The evolution of Post-Traumatic Stress Disorder in the UK Armed Forces: Traumatic exposures in Iraq & Afghanistan and responses of distress (TRIAD study)

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The King's Centre for Military Health Research (KCMHR), known previously as the Gulf War Illness Research Unit, was launched in 2004 as a joint initiative between the Institute of Psychiatry, Psychology and Neuroscience and the Department of War Studies, King's College London. KCMHR draws upon the experience of a multi-disciplinary team and is led by Professor Sir Simon Wessely and Professor Nicola Fear. It undertakes research studying military life by using quantitative and qualitative methods. Its flagship study is an ongoing epidemiological multiphase investigation of the health and well-being of approximately 20,000 UK Armed Forces personnel. The study, funded by the UK Ministry of Defence (MoD), has been running since 2003 and, as of 2016, has three phases of data. Data from our studies have been used to analyse various military issues, and papers have been published in peer reviewed, scientific journals. Our findings are regularly reported in the press and have been used to inform military policies.

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Acknowledgements

Foreword

'Leaving the military introduces rupture across all levels.'

What a powerful statement, supported by the evidence gained from a world-leading study and data from over seven thousand individual serving and former serving personnel, together with a range of in-depth interviews.

We know that most ex-service personnel transition successfully into civilian life having overcome a variety of challenges, some of which certainly fit the description of a rupture. But for a few, medical conditions associated with their service can have an enormous impact on their transition, and affect their ability to live on 'civvy street'. Fulfilled civilian life is the goal upon which Forces in Mind Trust's mission is absolutely focused, and we rightly look out for those facing the greatest of challenges.

Post-traumatic stress disorder (PTSD) is a clinically diagnosed mental health condition, and evidence such as that provided by the King's College London cohort study has consistently shown that although it affects relatively few, and the condition can be successfully managed, its impact can be devastating. This report suggests new explanations for why the act of leaving the Armed Forces, which is undertaken by every serving person, is associated with higher risks of PTSD.

Understanding more about the evolution of PTSD will ultimately help more successful transitions. The positive health effect of being in work (and its negative opposite), the reduction in barriers to reporting mental ill health once out of service, and the exacerbation of pre-existing symptoms brought on by the act of transition are all offered as reasons for worse outcomes amongst ex-serving personnel compared to their in-service equivalents. These seem logical conclusions based upon evidence gathered elsewhere under the Trust's mental health research programme.

Far more important to our role as an impactful Trust though are the key recommendations.

Promoting continuity requires smoother transition pathways. We have long argued that the hard wall between serving and ex-serving people, establishments and personal information needs to become far more permeable. It acts both ways. Some improvements have been made, notably around medical records, and there are some fine examples of collaboration 'across the wire'. But an almost institutional change is needed to bring the serving and ex-serving communities closer together.

Diversifying holding structures also reinforces many of our previous findings and recommendations. Families should be fully involved with, and integrated into, the transition journey, and networks and services that already exist need to be better joined up. This is not a question of resource, but of outwards vision and collaboration.

As long as these shortcomings continue to be evidenced, we will continue to press for changes to overcome them. I doubt that PTSD will disappear from our Armed Forces Community, so it is essential that we identify how it can be better dealt with. And even if the condition itself might not disappear, if those who hold the responsibility and wield the power were to implement all this report's recommendations, then the terrible impact it has on the lives of those it afflicts just might.

Ray Lock

Air Vice-Marshal Ray Lock CBE
Chief Executive, Forces in Mind Trust

Executive Summary

Background

Those currently serving in the UK Armed Forces (UKAF) do not experience higher rates of Post-Traumatic Stress Disorder (PTSD) than the general population, according to recent findings from the King's Centre for Military Health Research (KCMHR)'s flagship cohort study which has examined the health and wellbeing of the UKAF since 2004. This, however, is not the case for ex-serving personnel, especially if they deployed to Iraq or Afghanistan in combat roles. The 'TRaumatic exposures in Iraq & Afghanistan and responses of Distress' (TRIAD) study has therefore sought to better understand the higher rates of PTSD in some subgroups of the UK Armed Forces by examining how PTSD symptoms have progressed over the duration of the cohort study.

Objectives

The study was structured around three overarching research objectives. The first was to examine how PTSD symptoms evolve over time; the second to identify the pre, peri- and post-service vulnerability and protective factors influencing the development of PTSD symptoms, and the third to explore post-service outcomes of ex-serving personnel with PTSD symptoms, including the facilitators and barriers to accessing mental health services.

Methods

The present study was a mixed methods exploration into the longitudinal course of PTSD symptoms within the UK Armed Forces combining both epidemiological and lived experience perspectives. By drawing upon three phases of data from the KCMHR cohort (2004-2006; 2007-2009 and 2004-16), we identified the main courses of PTSD symptoms in a large sample of deployed and non-deployed UKAF personnel (N=7,357) and compared the trajectories of those currently serving and ex-serving. In this analysis, outcomes of PTSD were based on self-report data and measured using a validated tool (PCL-C, where scores of 50 or above indicated probable PTSD).

We secondly ran a focused qualitative investigation to explore the biographies of ex-regulars deployed in combat roles (the most at-risk group of PTSD) and to determine through-life traumatic experiences and psychological responses. Samples consisted of a group with probable PTSD (N=10) and a group without symptoms (N=7) which allowed for a comparison of the groups' vulnerability and protective factors. Themes based upon the interview data informed the variables that were investigated in a series of multinomial regression analyses to determine the factors associated with following different courses of PTSD.

Results

The evolution of PTSD symptoms

Quantitative findings

- 70% of the cohort demonstrated no or minimal symptoms of PTSD over the twelve-year period. This research reinforced that most serving and ex-serving UKAF personnel do not experience PTSD.

- We did, however, identify a subgroup consisting of 18% of the sample who consistently experienced mild distress, i.e. elevated symptoms under thresholds of probable diagnosis.

- A further 12% experienced probable PTSD at one time point over the study period. Of these, 5% improved, 5% worsened and 2% exhibited ongoing symptoms over time.

- The courses of PTSD were generally similar when comparing the trajectories of current and ex-serving personnel but there were some noteworthy differences:
  - More ex-serving personnel than currently serving personnel (13% v. 10%) reported probable PTSD (scores of ≥ 50 for at least one of three phases) over the study period (2004-16).
  - About half of currently serving personnel with probable PTSD improved over time, yet this only applied to a third of ex-serving personnel.
  - Ex-serving personnel who experienced probable PTSD throughout the study period worsened over time, whilst the same group who were still in service showed stable levels of symptoms.

Qualitative findings

- We explored how individuals experienced their PTSD symptoms develop over time. We found most did not experience acute symptoms after traumatic events in childhood or on their initial deployments - even if such events were perceived to be the root cause of later problems. Rather, PTSD developed in a protracted way, i.e. extended over a longer period, and in interaction with other life events, such as further deployments and leaving service.

- To explain this process, we present the ecological model of PTSD symptom development. This model proposes that there are key structures on individual, social and institutional levels which help to hold, organise or process the potential rupture of traumatic experiences over the lifetime. In the military, holding structures can include the individual capacities of personnel, the pseudo-family of the unit and in-service practical supports like leadership.
  - **Upon enlistment**, the military may help to hold ruptures from childhood and, in some cases, psychological defences/ symptoms like emotional numbing and hypervigilance may prove initially helpful in service, particularly on deployment.
  - **Following exposure to deployment trauma**, the quality of holding structures (such as relationships with leadership, family, colleagues and the individual's capacity to compartmentalise their trauma) weaken, or rupture, and are compounded by the emergence of early symptoms (such as anger) and other life stressors.
  - **Leaving service** introduces rupture across all levels of experience. This not only includes in-service structures, but also the cultural contexts where trauma is collectively experienced, shared and made sense of. These may enact as protective buffers which, when lost, mark a collapse in the individual's compartmentalisation of traumatic experiences, ultimately bringing them into consciousness many years after the event(s). It is therefore possible that the 'no symptom' group consists of personnel whose holding structures remained intact or were able to compensate enough to either process such experiences or continue compartmentalising them.

