories instead of delirium. In their review of risk factors for post-ICU PTSD, Davydow et al. [7] found only one eligible study which directly investigated delirium, suggesting that it was a risk factor for PTSD. Similarly, Langan et al. [8] included one study which investigated PTSD symptoms following delirium as part of a larger investigation into the prevalence of psychiatric symptoms.

This study found no association between delirium and PTSD in non-ICU patients. Consequently, the impact of delirium on PTSD remains unclear.

A review by Martins and Fernandes [9] summarised negative effects of delirium, such as an increased length of hospital stay, functional and cognitive decline, and higher risk of institutionalisation and death. As older age is a well-established risk factor for delirium [2], older adults are more vulnerable to these adverse physical and socio-economic consequences of delirium. The subsequent development of PTSD in older adults may further complicate recovery and prognosis from physical illness. PTSD in later life has been associated with multiple physical and psychological co-morbidities, including coronary heart disease, depression, anxiety [10,11], poorer quality of life and impairments in daily function [12,13]. Consequently, diagnosing PTSD in older adults is of utmost importance, particularly as PTSD symptoms are often underreported in this population [14], further delaying appropriate treatment. Previous research has suggested that older age may act as a protective factor against PTSD following critical illness [15,16]. Other studies, however, indicated physical health issues as an age-specific risk factor for PTSD in older adults [17,18].

To our knowledge this is the first systematic review to directly explore the relationship between delirium and subsequent PTSD in older hospital inpatients. The current review aims to expand on the previous work and address the identified gap by providing a contemporary synthesis of literature on delirium and PTSD across hospital settings, with a specific focus on patients aged 65 years and older. The main objective is therefore twofold: (1) to summarise and critically appraise data on the

relationship between in-hospital delirium and subsequent PTSD in older hospital inpatients, and (2) to explore the relationship between age and PTSD after delirium.

Method

Search strategy

A literature search of Web of Science, EMBASE, PsychINFO, Medline and CINAHL was conducted at the end of January 2019. The search strategy included the following broad text-word or MeSH subject headings: "delirium" OR "acute confusion" AND "posttraumatic stress disorder" OR "post-traumatic stress disorder" OR "PTSD". No restrictions or time limits were applied at this stage. The search was limited to articles written in English. A full strategy for each database is outlined in Appendix B. The references of identified articles were hand-searched for additional relevant studies.

Study selection

All cohort studies which assessed participants for symptoms of delirium during their hospital stay and followed them up to establish the presence of PTSD symptoms post-discharge were eligible for inclusion. The selection was limited to peer-reviewed studies with older patients aged 65 years and over, either exclusively or as part of a larger cohort, and excluded abstracts, case studies, qualitative studies, and review articles. Studies in which delirium occurred as a consequence of drug or alcohol withdrawal or which used a non-validated tool for a diagnosis of delirium or retrospectively diagnosed patients with delirium were also excluded.

Data extraction

Data was extracted for each eligible study in a structured way by recording, where possible, the following information: (1) name of the first author, (2) year of publication, (3) country of origin, (4) type of study design, (5) study setting and population, (6) study inclusion and exclusion criteria, (7) age of participants or age groups, (8) delirium prevalence, (9) delirium assessment measure, (10) length of follow-up, (11) PTSD symptoms prevalence, (12) PTSD symptoms assessment measure, (13) the relationship between PTSD and delirium, and (14) the relationship between age and PTSD (Appendix C). Authors were contacted, where necessary, for further information.

Assessment of study quality

Two authors (KS and AG) used the Newcastle-Ottawa Quality Assessment Form for Cohort Studies [19; Appendix D.1] to assess the risk of bias and methodological quality of selected studies. Any disagreements between authors were discussed until a consensus was reached. Eight criteria were considered for each study: (1) the representativeness of the exposed cohort (i.e. whether the cohort with delirium was representative of average hospital inpatients aged 65 years and over); (2) selection of the non-exposed cohort (i.e. whether patients who did not develop delirium were drawn from the same community as those who did); (3) ascertainment of exposure (i.e. delirium diagnosis); (4) demonstration that participants were free of the outcome (i.e. PTSD) at the start of study; (5) comparability of cohorts on the basis of the design or analysis controlled for confounders; (6) assessment of outcome (i.e.

PTSD); (7) whether the follow up period was sufficient for the outcome (i.e. PTSD) to occur; (8) adequacy of follow-up cohorts (i.e. whether the number lost to follow-up is less than or equal to 20% or whether the description of those lost to follow-up suggested no differences from those who were followed).

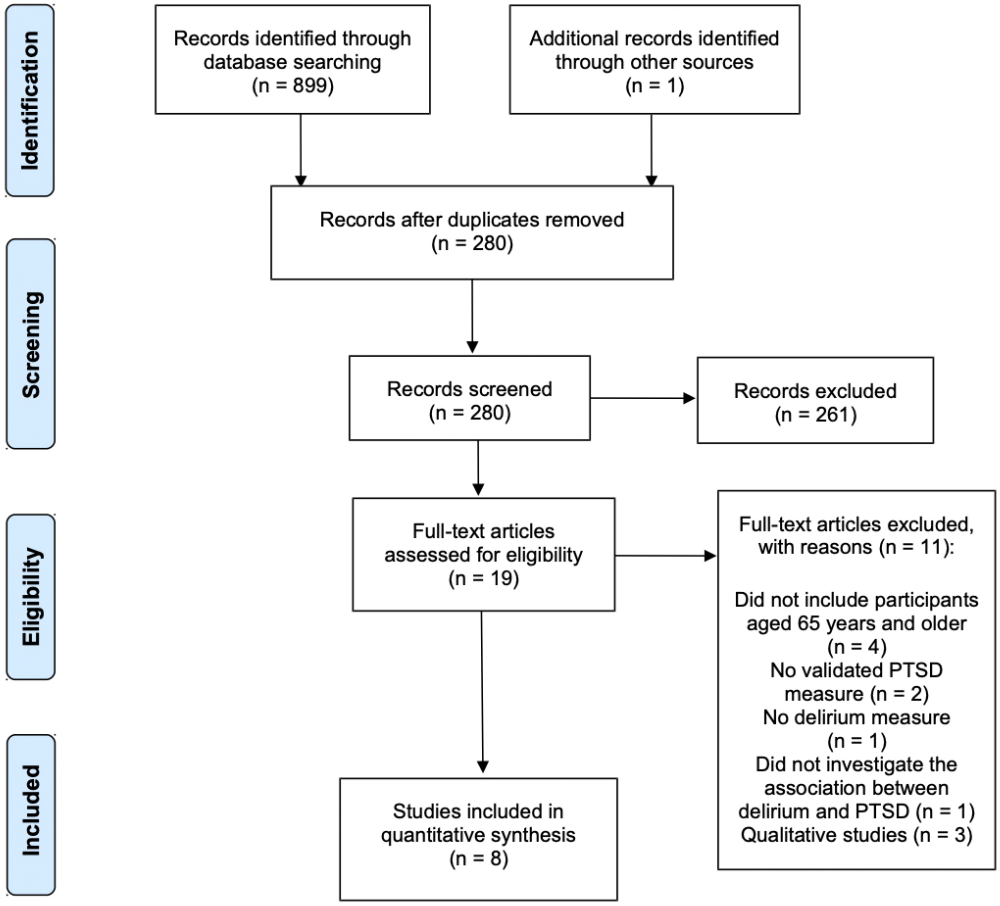
These criteria were divided into the following categories: Selection (1 – 4), Comparability (5), and Outcome (6 – 8). A maximum of one point was given for each criterion within the Selection and Outcome categories, and a maximum of 2 points was awarded for Comparability. Combinations of points within each category were used to categorise studies as having a good, fair, or poor quality (Appendix D.2).

Results

Search results

From 279 records, eight articles met the inclusion criteria and were eligible for data extraction as illustrated in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram below [20; Figure 1; see Appendix E for the full details of PRISMA checklist].

Figure 1. PRISMA flow diagram illustrating the literature search results.



Heterogeneity in the measures and methods of included studies precluded a more direct combination of results in the form of meta-analysis. Consequently, this review will be narrative in format and will be structured around critically appraising the following: (1) study characteristics, including prevalence rates for delirium and PTSD, (2) assessment methods and follow-up periods for PTSD, (3) the relationship between delirium and PTSD following hospital discharge, and (4) the relationship between age and PTSD after delirium.

Study characteristics

Study characteristics and summaries of main findings are presented in Tables 1 and 2. Two studies were conducted in each the USA [23,28] and Germany [21,24], and one study each in the Netherlands [22], Denmark [25], the UK [27], and Iran [28]. Five studies included ICU patients [23,25–28], and three recruited patients from different surgical settings, i.e. elective cardiac surgery [21], hip fracture [22], and general surgery [24]. Four studies included participants who were predominantly aged 65 years and over [21,22,24,28], two those who were aged 60 years and over [25,28], and two investigated age as a factor in a broader range of participants, including those who were 65 years and over [23,26]. The variable reporting of patient characteristics prevented from calculating the mean age across eight studies. The broadest age range was from 20 to 91 years [26].

Delirium prevalence was estimated in two ways, either from the original sample in three studies [21,23,25] or at follow-up in five studies [22,24,26–28]. Delirium rates across studies ranged from 14 –100% [21–28]. Approximately 1106 patients with delirium were included, with sample sizes ranging from 11 – 606, either at the start of the study or follow-up. One study [28] exclusively recruited patients with delirium, therefore the number of participants without delirium was calculated across seven studies, and ranged from 23 – 482. A total of 1080 patients without delirium were included either at the start of the study or follow-up. All studies used validated screening methods to detect delirium. In order of frequency these were as follows: the Confusion Assessment Method-ICU [23,25,26,28], the Confusion Assessment Method [22,24], the Delirium Rating Scale [21], the Delirium Rating

Scale-Revised-98 [22] and the delirium diagnosis made by a specialist consultant [27].

Table 1. Summary of studies in chronological order.

Study	Study population	Total sample size	Age (years)[a]	Number of delirium patients	Delirium prevalence (%)	Delirium Measure	F/U (months)	F/U sample size (%)	Age at F/U (years)[a]
Rothenhäeusler et al. [21]	Elective cardiac surgery patients	34	68.2 ± 9.7	11	32.4	DRS	12	30 (88)	68.1 ± 8.9
Slor et al. [22]	Hip fracture patients	157	–	23 at F/U	43.4	CAM DRS-R-98	3	53 (34)	Delirium: 84.3 ± 5.1 vs. non-delirium: 82.5 ± 6.1
Jackson et al. [23]	Medical and surgical ICU patients	821	61 (51 – 71)	606	73.8	CAM-ICU	3, 12	467 (57)	59 (49 – 69)
Drews et al. [24]	Hospital surgery patients	1277	–	77 at F/U (PTSD: 62 vs. non-PTSD: 15)	14 at F/U (PTSD: 11 vs. non-PTSD: 3)	CAM	3	559 (44)	PTSD: 67 (58 – 76) vs. non-PTSD: 69 (61 – 77)

[a]Ages are reported as mean ± standard deviation (SD) or median age (interquartile range); F/U, follow-up; ICU, Intensive Care Unit; PTSD, Post-Traumatic Stress Disorder; DRS, Delirium Rating Scale; CAM, Confusion Assessment Method; DRS-R-98, Delirium Rating Scale-Revised-98; CAM-ICU, Confusion Assessment Method-ICU.

Table 1. *(continued)*

Study	Study population	Total sample size	Age (years)[a]	Number of delirium patients	Delirium prevalence (%)	Delirium Measure	F/U (months)	F/U sample size (%)	Age at F/U (years)[a]
Svenningsen et al. [25]	Mixed ICU patients	641	–	161	54	CAM-ICU	2, 6	299 (47)	62 (40; 78)
Warlan et al. [26]	Medical and surgical ICU patients	47	–	12 at F/U (High PTSS: 5/7 vs. low PTSS: 7/34)	29 at F/U (High PTSS: 71 vs. low PTSS: 21)	CAM-ICU	0.5 – 1	41 (95)	49 ± 16.3 (20 – 91)
Battle et al. [27]	General ICU patients	–	–	35	18	Diagnosis by ICU consultant	3	198 (N/A)	64 (53 – 73)
Bashar et al. [28]	ARDS ICU patients	209	–	181	100	CAM-ICU	2	181 (87)	65 (62 – 68)

[a]Ages are reported as mean ± standard deviation (SD) or median age (interquartile range) with the exception of Svenningsen et al. where age is reported as median age (10; 90 percentile); F/U, follow-up; ICU, Intensive Care Unit; ARDS, Acute Respiratory Distress Syndrome; PTSD, Post-Traumatic Stress Disorder; PTSS, Post-Traumatic Stress Syndrome; CAM-ICU, Confusion Assessment Method-ICU; N/A, Not Applicable.

Two studies [21,22] reported no baseline age or gender differences between delirious and non-delirious patients (34 patients with delirium and 53 patients without delirium); similar to the Bashar et al. [28] study of patients with short (≤ 40 days) and long (> 40 days) delirium duration (181 participants in total). Five studies did not explore baseline differences specifically in relation to delirium [23–27].

Table 2. Summary of main findings (studies presented in chronological order).

Study type	PTSD measure	PTSD scores[a]	PTSD prevalence (%)	Statistical analysis	Main findings
Rothenhäeusler et al. [21] Prospective cohort	SCID PTSS-10	16.90 ± 5.11	0	Fisher's Exact Test and Mann-Whitney *U*	PTSD during hospital admission was linked to postoperative delirium ($\chi 2$ = 0.92, *df* = 1, p < .05; Fisher's Exact Test *p* = 0.07) and significantly correlated with higher DRS scores (Mann-Whitney *U* = 38.5, *p* < 0.05). At 1-year follow-up the severity of PTSD symptoms returned to the preoperative levels as measured by the mean PTSS-10 score ± SD (baseline: 19.41 ± 9.46 vs. 12 months: 16.90 ± 5.11, *p* = 0.30). At this point no diagnoses of PTSD were made.
Slor et al. [22] Prospective cohort	MINI PTSS-10	Delirium: 19 ± 5.3 vs. non-delirium: 17.8 ± 5.3	0	Mann-Whitney *U*	Patients with and without delirium did not differ on the mean PTSS-10 scores ± SD (delirium: 19 ± 5.3 vs. non-delirium: 17.8 ± 5.3, *p* = 0.27). No diagnoses of PTSD were made at follow-up.
Jackson et al. [23] Prospective cohort	PCL-S DMS-IV	23 (19 – 29) at 3 months. vs. 22 (19 – 28) at 12 months	7	Proportional odds logistic regression	No association was found between duration of delirium and symptoms of PTSD at either 3 months (OR = 1.39, 95%CI = 0.78 – 2.47, *p* = 0.59) or 12 months (OR = 1.92, 95%CI = 1.03 – 3.55, *p* = 0.18). Older age was associated with lower PCL-S scores at 3 months (OR = 0.39, 95%CI = 0.21 – 0.74, *p* = 0.02) and 12 months (OR = 0.43, 95%CI = 0.22 – 0.84, *p* = 0.02).
Drews et al. [24] Prospective cohort	PTSS-14	–	12	Multivariate backward logistic regression	Postoperative delirium was a risk factor for PTSD at follow-up (OR = 2.41, 95%CI = 1.06 – 5.46, *p* = 0.04). No significant age differences were found between PTSD and non-PTSD groups (mean ± SD: 67 ± 11.23 vs. 69 ± 11.52).

PTSD scores are reported as mean ± standard deviation (SD) or interquartile range; PTSD, Post-Traumatic Stress Disorder; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; SCID, Structural Clinical Interview for DSM-IV; PTSS-10, Post-Traumatic Stress Syndrome-10 Questions Inventory; MINI, Mini-International Neuropsychiatric Interview; PCL-S, Post-Traumatic Stress Disorder Checklist-Event Specific Version; PTSS-14, Post-Traumatic Stress Syndrome-14 Questions Inventory; DRS, Delirium Rating Scale; OR, odd ratio; CI, Confidence Interval.

Table 2. *(continued)*

Study type	PTSD measure	PTSD scores	PTSD prevalence (%)	Statistical analysis	Main findings
Svenningsen et al. [25] Prospective cohort	HTQ-IV	Delirium: OR = 1.14 (95%CI = 1.00 – 1.89) vs. non-delirium: OR = 1.19 (95%CI = 1.00 – 1.88) at 2 months Delirium: OR = 1.06 (95%CI = 1.00 – 1.81) vs. non-delirium: OR = 1.06 (95%CI = 1.00 – 1.63) at 6 months	Delirium: 8 vs. non-delirium: 7 at 2 months Delirium: 6 vs. non-delirium: 3 at 6 months	Linear regression	No association was found between ICU-delirium and PTSD symptoms at either 2 months (OR = 1.25, 95%CI = 0.60 – 2.57, $p = 0.68$) or 6 months (OR = 1.31, 95%CI = 0.63 – 2.71, $p = 0.44$) post-ICU discharge.
Warlan et al. [26] Cross-sectional cohort	PTSS-14	29.17 ± 14.59 (15 – 76)	17	Chi-square test	Delirium was associated with the highest PTSS risk ($\chi 2 = 7.4$, $p = 0.02$). No association was found between age and PTSS risk.
Battle et al. [27] Retrospective cohort	UK-PTSS-14	–	27	Multivariate logistic regression	ICU delirium (OR = 10.93, 95%CI = 4.18 – 28.56, $p = 0.001$) and younger age (OR = 0.97, CI = 0.94 – 0.99, $p = 0.03$) were predictors of PTSD at follow-up.
Bashar et al. [28] Prospective cohort	PTSS-14 IES-R	PTSS-14: 69.16 ± 3.93 IES-R: 70.1 ± 4.8	46	Multivariate logistic regression	Delirium was associated with higher mean PTSS-14 scores suggestive of PTSD. PTSS-14 ≥ 49 was significantly correlated with prolonged delirium (>40 days; CI = 1.01 – 1.04, $p = 0.001$).

PTSD scores are reported as mean ± standard deviation (SD) or interquartile range, with the exception of Svenningsen et al. where PTSD scores are reported as odds ratio (OR) with a 95% confidence interval (95%CI); HTQ-IV, Harvard Trauma Questionnaire, Fourth Section; PTSD, Post-Traumatic Stress Disorder; PTSS-14, Post-Traumatic Stress Syndrome-14 Questions Inventory; UK-PTSS-14, Post-Traumatic Stress Syndrome-14 Questions Inventory, UK Version; IES-R, Impact of Event Scale-Revised; ICU, Intensive Care Unit; PTSS, Post-Traumatic Stress Syndrome.

PTSD assessment and follow-up

Three studies excluded participants with a history of PTSD [25,26,28]. One study [21] screened for prior PTSD and another study [23] controlled for psychiatric history. In one study [27] previous psychopathology was associated with PTSD after critical illness (OR = 6.15, 95%CI = 2.60 – 14.54, $p = 0.001$). Two studies [22,24]

did not control for pre-existing PTSD or psychiatric history. None of the studies compared baseline PTSD prevalence rates between patients with and without delirium.