Research objective 2

Pre-, peri, and post-service vulnerability and protective factors

* **Pre-service factors** linked to PTSD symptoms in a quantitative analysis included childhood interpersonal stress or violence and other ranks (commonly implying lower socioeconomic/ educational status). Qualitative findings similarly pointed to the vulnerability of those with early experiences of family and/ or social adversity and whilst these individuals may benefit from military holding structures more than most initially, rupture in childhood appeared to interact with other stressors later along the lifespan.

* **Peri-service factors** linked to PTSD symptoms in a quantitative analysis included serving in the Army (compared to other branches) and proximity to the wounding/ death of others if deployed to Iraq and/or Afghanistan. We also explored violent combat exposures and the only association was among improvers who were less likely to report such experiences. Being close to wounding/ death appeared to be influential in symptoms developing, whilst violent combat appeared to prevent recovery if some symptoms were already present. 'Index' events (exposures thought to cause PTSD) described during interviews mainly involved incidents of wounding of others/ death; such events tended to be vivid and visceral, ethically problematic, revealed the limits of training and were difficult to process in real-time. Perceived military and social support post-deployment were further linked to a lack of symptoms, yet only social support appeared protective in not worsening symptoms if they were already present.

* A **post-service** sub-analyses suggested that those with worsening symptoms were more likely to be recent service leavers and had left service by Premature Voluntary Release or Medical Discharge. Qualitative findings highlighted a group with multiple deployments who had left service following difficult deployments in Afghanistan (circa 2007-10) with physical and mental health comorbidities. We further examined time since leaving service. Those with chronic symptoms were more likely to have left service at earlier time-points rather than having left in the past four years at the time data were collected (phase 3, 2014-16), although this also applied to improving classes therefore it is difficult to draw conclusions.

* Finally, by examining those with the same starting point of symptoms, we could identify which factors relate to worsening or improving over time. Worsening from mild distress was related to alcohol misuse, less social support (indicated by being separated/ widowed/ divorced and inconsistent social support post-deployment) and proximity to the wounding/ death of others on deployment. Improvements from PTSD were linked to serving as an officer and not reporting proximity to wounding /death or violent combat on deployment.

Research objective 3

Post-service outcomes and help-seeking

* **Quantitative analyses** showed that negative post-service outcomes (including adverse life events, employment and finances) were linked to any level of PTSD symptoms, irrespective of whether they had already improved over time.

* **Qualitative findings** indicated that post-service outcomes were often interrelated and therefore repercussive in nature. In this way, ruptures in post-service holding structures appeared to affect all others. For example, unemployment – which was commonly linked to deployment-related physical and mental health problems - negatively impacted participants' family life, their symptoms and sense of self. Conversely, those who did not develop symptoms reported holding structures that were instead mutually supporting.

- We also qualitatively explored points of **help-seeking** along the timeline of symptoms. Some of the sample encountered short-term treatment for emerging symptoms while still in service but found interventions did not sufficiently address their needs. Themes of 'not enough' related to specialist physical and mental health support and applied to peri-service, transition and post-service periods. In the main, this was characterised by a lack of continuity and 'joined-up' care.

Discussion

This project facilitated a multifaceted exploration of PTSD symptoms among serving and ex-serving personnel of the UK Armed Forces. As indicated by other research, our study found that most of serving and ex-serving personnel do not experience PTSD (approximately 70%). However, by looking at PTSD symptoms longitudinally over a twelve-year period and examining the main trajectories within the sample, we were able to identify other subgroups, including a) those with elevated but subthreshold symptoms, b) a minority group with chronic symptoms, c) those who eventually develop PTSD and d) those who improve. Whilst the actual courses of PTSD development did not appear to differ between those who have left and those still in service, our findings demonstrate that the poorer PTSD outcomes of ex-serving personnel found in other cross-sectional work were evident also longitudinally.

In our qualitative interviews, we found that most ex-serving personnel interviewed experienced their first symptoms of PTSD during military service. Symptoms developed not immediately, but in a protracted way over additional deployments yet exacerbated greatly upon leaving service. We found that leaving the military marked the loss of many protective buffers supporting the individual's ability to compartmentalise their traumatic experiences and holding symptoms at bay.

The **ecological model of PTSD symptom development** we presented chimes with other concepts, such as 'holding' and 'containment' in psychotherapeutic theory and the social buffering hypothesis in social science. The model further provides a framework to represent the interrelationships between individual through to institutional support structures and how these interact with a host of life stressors, including childhood adversity, deployment trauma and military discharge. This approach effectively makes space for representing the role of wider environmental processes in PTSD development.

The Ministry of Defence (MoD)'s wrap-around 'Defence Holistic Transition Policy' is encouraging given the wide-ranging contextual influences that appear to contribute to the development of PTSD symptoms. We note, however, that participants reported insufficient support for early mental health problems in service which carried on through the transition period and in their post-service lives. By the time mental health problems were more complex and chronic, access to specialist support was impeded by geographical limitations, not meeting the inclusion criteria for services and delays and therefore the available interventions were perceived to be 'not enough'.

Implications

Two virtual stakeholder events were held in August 2020 to discuss the implications of these findings. Feedback aligned to two themes of 1) promoting continuity and 2) diversifying holding structures.

- **Promoting continuity** referred to ways of managing changes to holding structures, particularly during the transition from the military 'micro-society' to civilian life. Ideas included implementing a more intentional 'holding' period following military discharge to encourage the building of transition networks between service leavers with shared experiences/ similar needs and optimising the suite of already available military and civilian support services. Continuity also related to the provision of joined-up care, relating to both physical and mental health support. Ideas included step-down interventions or handovers to other services to prevent the premature removal of a key holding structure and to support the long-term improvement of symptoms.

- **Diversifying holding structures** represented the opportunity to draw upon different ecological levels of support highlighted by our qualitative model (i.e. individual, social and institutional levels). This would avoid too much pressure on any one structure. Most notably, discussions centred upon alleviating the pressure upon individuals and their families by mobilising a range of military and civilian provisions during the transition process and beyond in order to substitute the holding structures found in service.

Introduction

Post-Traumatic Stress Disorder (PTSD) is a psychiatric disorder that can occur following exposure to a traumatic event and is characterised by i) re-experiencing symptoms, including intrusive thoughts, 'flashbacks' and recurring nightmares; ii) the avoidance of thoughts or reminders of the trauma, iii) emotional numbing and iv) hypervigilance, arousal, irritability and anger (1). PTSD has itself evolved since its entry into the Diagnostic and Statistical Manual of Mental Disorders (DSM-lll) in 1980 after the Vietnam war (2). Criteria changed even during the King's Centre for Military Health Research (KCMHR) cohort study, a longitudinal study which has examined the health and wellbeing of the UK Armed Forces since 2004. These changes included the separation of emotional numbing and avoidance symptom domains, and a return to the objective categorisation of 'qualifying' traumas, rather than any event that subjectively evoked 'intense fear, horror or helplessness' (3, 4).

PTSD has been widely considered the 'signature injury' of the military (5) although anxiety, depression, and alcohol misuse are more common in the UK Armed Forces (UKAF) (6). Nonetheless, the military encounter unique occupational exposures that may place them at greater risk of developing PTSD than civilians. Novel findings from the most recent phase of the KCMHR cohort study found that rates of PTSD were no higher in those still serving in the UKAF than in the general population (4%) (6). However, this differed for ex-serving personnel where rates of PTSD were 9% for regular personnel who deployed to Iraq or Afghanistan and who had since left service, and 17% if they had deployed in a combat role. In light of the serious and debilitating effects of PTSD and poor treatment outcomes among ex-serving personnel (7, 8), these findings signal an urgent need to better understand the development of PTSD in both current and former members of the UK Armed Forces.

The likelihood of developing PTSD itself depends on a complex interaction between individual and situational factors that, in turn, impact the course of symptoms over time (9, 10). Onset, for example, is influenced by numerous factors at the time of the trauma, including neurobiological changes in individual stress responses and dissociative states as memories are formed (11), through to post-event factors, such as the individual's ability to cognitively appraise and make sense of what happened, and their access or ability to engage with their social network (12). We know from prior research that the course of PTSD is heterogeneous, meaning that there can be marked differences in the progression of the disorder. Previous studies have found that most military personnel who score as having probable PTSD on an initial assessment will no longer meet thresholds at follow-up (e.g. half of US military personnel (13) and two-thirds of UK military personnel (14)), however approximately a third will continue to experience symptoms and a small percentage (3.5% in the UK Armed Forces (15)) appear to develop PTSD at a later stage.

Complicating the prognosis, military personnel may have been exposed to adversity in childhood, as well as exposures in service (16). Complex PTSD (cPTSD) (17), a sibling condition to PTSD (18), is thought to affect those with experience of repeated traumatic exposures (e.g. chronic child

abuse, intimate partner violence, exposures as a prisoner of war) and is associated with disturbances in being able to regulate emotions, the concept of the self and relationships. Comorbidities with other problems, such as suicidal ideation, alcohol use (19) and moral injury (20), further complicate symptomatology, prognosis and effective treatment, demonstrating the need to better understand how PTSD develops in order to determine (or configure) appropriate and effective timely treatment.

Research based specifically upon military samples found that combat exposure, such as discharging a weapon or witnessing the wounding or death of others, was related to persistent PTSD (21); increasing PTSD symptoms were related to childhood adversity (9), and social support (from the unit (14, 22) and wider community (23)) appear related to recovering trajectories.

Leaving service has also been consistently associated with higher risks of PTSD (14, 21). There are several possible explanations for this: It could be that those who leave service 1) are more likely to be experiencing psychological ill health; 2) feel more comfortable reporting symptoms of PTSD once leaving service due to fears about the potential impact upon their careers; and/ or 3) have experienced the multiple challenges of leaving service which may exacerbate pre-existing symptoms. Whilst it is likely that it is a mixture of these reasons, it is not definitive why ex-serving personnel demonstrate worse outcomes than those who remain in service.

Research objectives

The 'Traumatic exposures in Iraq & Afghanistan and responses of distress' (TRIAD) study has sought to better understand the higher rates of PTSD in some subgroups of the UK Armed Forces by examining how PTSD has progressed throughout the duration of the cohort study. A previous analysis examined trajectories of PTSD in UKAF personnel sampled before the Iraq War (9); however, the current study is based on a younger and larger cohort sample, and it is the first UK study to examine trajectories separately by serving status. We complemented this with a biographical exploration of PTSD development by interviewing a sample of the most at-risk group, namely ex-serving regulars who had been deployed in combat roles whilst serving. Both the quantitative and qualitative analyses allowed for a nuanced and multidimensional investigation into the vulnerability and protective factors of PTSD. The research objectives guiding this study were therefore:

1. To investigate the evolution of PTSD symptoms over time;

2. To identify the pre, peri- and post-service vulnerability and protective factors for developing PTSD symptoms;

3. To explore post-service outcomes among ex-serving personnel with PTSD symptoms, including the facilitators and barriers to accessing mental health services.

Methods

Study design

To address the research objectives of the present study, we used both quantitative and qualitative methodologies within a multiphase design. Mixed methods research can be used to expand the research programme in ways that are not possible when using only one method (24). In addition, findings from different methods can be triangulated to clarify or elaborate upon the results of a single method, and to explore points of divergence and contradiction (25). Table 1 outlines the research objectives and the components we used to address them.

Table 1: TRIAD research objectives – Quantitative and qualitative components

Objective	Quantitative	Qualitative
1. To investigate the evolution of PTSD symptoms over time	Systematic review of the PTSD trajectories in military samples and factors associated with different courses of the disorder. This will allow a comparison between these and the present study's trajectories Definition of the most common PTSD trajectories in the full UKAF sample (N=7,357) then separated by serving (N=3,809) and ex-serving (N=3,538) status	Insight into the lived experiences of symptom development in a subsample of ex-regulars who had served in combat roles in Iraq/Afghanistan with and without probable PTSD (N=17)
2. To identify pre, peri- and post-service vulnerability and protective factors influencing the development of PTSD symptoms	Identification of the factors associated with identified PTSD trajectories	Insights into the life events influencing the onset of symptoms from the perspectives of the subsample
3. To explore post-service outcomes for ex-serving personnel, including help-seeking, including the facilitators and barriers to accessing mental health services	Identification of the factors relevant to ex-serving personnel (e.g. discharge type, financial and employment outcomes)	Accounts of help-seeking throughout the lifespan and interactions with both symptoms and transition among the PTSD symptom group (N=10)

Quantitative investigation

To assist the delivery of the quantitative and qualitative components, we developed more specific research aims. The quantitative aims were:

1. To investigate the main symptom trajectories of PTSD in a UKAF sample

This aim involved defining the most common symptom trajectories of PTSD in a sample of current and ex-serving UKAF personnel (N=7,357) drawn from the KCMHR cohort study. Trajectory analyses differ from more conventional statistical approaches as they do not determine groups of interest from the outset but, rather, the groups are defined during the modelling process (26). This data-driven approach has become popular in clinical and health research for identifying atypical groups following different courses of a disorder and who may require specific interventions (27). The statistical characteristics of trajectory analyses are explained further on p. 17.

2. To examine the pre-, peri- and post-service factors associated with following these trajectories

This sought to investigate key demographic and military characteristics and the vulnerability and protective factors, associated with belonging to the trajectory classes identified.

Study design and sample

The present study included a secondary data analysis of the three phases of data from the KCMHR cohort study, spanning 2004-2016 (6, 28, 29). At phase 1 (2004-6), the cohort study consisted of a sample of 10,272 UK Armed Forces (UKAF) personnel drawn randomly from several sampling frames who were either deployed to the first TELIC operation or were deployable but did not deploy. Participants were from the Tri-services on either a regular or reserve engagement. Of the

10,272 participating at phase 1, 7,499 had data at follow-up phases conducted in 2007-2009 (phase 2) and/or 2014-2016 (phase 3). Participants were excluded from the trajectory models if they did not have scores of PTSD at baseline (N=115) or if they lacked data at a follow-up phase (N=13). The final sample included 7,357 participants, however we then split the sample by serving status to determine if trajectories differed between those in-service and those who had left. Samples included:

- Currently serving personnel (N=3,809): This model estimated the trajectories for those still in-service at phase 3 (the most recent phase) of the cohort study.
- Ex-serving personnel (N=3,538): This model estimated trajectories for those who had left service by phase 3. This strategy was chosen so that the ex-serving sample could be more representative of recent service leavers, and therefore a more contemporary population. We were able to be more specific about when participants in each trajectory had left service by examining this as a factor in the second quantitative analysis.

Measures

Outcome

Probable PTSD was measured using the 17-item National Centre for PTSD Checklist (PCL-C) (30). Scores were calculated by summing responses to individual items (scores of 1-5) with totals ranging from 17 to 85. Models were based upon a continuous score, i.e. symptom level from 17 to 85. Models did not rely upon a cut-off to indicate probable PTSD, however we refer to this threshold within the report and this was measured as scores of 50 or above. This is not equivalent to a diagnosis, which can only be made by a qualified clinician, however it is indicative of probable disorder for research purposes.