Different methods were used to assess PTSD symptoms at follow-up. Only two studies [21,22] used clinical interviews, including the Structural Clinical Interview for DMS-IV [21] and Mini-International Neuropsychiatric Interview [22]. One study [23] mapped the Post-Traumatic Stress Disorder Checklist-Event Specific Version (PCL–S) onto DSM-IV criteria for PTSD diagnosis. All studies used validated symptom rating scales to screen for PTSD [21–28]. The most common one was the Post-Traumatic Stress Syndrome Inventory (PTSS), which was used in six studies, either as the 10 Questions version [21,22] or the 14 Questions version [24,26–28]. Other measures included the previously mentioned PCL–S [23] and the Harvard Trauma Questionnaire, Fourth Section [25]. One study [28] used the Impact of Event Scale-Revised in combination with the PTSS-14 to assess for symptoms of PTSD. None of the studies specified whether the assessments were blind.

Only two studies [22,25] reported the prevalence rates of PTSD symptoms specifically in patients with delirium, which ranged from 0 to 8%. Other studies [21,23,24,26–28] reported general prevalence rates for PTSD symptoms after hospital discharge irrespective of delirium status. These ranged widely from 0 to 46%.

The length of follow-up from hospital discharge to the assessment of PTSD symptoms varied from 2 weeks [26] to 1 year [21,23]. One study [27] used a retrospective cohort design. Four studies (50%) assessed participants at 3 months

[22–24,27] and three studies [23,25,26] followed participants at two time points. The loss of participants to follow-up varied widely from 5 – 66%. Only three studies [21,26,28] followed up 80% or over of their original sample.

Association between delirium and subsequent PTSD

Four studies found a significant relationship between delirium, including delirium duration [28], and later PTSD symptoms [24,26–28]. These studies followed up a total of 979 participants, of which 305 (31%) were delirious during their hospital admission. The PTSD prevalence rates in these studies ranged from 12 – 46%. One study [21] found that in-hospital PTSD was associated with delirium in a sample of 34 participants, of which 11 (32%) were delirious. This relationship, however, disappeared at one year follow-up, when PTSD symptoms returned to the baseline levels and none of the participants met the diagnostic criteria for PTSD.

Three studies found no association between delirium and subsequent PTSD for either delirium diagnosis [22,25] or delirium duration [23]. These studies included a total of 819 participants at follow up, of which approximately 529 (65%) were delirious during their hospital admission (based either on the estimate from the reported delirium prevalence rates in the original sample or the actual delirium prevalence rates at follow-up). The prevalence of PTSD ranged from 0 – 8% across these samples.

Association between age and subsequent PTSD

Three studies [23,26,27] also investigated the relationship between age and subsequent PTSD, however, this was not specifically in relation to delirium. These

studies were limited to ICU populations. Two studies [23,27] with a total of 665 participants found that older age was associated with less PTSD symptoms at follow up (combined age range across samples: 49 – 73 years). One study [26] with 41 participants found no association between age and later PTSD (age range: 20 – 91 years). However, given methodological differences, a direct comparison of these results is not possible.

Jackson et al. [23] used the PCL–S to measure PTSD symptoms in their large prospective cohort (N = 467) and found that older age was associated with lower PTSD symptoms at 3 months (OR = 0.39, p = 0.02) and at 12 months (OR = 0.43, p = 0.02). However, participants included at follow-up were relatively young (age range: 49 – 69 years). Two studies [26,27] which used the same measure, i.e. PTSS–14, produced contradictory results in relation to the impact of age on PTSD symptoms. Battle et al. [27] recruited a larger number of participants (N = 198) with a relatively small age range (53 – 73 years) and found that younger age predicted higher PTSD symptoms post-discharge (OR = 0.97, p = 0.03). Warlan et al. [26] recruited a smaller number of participants (N = 41) and found no significant association between age and PTSD symptoms across a wide age range (20 – 91 years).

Discussion

The available studies with older participants indicate that there may be a link between delirium and subsequent PTSD. Some studies also suggest that older patients may be less likely to develop PTSD following hospital discharge. These results, however, should be interpreted with caution given the heterogeneity of

available literature, particularly in the choice of patient populations and assessment methods, and a small number of studies with considerable limitations, such as incomplete follow-up and inconsistent adjustments for confounding variables.

Four of the eight studies [24,26–28] found a statistically significant relationship between delirium and PTSD symptoms following hospital discharge in general surgery and ICU patients. An additional study of elective cardiac surgery patients [21] found that PTSD is significantly associated with delirium during hospital admission. However, at follow-up PTSD symptoms returned to the baseline levels and none of the participants met the criteria for PTSD diagnosis. Three of the eight studies [22,23,25] found no association between delirium and PTSD in hip fracture and ICU patients. Studies which indicated that delirium was a risk factor to subsequent PTSD had a larger number of participants (N = 1013 vs. N = 819), lower delirium prevalence rates (31% vs. 65%) and higher PTSD prevalence rates (range: 12 – 46% vs. 0 – 8%) as compared to studies which showed no association between delirium and later PTSD. Overall, rates of PTSD across studies were higher than the previously reported lifetime PTSD prevalence rate of 2.5% in older adults [29].

Only three of the eight studies [23,26,27] investigated the relationship between age and PTSD at follow-up, however, this was not specifically in relation to delirium. These studies were limited to ICU populations. Two studies [23,27] found that older participants reported significantly less PTSD symptoms after hospital discharge. One study [26] found no association between age and subsequent PTSD risk. Studies which indicated that older age may protect from subsequent risk of PTSD included a larger number of participants (N = 665 vs. N = 41), who were

generally older (age range: 49 – 73 vs. mean age: 49 ± 16.3), and reported higher PTSD prevalence rates (range: 7 – 27% vs. 17%). Previously, it was suggested that older patients may perceive their hospital stay as less stressful due to a higher number of physical co-morbidities and history of hospital admissions [30]. Given a small number of existing studies, further research is needed to determine whether older age is as a protective factor in the development of PTSD following hospital discharge.

The relative strength of the present review is its focus on older hospital patients. As older adults are at an increased risk of delirium and consequently its adverse effects, a better understanding of emotional consequences of delirium in this population is of clinical relevance. This review is the first one to specifically explore the relationship between delirium and subsequent PTSD in participants aged 65 years and over across hospital settings. As part of this review, we also investigated the association between age and PTSD following hospital discharge. The present review included only one of the same articles from the previous reviews [22], and additionally identified seven new studies [21,23–28]. Previous reviews showed contradictory results, with two reviews [3,8] finding no relationship between delirium and PTSD, and one identifying delirium as a possible risk factor for subsequent PTSD [7]. These reviews, however, discussed the link between delirium and later PTSD as part of larger investigations into either risk factors for PTSD following critical illness [7] or psychological consequences of delirium in ICU [3] and non-ICU populations [4]. Consequently, previous reviews only included a small

number of eligible studies which directly investigated the link between delirium and subsequent PTSD.

The present review had some limitations. The search focused exclusively on peer-reviewed studies in English. Due to heterogeneity of eligible studies, a meta-analysis was not carried out. The majority of studies showed poor methodological quality, as measured by the Newcastle-Ottawa Quality Assessment Form for Cohort Studies [19]. The quality assessment ratings were complicated as none of the studies exclusively investigated the relationship between in-hospital delirium and subsequent PTSD. Instead, studies investigated a broad range of psychosocial factors [21,22,23,28] or predictors of PTSD [24–27] following hospital admission. Across studies these outcomes were measured in specific patient populations, i.e. ICU and surgical, which also contributed to lower quality ratings. Other points were deducted due to issues with accounting for participants lost to follow-up, unclear blinding of assessment outcomes, and incomplete control of confounding variables, e.g. pre-existing mental health issues and history of PTSD at the onset of the study.

The available studies used heterogenous PTSD assessment methods. Only three studies [21–23] mapped PTSD symptoms onto the DSM diagnostic criteria. It was previously suggested that reliance on self-report measures may over-estimate PTSD prevalence rates [31]. However, as PTSD is characterised by avoidance of trauma-related triggers, patients who develop PTSD after hospital admission might opt out from participating in the follow-up assessments [32]. Individuals with the highest disease burden, who may also be at an increased risk of PTSD, might have died before follow-up, particularly given the high mortality rates in delirium [8].

Future studies should account for participants lost to follow-up and incorporate diagnostic criteria to improve the prevalence estimates of PTSD following delirium.

As previously discussed, all studies recruited participants from specific patient populations, i.e. ICU and surgical, which likely limits the generalisability of current findings. ICU and surgical patients may be predisposed to PTSD either due to the nature of their critical illness, severity of their injury or because of invasive treatment procedures [32]. The majority of studies found a significant association between delirium and subsequent PTSD, despite not controlling for the primary illness aetiology and treatment procedures. This result further strengthens the argument that delirium may be a risk factor for PTSD, however, additional data is required to explore the causal mechanism behind this. Future studies should introduce more variety in patient populations to expand on the present findings in ICU and surgical settings.

Despite the above discussed limitations, the current review has a number of clinical implications. It highlights the high prevalence of PTSD symptoms after hospital admission in older adults. The extent to which delirium is a risk factor for PTSD needs to be further investigated, however, as patients continue to rely on their primary care providers after hospital discharge, it is important to raise the awareness of potential psychological consequences of delirium and predictors of PTSD among professionals. In the future more active and consistent screening process for PTSD will lead to early identification of at-risk individuals and more appropriate treatments. This will ultimately enhance patient care and improve clinical outcomes. If delirium is a risk factor for PTSD, it will be of clinical importance to develop

information and support services for older patients at risk of delirium, including their families and carers. Further consideration of delirium in theoretical models of PTSD will lead to more appropriate treatment options for hospital patients, which can extend to psychological education, counselling, coping strategies and psychological interventions. Follow-up clinics focused on evaluating physical and psychological consequences of hospital admission will likely improve the already existing early intervention and prevention efforts. Present findings also indicate that older participants may experience less PTSD symptoms after hospital discharge. If further evidence supports these preliminary results, it will be important to determine whether this apparent decrease in PTSD symptoms in older adults is due to lack of awareness and issues with underreporting [10] or unique age-related differences which buffer the negative emotional consequences of physical illness.

PTSD in hospital settings can also follow an exposure to perceived life-threatening stressors which induce high levels of fear [5]. In the cognitive model of PTSD, Ehlers and Clark [33] proposed that PTSD may arise due to the compromised processing of a traumatic event, which is manifested by impairments in autobiographical memories, e.g. poor recall of details and inadequate contextualisation of the traumatic memory. Delusions and confusion associated with delirium likely lead to fragmented memories and therefore may impact on memory encoding [34]. Previous studies have indicated that amnesia for the early period of hospitalisation [35] and higher recall of delusional memories [36,37] increase the PTSD risk and severity of PTSD symptoms. The available literature on the risk of PTSD post-delirium has not measured disturbances in factual memories, which may

explain the heterogeneity in findings. Understanding the implications of delusions, especially of persecutory nature, and hallucinations associated with delirium, is of great importance as it may underline the suggested link between delirium and the development of PTSD [22].

Conclusion

Within the context of limited research, in-hospital delirium appears to be a risk factor in the development of PTSD. Preliminary evidence also suggests that older individuals experience less PTSD symptoms after hospital discharge in comparison to younger adults. Further research, however, is required to establish the accuracy of the present findings. We hope that this review will bring awareness to the importance of further investigating psychological outcomes of delirium and risk factors for PTSD in older adult populations. If delirium plays a role in the development of PTSD symptoms after hospital discharge, this will have implications for current patient care, particularly in relation to early identification of at-risk patients and development of appropriate information services and psychological treatments.

Funding

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Acknowledgements

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Appendix A: Summary of relevant submission guidelines for *Journal of Psychosomatic Research*

JOURNAL OF PSYCHOSOMATIC RESEARCH

Official Journal of the European Association of Psychosomatic Medicine and affiliated with the International College of Psychosomatic Medicine.

The *Journal of Psychosomatic Research* is a multidisciplinary research journal covering all aspects of the relationships between **psychology** and **medicine**. The scope is broad and ranges from basic human biological and psychological research to evaluations of **treatment** and services. Papers will normally be concerned with **illness** or **patients** rather than studies of healthy populations. Studies concerning special populations, such as the elderly and children and adolescents, are welcome. In addition to peer-reviewed original papers, the journal publishes editorials, reviews, and other papers related to the journal's aims.

AUDIENCE

Basic and clinical researchers in psychiatry.

IMPACT FACTOR

2018: 2.722 © Clarivate Analytics Journal Citation Reports 2019

ABSTRACTING AND INDEXING.

Web of Science
Current Contents - Social & Behavioral Sciences Research Alert
ASSIA
BIOSIS Citation Index
Elsevier BIOBASE
Embase
PubMed/Medline
PsycINFO
Sociological Abstracts
Current Contents
Science Citation Index
Scopus

GUIDE FOR AUTHORS

Review Articles

Review papers are normally systematic reviews of 4000-5000 words (Introduction through Discussion). Authors are advised to consult the Editor with an outline before submitting a review.

Contact details for submission

Editorial Office E-mail: JPsychosomRes@healthcare.uiowa.edu

Submission checklist

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details: • E-mail address
• Full postal address

All necessary files have been uploaded:
Manuscript:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
• Ensure all figure and table citations in the text match the files provided • Indicate clearly if color should be used for any figures in print *Graphical Abstracts / Highlights files* (where applicable)

Supplemental files (where applicable)

Further considerations
• Manuscript has been 'spell checked' and 'grammar checked'
• All references mentioned in the Reference List are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Internet)
• A competing interests statement is provided, even if the authors have no competing interests to declare
• Journal policies detailed in this guide have been reviewed
• Referee suggestions and contact details provided, based on journal requirements

Cover letter

Each manuscript should be accompanied by a Cover Letter. In addition to a brief description of the article being submitted and its relevance to likely readers of the journal, the Cover Letter should include a statement that (1)authors of this article had access to all study data, are responsible for all contents of the article, and had authority over manuscript preparation and the decision to submit the manuscript for publication, (2) that all listed authors have approved of the submission of the manuscript to the journal, and (3) an explanation of the relationship of the submitted paper to any other published, submitted or proposed papers reporting the same or overlapping data. You may submit the completed letter online.

Title Page

This should contain (a) the title of the article; (b) a short running head; (c) name of department where the work was conducted; (d) names of the each author with highest

academic degree; (e) name, address, phone and fax of author responsible for correspondence and to whom requests for reprints should be addressed.

Structured Abstract

This should be subdivided under the headings **Objective, Methods, Results, and Conclusion** and should not exceed 250 words.

Keywords

Up to six keywords should be listed in alphabetical order after the abstract. These terms should optimally characterize the paper to facilitate choice of peer reviewers.

Article Structure

The text should be divided into sections with main headings: Introduction, Method, Results and Discussion and, in total, these sections should not normally be greater than 4000 words in length.

Acknowledgements

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. Acknowledgements must include mention of any source of funding outside the basic funding of the host institution (see *Role of the funding source* above). List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Tables

Number tables consecutively in accordance with their appearance in the text. Place footnotes to tables below the table body and indicate them with superscript lowercase letters. Avoid vertical rules. Be sparing in the use of tables and ensure that the data presented in tables do not duplicate results described elsewhere in the article. Each should be on a separate sheet, numbered consecutively in Arabic numerals.

Figures

Each should be on a separate sheet, and numbered consecutively. Captions should be on a separate sheet. The number of illustrations should be kept to a minimum. Colour illustrations are not normally acceptable. Authors may be asked to support the costs of colour reproduction.

Competing Interest Statement

All manuscripts should include a competing interests declaration that should be in the following format:

'All authors have completed the Unified Competing Interest form at http://www.icmje.org/coi_disclosure.pdf and declare that(1)[authors] received support from

[name of company or other competing interest] for the submitted work;(2)[authors] have [specify relationships] with [name of companies or other competing interests] in the past three years that could be perceived to constitute a conflict of interest;(3)spouses, partners, or children of [authors] have [specified] financial relationships that may be relevant to the submitted work; and(4)[authors] have [specify type of relationship] non-financial interests that may be relevant to the submitted work. 'If there are no competing interests to report, the authors should state, 'The authors have no competing interests to report'.

Appendices

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Highlights

Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view example Highlights on our information site.

Abbreviations

Keep abbreviations to a minimum and avoid their use in the abstract. Spell out each abbreviation in the text the first time that it is used. Ensure consistency of abbreviations throughout the article.

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Figure captions

Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

References

These should be numbered consecutively in the text in the order in which they are first mentioned and be so denoted in the list. Their form should be that adopted by the US National Library of Medicine, as used in the Index Medicus and as recommended in Huth EJ, Medical Style and Format.

Reference links

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is highly encouraged.

A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. Journal of Geophysical Research, https://doi.org/10.1029/2001JB000884. Please note the format of such citations should be in the same style as all other references in the paper.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Reference formatting

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/ book title, chapter title/article title, year of publication, volume number/book

chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style

Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
Example: '..... as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....'
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.
Examples:
Reference to a journal publication:
[1] J. van der Geer, J.A.J. Hanraads, R.A. Lupton, The art of writing a scientific article, J. Sci. Commun. 163 (2010) 51–59. https://doi.org/10.1016/j.Sc.2010.00372.
Reference to a journal publication with an article number:
[2] Van der Geer, J., Hanraads, J.A.J., Lupton, R.A., 2018. The art of writing a scientific article. Heliyon. 19, e00205. https://doi.org/10.1016/j.heliyon.2018.e00205.
Reference to a book:
[3] W. Strunk Jr., E.B. White, The Elements of Style, fourth ed., Longman, New York, 2000.
Reference to a chapter in an edited book:
[4] G.R. Mettam, L.B. Adams, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), Introduction to the Electronic Age, E-Publishing Inc., New York, 2009, pp. 281–304. Reference to a website:
[5] Cancer Research UK, Cancer statistics reports for the UK.
http://www.cancerresearchuk.org/ aboutcancer/statistics/cancerstatsreport/, 2003 (accessed 13 March 2003).
Reference to a dataset:
[dataset] [6] M. Oguro, S. Imahiro, S. Saito, T. Nakashizuka, Mortality data for Japanese oak wilt disease and surrounding forest compositions, Mendeley Data, v1, 2015.
https://doi.org/10.17632/ xwj98nb39r.1.

Journal abbreviations source

Journal names should be abbreviated according to the List of Title Word Abbreviations.