Vulnerability and protective factors

We explored factors associated with belonging to the trajectory classes identified (Aim 2) and these were informed by themes from the qualitative interviews and the wider literature (Table 2).

Table 2: Factors examined in the second quantitative analysis identifying associations with trajectories

Factors	Definition and measurement
Demographic or military characteristics (phase 1)	
Age group	Self-reported categorised into ages of 18-24/ 25-39/ 40+ years old
Gender	Male/ female
Branch of Service	Army/ Royal Navy including Royal Marines/ Royal Air Force (RAF)
Rank	Other ranks/ Officer
Possible vulnerability factors (pre and peri-service)	
Childhood interpersonal stress and violence	Yes/no. This variable was drawn from three items from the Adverse Childhood Experiences scale (31) and included any endorsement of being 'regularly hit/hurt as a child by parents/carers', 'being shouted at a lot' or 'witnessing physical or verbal abuse between parents as a child'
Alcohol misuse	Yes/no. This variable was measured using Alcohol Use Disorder Identification Test (AUDIT) where scores of 16 or above indicated drinking at levels of probable harm (32)
Proximity to the wounding/death of others	Yes/no: This was based on self-report data about positively responding to handling dead bodies, seeing personnel wounded or killed or giving aid at any phase
Violent combat exposures	Yes/no: This was based on self-report data and included exposure to small arms fire, mortar fire or discharging a weapon in direct combat at any phase
Possible protective factors (peri-service)	
Relationship status at phase 1	In a relationship/ single/ separated, widowed or divorced
Perceptions of post-deployment social support	Consistent/ inconsistent: Consistent support was defined by participants disagreeing or strongly disagreeing with the statements: 'people did not understand what I had been through', 'I did not want to talk about my experiences with family/ friends' and 'I argued more with my partner/ spouse' following reported deployments. Agreement with any of these statements at any phase constituted 'inconsistent support'
Perceptions of post-deployment military support	Consistent/ inconsistent: Consistent support was defined by participants agreeing or strongly agreeing with the statement: 'I was well supported by the military' after any reported deployment. 'Inconsistent support' constituted disagreement or strong disagreement with the statement at any phase

Table 2: continued

Factors	Definition and measurement
Ex-serving factors (post-service)	
Time since leaving service	4-7/ 8-11/ 12+ years: This variable was based on self-report data and was supplemented with data supplied by Defence Statistics if missing
Discharge status	End of contract/ Premature Voluntary Release (PVR)/ medical discharge and other. This variable was based upon self-report data. 'Other' included low numbers of other categories e.g. administrative discharge, discharge for temperamental unsuitability and disciplinary reasons, redundancy and retirement or undisclosed 'other' reasons
Post-service financial problems	Yes/no. A positive endorsement of this factor was if participants' responses indicated that they found it 'quite' or 'very' difficult to how they were managing financially
Post-service employment status	Employed/not in employment. Employment included full or part-time employment. Not in employment included job-seeking, off work due to sickness, retirement and other reasons
Frequency of post-service negative life events	Categorised into 0-2/ 3-4/ 5+ events. A frequency count was developed using items from the Negative Life Events scale asking whether participants experienced a divorce or broken relationship, accident, assaults, severe physical or mental health problems and negative events or death to someone close, being victim to a burglary, robbery or other serious crime, financial problems, unexpectedly losing a job, being arrested or charged with a criminal offence in the past three years

Statistical analysis

Trajectory analyses

Latent growth mixture modelling (26) was used to define trajectories of PTSD in Mplus (7.4), a statistical software package. Models based on the full sample were conducted before running the current and ex-serving models separately. We compared models with one group through to six groups using statistical indicators to assess which provided the best fit to the data. Indicators included the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and the Sample Size Adjusted BIC (SABIC) where lower values signalled a more appropriate solution. The adjusted Lo-Mendell-Rubin Adjusted Likelihood Ratio Test (LMR-LRT) was used to determine if models fit the data better than a model with one less class (significant p value <0.05). Further statistics, including entropy (with values nearest to 1) and average posterior probabilities (>0.7), indicated how accurately individuals were classified (33). We judged whether emerging trajectories 'made sense' theoretically and clinically when choosing the best fitting model.

Regression analyses

Once a trajectory model was selected, we ran multinomial regression models to identify the factors associated with the identified trajectories. In this analysis, trajectory classes were used as dependent variables and factors listed in Table 2 were inputted as independent variables. Our steps included:

1

Trajectories of PTSD symptoms are identified via the modelling process

2

Assessing factors individually in Stata 15.0.

3

Factors that were statistically associated[1] were put forward to the final model in Mplus 7.4 with all other factors. We weighted analysis toward individuals who were more typical of their assigned class (34).

4

Sub-analyses were performed to investigate combat factors among those who deployed to Iraq and Afghanistan and post-service factors among ex-serving personnel.

5

To examine post-service outcomes measured at phase 3, we switched the dependent and independent variables. This allowed us to explore how trajectories of PTSD may influence outcomes of employment/ financial/ life events at the final phase. These multinomial logistic regression analyses were conducted in Stata 15.0 and the probabilities of belonging to a class were used as probability weights (35).

Qualitative exploration

Research exploring the lived experience of PTSD is lacking among military populations. Whilst epidemiological approaches can assess mental health problems on a population-level (36), qualitative perspectives may be helpful for situating mental health problems in the lived experience and in the context of other biographical processes (37-39). Such insights can be helpful for understanding how and why individuals become affected by traumatic experiences, impacts upon other areas of life, their coping strategies and whether they decide to seek help. This part of the study was directed by four research questions:

1. How do participants experience the evolution of their PTSD symptoms over time?

2. What are the pre-, peri- and post-Service experiences participants ascribe to developing PTSD symptoms?

3. What differentiates those who do and do not develop symptoms of PTSD over time?

4. What are the facilitators and barriers to help-seeking and supports in transition and post-service?

Sample

Participants were selected from a subsample of ex-serving personnel who had taken part in the KCMHR cohort study. Inclusion criteria were shaped by the characteristics of the at-risk group with a prevalence rate of 17%. Participants were:

⬩ Regulars at phase 1

⬩ Deployed in combat roles to Iraq or Afghanistan

⬩ Had since left service according to phase 3 serving status

The sample were restricted to Army and Royal Marines in order to interview those in more typical combat roles. We excluded participants who

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[1]*Associations determined by the 95% confidence interval not spanning the null value (1.0)*

had not consented to learn about future research opportunities and those who did not live in the UK to ensure that the study's risk protocols could be followed. We devised two samples from their PCL-C scores:

- The symptom sample (N=10) included participants who had probable PTSD (PCL-C scores ≥50) in the most recent phase of the cohort study (phase 3).
- The no symptom sample (N=7) included participants with no to very low scores in their available questionnaires. We drew on previous responses to ensure this sample did not have historical scores of PTSD so that the no symptom group could function as a pseudo-control. Before the interview, participants retook a PCL-C where an additional question about mental health diagnoses was included.

We also stratified the samples to ensure the levels of combat exposures were similar in both groups using data from the cohort questionnaires. This ensured the 'no symptom group' were not just those who had experienced fewer exposures.

Note: A total of 17 participants were interviewed. Data collection was cut short in March 2020 due to the COVID-19 pandemic. As interview guides focused upon lifetime trauma, we deemed it inappropriate to collect sensitive data during the lockdown phase. Despite this, we had already collected 26 hours of data from 17 individuals; the volume and richness of data enabled a full exploration of the qualitative aims.

Recruitment

Participants were emailed or posted a study invitation pack including a Participant Information Sheet, a Consent Form and a booklet of relevant signposting services. Those who did not respond to email/postal invitations were followed up by telephone and, if they consented to take part, we arranged a time for a telephone interview. Interviews ranged from 1 to 2.5 hours, with participants reminded that they could stop at any point. Participants were given a £25 e-voucher to reimburse them for their time.