Appendix B: Full search strategy

Web of Science Search Strategy

1. delirium
2. “acute confusional state”
3. 1 or 2
4. “post-traumatic stress disorder”
5. PTSD
6. 4 or 5
7. 3 and 6

EMBASE Search Strategy

1. exp delirium/
2. delirium.tw
3. acute confusion/
4. acute confusion.tw
5. 1 or 2 or 3 or 4
6. Postraumatc stress disorder/
7. Post-traumatc stress disorder.tw
8. Postraumatc stress disorder.tw
9. PTSD.tw
10. 6 or 7 or 8 or 9
11. 5 and 10

PsycINFO Search Strategy

1. delirium/
2. Delirium.tw
3. Acute confusion.tw
5. 1 or 2 or 3
6. postraumatc stress disorder/
7. Postraumatc stress disorder.tw

8. Post-traumatc stress disorder.tw

9. PTSD.tw

10. 6 or 7 or 8 or 9

11. 5 and 10

MEDLINE Search Strategy

1. Delirium.tw

2. Exp Confusion/

3. Acute confusion.tw

4. 1 or 2 or 3

5. Post-traumatc stress disorder.tw

6. Posttraumatc stress disorder.tw

7. PTSD.tw

8. 5 or 6 or 7

9. 4 and 8

CINAHL Search Strategy

delirium or acute confusion or confusion or disorientation AND ptsd or post traumatic stress disorder or posttraumatic stress disorder or post-traumatic stress disorder

Appendix C: Data extraction checklist

Domain	Extracted information
Study characteristics	• Name of first author • Year of publication • Country of origin • Type of study design • Study setting • Study population
Eligibility criteria	• Study inclusion criteria • Study exclusion criteria
Outcomes	• Age of participants/age groups • Delirium prevalence • Delirium assessment measure • Length of follow-up • PTSD symptoms prevalence • PTSD symptoms assessment measure • Relationship between PTSD and delirium • Relationship between age and PTSD

Appendix D: Quality assessment

Appendix D.1: Newcastle-Ottawa Quality Assessment Form for Cohort Studies

Newcastle-Ottawa Quality Assessment Form for Cohort Studies

Note: A study can be given a maximum of one star for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for Comparability.

Selection

1) Representativeness of the exposed cohort
    a) Truly representative (one star)
    b) Somewhat representative (one star)
    c) Selected group
    d) No description of the derivation of the cohort
2) Selection of the non-exposed cohort
    a) Drawn from the same community as the exposed cohort (one star)
    b) Drawn from a different source
    c) No description of the derivation of the non exposed cohort
3) Ascertainment of exposure
    a) Secure record (e.g., surgical record) (one star)
    b) Structured interview (one star)
    c) Written self report
    d) No description
    e) Other
4) Demonstration that outcome of interest was not present at start of study
    a) Yes (one star)
    b) No

Comparability

1) Comparability of cohorts on the basis of the design or analysis controlled for confounders

a) The study controls for age, sex and marital status (one star)

b) Study controls for other factors (list)

_____ (one star)

c) Cohorts are not comparable on the basis of the design or analysis controlled for confounders

Outcome

1) Assessment of outcome

a) Independent blind assessment (one star)

b) Record linkage (one star)

c) Self report

d) No description

e) Other

2) Was follow-up long enough for outcomes to occur

a) Yes (one star)

b) No

Indicate the median duration of follow-up and a brief rationale for the assessment above: _____

3) Adequacy of follow-up of cohorts

a) Complete follow up- all subject accounted for (one star)

b) Subjects lost to follow up unlikely to introduce bias- number lost less than or equal to 20% or description of those lost suggested no different from those followed. (one star)

c) Follow up rate less than 80% and no description of those lost

d) No statement

Thresholds for converting the Newcastle-Ottawa scales to AHRQ standards (good, fair, and poor):

Good quality: 3 or 4 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain

Fair quality: 2 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain

Poor quality: 0 or 1 star in selection domain OR 0 stars in comparability domain OR 0 or 1 stars in outcome/exposure domain

Appendix D.2: Newcastle-Ottawa Quality Assessment Form for Cohort Studies

Study	Selection				Comparability	Outcome			Standard
	Representativeness of exposed cohort	Selection of non-exposed cohort	Exposure ascertainment	Outcome freedom at exposure	Comparability of cohorts	Outcome assessment	F/U length	Adequacy of cohorts at F/U	Appraisal of study quality
Rothenhäeusler et al. [21]	(c)	(a) *	(b) *	(a) *	(b)*	(c) (e)	(a) *	(b) *	Fair
Slor et al. [22]	(c)	(a) *	(b) *	(b)	(a) (b) **	(c) (e)	(a) *	(c)	Poor
Jackson et al. [23]	(c)	(a) *	(b) *	(b)	(a) (b) **	(c) (e)	(a) *	(c)	Poor
Drews et al. [24]	(c)	(a) *	(b) *	(b)	(a) (b) **	(c) (e)	(a) *	(c)	Poor
Svenningsen et al. [25]	(c)	(a) *	(b) *	(a) *	(c)	(c)	(a) *	(c)	Poor
Warlan et al. [26]	(c)	(a) *	(a) *	(a) *	(c)	(c)	(b)	(b) *	Poor
Battle et al. [27]	(c)	(a) *	(a) *	(b)	(a) (b) **	(c)	(a) *	(d)	Poor
Bashar et al.[a] [28]	(c)	N/A	(b) *	(a) *	(a) (b) **	(c)	(a) *	(b) *	Fair

F/U, follow-up; [a] All participants were exposed to delirium, cohorts were determined by delirium duration (<40 delirium days = low delirium group, ≥40 delirium days = high delirium group).

Appendix E: PRISMA checklist

Section/ topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Page 8 main text
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Page 8 and 9 main text
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	Page 9 – 11 main text
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	Page 11 main text
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Protocol prepared but not published
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	Page 12 main text
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	Page 12 main text
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix B and page 12 main text
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	Page 12 main text
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	Page 12 and 13 main text
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Appendix C and page 12 and 13 main text
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Appendix D and page 13 and 14 main text
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A

Section/ topic	#	Checklist item	Reported on page #
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	N/A
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Page 14 main text and figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Page 16 – 20 main text
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Appendix D
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Page 16 – 23 main text
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Page 23 – 29 main text
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	Page 26 – 28 main text
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Page 29 main text
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Page 29 main text

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

Post-traumatic stress disorder (PTSD) symptoms in later life: the contribution of cumulative trauma exposure, emotion regulation, group identifications, and socioeconomic deprivation

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Post-traumatic stress disorder (PTSD) symptoms in later life: the contribution of cumulative trauma exposure, emotion regulation, group identifications, and socioeconomic deprivation

Objectives: Around three in four older adults report exposure to at least one traumatic event, however, only a small proportion develop PTSD. Making a PTSD diagnosis in later life can be challenging for a number of reasons, including underreporting of trauma history and misattribution of symptoms to a physical illness. Research on PTSD in older adults remains scarce and little is known about complex factors involved in the development and maintenance of PTSD. The present study aimed to extend findings from younger adult populations by examining the predictive utility of emotion regulation strategies, cumulative trauma exposure, group identifications, and socioeconomic deprivation on current PTSD symptoms in older adults.

Method: This was a cross-sectional study which recruited an opportunistic sample of older adults in receipt of psychological treatment for common mental health disorders. Following screening for cognitive impairment with the Montreal Cognitive Assessment (MoCA), a total of 88 participants provided basic demographic information and completed self-report measures of traumatic events (Trauma History Questionnaire; THQ), emotion regulation difficulties (Difficulties in Emotion Regulation Scale; DERS), PTSD symptoms (Civilian Version of the PTSD Checklist; PCL-C) and group identifications (Group Identification Scale; GIS). Socioeconomic deprivation was determined with the Scottish Index of Multiple Deprivation (SIMD).

Results: Preliminary correlational analyses showed that higher PTSD symptoms were associated with greater total exposure to traumatic events (r = 0.47, $p \leq 0.01$), limited access to emotion regulation strategies (r = 0.71, $p \leq$ 0.01), lower number of group identifications (r = –0.34, $p \leq 0.01$) and higher degree of socioeconomic deprivation (r = –0.24, $p \leq 0.01$). However, further hierarchical regressions revealed that only limited emotion regulation strategies (β = 0.63, $p \leq 0.001$) and cumulative traumatic experiences (β = 0.27, $p \leq 0.001$) significantly contributed to PTSD symptoms. The final model with these two predictor variables explained 58% variability in PTSD scores.

Conclusion: Limited access to emotion regulation strategies may be a vulnerability factor in the development and maintenance of PTSD symptoms in older adults. There also appears to be a dose-response relationship between cumulative trauma exposure and severity of PTSD symptoms in later life. Clinical implications of these findings for older adults seeking psychological treatment are discussed. These include the importance of taking a comprehensive trauma history irrespective of the referral reason, psychological education approaches and further development of psychological interventions specifically targeting emotion regulation strategies.

Keywords: cumulative trauma, emotion regulation, old age, post-traumatic stress disorder, PTSD

Introduction

As the median age across the world increases, older adults are becoming a growing proportion of people utilising mental health services (Böttche, Kuwert &

Knaevelsrud, 2011). Consequently, developing a better understanding of factors which determine the well-being of older individuals is crucial, with the impact of trauma being identified as one area of particular concern (Lapp, Agbokou & Ferreri, 2011).

Around three in four older adults report exposure to at least one traumatic event (Frans, Rimmö, Åberg, & Fredrikson, 2005), however, only a minority of these suffer long-term psychological consequences, including post-traumatic stress disorder (PTSD). As specified in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; American Psychiatric Association, 2013), PTSD occurs following an exposure to a life threatening event and is characterised by marked psychological distress or impairment in functioning due to associated changes in mood, cognition and behaviour. The main diagnostic features of PTSD include repeated re-experiences of the traumatic event in the form of e.g. intrusive thoughts, flashbacks or nightmares, avoidance of trauma-related reminders, and increased arousal, as indicated by e.g. irritability, hypervigilance or sleeping difficulties. To meet the diagnostic criteria, symptoms must be linked to the initial trauma and last for at least one month. A meta-analysis estimated that the lifetime prevalence of PTSD in later life is approximately 2.5% (Volkert, Schulz, Härter, Wlodarczyk & Andreas, 2013). A six-month prevalence for subthreshold symptoms of PTSD in older adults has been reported to be around 13% (van Zelst, de Beurs, Beekman, Deeg, & van Dyck. 2003).

Some evidence suggests that PTSD can be exacerbated by stressors associated with ageing, such as changes in social roles and function, e.g.

bereavement (Elklit & O'Connor, 2005) and retirement (Port, Engdahl, & Frazier, 2001), health issues (Chung, Berger, Jones, & Rudd, 2008; Chung et al., 2009), and cognitive decline (Floyd, Rice, & Black, 2002). PTSD in later life has been associated with an increased risk of health conditions, such as coronary heart disease (Kubzansky, Koenen, Spiro, Vokonas, & Sparrow, 2007), and multiple psychiatric co-morbidities, including depression and anxiety (Spitzer, Barnow, Völzke, Freyberger, & Grabe, 2008). Older individuals with PTSD symptoms report significant impairments in daily functioning, greater health problems, less satisfaction with life and the quality of their care (e.g. Solomon, Helvitz, & Zerach, 2009; van Zelst, de Beurs, Beekman, van Dyck, & Deeg, 2006).

Early recognition and treatment will likely mitigate the negative consequences of PTSD. However, making the PTSD diagnosis in later life can be challenging for a number of reasons, including symptom overlap between PTSD and other conditions, and underreporting of PTSD symptoms and trauma history due to lack of awareness or self-stigma (Kaiser, Cook, Glick, & Moye, 2019). Even if the symptoms of PTSD are reported, they may be misperceived as part of a normal ageing process or a somatic illness (van Zelst et al., 2003), further delaying appropriate treatment.

There has been an increased interest in understanding the effects of cumulative trauma given the widespread prevalence of multiple traumatic events. Prior exposure to trauma was hypothesised to increase the susceptibility to the effects of subsequent stressful events (Solomon & Ginzburg, 1998). Low grade life stressors, which normally should have no effect, have been reported to trigger PTSD

in older adults with previous trauma history (Boe, Holgersen, & Holen, 2010). Preliminary evidence suggests that greater lifetime exposure to trauma is a stronger predictor of PTSD symptoms among community-dwelling older adults than the severity of a single event, with the experience of multiple events involving physical violence and assault being particularly detrimental to mental well-being (Ogle, Rubin, & Siegler, 2014).

In recent years research has focused on individual differences likely to account for heterogeneity of responses to traumatic events, particularly the way individuals manage their emotional responses. A recent meta-analysis has found a strong association between general difficulties in emotion regulation and PTSD symptoms across different samples of younger adults (Seligowski, Lee, Bardeen, & Orcutt, 2015). Less is known about the impact of emotion regulation difficulties on PTSD in older adults despite the emerging evidence that emotion regulation strategies may change with age. The socio-emotional selectivity theory (SST; Carstensen, Isaacowitz, & Charles, 1999) proposes that with greater awareness of a limited time perspective, older adults are motivated to prioritise emotional goals. Urry and Gross (2010) extended this theory by suggesting that the selection and optimisation of emotion regulations strategies in later life helps to compensate for age-related changes in the available social, cognitive, and physical resources. In order to manage negative emotional arousal, it was suggested that older adults may utilise more passive or less taxing strategies, including acceptance, withdrawal, suppression and denial (Nolen-Hoeksema, & Aldao, 2011; Schirda, Valentine, Aldao, & Prakash, 2016). Brummer, Stopa, and Bucks (2014) found that older adults

make greater use of suppression as an emotion regulation strategy, as compared to younger adults, without reporting higher levels of distress. Further evidence suggests that, in contrast to younger adults, older people favour distraction-based strategies to regulate their emotional response to aversive materials, which appeared to facilitate their affective well-being (Scheibe, Sheppes, & Staudinger, 2015). Other studies found a general reduction in using emotion regulation strategies with age (Nolen-Hoeksema, & Aldao, 2011; Schirda, et al., 2016).

Historically, theoretical models of PTSD predominantly incorporated the individual-centred perspective, e.g. the role of negative appraisals following trauma in a cognitive model of PTSD (Ehlers & Clark, 2000). More recently, the importance of social and environmental context in understanding the aetiology of PTSD has gained increased attention (Maercker & Horn, 2013; Vogt, Erbes, & Polusny, 2017). Poor social support following trauma has been identified as one of the strongest risk factors associated with PTSD in two meta-analyses (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). Different aspects of social support have been implicated in the development and course of PTSD, including the quality, size, diversity and the perceived helpfulness of the support network (Charuvastra & Cloitre, 2008; Vogt, Erbes, & Polusny, 2017).

A sense of belonging to a specific group, defined as group identification, may be particularly important in predicting psychological distress. Evidence suggests that people are more likely to offer and accept support from people they identify with and to interpret this support positively (e.g. Haslam, Jetten, O'Brien, & Jacobs, 2004; Levine, Prosser, Evans, & Reicher, 2005). Multiple group identifications are likely to

buffer the negative consequences of stressful events by decreasing people's vulnerability to changes in their social network (Haslam et al., 2008; Kawachi & Berkman, 2001), and have been shown to improve adjustment to life transitions (Steffens, Cruwys, Haslam, Jetten, & Haslam, 2016). Within a general population, greater number of group identifications better predicted subjective symptoms of depression than social contact alone (Sani, Herrera, Wakefield, Boroch, & Gulyas, 2012), and was associated with a reduced risk of depression relapse (Cruwys et al., 2013). In clinical samples, individuals who identified with more groups reported lower levels of psychological distress (Cientanni et al., 2017) and higher levels of well-being (Haslam et al., 2008).

Social support has not been specifically studied in older adults with trauma history, however, the significance of social connections in later life has been widely reported, particularly in relation to improved mental and physical well-being, including satisfaction with life, general levels of happiness and self-esteem, as well as physical and cognitive ability (e.g. Glass, De Leon, Bassuk, & Berkman, 2006; Golden, Conroy, & Lawlor, 2009). Multiple group identifications may be particularly relevant in later life due to age-related changes and transitions which impact on social networks, e.g. bereavement and retirement.

As PTSD is among only a few disorders defined by its aetiology (i.e. an exposure to trauma), understanding environmental factors impacting on the experience of PTSD is crucial. It has been suggested that the neighbourhood context may affect PTSD symptoms in various ways, including premorbid vulnerability to trauma (Nurius, Uehara, & Zatzick, 2013), the number and severity of traumatic

experiences within communities, e.g. crime and assaultive violence (Wilkinson & Pickett, 2007), perceived threat levels (Collins & Marrone, 2015), as well as prognosis and coping following trauma, e.g. the ability of social networks to buffer stress (Ross & Jang, 2000). Previous studies have begun to explore the impact of neighbourhood characteristics, including socioeconomic deprivation, on psychopathology, however, the focus has been predominantly on depression, schizophrenia, and substance abuse (Monson, Paquet, Daniel, Brunet, & Caron, 2016).

Research on PTSD in later life remains scarce and little is known about complex factors affecting the experience of PTSD in older adults. This is in spite of an emerging evidence of age-related differences in symptom presentations, coping preferences, and ageing related stressors, such as role transitions, changes in social networks, and loss of cognitive and functional abilities. The aforementioned evidence suggests that prior exposure to multiple traumatic events and emotion regulation difficulties likely increase vulnerability to PTSD. Research also indicates the social and environmental context is of relevance in the development and maintenance of PTSD symptoms. However, no study to date has looked at the relationship between cumulative trauma exposure, emotion regulation, group identifications, socioeconomic deprivation, and PTSD symptoms in later life. The present study aims to address this gap in the literature by exploring how these factors relate to each other, and their relative contributions to PTSD symptoms in a clinical sample of older adults seeking psychological treatment for common mental health disorders. As part of this investigation, we also explore what types of traumatic

events and which aspects of emotion regulation are most strongly associated with PTSD symptoms in later life.

Method

Participants and procedure

Participants were recruited across the Older People Psychological Therapies services in NHS Tayside between November 2018 and May 2019. Individuals aged 65 years and older were eligible to participate if they were: (1) in receipt of psychological treatment for anxiety, depression, or PTSD, (2) able to communicate in English and (3) give consent. Exclusion criteria were: (1) cognitive impairment (as indicated by a MoCA score of ≤ 20), (2) ongoing investigations for or a confirmed diagnosis of dementia, (3) a current episode of a serious mental illness (e.g. psychosis), (4) ongoing substance misuse, and (5) serious risk issues (e.g. risk of harm to self and others, suicidality). The study was approved by the North of Scotland Research Ethics Committee 1 (REC reference: 18/NS/0089; Appendix G).

Suitable participants were identified and approached about the study by a psychologist involved in their care (Participant Information Sheet; Appendix H). Participants who expressed interest in the study provided consent for one of the researchers (KS) to contact them (Appendix I.1). They were subsequently invited to attend a 45-minute, face-to-face appointment to complete the relevant study measures (Appendix J). Whenever possible, the appointment was arranged at the usual treatment location. The consent to participate in the study was reaffirmed at the appointment with the researcher (Appendix I.2). As part of the consenting procedure,

participants were informed that a satisfactory score on a brief cognitive screening measure (i.e. MoCA ≤ 20) was required before proceeding with the remaining measures. All referred participants met this study inclusion criterion.

The sample consisted of 88 participants (69% females), with mean age of 72.17 years (*SD* = 4.67). Mean MoCA score was 27 (*SD* = 2.26). The majority of participants were married (49%), followed by those who were widowed (26%), separated or divorced (22%), and never married (3%). The highest academic qualifications were as follows: a degree or higher degree (19%), a diploma (18%), an apprenticeship or other vocational qualifications (26%), secondary school qualifications (17%), and no qualifications (19%). Participants were predominantly retired (93%). 75% lived in the least deprived areas as measured by the Scottish Index of Multiple Deprivation (quintiles 3 – 5; SIMD; Scottish Executive, 2016). 67% reported receiving previous psychological or psychiatric outpatient treatment and 28% inpatient treatment. The majority of participants (59%) reported currently taking psychotropic medication for their mental health issues. The median duration of the current episode of mental illness was 2 years (range: 1 month – 70 years). Data was missing for one participant who did not complete the emotion regulation questionnaire (DERS).

Measures

Cognitive impairment

The Montreal Cognitive Assessment (MoCA; Nasreddine, et al., 2005) briefly screens for mild cognitive impairment (MCI) by assessing several cognitive

domains: (1) attention, (2) executive function, (3) memory and (4) orientation, with a maximum score of 30. The MoCA has been translated to multiple languages and has been widely used in clinical practice (Appels & Scherder, 2010). It has demonstrated good internal consistency (α = 0.83) and better sensitivity and specificity for detecting mild cognitive impairment (MCI) and future risk of dementia than other commonly used screening measures (Nasreddine et al., 2005; Smith, Gildeh, & Holmes, 2007). A cut-off score of ≤ 20 has been recommended to optimise the MoCA's sensitivity and specificity for detection of MCI in older adults (Waldron-Perrine & Axelrod, 2012).

Traumatic events

The Trauma History Questionnaire (THQ; Green, 1996) measures lifetime exposure to a range of potentially traumatic experiences in three broad areas of (1) crime-related events, (2) general disaster and trauma, and (3) physical and sexual experiences (e.g. rape, physical assault). The final item allows participants to report an additional extraordinarily stressful experience (i.e. *Have you experienced any other extraordinarily stressful situation or event that is not covered above?)*. Participants were required to answer 24 items in a *yes/no* format and indicate the frequency and age of onset for each experienced event. The THQ has good inter-rater reliability and construct validity and has been widely used in research (Hooper, Stockton, Krupnick, & Green, 2011). For the purpose of this study, traumatic events were categorised as occurring in childhood (> 18 years), adulthood (18 – 64 years), and later life (≤ 65 years). If a traumatic event occurred on more than one occasion and encompassed a number of years, it was counted separately in each age category.

Emotion regulation

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) measures six aspects of emotion regulation difficulties: (1) non-acceptance of emotional responses (*Non-acceptance*), (2) lack of engagement in goal-directed behaviours (*Goals*), (3) difficulties in impulse control (*Impulse*), (4) lack of emotional awareness (*Awareness*), (5) limited access to emotion regulation strategies (*Strategies*) and (6) lack of emotional clarity (*Clarity*). Participants were asked to rate how often each item applied to them on a 5–point scale (1 = *almost never* to 5 = *almost always*). Higher scores indicate greater difficulties in emotion regulation. The DERS has demonstrated good internal consistency (α = 0.80 – 0.89) and acceptable validity (Gratz & Roemer, 2004). Orgeta (2009) reported that this measure is suitable for use with older adults.

PTSD symptom severity

The Civilian Version of the PTSD Checklist (PCL-C; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1993) measures PTSD symptoms in the civilian population. Participants answered 17 items by rating levels of distress caused by each symptom in the past month on a 5–point scale (1 = *not at all* to 5 = *extremely*). Higher scores indicate greater symptom severity. The PCL-C demonstrated high internal consistency (α = 0.87 – 0.94), good test-retest reliability and positive correlations with other widely used PTSD scales (Conybeare, Behar, Solomon, Newman, & Borkovec, 2012; Ruggiero, Ben, Scotti, & Rabalais, 2003). Cook and colleagues (2005) reported that this measure is suitable

for use with older adults and recommended a cut-off score of 37 to reliably diagnose PTSD in this population.

Group identifications

The Group Identification Scale (GIS; Sani et al., 2012) measures identification with three groups: (1) family, (2) local community and (3) a social group chosen by the participant from the list provided, e.g. a group of friends, a voluntary group or a hobby group. Identification with each group is measured with four items, encompassing a general sense of belonging and commonality with other group members (e.g. *I feel similar to the other members of my [group]*). Participants were asked to rate their agreement with each item on a 7–point scale (1 = *strongly disagree* to 7 = *strongly agree*). The cut-off score for being classified as identifying with a given group is 20. The GIS has demonstrated good internal reliability (α = 0.85 – 0.92) and construct validity (Sani, Madhok, Norbury, Dugard, & Wakefield, 2015).

Socioeconomic deprivation

The Scottish Index of Multiple Deprivation (SIMD; Scottish Executive, 2016) ranks smaller areas in Scotland according to 38 indicators of multiple deprivation which are combined into 7 broader domains: (1) income, (2) employment, (3) education, (4) health, (5) access to services, (6) crime, and (7) housing. The SIMD is the only readily available measure of socioeconomic deprivation which covers the whole population of Scotland. For the purpose of this study, we grouped the data into

quintiles from 1 (most deprived) to 5 (least deprived). The participant's score of multiple deprivation was based on their postcode.

Demographic measures

A form was developed by the research team to collect basic demographic information, such as the participant's age, gender, postcode, marital status, the highest academic qualification, employment status, brief treatment history and characteristics (i.e. whether the participant received previous psychiatric or psychological inpatient or outpatient treatment, duration of the current episode of mental illness, and whether the participant was currently taking psychotropic medication for mental health issues).

Data analysis

Data was analysed using SPSS version 23. The main purpose of the analysis was to examine the predictive utility of four variables: (1) cumulative traumatic experiences, (2) emotion regulation, (3) group identifications, and (4) socioeconomic deprivation on current PTSD symptoms in older adults. In all analyses, subscales and total scores for cumulative trauma exposure and emotion regulation difficulties were explored separately. Cases were excluded on pairwise basis due to missing data for one participant.

As the majority of data were non-normally distributed, non-parametric statistical tests were used to explore the relationship between demographic variables (i.e. age, gender, cognitive scores, treatment history and characteristics) and variables of interest (i.e. cumulative traumatic experiences, emotion regulation difficulties,

group identifications, socioeconomic deprivation, PTSD symptoms). Mann-Whitney *U* tests were used for between-group analyses and Spearman's rho for correlations. Statistical significance was set at a two-sided $p \leq 0.05$ level.

Preliminary analyses were conducted to check for normality and adequacy for multiple regression analysis. Descriptive statistics were calculated and bivariate Pearson's correlation analyses among variables of interest were explored. Hierarchical regressions were conducted to examine the predictive value of the hypothesised variables (i.e. cumulative traumatic experiences, emotion regulation difficulties, group identifications, socioeconomic deprivation) on the severity of PTSD symptoms. The order of entry was decided based on the strength of the respective associations with PTSD symptom severity. Statistical significance for linear regressions was adjusted for multiple comparisons and set at a conservative $p \leq 0.01$ level to control for type I errors.

A priori power calculations carried out using G*Power 3.1 (Faul, Erdfelder, Lang & Buchner, 2007) estimated that 85 participants were needed in order to detect a medium effect size, using linear regression with four predictors at an alpha level of 0.05 ($p \leq 0.05$) and a power of 0.80.

Results

Participant characteristics

Table 1 summarises demographic characteristics of participants.

Table 1. Summary of demographic characteristics.

	Mean/median	*SD*	*Range*
Age (years)	72.17	4.67	65 – 88
MoCA	27	2.26	22 – 30
Duration of the current mental illness episode (years)	2	–	0.8 – 70

SD = standard deviation, MOCA = Montreal Cognitive Assessment.

Table 1. *(continued)*

	Category	*N*	*%*
Gender	Male	27	31
	Female	61	69
Martial status	Married	43	49
	Widowed	23	26
	Separate/divorced	19	22
	Never married	3	3
Highest academic qualifications	Degree/higher degree	17	19
	Diploma	16	18
	Apprenticeship/other vocational	23	26
	Secondary school	15	17
	No qualifications	17	19

N = number of participants, % = percentage total rounded.

Table 1. *(continued)*

	Category	*N*	*%*
Employment status	Retired	82	93
	Working	2	2
	Volunteering	2	2
	Carer	1	1
	Never worked	1	1
Treatment history	Previous psychological/psychiatric outpatient	59	67
	Previous psychological/psychiatric inpatient	25	28
	Currently taking psychotropic medication	52	59

N = number of participants, % = percentage total rounded.

Participant's age was negatively associated with physical and sexual trauma (r_s = −0.28, N = 88, p = 0.009), and difficulties in impulse control (r_s = −0.23, N = 87, p = 0.03), but not with other predictor variables. There were no significant differences between gender and predictor variables, with the exception of emotional awareness. Women reported greater difficulties in emotional awareness than men (*Mdn* = 15 vs. *Mdn* = 13, U = 1048.50, N = 87, p = 0.03). MoCA scores showed no significant associations with any predictor variables.

The duration of the current episode of mental illness was positively associated with lack of emotional clarity (r_s = −0.23, N = 87, p = 0.03). Participants with previous history of outpatient treatment for their mental health difficulties showed greater difficulties engaging in goal-directed behaviours (*Mdn* = 17.50 vs. *Mdn* = 15, U = 540, N = 87, p = 0.007) and more limited access to emotion regulation strategies (*Mdn* = 22.50 vs. *Mdn* = 17, U = 506, N = 87, p = 0.003).

Similarly, participants with previous history of inpatient treatment for their mental health difficulties showed greater overall difficulties in emotion regulation (*Mdn* = 104.50 vs. *Mdn* = 90, *U* = 539, *N* = 87, *p* = 0.04), more limited access to emotion regulation strategies (*Mdn* = 25 vs. *Mdn* = 18, *U* = 506.50, *N* = 87, *p* = 0.02) and higher severity of PTSD symptoms (*Mdn* = 47 vs. *Mdn* = 37, *U* = 542, *N* = 88, *p* = 0.02).

Participants who were currently taking psychotropic medication for their mental health issues reported greater difficulties across all aspects of emotion regulation, including (1) non-acceptance of emotional responses (*Mdn* = 19 vs. *Mdn* = 14, *U* = 626, *N* = 87, *p* = 0.01), (2) lack of engagement in goal-directed behaviours (*Mdn* = 19 vs. *Mdn* = 15, *U* = 550.50, *N* = 87, *p* = 0.001), (3) difficulties in impulse control (*Mdn* = 12 vs. *Mdn* = 10, *U* = 626, *N* = 87, *p* = 0.01), (4) lack of emotional awareness (*Mdn* = 15 vs. *Mdn* = 12.50, *U* = 630.50, *N* = 87, *p* = 0.01), (5) limited access to emotion regulation strategies (*Mdn* = 24 vs. *Mdn* = 17, *U* = 538.50, *N* = 87, *p* = 0.001), (6) lack of emotional clarity (*Mdn* = 12 vs. *Mdn* = 9.50, *U* = 624, *N* = 87, *p* = 0.01), and (7) overall emotion regulation difficulties (*Mdn* = 101 vs. *Mdn* = 76.5, *U* = 469, *N* = 87, *p* < 0.001). Those currently using psychotropic medication also reported significantly higher PTSD symptom severity (*Mdn* = 46 vs. *Mdn* = 37.50, *U* = 683, *N* = 88, *p* = 0.03).

Prevalence of traumatic events

Participants reported a total of 522 traumatic events, of which 335 (64%) involved general disaster and trauma, 85 (16%) physical and sexual trauma, 67 (13%) crime-related trauma, and 35 (7%) other non-specified traumas. The majority of traumatic

experiences occurred in adulthood (N = 371; 63%), followed by childhood (N = 107; 18%) and later life (N = 107; 18%). Table 2 summarises the prevalence of reported traumatic events.

Table 2. Summary of prevalence of traumatic events.

	Total	*Range*	
Number of traumatic events	522	0 – 18	
	Category	*N*	*%*
Type of traumatic events	Crime-related	335	64
	General disaster and trauma	85	16
	Physical/sexual	67	13
	Other	35	7
Period when traumatic events occurred	Childhood (>18 years)	371	63
	Adulthood (18 – 64 years)	107	18
	Later life (≤ 65 years)	107	18

N = number of traumatic events in each category, % = percentage total rounded.

Preliminary analyses

In the first instance, we investigated the distributions of the predictor and outcome variables. Most variables were positively skewed, with the exception of socioeconomic deprivation and lack of engagement in goal-directed behaviours (subscale of DERS: *Goals*) which were negatively skewed. However, levels of skewness (range: −0.28 – 1.42) and kurtosis (range: −1.01 – 1.79) in the sample were within acceptable ranges (George, 2012) on most variables, with the exception of a total number of traumatic experiences (skewness = 1.32, kurtosis = 2.29).

One outlier was identified for the total trauma and once removed, levels of skewness and kurtosis improved (skewness = 1.13, kurtosis = 1.74). All statistical analyses were repeated with and without the inclusion of the identified outlier. As the outlier did not significantly change the results, all participants (N = 88) were included in the reported analyses.

Preliminary analyses for multiple regressions included checks for linearity, multicollinearity, residuals, and outliers. In all cases, collinearity statistics were within acceptable parameters, residuals showed normal distribution and homoscedasticity, and regression assumptions were met.

Correlational analyses among predictor variables for PTSD symptoms

Table 3 illustrates means, standard deviations, and ranges of scores for each predictor variable.

Table 3. Summary of means, standard deviations, and ranges of scores for predictor variables.

		Mean	*SD*	*Range*
Type of traumatic events	Crime-related	0.76	0.88	0 – 3
	General disaster and trauma	3.81	2.09	0 – 11
	Physical/sexual	0.97	1.37	0 – 5
	Total number of traumatic events	5.93	3.42	0 – 18
DERS[a]	Non-acceptance	17.20	6.99	6 – 30
	Goals	16.59	4.76	6 – 25
	Impulse	12.26	5.37	6 – 27
	Awareness	14.56	4.37	7 – 26
	Strategies	21.51	7.13	9 – 40
	Clarity	11.51	4.18	5 – 20
	DERS total score	93.63	24.33	50 – 161
SIMD		3.31	1.27	1 – 5
GIS		1.73	1.04	0 – 3
PCL severity		42.14	14.47	18 – 81

DERS = Difficulties in Emotion Regulation Scale, SIMD = Scottish Index of Multiple Deprivation, GIS = Group Identification Scale, PCL severity = PTSD Checklist symptom severity scores, SD = standard deviation. [a] $N = 87$.

Higher PTSD severity scores were significantly associated with greater exposure to various traumatic events, including (1) general disaster and trauma ($r = 0.39$, $N = 88$, $p \leq 0.01$), (2) physical and sexual trauma ($r = 0.45$, $N = 88$, $p \leq 0.01$), and (3) higher overall number of traumatic events ($r = 0.47$, $N = 88$, $p \leq 0.01$). Higher PTSD severity scores were also significantly associated with higher emotion regulation difficulties across the majority of subscales, including (1) non-acceptance of emotional responses ($r = 0.54$, $N = 87$, $p \leq 0.01$), (2) lack of goal-directed behaviours

($r = 0.42$, $N = 87$, $p \leq 0.01$), (3) difficulties in impulse control ($r = 0.65$, $N = 87$, $p \leq 0.01$), (4) limited access to emotion regulation strategies ($r = 0.71$, $N = 87$, $p \leq 0.01$), (5) lack of emotional clarity ($r = 0.52$, $N = 87$, $p \leq 0.01$), and (6) overall difficulties in emotion regulation ($r = 0.69$, $N = 87$, $p \leq 0.01$). Finally, greater severity of PTSD symptoms was associated with a lower number of group identifications ($r = -0.34$, $N = 87$, $p \leq 0.01$) and a higher degree of socioeconomic deprivation ($r = -0.24$, $N = 88$, $p \leq 0.05$). Table 4 shows intercorrelations among predictor variables and PTSD symptoms.

Table 4. Intercorrelations between predictor variables and PTSD symptom severity.

	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Crime-related trauma													
(2) General disaster and trauma	0.27**												
(3) Physical/ sexual trauma	0.42**	0.30**											
(4) Total trauma	0.62**	0.82**	0.72**										
(5) Non-acceptance[a]	0.03	0.11	0.20*	0.16									
(6) Goals[a]	0.24*	0.20*	0.26**	0.28**	0.44**								
(7) Impulse[a]	0.15	0.19*	0.28**	0.27**	0.51**	0.48**							
(8) Awareness[a]	0.12	0.14	0.10	0.15	0.12	0.13	0.29**						
(9) Strategies[a]	0.14	0.22*	0.31**	0.30**	0.70**	0.63**	0.70**	0.25*					
(10) Clarity[a]	−0.03	0.21*	0.17	0.21*	0.45**	0.24*	0.60**	0.38**	0.49**				
(11) DERS total[a]	0.15	0.24*	0.31**	0.31**	0.79**	0.68**	0.82**	0.44**	0.90**	0.69**			
(12) SIMD	−0.12	−0.18	−0.25**	−0.25**	−0.09	−0.26**	−0.05	−0.06	−0.16	−0.09	−0.16		
(13) GIS	−0.12	−0.24*	−0.19*	−0.28**	−0.16	−0.34**	−0.33**	−0.14	−0.41**	−0.19*	−0.36**	0.19*	
(14) PCL severity	0.09	0.39**	0.45**	0.47**	0.54**	0.42**	0.65**	0.03	0.71**	0.52**	0.69**	−0.24*	−0.34**

DERS = Difficulties in Emotion Regulation Scale, SIMD = Scottish Index of Multiple Deprivation, GIS = Group Identification Scale, PCL severity = PTSD Checklist symptom severity scores. * $p \leq 0.05$, ** $p \leq 0.01$, [a] $N = 87$.

Regression analyses predicting PTSD symptoms

A series of hierarchical regression analyses were conducted to test the predictive utility of proposed variables on current PTSD symptoms in older adults, with PCL-C scores as the dependent variable. As previously outlined, the order in which variables were entered into the regression models was decided according to their relative strength of association with the severity of PTSD symptoms. Limited access to emotion regulation strategies was entered as the first variable. We decided to focus on this aspect of emotion regulation as not only it showed the strongest correlation with PTSD symptoms, but also because the selection and optimisation of emotion regulation strategies were suggested to be particularly important in compensating for age-related losses of resources (Urry & Gross, 2010). Following this, the cumulative traumatic experiences were entered as the second variable, group identifications as the third variable, and socioeconomic deprivation as the fourth variable. Table 5 summarises the results of regression analyses.

Table 5. Linear regression models predicting PTSD symptom severity from emotion regulation strategies, cumulative trauma exposure, group identifications, and socioeconomic deprivation.