Data collection and ethics

Informed consent was obtained via a written consent form collected pre-interview. Interviews took a semi-structured format and explored participants' military career, their post-service life and, lastly, childhood and pre-service experiences. This sequence allowed for a rapport to be built before the interviewer asked about potentially difficult events in childhood. Interviews were audio-recorded and transcribed by an independent transcription company that had signed a confidentiality agreement. Participants' audio data and transcripts were stored under a unique identifier and separately to their personal data, such as names and contact details, to prevent identification. All audio data were destroyed at the end of analysis and transcripts were pseudonymised. Pseudonyms are used in the write-up of results. To ensure the safety of all participants, a robust risk protocol was followed which involved the interviewer monitoring psychological distress during the interview, offering a clinical call-back if required and a protocol to contact relevant authorities if participants presented with immediate risk, although this did not arise in the present study.

Ethical approval was obtained via the King's Psychiatry, Nursing and Midwifery Research Ethics Subcommittee (Ref: HR-18/19-11668).

Approach

Data were managed using a framework approach (40), a strategy that can be used to handle large and complex qualitative data. A top-down framework is applied to both data collection and analysis and allows for data to be collected on relevant topics. The framework was divided into pre-, peri- and post-service periods and focused upon traumatic life events, psychological responses, vulnerability factors, protective factors, and general context. As the framework approach is not tied to any theory, this biographical analysis was informed by both narrative and phenomenological concepts. The first is concerned with how individuals construct their life histories and the meanings they place upon their experiences (41, 42). The second is interested in the subjective experience itself; in other words, the first-hand knowledge of a particular event, situation or experience.

Steps of analysis

1

An initial framework was developed

to guide data collection and analysis. This included the pre-, peri-and post-service periods and, within these, vulnerability factors, protective factors, and psychological responses

2

Data were transcribed

and the researcher familiarised herself with all audio and transcript data

3

The framework was developed

in response to the data collected (see 'A shift in analysis' for how this changed)

4

Data were coded

into the thematic framework using NVivo 12 software and grouped into wider themes

5

Charts were created

(separate to the data management file) and allowed researchers to visualise summaries of their data. These included individual timelines outlining participants' life events, psychological responses and supports. This was helpful for establishing patterns in the samples and making cross-comparisons

6

Mapping and interpretation:

This stage involved drawing connections and relationships between themes and included a comparison of the symptom and no symptom group

Box 2: A shift in analysis

When categorising events as 'vulnerability' or 'protective' factors, the analysis initially overlooked vital interactions between these elements. As a result, the experiences of participants in the symptom and no symptom group appeared superficially similar (e.g. both reporting serious childhood abuse and extreme combat experiences) and the qualities that made them differ were not being captured. We revised the framework to examine how events, vulnerability and protective factors were interrelated on institutional, social and individual levels. This method allowed for more nuance, including how some factors may act as vulnerability and protective factors simultaneously (see paradoxical structures on p. 39).

This formed the basis of the final qualitative model: the ecological model presented on p.33.

Findings

Quantitative results

Sample characteristics

Characteristics of the sample used in the trajectory model can be found in Table 1 (Appendix). Most of the sample were aged between 25 and 39 years at phase 1 (61.1%, median age 34.5 years old), 89.3% were male and 78.6% were in a relationship at phase 1. Overall, 77.4% of the sample were other rank rather than commissioned officers, 83.5% were regulars and 66.3% served in the Army, 20.4% in the RAF and 13.3% in the Royal Navy or Royal Marines. A total of 13.7% misused alcohol (AUDIT ≥16) at phase 1 and 35.5% reported childhood interpersonal stress or violence. Among those deployed to Iraq or Afghanistan, 78.2% experienced proximity to the wounding or death of others (including peers, colleagues, enemies or civilians), 60.5% experienced violent combat, 13.4% perceived consistent post-deployment social support and 40.7% perceived consistent post-deployment military support. Among ex-serving personnel (N=3,548), almost half (44.1%) left service between 8-11 years ago. The most common type of discharge was end of contract (53.0%) and medical discharge was the least common (6.5%).

The main PTSD trajectories

There were five main symptom trajectories of probable PTSD in both the full sample (Figure 1) and current and ex-serving personnel separately (Figure 2). Models were chosen based upon the fit criteria, a statistically significant LMRT result (which shows that the selected model outperforms the model with one less class) and the value of trajectories found (Table 2, Appendix). Classes included:

1 A 'no-low' symptom class (71.3%) with no symptoms over time

2 A 'mild distress' class (17.3%) with elevated symptoms (approximately PCL-C scores of 28)

3 A 'worsening' class (4.9%) progressing from mild distress to probable PTSD by phase 3

4 An 'improving class' (4.7%) reducing from probable PTSD to levels of mild distress

5 A 'chronic' class (1.8%) with probable PTSD throughout the study period.

When looking at the current and ex-serving models, we observed that:

- 13% of ex-serving and 10% of currently serving personnel reported probable PTSD (scores of ≥ 50 for at least one of three phases) over the study period (2004-16).
- Of those who reported symptoms of PTSD, approximately a third of ex-serving personnel and half in the currently serving personnel improved over time.
- Among those who develop symptoms, symptom levels in the ex-serving samples are generally higher than those in the currently serving sample.
- The chronic class is double the size in the ex-serving model and increases over time (as opposed to the currently serving chronic class whose symptoms remain stable).

Figure 1. Five trajectories of PTSD symptoms in the full UKAF sample
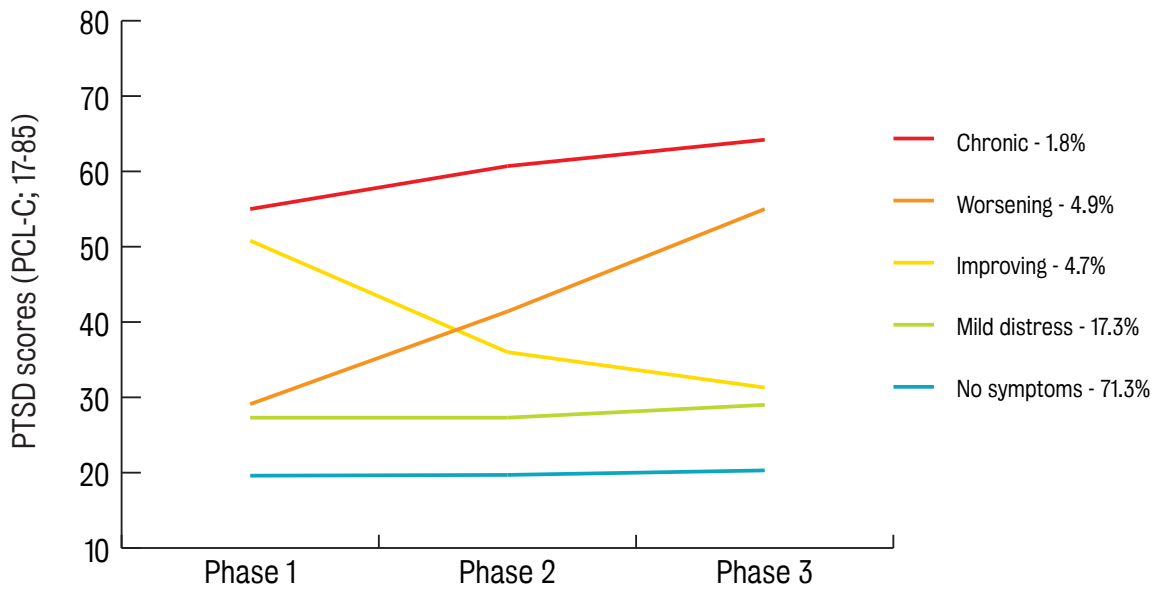
Note: Scores of 50 or above indicate probable PTSD