Predicting PTSD symptoms	*B*	SE *B*	*β*	*t*	*R*	R^2	R^2 change	*F* change	*p* change
Model 1:					0.71	0.51	0.51	87.92	$p \leq 0.001$
(Constant)	10.82	3.50		3.09*					
(1) Limited emotion regulation strategies (*Strategies*; DERS)	1.45	0.15	0.71	9.38*					
Model 2:					0.76	0.58	0.07	13.45	$p \leq 0.001$
(Constant)	7.60	3.38		2.25					
(1) Limited emotion regulation strategies (*Strategies*; DERS)	1.28	0.15	0.63	8.47*					
(2) Cumulative trauma exposure (PCL-C)	1.16	0.32	0.27	3.67*					
Model 3:					0.76	0.58	≤ 0.001	≤ 0.001	$p > 0.99$
(Constant)	7.60	4.88		1.56					
(1) Limited emotion regulation strategies (*Strategies*; DERS)	1.28	0.16	0.63	7.87*					
(2) Cumulative trauma exposure (PCL-C)	1.16	0.32	0.27	3.59*					
(3) Group Identifications (GIS)	0.002	1.11	≤ 0.001	0.002					
Model 4:					0.76	0.58	0.006	1.18	$p = 0.28$
(Constant)	11.01	5.80		1.90					
(1) Limited emotion regulation strategies (*Strategies*; DERS)	1.27	0.16	0.63	7.82*					
(2) Cumulative trauma exposure (PCL-C)	1.09	0.33	0.26	3.29*					
(3) Group Identifications (GIS)	0.13	1.11	0.01	0.12					
(4) Socioeconomic deprivation (SIMD)	−0.92	0.85	−0.08	−1.09					

DERS = Difficulties in Emotion Regulation Scale, PCL severity = PTSD Checklist symptom severity scores, GIS = Group Identification Scale, SIMD = Scottish Index of Multiple Deprivation, SE = standard error. The value for R^2 change in Model 1 reflects the variation explained only by limited emotion regulation strategies in this linear regression model. R^2 change values in Model 2, 3, and 4 reflect additional variation explained by the new variables included in these models above and beyond the access to emotion regulation strategies. $N = 87$, * $p \leq 0.001$.

In the first model, limited access to emotion regulation strategies highly predicted PTSD symptoms in older adults, $\beta = 0.71$, t (1) = 9.38, $p < 0.001$, and accounted for 51% of variability in PTSD scores. When cumulative traumatic experiences were entered into the second model, emotion regulation strategies continued to predict PTSD symptoms, $\beta = 0.63$, t (2) = 8.47, $p < 0.001$, as did cumulative traumatic experiences, $\beta = 0.27$, t (2) = 3.67, $p < 0.001$. Cumulative traumatic experiences were a significant predictor of PTSD symptoms above and beyond limited access to emotion regulation strategies, accounting for an additional 7% of variance in PTSD scores, *F-change* (1, 84) = 13.45, *p-change* < 0.001. Introducing group identifications in the third model did not significantly contribute to PTSD symptoms, *F-change* (1, 83) < 0.001, *p-change* > 0.99. Similarly, adding socioeconomic deprivation did not improve the predictive utility of the fourth model, *F-change* (1, 82) = 1.18, *p-change* = 0.28. The best model with two predictor variables, i.e. limited access to emotion regulation strategies and cumulative trauma exposure, explained a total of 58% variability in PTSD scores.

Discussion

To our knowledge, this is the first study to examine the predictive utility of emotion regulation strategies, cumulative trauma exposure, group identifications, and socioeconomic deprivation on current PTSD symptoms in a clinical sample of older adults receiving psychological treatment for common mental health disorders. The available literature on the experience of PTSD has largely focused on younger adult populations or high risk groups, e.g. Holocaust survivors, combat veterans and former prisoners of war, and has mainly explored individual vulnerability factors,

including the experience of cumulative trauma and difficulties in emotion regulation. The present study aimed to extend these findings to older adults, particularly given the emerging evidence of age-related differences in PTSD symptom presentations, coping preferences, and triggers. We also aimed to broaden the perspective on PTSD by incorporating socio-interpersonal factors, i.e. group identifications and socioeconomic deprivation.

Our results indicate that the extent to which older adults have access to emotion regulation strategies accounted for the largest percentage of explained variance in PTSD symptom severity (51%). Although this finding has not been previously reported in older adults, growing evidence in younger adult populations suggests that individuals who lack access to adaptive emotion regulation strategies experience greater PTSD symptom severity (e.g. Ehring & Quack, 2010; Tull, Barrett, McMillan, & Roemer, 2007). Our results support these findings and further indicate that inflexible emotion regulation strategies may hinder recovery from traumatic experiences and serve as a vulnerability factor in the development and maintenance of PTSD symptoms across the lifespan.

The indication that limited access to emotion regulation strategies explains over half of the variance in the experience of PTSD symptoms in older adults is broadly in keeping with the socio-emotional selectivity theory (SST; Carstensen, et al., 1999). The SST proposes that with age individuals are more motivated to prioritise emotional goals, given their increased awareness of the limited time perspective, and consequently invest more in selecting and optimising emotional regulation strategies to manage negative emotional arousal (Nolen-Hoeksema, &

Aldao, 2011; Schirda, Valentine, Aldao, & Prakash, 2016; Urry & Gross, 2010). Our results add to the existing evidence-base on the use of emotion regulation strategies in facilitating well-being in older adults, however, in this case, more specifically as part of the adjustment process to prior trauma. The development of adaptive, present-focused strategies to manage emotions associated with traumatic experiences can become an important intervention target for the psychological treatment of PTSD in later life.

Our next finding that cumulative trauma exposure significantly predicts PTSD symptom severity in older adults, above and beyond emotion regulation strategies, is in line with the previously observed dose-response relationship between repetitive traumatic experiences and PTSD (e.g. Boe, Holgersen, & Holen, 2010; Ogle, Rubin, & Siegler, 2014). Cumulative exposure to traumatic experiences contributed an additional 7% of unique variance to the severity of PTSD symptoms. Participants in our sample reported a broad range and high prevalence of traumatic experiences, which mostly occurred in adulthood. This variability in traumatic experiences further supports previous research suggesting that the cumulative burden of lifetime exposure to trauma may be more predictive of PTSD symptoms than the severity of a single traumatic event. Participants in our study were receiving psychological treatment for a range of common mental health disorders, which were not limited to trauma, and yet reported significantly increased PTSD symptoms, partly due to their history of repeated traumatic experiences. This result highlights the clinical importance of taking a comprehensive trauma history, e.g. with the use of

a checklist, to avoid problems of misdiagnosis and underreporting of PTSD symptoms in later life.

Contrary to our predictions, socioeconomic deprivation and group identifications were only weakly associated with PTSD symptoms in our study. These associations were no longer significant when included in regression models with limited access to emotion regulation strategies and cumulative trauma exposure. However, this finding is perhaps unsurprising given that the substantial amount of variance (58%) in PTSD symptoms was explained by these two predictor variables alone. Importantly, the majority of our participants (75%) lived in the least deprived areas, as measured by the Scottish Index of Multiple Deprivation (SIMD; Scottish Executive, 2016), which likely compromised our results in relation to the contribution of socioeconomic deprivation in predicting PTSD symptoms. Regardless of our sample characteristics, the SIMD is a broad measure of socioeconomic deprivation, which may lack sensitivity to fully capture subtle complexities of the environmental context in PTSD aetiology. Past research has suggested that specific environmental factors within local communities, e.g. threat levels and fear of crime (Collins & Marrone, 2015), as well as social order and cohesion (e.g. Johns et al., 2012), are important determinants of PTSD. Consequently, perceptions of the neighbourhood environment are likely influenced by a range of individual and contextual factors, which may not correspond to objectives measures, such as the SIMD (Monson, et al., 2016).

Finally, we investigated multiple group identifications under the assumption that a sense of belonging to different social groups will likely buffer stressors and

decrease the vulnerability to age-related changes in social networks. Prior research has indicated that, relative to younger adults, older adults enjoy smaller but closer social networks (English & Carstensen, 2014). These findings are consistent with the SST (Carstensen, et al., 1999) which proposes that emotional goals become increasingly more important when time is limited. As indicated by our results, having emotion regulation strategies appears crucial in helping older adults disengage from distressing emotional stimuli. Investment in rewarding and meaningful social interactions can further facilitate satisfaction of emotional needs and lead to strategic optimisation of social networks (English & Carstensen, 2014). A sense of closeness to a specific group might therefore be sufficient in mitigating PTSD risk and promoting well-being in later life, making additional group identifications redundant. However, as social support is a complex construct and has been variably defined in the literature, no firm conclusions can be drawn based on this study alone. A more nuanced understanding of the role of social networks in the aetiology and maintenance of PTSD is needed.

Several limitations of this study should be considered. Firstly, our results are limited by the utility of self-report measures and cross-sectional study design in elucidating complex aetiology and maintenance of PTSD symptoms. Retrospective self-report measures may inadvertently bias the results by leading to underreporting of PTSD symptoms and trauma histories, e.g. due to lack of awareness or self-stigma, and cannot be used for diagnostic purposes in isolation. For the purpose of this study we used widely validated self-report measures, which are commonly applied in research, to minimise the risk of bias and allow for comparability of our

findings with existing trauma literature. Cross-sectional design impeded an appropriate exploration of temporal relationships between variables, e.g. the extent to which limited access to emotion regulation strategies is a risk factor or a consequence of trauma. Larger prospective cohort studies are required to unravel causal relationships between individual differences, socio-interpersonal factors, and PTSD symptomatology. Secondly, our sample was opportunistic and under-represented individuals from deprived areas. In spite of this, our results indicated that exposure to traumatic events and PTSD symptoms are common in later life. Our preliminary analyses indicated that treatment seeking behaviours (i.e. past treatment history and current medication use) are associated with greater severity of PTSD symptoms and poorer access to emotion regulation strategies. However, the present sample size precluded further investigation of the predictive utility of these variables in our model.

Conclusion

Overall, our findings suggest that limited access to emotion regulation strategies may be a vulnerability factor in the development and maintenance of PTSD symptoms in older adults. There also appears to be a dose-response relationship between repetitive exposure to traumatic experiences and severity of PTSD symptoms in later life. Contrary to our predictions, socioeconomic deprivation and group identifications did not contribute to PTSD symptoms in our study. However, it may be that individual perceptions of the neighbourhood environment, e.g. subjective threat levels and the degree of social order, are more important to the experience of PTSD than the objectively measured level of socioeconomic deprivation. Similarly, a sense of

belonging to a specific group, e.g. family, may be more crucial to the development of PTSD than a total number of group identifications.

Our results have important clinical implications for the diagnosis and treatment of PTSD in older adults. They highlight the importance of taking comprehensive trauma histories for older adults referred to mental health services and of providing education about the impact of cumulative trauma on psychological symptoms to individual patients, their families and carers. Regular screening for PTSD symptoms at initial assessment may improve the diagnostic process and access to appropriate treatments. Psychological education can be beneficial in reducing self-stigma and improving recognition of experienced symptoms in older adults. Our research also contributes to the theoretical understanding of trauma in later life and stresses the importance of having access to emotion regulation strategies in the recovery process. Future treatment options therefore may focus on helping older individuals develop more adaptive and flexible emotion regulation strategies to cope with the lasting effects of traumatic experiences.

Future studies may wish to explore the aforementioned socio-interpersonal factors, i.e. neighbourhood perceptions and a sense of belonging to specific groups, in greater detail to establish their relative contributions to the experience of trauma in later life. Based on our results, it will be important to design further studies to determine whether specifically targeting emotion regulation strategies, such as relaxation and grounding techniques, in the treatment of PTSD leads to better outcomes and whether the impact of emotion regulation strategies extends beyond coping with trauma reminders, e.g. to the symptoms of hyperarousal. Research

employing randomised controlled trials with older adult populations will greatly support a further investigation of these assumptions. The results of randomised control trials will have important theoretical and clinical implications and will be crucial in expanding our current understanding of emotion regulation strategies in the context of the burden of cumulative trauma exposure and PTSD symptoms across the lifespan.

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Appendix F: Summary of relevant submission guidelines for *Aging & Mental Health*

Impact Factor 2.663
5-Year Impact Factor 2.761

Aging & Mental Health provides a leading international forum for the rapidly expanding field which investigates the relationship between the aging process and mental health. The journal addresses the mental changes associated with normal and abnormal or pathological aging, as well as the psychological and psychiatric problems of the aging population. The journal also has a strong commitment to interdisciplinary and innovative approaches that explore new topics and methods.

Aging & Mental Health covers the biological, psychological and social aspects of aging as they relate to mental health. In particular it encourages an integrated approach for examining various biopsychosocial processes and etiological factors associated with psychological changes in the elderly. It also emphasizes the various strategies, therapies and services which may be directed at improving the mental health of the elderly and their families. In this way the journal promotes a strong alliance among the theoretical, experimental and applied sciences across a range of issues affecting mental health and aging. The emphasis of the journal is on rigorous quantitative, and qualitative, research and, high quality innovative studies on emerging topics.

Readership: The journal is directed at an international audience, with editors in London, Hong Kong and North America and an Editorial Board from around the world. The readership of the journal is drawn from many disciplines, with particularly strong representation from psychiatrists and psychologists working with older people. Its strong scientific foundation makes it of considerable interest to basic and applied scientists interested in the biological, psychological and social aspects of aging and mental health.

Article layout guide
Font: Times New Roman, 12-point, double-line spaced. Use margins of at least 2.5 cm (or 1 inch).

Title: Use bold for your article title, with an initial capital letter for any proper nouns.

Abstract: Indicate the abstract paragraph with a heading or by reducing the font size. Check whether the journal requires a structured abstract or graphical abstract by reading the Instructions for Authors. The Instructions for Authors may also give word limits for your abstract.

Keywords: Please provide keywords to help readers find your article. If the Instructions for Authors do not give a number of keywords to provide, please give five or six.

Headings: Please indicate the level of the section headings in your article:

1.First-level headings (e.g. Introduction, Conclusion) should be in bold, with an initial capital letter for any proper nouns.

2.Second-level headings should be in bold italics, with an initial capital letter for any proper nouns.

3.Third-level headings should be in italics, with an initial capital letter for any proper nouns.

4.Fourth-level headings should be in bold italics, at the beginning of a paragraph. The text follows immediately after a full stop (full point) or other punctuation mark.

5.Fifth-level headings should be in italics, at the beginning of a paragraph. The text follows immediately after a full stop (full point) or other punctuation mark.

Tables and figures: Indicate in the text where the tables and figures should appear, for example by inserting [Table 1 near here]. You should supply the actual tables either at the end of the text or in a separate file and the actual figures as separate files. You can find details of the journal Editor's preference in the Instructions for Authors or in the guidance on the submission system. Ensure you have permission to use any tables or figures you are reproducing from another source.

Running heads and **received dates** are not required when submitting a manuscript for review; they will be added during the production process.

Spelling and punctuation: Each journal will have a preference for spelling and punctuation, which is detailed in the Instructions for Authors.

Appendix G: Evidence of favourable ethical opinion

North of Scotland Research Ethics Committee (1)
Summerfield House
2 Eday Road
Aberdeen
AB15 6RE

Telephone: 01224 558458
Facsimile: 01224 558609
Email: nosres@nhs.net

27 July 2018

Professor Kevin Power
Tayside Area Psychological Therapies Service
15 Dudhope Terrace
DUNDEE
DD3 6HH

Dear Professor Power

Study title:	**Distress in old age: the contribution of lifetime trauma exposure, emotion regulation, social group identifications and socioeconomic deprivation**
REC reference:	**18/NS/0089**
Protocol number:	**CAHSS1802/04**
IRAS project ID:	**236535**

The Research Ethics Committee reviewed the above application at the meeting held on 26 July 2018. Thank you for attending by telephone along with Dr Helen Nicholson-Langley and Ms Klaudia Suchorab to discuss the application.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact hra.studyregistration@nhs.net outlining the reasons for your request. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Ethical opinion

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below. .

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System, at www.hra.nhs.uk or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations.

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS Sites

The favourable opinion applies to all NHS sites taking part in the study taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Extract of the meeting minutes

Care and protection of research participants; respect for potential and enrolled participants' welfare and dignity; Trial registration; Data protection & research participant's confidentiality

The Committee noted the possibility of participants becoming distressed by answering some of the questions and asked what steps were in place to minimise this risk.

Ms Suchorab replied that participants would be referred from the Older People Psychological Therapies Service so all were under the care of the clinician. She was trained to recognise distress so would monitor participants throughout and offer comfort breaks as needed.

The Committee asked what steps were in place if participants were distressed after the procedure.

Dr Nicholson-Langley replied that there were nine clinical psychologists and all participants would remain under their care. The participants would be reminded of the contact details for their referring clinician and all participants would have contact telephone numbers for organisations [NHS Tayside Crisis Contacts].

Professor Power added that the research was not undertaken in isolation, it would happen during clinic times. If the potential participant was vulnerable, the referring clinician would not refer them to the study.

The Committee encouraged registration of the trial as it was good practice for all research projects to be registered in a publicly-accessible database.

Professor Power agreed to do so.

Other general comments

The Committee asked the researchers if they had any questions.

Professor Power raised the issue of cognitive assessment and suggested it was not described as clearly as it could have been.

Dr Nicholson-Langley added that page 8 of the IRAS Form referred to a MoCA [Montreal Cognitive Assessment] cut off score of ≤20 which would suggest significant cognitive impairment. The patient letter which recorded their score highlighted that the score could be discussed in more detail with their clinician.

The Committee advised that this was not a concern as members were well used to MoCA.

Please contact the REC Manager if you feel that the above summary is not an accurate reflection of the discussion at the meeting.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Employers Liability Certificate]	1	11 July 2018

GP/consultant information sheets or letters [Klaudia Suchorab GP Letter v1 23 Apr 2018]	1	23 April 2018
IRAS Application Form	236535/122 8152/37/81 1	06 July 2018
IRAS Checklist XML [Checklist_12072018]		12 July 2018
Letters of invitation to participant [Klaudia Suchorab Patient Letter v1 13 June 2018]	1	13 June 2018
Non-validated questionnaire [Klaudia Suchorab Demographic Information Sheet v1 13 June 2018]	1	13 June 2018
Other [Klaudia Suchorab Patient Consent Form 2 v1 13 June 2018]	1	13 June 2018
Other [Klaudia Suchorab Referrer Letter v1 29 May 2018]	1	29 May 2018
Other [HADS]		11 July 2018*
Other [Professional Indemnity Insurance]	1	04 August 2017
Other [Clinical Trial Liability Insurance]	1	27 July 2017
Other [DERS]		11 July 2018*
Other [MoCA]		11 July 2018*
Other [GIS]		11 July 2018*
Other [THQ]		11 July 2018*
Other [Klaudia Suchorab Study Feedback form v1 11 July 2018]	1	11 July 2018
Other [Public Liability confirmation]	1	11 July 2018
Other [Peer review]	1	13 July 2017
Participant consent form [Consent Form 2]	1	13 June 2018
Participant consent form [Klaudia Suchorab Patient Consent Form 1 v1 13 June 2018]	1	13 June 2018
Participant information sheet (PIS) [Klaudia Suchorab Participant Information Sheet v1 11 July 2018]	1	11 July 2018
Research protocol or project proposal [Klaudia Suchorab study protocol v1 11 July 2018]	1	11 July 2018
Sample diary card/patient card [Crisis Contacts]		03 April 2016
Summary CV for Chief Investigator (CI) [Professor Kevin Power Ethics CV v1 14 May 2018]	1	14 May 2018
Summary CV for student [Klaudia Suchorab]	1	01 June 2018
Summary, synopsis or diagram (flowchart) of protocol in non technical language [Klaudia Suchorab Identification of participants v1 23 Apr 2018]	1	23 April 2018
Validated questionnaire [PCL-C]		11 July 2018*

*date received

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

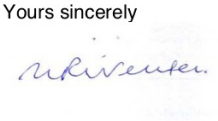
HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

18/NS/0089	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project.

Yours sincerely



Professor Nigel Webster
Chair

Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments

"After ethical review – guidance for researchers" SL-AR2 for other studies

Copy to: Ms Charlotte Smith
Mrs Liz Coote, NHS Tayside

North of Scotland Research Ethics Committee 1

Attendance at Committee meeting on 26 July 2018

Committee Members:

Name	Profession	Present	Notes
Mrs Anthonia Amayo	Senior Healthcare Support Worker	No	
Dr Suzanne Breeman	Trial Manager	No	
Mr John Bruce	Area Education Manager	Yes	
Dr Jennifer Caldwell	Alternate Vice-Chair & Senior Lecturer in Occupational Therapy	No	
Mrs Katie Gordon	Physiotherapist - Private Practitioner	Yes	
Mrs Morag Howard	Lecturer	No	
Mrs Kathryn McMullan*	Retired Clinical Pharmacist	Yes	
Dr Rajib Purkayastha	Consultant in Rehabilitation Medicine	Yes	
Dr Detlev Rogahn	Consultant Paediatrician	No	
Mrs Elsie Thomson	Retired Advanced Specialist Dietitian	Yes	
Mr Bartosz Was	Clinical Trials Pharmacist	Yes	
Professor Nigel Webster	Chair & Emeritus Professor of Anaesthesia and Intensive Care Medicine	Yes	Chair
Mrs Sophie Welch	Vice-Chair & Coach Practitioner	No	
Dr Berwyn Williams	Retired Soil Chemist	Yes	

*co-opted from the North of Scotland Research Ethics Committee (2)

Also in attendance:

Name	Position (or reason for attending)
Ms Sarah Lorick	Assistant Ethics Co-ordinator
Miss Holly Foubister	Healthcare Science Assistant (Observer)

Appendix H: Participant information sheet

PARTICIPANT INFORMATION SHEET

Study title: What factors influence the experience of distress in later life?

My name is Klaudia Suchorab. I am doing a research study as part of my training course to become a Clinical Psychologist and you are being invited to take part in this study. Before you decide, it is important for you to understand why the research is being done and what it will involve if you do decide to take part. Please take time to read the following information carefully and to decide whether or not you wish to take part. You can also talk to others if you wish.

If there is anything that is not clear or if you would like to know more then please ask your psychologist or contact me using the details I have provided at the end of this form. This information sheet is for you to keep.

What is the purpose of the study?
We know that over 70% of the general population have encountered at least one traumatic event in their lives, such as a serious accident, assault or death of a loved one. People usually experience some distress (e.g. low mood, anxiety, 'flashbacks', nightmares) after they go through a traumatic event. This distress may happen either immediately after the event or at a later date. The way people respond to those experiences may depend on many factors, such as how they manage their emotions, the social groups they belong to or where they live.

We are interested in whether people's experiences of traumatic events, as well as the way they manage their emotions, their social groups and where they live, affect people's experience of distress in later life. It is hoped that this study will help in better understanding what factors influence the likeliness of someone experiencing distress in later life and help in the development of better treatment for those people.

Why have I been invited?
You have been invited to take part because you are a person aged over 65 attending the Psychological Therapies Service. Your psychologist identified you as a potential participant. All people we ask to participate will have experienced anxiety, depression or PTSD (an anxiety disorder caused by very stressful, frightening or distressing events) at some point in their lives.

Do I have to take part?
No, it is your choice whether to take part or not. Your participation is entirely voluntary.

If you do decide to take part you, you are still free to change your mind. You can decide to end your involvement with the study at any point. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

What will I be asked to do if I decide to take part?
If you are interested in taking part in this study, you will be asked to consent to your psychologist passing on your contact details. I will then arrange to meet with you. This will be at a time that is convenient for you. The meeting will usually be at an NHS location that is familiar to you. The meeting will be at least 48 hours after your details have been provided to me. This will allow you more time to think about taking part in the study and ask any questions you may have.

At the meeting I will go through this information sheet with you to give you an opportunity to ask any questions you may have about the study. Expressing an interest and meeting with me does not commit you to taking part and you can withdraw from the study at any point. If you decide you would like to take part, I will ask you to complete a second consent form. This says that you understand what the study involves and you agree to take part in the study.

If you agree to take part and sign the consent form, we will begin the study. You will first be asked to do some short tasks of thinking and concentration which will last around 10 minutes. For this study we are only looking to include people who obtain a certain range of scores on those tasks. I will tell you what your score was and whether you meet the study inclusion criteria. I will also write to your psychologist to inform him/her of your score and whether you were included in the study. Your psychologist can give you further feedback on your score.

If you meet the study criteria, you will be asked to provide some basic information about you and your treatment for anxiety, depression or PTSD. After this, you will be asked to complete five questionnaires about your mood, whether you have experienced any traumatic events, the way you manage emotions and the social groups you belong to. This should take no more than 25 minutes. You will be offered breaks during this time. You will be asked to do all the tasks only once. In total, this meeting will last approximately 45 minutes.

What are the possible disadvantages and risks of taking part?
There are minimal risks involved in the study and the questionnaires in the study have been used by other clinical and research teams. There is no evidence to

suggest that completing the questionnaires will cause any harm to you. However, you may find some of the thinking and concentration tasks frustrating if you are not sure of the answers. You may also find filling in the questionnaires tiring and some questions may make you think about difficult experiences which could be upsetting.

If you feel tired or wish to stop, you can say this at any time. If you find some questions upsetting, you do not have to answer them. If you become upset, you can speak to me, your psychologist or your GP.

What are the possible advantages and benefits of taking part?
There is unlikely to be a direct benefit to you from taking part in this study. However, you may feel that by taking part in the study you will contribute to a greater understanding of the factors that influence the experience of distress in later life.

Will my participation in this study be kept confidential?
Yes. All the information about your participation in this study will be kept confidential. There are strict laws which safeguard your privacy at every stage of the study. Only my supervisors (Dr Helen Nicolson-Langley, Professor Kevin Power and Dr Azucena Guzman) and I will be allowed to look at the information that you give me.

After you have completed the questionnaires, your name and identifiable information will be removed and replaced by a code. This means that only the research team will know who has completed the questionnaires. Your GP will be sent a brief letter with your consent informing him/her that you have participated in the study but the letter will not include any details about the answers you have provided.

If at any stage of this study, you tell me information which indicated any risk of harm to you or other people around you, I will have to tell someone. This is to make sure that you and other people are safe. I will only speak to a qualified member of staff, usually your psychologist, and I will discuss this with you before I speak to them.

What are my data protection rights?
The University of Edinburgh is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance to Data Protection Law. You also have other rights including rights of correction, erasure and objection. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer – dpo@ed.ac.uk

What happens when the study is finished?
At the end of our meeting you will have the chance to talk about your experience of taking part in the study with me. You can also discuss your experience of taking part in the study with your psychologist if you would like to.

I will keep the completed consent form and questionnaires in a locked NHS cabinet. I will also store the information on a NHS computer so I can analyse the data when I have finished collecting information from all other participants. The information on the NHS computer will be anonymised and protected with a password to keep it confidential.

What will happen to the results of the research study?
The results will be written up as part of my course work and submitted to the University of Edinburgh as part of my training in the Doctorate of Clinical Psychology. I will also aim to publish the results of this study in international journals and present the results to relevant interested groups and conferences to help clinicians across the world have a better idea of different factors influencing the experiences of distress in later life. The results will be anonymised. This means that no participants will be named and no one that has taken part can be identified.

Can I find out the results of the study?
Yes. You will be able to get a written summary of the study by asking your psychologist. Alternatively, I can send you a written summary by post.

Who has reviewed the study?
The study has been approved by the North of Scotland Research Ethics Committee and the University of Edinburgh. NHS management approval has also been obtained.

Researcher contact details
If you have any further questions about the study please contact me (Klaudia Suchorab) on 01382 346556 or email: klaudia.suchorab@nhs.net

Independent contact details
If you would like to discuss this study with someone independent of the study team please contact Dr Fiona Macleod on 01356 692807 or email: fmacleod@nhs.net

Complaints
If you wish to make a complaint about the study please contact:

Complaints and Feedback Team Lead
Complaints and Advice Team
Level 9, Ninewells Hospital
Dundee, DD1 9SY
Telephone: 0800 027 5507 **Email:** feedback.tayside@nhs.net

Appendix I: Study consent forms

Appendix I.1: Participant details – consent form 1

Participant number:

PARTICIPANT DETAILS – CONSENT FORM 1

Study Title: What factors influence the experience of distress in later life?

Details of Participant

Name: _____

Current address: _____

_____

_____

Telephone: _____

I agree for my contact details to be passed to the researcher and for the researcher to arrange a meeting with me to discuss the study further.

I would like to be contacted about the meeting by:
(Please tick the relevant box)

Phone Letter No preference

_____ _____ _____

Name of Person Giving Consent Date Signature

_____ _____ _____

Name of Person Taking Consent Date Signature

Please send the completed form to klaudia.suchorab@nhs.net

Appendix I.2: Participant consent form 2

Participant number:

PARTICIPANT CONSENT FORM 2

Study Title: What factors influence the experience of distress in later life?

Please initial box

1. I confirm that I have read and understood the information sheet dated 26/07/2018 (Version 1) for the above study. I have had opportunity to consider the information, ask questions and have had these questions answered satisfactorily. ☐

2. I understand that my consent for my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that the relevant sections of my medical notes and data collected during the study may be looked at by individuals from the regulatory authorities and from the Sponsor (the University of Edinburgh) or from the NHS Board where it is relevant to my taking part in this research. I give permission for those individuals to have access to my records. ☐

4. I understand that my psychologist will be informed whether I meet the study inclusion criteria. I understand that I will be able to get further feedback on this from my psychologist. ☐

5. I understand that my GP will be informed of my participation in this study. ☐

6. I understand that if I say something that indicates risk to myself or others, the researcher (Klaudia Suchorab) will have to pass this information on to a qualified member of staff. ☐

7. I would like to receive a written summary of the study results by post. Yes ☐ No ☐

8. I agree to take part in this study. ☐

Name of Person Giving Consent	Date	Signature
Name of Person Taking Consent	Date	Signature

Original (x1) to be retained in site file. Copy (x1) to be included in patient notes. Copy (x1) to be retained by the participant.

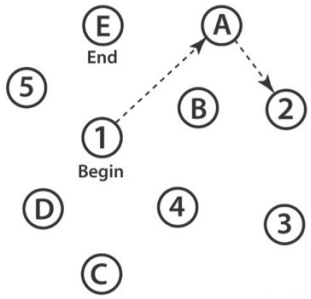
Appendix J: Study measures

Appendix J.1: Montreal Cognitive Assessment (MoCA; Nasreddine et al. 2005)

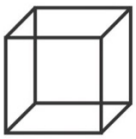
MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

Name:
Education: Date of birth:
Sex: DATE:

VISUOSPATIAL / EXECUTIVE



☐



Copy Cube

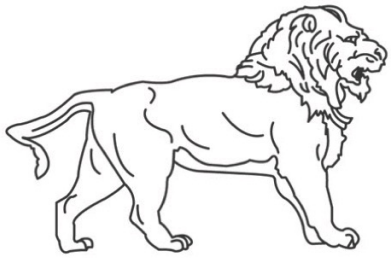
☐

Draw CLOCK (ten past eleven)
(3 points)

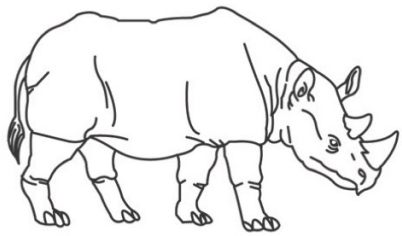
☐ Contour ☐ Numbers ☐ Hands

POINTS ___/5

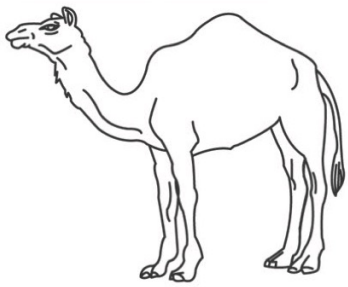
NAMING



☐



☐



☐

___/3

MEMORY — POINTS

Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION

Read list of digits (1 digit/sec)

Subject has to repeat them in the forward order ☐ 2 1 8 5 4

Subject has to repeat them in the backward order ☐ 7 4 2

__/2

Read list of letters. The subject must tap with their hand at each letter A. No points if ≥ 2 errors

☐ FBACMNAAJKLBAFAKDEAAAJAMOFAAB

__/1

Serial 7 subtraction starting at 100 ☐ 93 ☐ 86 ☐ 79 ☐ 72 ☐ 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt** 0 correct: **0 pt**

__/3

LANGUAGE

Repeat: I only know that John is the one to help today. ☐

The cat always hid under the couch when dogs were in the room. ☐

__/2

Fluency / Name maximum number of words in one minute that begin with the letter F

☐ _____ (N ≥ 11 words)

__/1

ABSTRACTION

Similarity between e.g. banana – orange = fruit ☐ train – bicycle ☐ watch – ruler

__/2

DELAYED RECALL

	Has to recall words **WITH NO CLUE**	FACE ☐	VELVET ☐	CHURCH ☐	DAISY ☐	RED ☐	Points for UNCUED recall only
Optional	Category cue						
	Multiple choice cue						

__/5

ORIENTATION ☐ Date ☐ Month ☐ Year ☐ Day ☐ Place ☐ City

__/6

 www.mocatet.org Normal **≥** 26 / 30

TOTAL __/30

Add 1 point if **≤** 12 yr edu

Administered by: _____

Appendix J.2: Trauma History Questionnaire (THQ; Green, 1996)

Participant ID: **Date:**

TRAUMA HISTORY QUESTIONNAIRE

The following is a series of questions about serious or traumatic life events. These types of events actually occur with some regularity, although we would like to believe they are rare, and they affect how people feel about, react to, and/or think about things subsequently. Knowing about the occurrence of such events, and reactions to them, will help us to develop programs for prevention, education, and other services. The questionnaire is divided into questions covering crime experiences, general disaster and trauma questions, and questions about physical and sexual experiences.

For each event, please indicate (circle) whether it happened and, if it did, the number of times and your approximate age when it happened (give your best guess if you are not sure). Also note the nature of your relationship to the person involved and the specific nature of the event, if appropriate.

Crime-Related Events		**Circle one**		***If you circled yes, please indicate***	
				Number of times	**Approximate age(s)**
1	Has anyone ever tried to take something directly from you by using force or the threat of force, such as a stick-up or mugging?	No	Yes		
2	Has anyone ever attempted to rob you or actually robbed you (i.e., stolen your personal belongings)?	No	Yes		
3	Has anyone ever attempted to or succeeded in breaking into your home when you were <u>not</u> there?	No	Yes		
4	Has anyone ever attempted to or succeed in breaking into your home while you <u>were</u> there?	No	Yes		
General Disaster and Trauma		**Circle one**		***If you circled yes, please indicate***	
				Number of times	**Approximate age(s)**
5	Have you ever had a serious accident at work, in a car, or somewhere else?	No	Yes		

General Disaster and Trauma		Circle one		*If you circled yes, please indicate*	
				Number of times	Approximate age(s)
6	Have you ever experienced a natural disaster such as a tornado, hurricane, flood or major earthquake, etc., where you felt you or your loved ones were in danger of death or injury?	No	Yes		
7	Have you ever experienced a "man-made" disaster such as a train crash, building collapse, bank robbery, fire, etc., where you felt you or your loved ones were in danger of death or injury?	No	Yes		
8	Have you ever been exposed to dangerous chemicals or radioactivity that might threaten your health?	No	Yes		
9	Have you ever been in any other situation in which you were seriously injured?	No	Yes		
10	Have you ever been in any other situation in which you feared you might be killed or seriously injured?	No	Yes		
11	Have you ever seen someone seriously injured or killed?	No	Yes		
12	Have you ever seen dead bodies (other than at a funeral) or had to handle dead bodies for any reason?	No	Yes		
13	Have you ever had a close friend or family member murdered, or killed by a drunk driver?	No	Yes		
14	Have you ever had a spouse, romantic partner, or child die?	No	Yes		

General Disaster and Trauma		**Circle one**		***If you circled yes, please indicate***	
				Number of times	**Approximate age(s)**
15	Have you ever had a serious or life-threatening illness?	No	Yes		
16	Have you ever received news of a serious injury, life-threatening illness, or unexpected death of someone close to you?	No	Yes		
17	Have you ever had to engage in combat while in military service in an official or unofficial war zone?	No	Yes		
Physical and Sexual Experiences		**Circle one**		***If you circled yes, please indicate***	
				Repeated?	**Approximate age(s) and frequency**
18	Has anyone ever made you have intercourse or oral or anal sex against your will?	No	Yes		
19	Has anyone ever touched private parts of your body, or made you touch theirs, under force or threat?	No	Yes		
20	Other than incidents mentioned in Questions 18 and 19, have there been any other situations in which another person tried to force you to have an unwanted sexual contact?	No	Yes		
21	Has anyone, including family members or friends, ever attacked you with a gun, knife, or some other weapon?	No	Yes		
22	Has anyone, including family members or friends, ever attacked you without a weapon and seriously injured you?	No	Yes		

Physical and Sexual Experiences		**Circle one**		***If you circled yes, please indicate***	
				Repeated?	**Approximate age(s) and frequency**
23	Has anyone in your family ever beaten, spanked, or pushed you hard enough to cause injury?	No	Yes		
24	Have you experienced any other extraordinarily stressful situation or event that is not covered above?	No	Yes		

Appendix J.3: Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)

1	2	3	4	5
Almost never (0-10%)	Sometimes (11-35%)	About half the time (36-65%)	Most of the time (66-90%)	Almost always (91-100%)

Difficulties in Emotion Regulation Scale (DERS)

Identifier Date

Please indicate how often the following 36 statements apply to you by writing the appropriate number from the scale above (1 – 5) in the box alongside each item.