Figure 2. Five trajectories of PTSD symptoms in currently and ex-serving samples separately
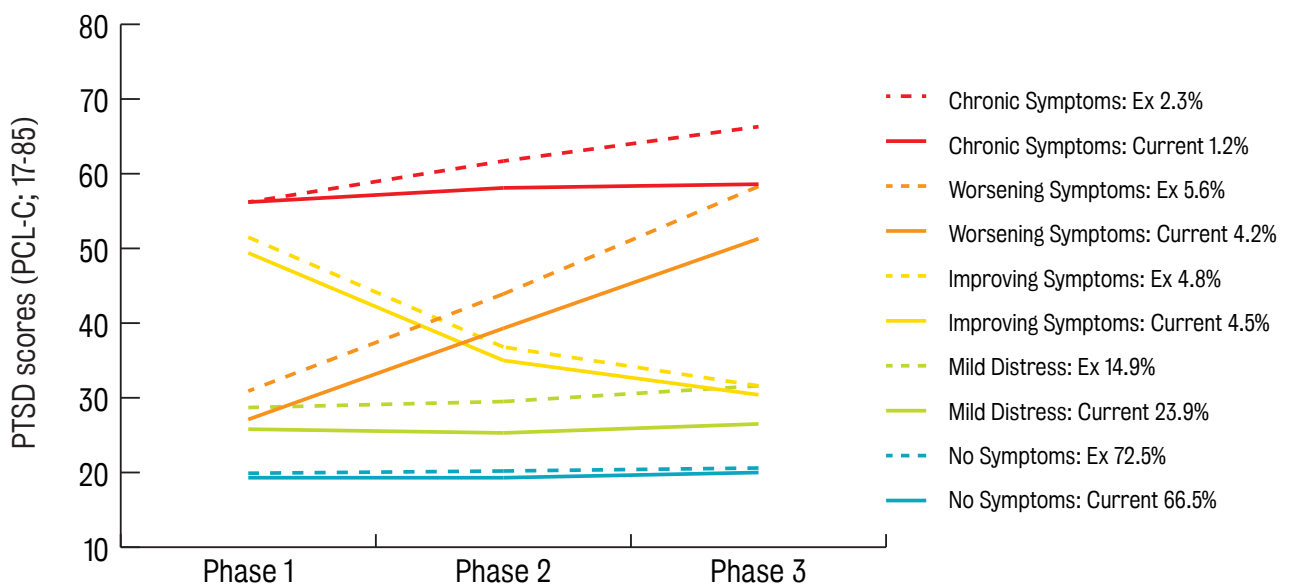
Note: Continuous lines refer to the currently serving sample and dotted lines refer to the ex-serving sample. Scores of 50 or above indicate probable PTSD.

Factors associated with PTSD symptom trajectories found

After identifying the trajectories, we carried out an analysis to determine the factors associated with belonging to the trajectories identified (Aim 2). The odds ratios are outlined in Table 3 – 6 (Appendix). Steps included:

1. Comparing all symptom classes (mild distress, improving, worsening and chronic) to the no/low symptom class.

2. Conducting a 'head-to-head' analysis of selected trajectories. We compared the worsening class against the mild distress class to determine why some individuals increase from this level. We also compared the chronic against the improving group to examine what influences persistence compared to recovery.
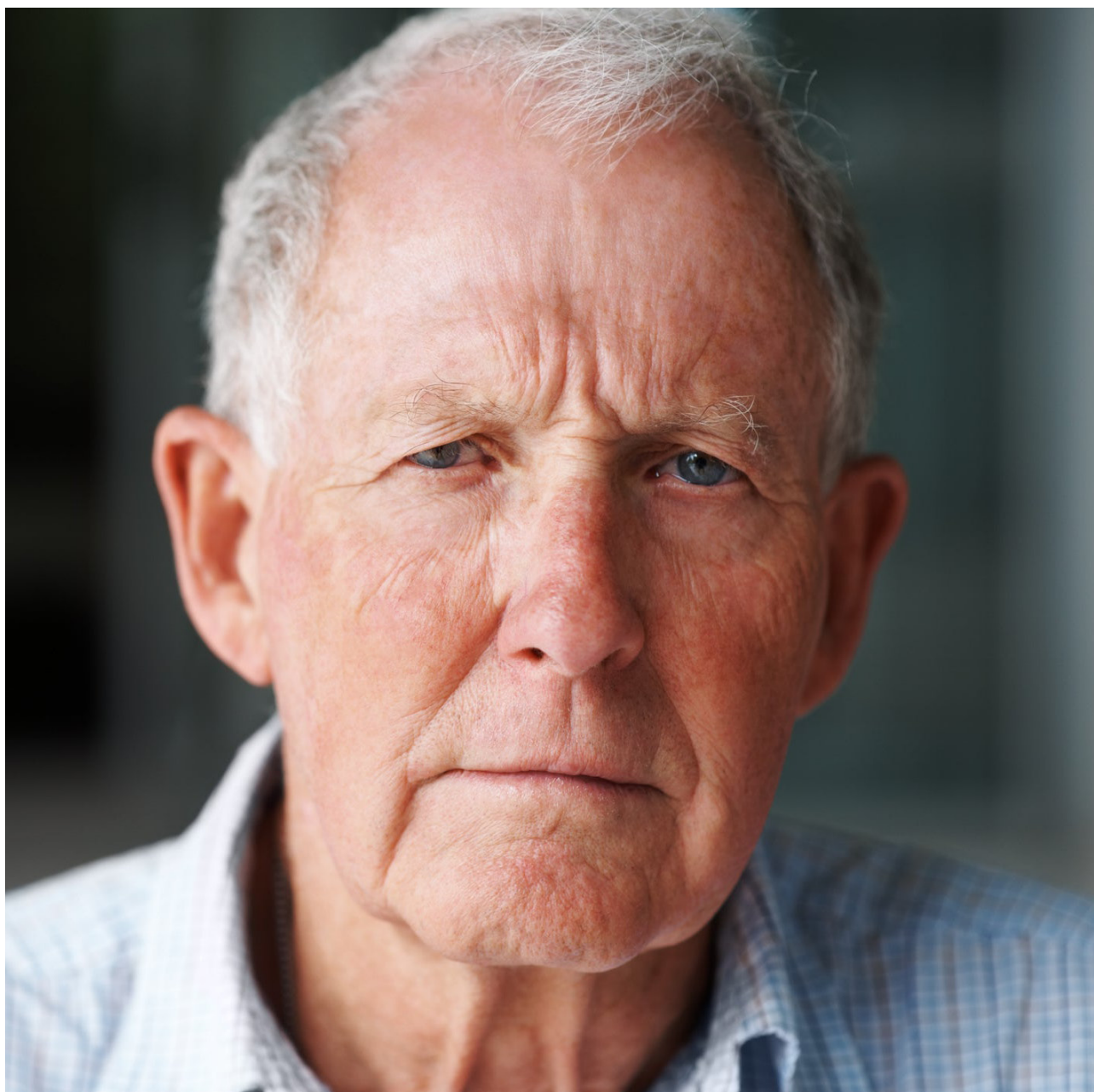
Table 3. The factors associated with PTSD trajectories

Pre-service factors	
All class analysis	**Head-to-head analyses**
Symptom classes, compared to the no/low symptom class, were: • More likely to report childhood interpersonal stress or violence	There was no difference between chronic and improving classes for childhood interpersonal stress or violence. The worsening, rather than mild distress, class was: • More likely to report childhood interpersonal stress or violence