1	I am clear about my feelings (R)	☐
2	I pay attention to how I feel (R)	☐
3	I experience my emotions as overwhelming and out of control	☐
4	I have no idea how I am feeling	☐
5	I have difficulty making sense out of my feelings	☐
6	I am attentive to my feelings (R)	☐
7	I know exactly how I am feeling (R)	☐
8	I care about what I am feeling (R)	☐
9	I am confused about how I feel	☐
10	When I'm upset, I acknowledge my emotions (R)	☐
11	When I'm upset, I become angry with myself for feeling that way	☐
12	When I'm upset, I become embarrassed for feeling that way	☐

1	2	3	4	5
Almost never (0-10%)	Sometimes (11-35%)	About half the time (36-65%)	Most of the time (66-90%)	Almost always (91-100%)

13	When I'm upset, I have difficulty getting work done	☐
14	When I'm upset, I become out of control	☐
15	When I'm upset, I believe that I will remain that way for a long time	☐
16	When I'm upset, I believe that I'll end up feeling very depressed	☐
17	When I'm upset, I believe that my feelings are valid and important (R)	☐
18	When I'm upset, I have difficulty focusing on other things	☐
19	When I'm upset, I feel out of control	☐
20	When I'm upset, I can still get things done (R)	☐
21	When I'm upset, I feel ashamed with myself for feeling that way	☐
22	When I'm upset, I know that I can find a way to eventually feel better (R)	☐
23	When I'm upset, I feel like I am weak	☐
24	When I'm upset, I feel like I can remain in control of my behaviours (R)	☐
25	When I'm upset, I feel guilty for feeling that way	☐
26	When I'm upset, I have difficulty concentrating	☐
27	When I'm upset, I have difficulty controlling my behaviours	☐

1	2	3	4	5
Almost never (0-10%)	Sometimes (11-35%)	About half the time (36-65%)	Most of the time (66-90%)	Almost always (91-100%)

28	When I'm upset, I believe that there is nothing I can do to make myself feel better	☐
29	When I'm upset, I become irritated with myself for feeling that way	☐
30	When I'm upset, I start to feel very bad about myself	☐
31	When I'm upset, I believe that wallowing in it is all I can do	☐
32	When I'm upset, I lose control over my behaviours	☐
33	When I'm upset, I have difficulty thinking about anything else	☐
34	When I'm upset, I take time to figure out what I'm really feeling (R)	☐
35	When I'm upset, it takes me a long time to feel better	☐
36	When I'm upset, my emotions feel overwhelming	☐

Document Version: 1.1
Last Updated: 05 June 2013
Planned Review: 30 June 2018

Privacy - please note - this form does not transmit any information about you or your assessment scores If you wish to keep your results, you must print this document These results are intended as a guide to your health and are presented for educational purposes only They are not intended to be a clinical diagnosis If you are concerned in any way about your health, please consult with a qualified health professional.

Gratz, K.L. & Roemer, E. Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. Journal of Psychopathology and Behavioral Assessment, 26: 1, pp. 41-54.

1	2	3	4	5
Almost never (0-10%)	Sometimes (11-35%)	About half the time (36-65%)	Most of the time (66-90%)	Almost always (91-100%)

SCORING THE DERS

The DERS is a brief, 36-item self-report questionnaire designed to assess multiple aspects of emotional dysregulation. Reverse-scored items are numbered 1, 2, 6, 7, 8, 10, 17, 20, 22, 24 and 34. Higher scores suggest greater problems with emotion regulation. The measure yields a total score (SUM) as well as scores on six sub-scales:

1. Non-acceptance of emotional responses (NONACCEPT)
2. Difficulties engaging in goal directed behaviour (GOALS)
3. Impulse control difficulties (IMPULSE)
4. Lack of emotional awareness (AWARE)
5. Limited access to emotion regulation strategies (STRATEGIES)
6. Lack of emotional clarity (CLARITY)

1: Nonacceptance of Emotional Responses (NONACCEPT)

25) When I'm upset, I feel guilty for feeling that way
21) When I'm upset, I feel ashamed with myself for feeling that way
12) When I'm upset, I become embarrassed for feeling that way
11) When I'm upset, I become angry with myself for feeling that way
29) When I'm upset, I become irritated with myself for feeling that way
23) When I'm upset, I feel like I am weak

2: Difficulties Engaging in Goal-Directed (GOALS)

26) When I'm upset, I have difficulty concentrating
18) When I'm upset, I have difficulty focusing on other things
13) When I'm upset, I have difficulty getting work done
33) When I'm upset, I have difficulty thinking about anything else
20) When I'm upset, I can still get things done (R)

1	2	3	4	5
Almost never (0-10%)	Sometimes (11-35%)	About half the time (36-65%)	Most of the time (66-90%)	Almost always (91-100%)

3: Impulse Control Difficulties (IMPULSE)

32) When I'm upset, I lose control over my behaviours
27) When I'm upset, I have difficulty controlling my behaviours
14) When I'm upset, I become out of control
19) When I'm upset, I feel out of control
3) I experience my emotions as overwhelming and out of control
24) When I'm upset, I feel like I can remain in control of my behaviours (R)

4: Lack of Emotional Awareness (AWARE)

6) I am attentive to my feelings (R)
2) I pay attention to how I feel (R)
10) When I'm upset, I acknowledge my emotions (R)
17) When I'm upset, I believe that my feelings are valid and important (R)
8) I care about what I am feeling (R)
34) When I'm upset, I take time to figure out what I'm really feeling (R)

5: Limited Access to Emotion Regulation Strategies (STRATEGIES)

16) When I'm upset, I believe that I'll end up feeling very depressed
15) When I'm upset, I believe that I will remain that way for a long time
31) When I'm upset, I believe that wallowing in it is all I can do
35) When I'm upset, it takes me a long time to feel better
28) When I'm upset, I believe that there is nothing I can do to make myself feel better
22) When I'm upset, I know that I can find a way to eventually feel better (R)
36) When I'm upset, my emotions feel overwhelming
30) When I'm upset, I start to feel very bad about myself

6: Lack of Emotional Clarity (CLARITY)

5) I have difficulty making sense out of my feelings
4) I have no idea how I am feeling
9) I am confused about how I feel
7) I know exactly how I am feeling (R)
1) I am clear about my feelings (R)

Appendix J.4: Civilian Version of the PTSD Checklist (PCL-C; Blanchard et al., 1996; Weathers et al., 1993)

PTSD CheckList – Civilian Version (PCL-C)

Client's Name: _____

Instruction to patient: Below is a list of problems and complaints that veterans sometimes have in response to stressful life experiences. Please read each one carefully, put an "X" in the box to indicate how much you have been bothered by that problem *in the last month*.

No.	Response	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing *memories, thoughts, or images* of a stressful experience from the past?					
2.	Repeated, disturbing *dreams* of a stressful experience from the past?					
3.	Suddenly *acting* or *feeling* as if a stressful experience *were happening* again (as if you were reliving it)?					
4.	Feeling *very upset* when *something reminded* you of a stressful experience from the past?					
5.	Having *physical reactions* (e.g., heart pounding, trouble breathing, or sweating) when *something reminded* you of a stressful experience from the past?					
6.	Avoid *thinking about* or *talking about* a stressful experience from the past or avoid *having feelings* related to it?					
7.	Avoid *activities* or *situations* because they *remind you* of a stressful experience from the past?					
8.	Trouble *remembering important parts* of a stressful experience from the past?					
9.	Loss of *interest in things that you used to enjoy?*					
10.	Feeling *distant* or *cut* off from other people?					
11.	Feeling *emotionally numb* or being unable to have loving feelings for those close to you?					
12.	Feeling as if your *future* will somehow be *cut short*?					
13.	Trouble *falling* or *staying asleep*?					
14.	Feeling *irritable* or having *angry outbursts*?					
15.	Having *difficulty concentrating*?					
16.	Being *"super alert"* or watchful on guard?					
17.	Feeling *jumpy* or easily startled?					

PCL-M for DSM-IV (11/1/94) Weathers, Litz, Huska, & Keane National Center for PTSD - Behavioral Science Division

PTSD CheckList – Civilian Version (PCL-C)

The PCL is a standardized self-report rating scale for PTSD comprising 17 items that correspond to the key symptoms of PTSD. Two versions of the PCL exist: 1) PCL-M is specific to PTSD caused by military experiences and 2) PCL-C is applied generally to any traumatic event.

The PCL can be easily modified to fit specific time frames or events. For example, instead of asking about "the past month," questions may ask about "the past week" or be modified to focus on events specific to a deployment.

How is the PCL completed?

- The PCL is self-administered
- Respondents indicate how much they have been bothered by a symptom over the past month using a 5-point (1–5) scale, circling their responses. Responses range from **1** *Not at All* – **5** *Extremely*

How is the PCL Scored?

1) Add up all items for a total severity score
or
2) Treat response categories **3–5** (*Moderately* or above) as symptomatic and responses **1–2** (below *Moderately*) as non-symptomatic, then use the following DSM criteria for a diagnosis:
- Symptomatic response to at least 1 "B" item (Questions 1–5),
- Symptomatic response to at least 3 "C" items (Questions 6–12), and
- Symptomatic response to at least 2 "D" items (Questions 13–17)

Are Results Valid and Reliable?

- Two studies of both Vietnam and Persian Gulf theater veterans show that the PCL is both valid and reliable (Additional references are available from the DHCC)

What Additional Follow-up is Available?

- All military health system beneficiaries with health concerns they believe are deployment-related are encouraged to seek medical care
- Patients should be asked, **"Is your health concern today related to a deployment?"** during all primary care visits.

• If the patient replies "**yes**," the provider should follow the Post-Deployment Health Clinical Practice Guideline (PDH-CPG) and supporting guidelines available through the DHCC and www.PDHealth.mil

Appendix J.5: Group Identification Scale (GIS; Sani et al., 2012)

Group Identification Scale

Participant ID: **Date:**

Instructions: Please read each statement below and indicate how much you agree or disagree with each statement. Please tick ONE box on each line below.

This section asks about you and your FAMILY. You may define family in any way that you wish (e.g. immediate family or extended family, etc.).						
1. **I feel a bond with my family**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
2. **I feel similar to the other members of my family**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
3. **I have a sense of belonging to my family**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
4. **I have a lot in common with the members of my family**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐

What factors influence the experience of distress in later life?
Group Identification Scale (Version 1, 11/07/18)

This section asks about you and your LOCAL COMMUNITY. Local community means your neighbourhood, village, city area, or any other way you may define it.						
5. **I feel a bond with my local community**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
6. **I feel similar to the other members of my local community**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
7. **I have a sense of belonging to my local community**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
8. **I have a lot in common with the members of my local community**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐

This section asks you to choose a SOCIAL GROUP to which you belong. Please place a tick in the box beside your chosen group. Please select only ONE group. If none of the listed groups correspond to the group that you want to chose, please tick "Other" and specify what type of group that is.

Sport team/class/club	☐	Voluntary/charity group	☐	Group of friends	☐
Hobby/interest group	☐	Workplace group	☐	Religious group/institution	☐
Support group	☐	Reading/study group	☐	Other	☐
				Please specify:	

9. **I feel a bond with my chosen group**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
10. **I feel similar to the other members of my chosen group**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
11. **I have a sense of belonging to my chosen group**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐
12. **I have a lot in common with the members of my chosen group**						
I strongly disagree ☐	I disagree ☐	I slightly disagree ☐	I neither agree nor disagree ☐	I slightly agree ☐	I agree ☐	I strongly agree ☐

Scoring:

Likert Scale: I strongly disagree = 1

I disagree = 2

I slightly disagree = 3

I neither agree nor disagree = 4

I slightly agree = 5

I agree = 6

I strongly agree = 7

Calculate mean for each subscale (Family, Community and Chosen).

Interpretation:

If mean is ≤4 this indicates that there is no positive identification with that group

If mean is ≥5 this indicates that there is a positive identification with that group.

Record total number of positive identifications (0, 1, 2 or 3)

Appendix J.6: Demographic form

Study Title: What factors influence the experience of distress in later life?

Demographic Information Sheet

Please answer the questions below:

Age: _____

Gender: Male ☐ Female ☐

Marital status:
- Married ☐
- Separated/divorced ☐
- Widowed ☐
- Never married ☐

Highest academic qualification:
- No qualifications ☐
- CSEs or equivalent ☐
- O grades, GCSE, or equivalent ☐
- Highers, A levels or equivalent ☐
- CSYS, AS levels or equivalent ☐
- Apprenticeship or other vocational qualification, e.g. SVQs ☐
- Diploma ☐
- Degree or PGCE ☐
- Higher degree (e.g. MSc, PhD) ☐
- Other (please specify) _____

(Please turn overleaf)

Employment status: Working ☐
Retired ☐
Carer ☐
Volunteering ☐
Never worked ☐

Have you had any previous psychological/psychiatric inpatient treatment? YES/NO

Have you had any previous psychological/psychiatric outpatient treatment? YES/NO

How long have you had your current episode of anxiety/depression/PTSD for? _____

Are you currently taking medication for these problems? YES/NO

Postcode: _____

GP details: _____
_____
_____
_____

Appendix K: Study protocol

Distress in old age: the contribution of lifetime trauma exposure, emotion regulation, social group identifications and socioeconomic deprivation

Protocol: 11/07/2018

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Introduction

With the ageing population, older adults are becoming a growing proportion of people utilising mental health services (Böttche, Kuwert & Knaevelsrud, 2011). For services to be able to effectively address the needs of this population, it is important to understand how older people are affected by mental health problems. Emerging evidence suggests that mental health conditions manifest themselves differently in old age but little research has been done on this topic to date (Lapp, Agbokou & Ferreri,, 2011). One of those conditions is Post Traumatic Stress Disorder (PTSD) which is characterised by marked psychological distress and changes in mood, cognition and behaviour following an exposure to a life threatening event (Hiskey, Luckie, Davies, & Brewin, 2008). The main diagnostic features of this disorder include repeated re-experiences of the traumatic event in the form of intrusive thoughts, flashbacks and nightmares, as well as avoidance of trauma-related reminders and increased arousal, as indicated by irritability, hypervigilance and sleeping difficulties (American Psychiatric Association, 2013).

Around three in four older adults report exposure to at least one traumatic event (Frans, Rimmö, Åberg & Fredrikson, 2005) with estimated PTSD prevalence rates ranging from 1.7% for current PTSD and 2.5% for lifetime PTSD (Volkert, Schulz, Härter, Wlodarczyk & Andreas, 2013). For those older adults who do not meet the full PTSD diagnostic criteria, a six-month prevalence for subthreshold symptoms has been reported to be around 13% (van Zelst, et al., 2003). However, it is important to note that most epidemiological studies have not investigated the prevalence rates of PTSD in older adult population (Lapp et al., 2011). Since older individuals tend to present with less objective arousal (Neiss, Leigland, Carlson & Janowsky, 2009) and may not disclose experienced trauma (Cook & Simiola, 2017), the diagnosis of PTSD is likely to be missed by clinicians.

PTSD in old age has been associated with an increased risk of health conditions, such as coronary heart disease (Kubzansky, et al., 2007), and multiple psychiatric co-morbidities, including depression and anxiety (Spitzer et al., 2008). Older individuals

with PTSD symptoms have reported significant impairments in daily functioning, greater health problems, less satisfaction with life and their quality of care (van Zelst, et al., 2006; Solomon, Helvitz & Zerach, 2009). Despite the serious consequences, PTSD symptoms in older adult population are underreported or misperceived as a somatic illness or part of an ageing process (van Zelst et al., 2003).

Various hypotheses have been put forward to explain the onset of PTSD in old age, such as age-related stressors or reduced physical and mental resilience (Lapp et al., 2011). Stressful changes associated with old age, such as bereavement (Elklit & O'Connor, 2005), physical illness (Macleod, 1994; Chung et al., 2008; 2009), retirement (Port, Engdahl, & Frazier, 2001) and cognitive decline (Hiskey, Luckie, Davies, & Brewin, 2009), have been associated with PTSD and greater symptom severity (Yehuda, et al., 1995). In addition, there is accumulating evidence that PTSD in old age can stem from earlier trauma and may present with delayed onset after years of experiencing no or minimal symptoms (Lapp et al., 2011). Prior exposure to trauma could increase the individual's susceptibility to the effects of subsequent stressful events (Solomon & Ginzburg, 1998). Low grade life stressors or exposure to a traumatic event have been shown to trigger PTSD in older adults with previous trauma history (Boe, Holgersen & Holen, 2010). In a community sample of older people, greater lifetime exposure to trauma has been found to be a stronger predictor of PTSD symptoms than the severity of a single event (Ogle, Rubin & Siegler, 2013). In elderly veterans, delayed onset of PTSD coincided with other stressors, such as the onset of physical illness and mild cognitive impairment (Ruzich, Looi & Robertson, 2005), which suggests a possible interaction between neurodegenerative processes and psycho-social stressors in the emergence of PTSD in old age. Due to age-related decreases in attention and memory, older adults might be able to exert less control over traumatic memories, which could explain the delay in experiencing PTSD symptoms (Floyd, Rice & Black**,** 2002). However, as ageing is an inherently heterogeneous process, establishing a clear relationship between PTSD and old age has been challenging (Lapp et al., 2011).

Typically, individual differences account for more variability in the experience of PTSD than the objective characteristics of traumatic events (Ogle et al., 2013). In younger adults, difficulties in emotion regulation have consistently been shown to be important in predicting PTSD symptoms over time (Seligowski, Lee, Bardeen & Orcutt, 2015). Despite strong evidence base in younger adult population, the impact of emotion regulation on psycho-social outcomes following trauma in older people is unclear. As psychological resources, including emotional stability, allow individuals to find appropriate coping strategies (Walker & Mollenkopf, 2007), emotion regulation strategies are likely to affect how older people cope with trauma.

In one study, individuals who showed greater signs of avoidance after a man-made disaster were at an increased risk of developing PTSD decades later (Boe et al., 2010). As very few participants described additional traumatic events, study authors concluded that psychological factors might be more important in triggering PTSD in old age than further trauma exposure (Boe et al., 2010). There is evidence that older people tend to rely on suppression as an emotion regulation strategy, however, unlike in younger adults, this has not been associated with higher levels of distress (Brummer, Stopa & Bucks, 2014). In one study, distraction-based strategies were favoured by older adults and predicted better emotional well-being by facilitating short-term benefits of greater disengagement with aversive materials (Scheibe, Sheppes & Staudinger, 2015). Additionally, previous research indicated that, with greater lifetime stress, older adults rely more on avoidance and withdrawal to regulate their emotions (Yehuda et al., 1997). However, other studies have found a general reduction in using emotion regulation strategies in old age (Schirda, et al., 2016; Nolen-Hoeksema & Aldao, 2011).

Trauma and adverse life events do not necessarily lead to negative outcomes (Walker & Mollenkopf, 2007). More recently, the role of social context in explaining vulnerability to PTSD has gained increased attention in younger adult populations (Vogt, Erbes & Polusny, 2017). Poor social support following trauma has been identified as one of the strongest risk factors associated with PTSD in two meta-

analyses (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). Social support has not been specifically studied in older adults with trauma history, however, the significance of social connections in later life has been widely reported, especially in relation to improved mental and physical well-being, including satisfaction with life, general levels of happiness and self-esteem, as well as physical and cognitive ability (e.g. Glass, De Leon, Bassuk & Berkman, 2006; Golden, Conroy & Lawlor, 2009). Loss of social support has been implied as one of the leading causes of reduced well-being in old age (Hansen & Slagsvold, 2012) and has also been implicated in the emergence of PTSD in older adults (Elklit & O'Connor, 2005; Chung et al., 2008). Recent research has shown that the source of support as well as the quality and size of support network, including its diversity, might be particularly important in the experience of PTSD (Vogt et al., 2017). It has also been suggested that the subjective appraisal of the helpfulness of others is more relevant in the development and course of PTSD than objective measures of social support (Charuvastra & Cloitre, 2008). Since social support is a complex construct and has been variably defined in the literature, more nuanced understanding of different social factors in PTSD is needed (Wagner, Monson & Hart, 2016).