Peri-service factors	
All class analysis	**Head-to-head analyses**
Symptom classes, compared to the no/low symptom class, were: • More likely to serve as reserves compared to regulars • More likely to misuse alcohol • More likely to be separated, widowed or divorced compared to married • Less likely to serve as Officers than other ranks • Less likely to serve in the RAF (all classes) or Royal Navy (including Royal Marines) (except chronic) If deployed to Iraq/ Afghanistan, they were: • More likely to be in the proximity of wounding/death of others • Less likely to receive consistent perceptions of post-deployment social support • Less likely to perceive consistent post-deployment military support • Perceptions of military support post-deployment were not associated The improving class were less likely to report experiencing violent exposures on deployment	The chronic, rather than improving, class was: • Less likely to serve as officers • If deployed, more likely to have been in the proximity of wounding/death and violent combat The worsening, rather than mild distress, class was: • Less likely to serve as Officers • More likely to be separated, widowed, divorced than married • More likely to misuse alcohol • If deployed, they were less likely to report consistent perceptions of post-deployment social support • More likely to be in the proximity of wounding/death on deployment

Post-service factors

All class analysis

Symptom classes, compared to the no/low symptom class, were:

Time since leaving service

* Those worsening were more likely to be recent service leavers
* Those with chronic symptoms were more likely to have left 4+ years ago than be recent service leavers (<4 years)
* Those improving were more likely to have left 8-12 years ago than be recent service leavers

Discharge

* Symptom classes were more likely to leave service on a medically discharge compared to end of contract
* Those worsening were more likely to have left via Premature Voluntary Release , and to a lesser extent, those with mild distress

We then examined how trajectories influenced factors at the last time point

Post-service outcomes

* Symptom classes, including those who improved by phase 3, were more likely at phase 3 not to be in employment than employed, to experience financial problems, and to experience negative life events than those in the no/low symptom group

Head-to-head analyses

Chronic (compared to improving class) and worsening (compared to mild distress) were:

* More likely to experience financial problems, not be in employment, and to have experienced 5+ negative life events (than 0-2). Additionally, worsening classes were more likely to have experienced 3-4 life events

There were no differences in time since leaving service or discharge when comparing the chronic to the improving class

The worsening, rather than mild distress, class were:

* More likely to be recent service leavers (left <4 years ago)
* More likely to have left via Premature Voluntary Release or medical discharge than reach end of contract

The most influential factors

Across the analyses, we examined the size of associations and found the most influential factors to be alcohol misuse measured at phase 1 (2004-6), being of other rank and childhood interpersonal stress and violence.

Key findings

Risk factors included:

• Exposure to violent combat was less likely to be reported by improvers. As this factor was not associated with 'onset', this suggests violent combat exposures may prevent recovery, as opposed to being the exposures responsible for developing symptoms.

• Factors leading to the onset of PTSD from mild distress were childhood interpersonal stress or violence, alcohol misuse and being in proximity to wounding/death of others on deployment.

• The most influential factors were alcohol misuse measured at phase 1 (2004-6), being of other rank and childhood interpersonal stress and violence.

Protective factors included:

• Being in a relationship. Separation, divorce or widowhood was associated with developing probable PTSD at any time point and was related to the onset of PTSD.

• Those developing symptoms were more likely to report inconsistencies in post-deployment military and social support, but only perceived inconsistencies in post-deployment social support was linked to worsening from levels of mild distress.

Post-service outcomes and discharge:

• Those who were recent service leavers (within 4 years of the final data collection period, 2014-16) who left via Premature Voluntary Release or medical discharge exhibited worsening symptoms.

• Those experiencing any level of symptoms were more likely to have negative post-service outcomes (including life events, employment and finances) at phase 3, irrespective of whether they had already improved by this phase.

• Those with chronic symptoms were more likely to have left service at earlier time-periods (i.e. 4+ years ago as measured at phase 3) although this also applied to the improving class (8+ years ago), therefore it is difficult to draw conclusions.

Qualitative findings

*Note: Pseudonyms are used throughout the write-up of these findings. Throughout this section, themes (**black font**) and subthemes (**orange font**) will be in bold.*

This section presents the findings for the following inquiries:

1 **How do participants experience the evolution of their PTSD symptoms over time?**

2 **What are the pre-, peri- and post-service experiences participants ascribe to their PTSD symptoms?**

3 **What differentiates those who do and do not develop symptoms of PTSD?**

4 **What are the facilitators and barriers to help-seeking and support in transition and post-service?**

Who did we interview?

- Samples were based on an at-risk group with high PTSD rates, namely regulars who served in combat roles in Iraq and/or Afghanistan and had since left service.

- 10 participants were interviewed within the PTSD **symptom group** (scores of probable PTSD in their phase 3 questionnaires) and 7 from the **no symptom group** (zero-minimal scores of probable PTSD in all available questionnaires).

- Groups were closely matched on age (average 41 years old, ranging from 31 to 51 years old) and gender (1 female in each group). However, **3** commissioned officers were interviewed in the no symptom sample and **none** were interviewed in the symptom sample. This was the result of ending data collection prematurely due to COVID-19.

- Deployment roles were similar across the groups, e.g. frontline war-fighting roles within armoured units. **6** of **10** in the symptom sample had served on previous operations (e.g. Bosnia, the First Gulf War, earlier operations in Afghanistan) compared to **3** of **7** in the no symptom sample. **5** of the no symptom group and **6** of the symptom group had deployed on HERRICK operations 7 to 11, occurring between 2007 and 2010.

- Both groups had, on average, deployed four times on a combat or peacekeeping mission.

- Average length of service 15 years (range 4-26 years) for the symptom group and 12.7 years (range 5-23 years) in the no symptom group.

- **4** of the symptom group were medically discharged (only one due to mental health problems and this was combined with physical health problems) compared to **1** in the no symptom group

Responses to trauma among the symptom group

This section outlines the findings for the first research question:

① How do symptoms of PTSD develop over time in the lived experience?

Characteristics

What was the symptom group's mental health status?

- Among the symptom group, **8** reported having received a diagnosis of PTSD and **2** had received a diagnosis of depression.
- **3** participants described experiences that seemed consistent with complex PTSD (cPTSD). This was not diagnosed but possible given disclosures of multiple traumas in childhood and on deployment and reported disturbances in both relationships and participants' perceptions of themselves.

What were their index traumas?

An index trauma is the traumatic event identified by participants (and, more widely, by clinicians for diagnosis and treatment) that lead to the onset of PTSD symptoms (43). Of the 10 participants in the symptom group,

8 attributed their symptoms to specific or cumulative index event(s) on deployments to Iraq or Afghanistan

6 participants experienced index events on any operation and continued to deploy

5 of the 6 above encountered further index events

4 participants identified index events through providing care as a section combat medic (a soldier who additionally provides specialist medical training to the sub-unit)

3 could not pinpoint specific events but attributed reactions to cumulative experiences on deployment: *"I can't put it down to one thing. It's an accumulation of everything" (Chris, symptom group)*

2 participants identified index events from Bosnia and Northern Ireland involving graphic injuries or witnessing atrocities

1 participant identified index events in both childhood and on deployment

Themes characterising index events are described on p. 37.

Responses over time

1. Compartmentalisation

Most participants did not note changes to their psychological state or behaviours after initial deployments, even if the index events thought to ultimately cause their eventual PTSD symptoms occurred on those deployments. Participants attributed a lack of response to an ability to compartmentalise traumatic experiences. For example, those in the symptom group described how they *"boxed" (Dan, symptom group)*, *"bottled" (Tom, symptom group)* or *"masked" (Mike, symptom group)* the effects of trauma or were *"emotionally closed off" (Matthew, symptom group)*. When asked about the timing of initial symptoms, *Jimmy (symptom group)* explains: *"not immediately it was just, like I say it was a couple of years down the line"*.