Group identification, defined as a sense of belonging to a specific group (Tajfel & Turner, 1979), may be important in predicting psychological distress since it has been shown to influence the response to social support. Evidence suggests that people are more likely to offer and accept support from in-group members and to interpret this support positively (e.g. Levine, Prosser, Evans, & Reicher, 2005; Haslam, Jetten, O'Brien, & Jacobs, 2004), which may buffer the negative consequences of stressful events (Haslam et al., 2008). Identifying with more than one group will likely maximise those benefits by decreasing the vulnerability to changes in the social group and providing individuals with more sources of support at times of distress (Kawachi & Berkman, 2001). Multiple group membership may be particularly important in later life due to age-related losses affecting social relationships, such as bereavement and retirement; factors associated with PTSD emergence in later life. In a general population, greater number of group

identifications was a better predictor of self-reported depressive symptoms than social contact alone (Sani, Madhok, Norbury, Dugard & Wakefield, 2015) and reduced the risk of depression relapse (Cruwys et al., 2013). Similarly, in a primary care sample of individuals receiving computerised cognitive behavioural therapy for depression, individuals who identified with more groups showed lower levels of psychological distress (Cientanni et al., 2017).

There is accumulating evidence that group membership facilitates the adjustment to life transitions, which are associated with PTSD in old age, by counteracting the adverse consequences of those changes. In individuals with multiple sclerosis, stronger identification with a support group was associated with lower levels of psychological distress, including depression and anxiety, as well as greater satisfaction with life (Wakefield, Bickley & Sani, 2013). Following stroke, multiple group membership predicted higher levels of well-being (Haslam et al., 2008). Post-retirement, individuals with more social group memberships reported higher quality of life and showed a reduced likelihood of dying in the first six years of their transition (Steffens, Cruwys, Haslam, Jetten & Haslam, 2016). Given implications for well-being, the impact of group identification on the experienced distress in older adults with trauma history requires further investigation.

Despite the high potential for misdiagnosis and different symptom presentations (Averill & Beck, 2000), research on PTSD in old age is scarce (Volkert et al., 2013). Most studies have recruited Holocaust survivors, combat veterans and former prisoners of war which could potentially affect the generalisability of current findings (Lapp et al., 2011). Given that PTSD is a significant issue for older people, it is important to gain a better understanding of how it is manifested in this population. There is emerging evidence that age-related stressors, such as bereavement and physical illness, are associated with PTSD in older adults (e.g. Hiskey, et al., 2009). Personal resources, such as emotion regulation and belonging to social groups, are thought to be crucial in adjusting to adversities (Walker & Mollenkopf, 2007). To our knowledge, only one study to date investigated the role of

emotion regulation in the emergence of PTSD in older people and found that lifetime trauma exposure was associated with symptoms of PTSD in old age, and that this relationship was partially influenced by difficulties in emotion regulation (McCluskey, 2015; unpublished doctoral dissertation). This study study will aim to extend those findings by additionally exploring the impact of socioeconomic deprivation on psychological distress in old age as exposure to traumatic events is more prevalent in disadvantaged populations (Heilemann, Kury & Lee, 2005).

Due to high heterogeneity and complex health trajectories within the older adult population, gaining a better understanding of factors influencing a response to trauma in old age is essential for effective psychological treatments. The present study aims to address the gap in literature by exploring the importance of interpersonal and intra-individual factors, including lifetime trauma exposure, emotion regulation, group identification and socioeconomic deprivation, in predicting psychological distress in older adults. To avoid problems of misdiagnosis and underreporting of PTSD in old age, the current study will recruit individuals with anxiety and depression since these disorders are highly prevalent within the older adult population (Andreas et al., 2016). The reported number of traumatic events is therefore likely to vary as diagnosis of PTSD will be desirable but not essential. In line with previous research (e.g. Ogle, et al., 2013), we hypothesise that older adults with greater lifetime exposure to trauma will show more symptoms of depression, anxiety and PTSD. In line with findings from younger adult populations population (e.g. Seligowski et al., 2015, Cientanni et al., 2017, Heilemann et al., 2005), we hypothesise that greater difficulties in emotion regulation, lower number of group identifications and higher levels of socioeconomic deprivation will predict higher psychological distress in older adults.

Hypotheses

Principal research questions

(1) Greater lifetime trauma exposure will predict higher levels of psychological distress (depression, anxiety, PTSD symptoms) in older

adults.

(2) Greater difficulties in emotion regulation will predict higher levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults.

(3) Lower number of group identifications will predict higher levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults.

(4) Higher levels of socioeconomic deprivation will predict higher levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults.

Secondary research questions

(1) What is the relative contribution of lifetime trauma exposure in predicting levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults?

(2) What is the relative contribution of difficulties in emotion regulation in predicting levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults?

(3) What is the relative contribution of group identifications in predicting levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults?

(4) What is the relative contribution of socioeconomic deprivation in predicting levels of psychological distress (depression, anxiety, PTSD symptoms) in older adults?

Methods

Recruitment

An opportunistic sample of 85 patients will be recruited from the Older People Psychological Therapies Service in NHS Tayside.

Power Calculations

A priori power calculations carried out using G*Power 3.1 (Faul, Erdfelder, Lang &

Buchner, 2007) estimated that 85 participants were needed in order to detect a medium effect size, using linear regression with four predictors at an alpha level of .05 ($p<.05$) and a power of .80.

Eligibility criteria

Inclusion criteria

- Aged 65 years and over
- In receipt of psychological treatment for PTSD, anxiety or depression
- Fluent English speaker
- Ability to give consent

Exclusion criteria

- Cognitive impairment (MoCA ≤20)
- Under investigation for or a confirmed diagnosis of dementia
- Currently experiencing an episode of a serious mental illness, e.g. psychosis
- Ongoing substance misuse
- Ongoing serious risk issues (i.e. risk of harm to self and others, suicidality)

Identification of participants

Eligible participants will be identified by Clinical Psychologists working in the Older People Psychological Therapies Service in NHS Tayside. Clinicians will receive the study inclusion and exclusion criteria to help them identify suitable participants from their caseload. Clinicians will also be provided with the study information sheet which they will be asked to discuss with identified individuals. All potential participants will be screened by their referring agents to ensure that patients not meeting the study criteria are excluded. Suitable patients who express interest in the study will be given the study participation sheet to keep for future reference and will be asked to give consent to be contacted by the researcher. If no issues are identified, the researcher will then contact potential participants via their preferred method of contact (i.e. telephone or letter) to briefly explain the study, check their willingness to participate and answer any questions. To fully consider their participation, the

researcher will aim to give potential participants at least 48 hours from the moment they were approached by the referring agent before contacting them via their preferred method.

Patient interview and consenting procedure

In the telephone conversation or in writing, potential participants will be told that they are being invited to take part in a research project about the impact of stressful life events on experiences of distress in old age. They will be informed that, should they wish to participate, they will be asked to answer some questions about their thinking, life experiences, emotions, mood and well-being. Potential participants will be advised that, as part of the study, they will also be asked to provide general demographic information regarding their age, gender, marital status, academic achievement, employment status, psychiatric or psychological treatment, medication, the duration of their current episode of mental illness, geographical area, and GP details.

Patients who wish to take part in the study will then arrange a mutually convenient time and place for the completion of relevant study forms and measures. In line with the current model of care operating within NHS Tayside, preferably, all participants will meet the researchers at the same location where they attend for appointments with their referring agent. Patients will be informed that the appointment will last approximately 45 minutes. The completion of study questionnaires should take no more than 35 minutes, however, additional time will be allowed for signing the consent form and offering participants the opportunity to provide feedback or ask questions about the study at the end of their appointment.

During the consenting procedure, the researcher will tell participants that they can withdraw from the study at any time if they do not want to continue. They will be reassured that this will not affect their care in any way and that they are not required to give a reason for their withdrawal. The participants will also be offered the

opportunity to receive written feedback about the study results by post once these are available. They will indicate their preference on the consent sheet in a yes/no format.

Initially participants will be screened for mild cognitive impairment using a brief screening tool. If their scores fall below a threshold (i.e. MoCA ≤20), they will be automatically excluded from the study and will not be asked to complete the remaining questionnaires. Each participant will receive a brief written note with their MoCA score, indicating whether they had met the study inclusion criteria and explaining that further feedback should be sought from their respective clinician as agreed with the service (contact details will be provided). The referring agent will then be informed in writing whether or not the participant was included in the study and what their MoCA score was. This will ensure that the patients who are excluded can be offered an appropriate follow-up appointment. This will be explained to participants as part of the consenting procedure.

Throughout the assessment process, the researcher will monitor participants for any signs of discomfort or distress associated with their study participation and will encourage comfort breaks as required as well as remind individuals about their right to withdrawal at any point of the study process. At the end of the study, participants will be asked whether they have any questions about the study and will have the opportunity to provide their feedback.

Procedure

A total of 85 patients in receipt of psychological treatment for PTSD, anxiety or depression in the Older People Psychological Therapies Service in NHS Tayside will be assessed individually in a clinic space. Selected measures were chosen with an intention of reducing unnecessary participation burden. The following procedure is estimated to take around 35 minutes in total. The questionnaires will be administered to participants once only.

The procedure will include the following:

1) The Demographic form which was developed by the research team. The form collects basic demographic information, including the participant's age, gender, marital status, academic achievement, employment status, previous outpatient or inpatient psychological or psychiatric treatment, duration of the current episode of depression, anxiety or PTSD, use of medication, and postcode. Completion time: 1 minute.
2) The Montreal Cognitive Assessment (MoCA; Nasreddine, Phillips, Bedirian, Charbonneau, Whitehead, et al., 2005) which briefly screens for mild cognitive impairment (MCI) by assessing several cognitive domains, including (1) attention, (2) executive function, (3) memory and (4) orientation, with a maximum score of 30. The MoCa has been translated to multiple languages and has been widely used in clinical practice (Appels & Scherder, 2010). It has demonstrated sound psychometric properties, with a good internal consistency (α=.83), and better sensitivity and specificity for detecting MCI than other commonly used screening measures (Nasreddine et al., 2005). Compared to other screening tools, the MoCA has also been shown to better predict dementia in the longer term (Smith, Gildeh & Holmes, 2007). A cut-off score of $\leq$20 has been recommended to optimise its sensitivity and specificity for detection of MCI in older adults (Waldron-Perrine & Axelrod, 2012). Completion time: 10 minutes.
3) The Trauma History Questionnaire (THQ; Green, 1996) which measures lifetime exposure to a range of potentially traumatic experiences in three broad areas of (1) crime-related events, (2) general trauma and disasters, as well as (3) unwanted sexual experiences and physical violence. Participants will be required to answer 24 items in a yes/no format and indicate the frequency and age of onset for each experienced event. The THQ was developed to be applicable to various populations and has been widely used in research (Hooper, Stockton, Krupnick & Green, 2011). In a recent review of studies employing this measure, the THQ demonstrated sound

psychometric properties, including a good interrater reliability and construct validity (Hooper et al., 2011). Completion time: 5 minutes.

4) The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) which measures six aspects of emotion regulation, including (1) acceptance of emotional responses, (2) engagement in goal-directed behaviours, (3) impulse control, (4) emotional awareness, (5) access to emotion regulation strategies and (6) emotional clarity. Participants will be required to answer 36 items by indicating the frequency of each item on a 5-point scale ranging from 1=*'almost never'* to 5=*'almost always'*. Higher scores indicate greater difficulties in emotion regulation. The DERS demonstrated a good internal consistency (α=.80-.89) and acceptable validity (Gratz & Roemer, 2004). Orgeta (2009) reported that this measure is suitable for use with older adults. Completion time: 8 minutes.
5) The Civilian Version of the PTSD Checklist (PCL-C; Weathers, Litz, Huska & Keane, 1994) which measures PTSD symptoms in the civilian population. Participants will be required to answer 17 items by rating the intensity of their symptoms on a 5-point scale ranging from 1=*'not at all'* to 5=*'extremely'*. Higher scores indicate greater symptom severity. The PCL-C demonstrated a high internal consistency (α=.87-.94), good test-retest reliability and positive correlations with other widely used PTSD scales (Ruggiero, Del Ben, Scotti & Rabalais, 2003). Cook, Elhai and Arean (2005) reported that this measure is suitable for use with older adults and recommended a cut-off score of 37 to reliably diagnose PTSD in this population. Completion time: 5 minutes.
6) The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) which measures symptoms of depression and anxiety on two 7-item subscales. Participants will be required to answer the total of 14 items by rating their symptom severity on a 4-point scale ranging from 0=*'not at all'* to 3=*'most of the time'*. Higher scores indicate greater symptom severity. The HADS has been widely used in research with older adults and demonstrated a good internal consistency (α=.75-.84) and test-retest reliability (Roberts, Fletcher & Merrick, 2014; Spinhoven et al., 1997). This scale is suitable for

the assessment of symptom severity, however, appropriate cut-off scores have yet to be determined in the older adult population (Robert et al., 2014). Completion time: 2 minutes.

7) The Group Identification Scale (GIS; Sani et al., 2012) which measures identification with three groups (i.e. family, community and a social group chosen by the participant from the list provided, e.g. a group of friends, a voluntary group or a sports group). Identification with each group is measured with four items, encompassing a general sense of belonging and commonality with in-group members. The items are rated on a 7-point scale ranging from 1=*'strongly disagree'* to 7=*'strongly agree'*. The cut-off score for group identification is 20, hence individuals scoring ≥20 will be considered as identifying with the given group. The GIS demonstrated a good internal reliability (α=.85-.92) and construct validity (Sani et al., 2015). Completion time: 2 minutes.
8) The Scottish Index of Multiple Deprivation (SIMD; Scottish Executive, 2016) which measures socioeconomic deprivation according to postcode information. Each postcode has a designated value between 1 and 10, where 1 indicates the least deprived and 10 indicates the most deprived households. Completion time: none; completed by the researcher.

The full procedure is summarised in Appendix 1.

Analysis

IBM SPSS Statistics Version 24 or equivalent will be used to analyse the data. All data will be assessed for normality using the Shapiro-Wilk test. Independent t-tests for parametric data or Mann-Whitney U tests for non-parametric data will be used for pairwise comparisons to test for gender and the developmental timing of trauma exposure (childhood, adulthood and old age) as co-variates. Statistical significance is taken as a two-sided p value of <.05.

Group characteristics

The group characteristics will firstly be reported. The proportion of male and female participants will be calculated together with means and standard deviations for age, years of education and the duration of the current episode of depression or anxiety. Additional descriptive statistics will be calculated in percentages for discrete demographic variables, including martial status ('married', 'separated/divorced', 'widowed', 'never married), employment status ('working', 'retired', 'volunteering', 'never worked'), and area of deprivation (as indicated by the Scottish Index of Multiple Deprivation). The proportion of participants who have received previous outpatient or inpatient psychological or psychiatric treatment as well as those who have been prescribed anti-depressant medication will also be reported. Means and standard deviations will be calculated for quantitative variables, including the brief cognitive screen (MoCA score), lifetime trauma exposure (THQ score), emotion regulation (DERS score), PTSD symptoms (PCL-C score), as well as symptoms of anxiety and depression (HADS score). The proportion of participants for each number of group identifications (ranging from 0-3) will also be reported.

The nature of trauma exposure

The data relating to the nature of lifetime trauma exposure will be of particular interest. The mean number of traumatic experiences will be calculated, together with the mean age of trauma encounter. The frequency of different types of traumas will also be reported and split into childhood trauma (>18 years of age), adult trauma (18-64 years of age) and trauma in old age (≤65 years of age).

Predictor variables and psychological distress

Correlations will be calculated to answer the principal research questions on whether lifetime trauma exposure, emotion regulation, number of group identifications and socioeconomic deprivation are associated with psychological distress. The Pearson product correlation coefficient for parametric data or the Spearman's rank correlation coefficient for non-parametric data will be used to explore the strength of the relationship between the predictor variables (i.e. lifetime trauma exposure, emotion

regulation, number of group identifications and socioeconomic deprivation) and scores on anxiety, depression and PTSD measures. The absolute value of the correlation coefficient will be taken to represent the following effect sizes: small for values >0.3, medium for values between 0.3-0.5 and large for values <0.5 (Cohen, 1988). Only variables that significantly correlate with the outcome variables will be included in subsequent regression analyses to answer secondary research questions.

To test the relative strength of each hypothesised variable (i.e. lifetime trauma exposure, emotion regulation, number of group identifications and socioeconomic deprivation) in predicting symptoms of distress (i.e. anxiety, depression and PTSD), a simultaneous forced entry linear regression model will be calculated for each outcome variable, yielding three models in total. The forced entry method allows to test the individual exploratory power of each hypothesised variable whilst controlling for other variables in the equation. This is a preferred method for making predictions for new models since it allows to weigh the relative contribution of each variable without making prior assumptions regarding their importance (Field, 2003).

Application

Accumulating evidence suggests that mental health conditions are manifested differently in old age (Lapp et al., 2011), however, the needs of this population are poorly understood, despite older people becoming a growing proportion of individuals utilising mental health services (Böttche et al., 2011). Distress in old age has been shown to be related to previous trauma (Boe et al., 2010). The vast majority of older people have encountered at least one traumatic event in their lives (Frans et al., 2005), however, it is not clear how PTSD is triggered in this population. Previous studies have shown that personal resources, such as emotional stability and social support, might help individuals adapt to adverse life circumstances (e.g. Seligowski et al., 2015; Haslam et al., 2008), potentially buffering the effects of trauma. Other factors, such as socioeconomic deprivation, are likely to affect the individual's chances of developing PTSD as previous research has indicated that disadvantaged populations are exposed to more traumatic events (Heilemann et al., 2005). Since the

role of these factors on the PTSD presentation in old age has not been investigated, the present study aims to expand our current understanding of distress in older adult population.

Given its serious and adverse consequences, the importance of improving detection rates of PTSD in older adults should be recognised. Findings from this study might encourage qualified professionals in older people's services to place more importance on taking trauma history as part of their assessment process and on recognising different PTSD presentations in old age to minimise the potential for mis-diagnosis and underreporting of this disorder. It can further contribute to the development of more effective treatment strategies for PTSD by, for example, increasing the focus of an intervention on emotion regulation strategies or encouraging social group participation. Lastly, as research in this population is scarce, it is hoped that the current study will inspire future projects which will continue to add to the current evidence base and to the efforts of raising awareness of the impact of traumatic experiences in old age.

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Appendix 1: Outline of Recruitment Procedure