2. First signs

A biographical approach allowed us to pinpoint the first signs of participants' PTSD. These were intermingled with other behaviours perceived as trauma responses. First signs were reported by all in the symptom group and 3 participants in the no symptom group, yet these were reported as temporary post-deployment responses.

- **Anger** – *"going from zero to ten" (Freddie, symptom group)*
- **Personality changes** – e.g. being two people *"Jekyll and Hyde" (Chris, symptom group)*
- **Increases in drinking**
- **Aggression and fighting**
- **Nihilism and lack of care for consequence** - *"I was taking unnecessary risks with my life" (Matthew, symptom group)*
- **Emotional withdrawal**
- **Mood swings** - *"I'd have peaks and troughs… I'd go from maybe a high being on the go…to like major low" (Ali, symptom group)*
- **Not being able to settle**
- **Hypervigilance, paranoia and mistrust**

"I'd got myself into this fatalistic mindset of I'm basically dead anyway, so I might as well do the best I can from the military perspective. But I think that had deadened my ability to be emotionally connected... to anyone beyond my unit. I held my girlfriend pretty much at arm's length... I felt stifled by the emotional support that she was trying to offer me" (Jordan, no symptom group)

"It was guaranteed I'd be in a fight because I just wasn't bothered and I wasn't bothered if I hurt him, if you know what I mean?" (Tom, symptom group)

"I have an evil twin hovering in the background. Where if it does come out, sometimes I can be quite physical. But that's the problem, over the years I've gone from one extreme to another" (Chris, symptom group)

3. Collapse

Narratives referred to points of 'collapse' and this marked a breakdown of life circumstances, mental health and eventually the ability to compartmentalise traumatic experiences. Participants described this stage using explosive imagery:

- *"Out of nowhere"* (Tom symptom group)
- *"Broke the camel's back"* (Brandon, symptom group)
- *"I was a ticking time bomb"* (Matthew, symptom group)
- *"I had like a rather explosive event... because I bottle it up. I just kept it inside of me and it got to the point where I just went boomph"* (Chris, symptom group)

For some, high-risk incidents marked this point of 'collapse':

- Violent threats
- Suicide attempts (N=3)
- Drawing a weapon on others (N=3): *"I saw a little bit of the red mist and actually pulled my pistol on X... And I suddenly realised that I wasn't 100%"* (Chris, symptom group)

At this stage, participants became aware of possible psychological problems but did not connect this to their traumatic experiences:

"I took an overdose a few weeks after I got out and ended up in hospital for a week. Again, they asked me there... but it's just hard to pinpoint what was actually the problem. I knew I wasn't myself and I knew there was something going on with me" (Ali, symptom group)

Participants often received support during this stage and emerging problems improved. Help-seeking experiences are outlined further on p. 45.

4. Conscious realisation

Conscious realisation described the point at which participants recognised being affected by traumatic experiences. Descriptions alluded to trauma 'coming to the surface':

"Considering I joined up in 1986, it didn't come to the surface until 2007. And that's when it all started coming to a head... it was only later" (Matthew symptom group). Note 'it' refers to index event occurring in 1987 which features in Matthew's flashbacks.

"Nothing has really sunk in until the past few years. It just seems to be years after that things I've realised, or I've thought things" (Jimmy, symptom group)

It was at this stage that most participants reported the first occurrences of nightmares, flashbacks and re-experiencing episodes:

"I wake up in the middle of the night wriggling all over the place... I can taste the area, I can smell the area, I can even go through the motions of trying to do a tracheotomy. So that one affects me" (Mike, symptom group)

"I had flashbacks a couple of years ago after I left service. I'd just zone out and sometimes in the weirdest places. Sometimes the trigger would just be a smell, even now I can't go down the raw meat aisle of Tesco" (Matthew, symptom group)

As indicated by Matthew's quotation, the surfacing of traumatic memories led to other typical PTSD symptoms, such as avoidance, i.e. avoiding reminders/ triggers of traumatic incidents. Factors leading to conscious realisation are outlined on p. 41.

When in their military career?

10 experienced first signs in service (2 of which during discharge)

3 continued to deploy after experiencing mental health problems (indicated by diagnoses or suicide attempts)

1 participant was diagnosed with PTSD and a physical injury which resulted in their discharge

10 of the symptom group described the peak of their problems as occurring post-service

10 of the symptom group described conscious realisation once leaving service: *"It's only now... ten years after I got out the army" (Ali, symptom group)*

Summary of how PTSD evolved in the lived experience

1 **Compartmentalisation**: Participants compartmentalise traumatic experiences from initial deployments

2 **First signs**: Anger, aggression, personality changes, emotional withdrawal, lack of care for consequences and increases in drinking emerge later but all while still in service

3 **Collapse**: Mental health problems become more evident (sometimes through high-risk incidents) but participants do not necessarily connect this to traumatic experiences

4 **Conscious realisation**: Participants refer to becoming aware of their traumatic experience post-service

According to narratives, symptoms were either **"lingering"** at low but increasing levels over time, e.g. *"[they] took a little bit of time. It crept up" (Beth, symptom group)*; *"it just carried on through..." (Mike, symptom group)* or were more **fluctuating** and **intermittent** (e.g. being medically evacuated from deployment due to a breakdown or attempting suicide). Both presentations suggest that symptom development was **protracted** (i.e. elongated over a long period of time).

What participants said and how they scored

We checked interview data against PCL-C scores from participants' questionnaires, and found:

- Some participants had scores of zero before their index event, suggesting that those who progressed to 'full' PTSD may not always have pre-existing mild distress.
- There was evidence of both **lingering** and **fluctuating** symptoms, demonstrating that onset was **protracted** over time.
- There were some discrepancies between score and perceptions. One participant described low, lingering symptoms but scored as having 'full' PTSD in their questionnaires. Another described experiencing "no warning signs" but did scored as having symptoms during the same period.

A comment on the no symptom group

The following section proposes an explanation of why groups appeared to differ.

3 of 7 in the **no symptom group** reported post-deployment traumatic stress that dissipated (p. 27). When asked about their resilience, participants in the no symptom group described both:

- **Continued compartmentalisation**: This refers to an ongoing ability to remain detached from traumatic experiences: *"I had a shelf, if that makes sense. Once I left [deployment], I just put that to one side" (John, no symptom group).*
- **Real-time processing**: i.e. processing traumatic experiences effectively by talking with peers, seniors and family in-service at or near the time of the event.

An ecological model of PTSD symptom development

This section presents qualitative findings relating to the following questions:

2 **What are the pre-, peri- and post-service experiences participants ascribe to developing PTSD symptoms?**

3 **What differentiates those who do and do not develop symptoms of PTSD over time?**

To answer these, we present the **ecological model of PTSD symptom development**. This model proposes that PTSD develops within a context of many individual, social and institutional factors over the lifespan. The model describes how the *rupture* of traumatic experiences (in childhood, on deployment or in transition) may be contained or supported by a range of *holding structures* during military service and beyond. The balance of these components potentially explains how two people can experience the same event but may or may not be impacted.

Key terms

- 'Holding' refers to the structures that scaffold individuals in the processing or compartmentalising of challenging events. This concept was drawn from participants' descriptions yet resonates with established concepts in psychotherapy, such as 'holding' (Winnicott, 1953) and 'containment' (Boyd, 1959).
- 'Rupture' refers to life events that threaten the holding structures supporting an individual, and their essential sense of self.

There were numerous **military holding structures** identified by participants. On an **institutional level**, examples included practical support and structures and values, ideologies and ethical sense-making systems; on a **social level**, the experiential kinship of the unit, and on an **individual level**, participants' own predispositions and some of the qualities encouraged or explicitly taught in training, referred to here as the military psychological toolkit.

Figure 3: Ecological model of PTSD symptom development
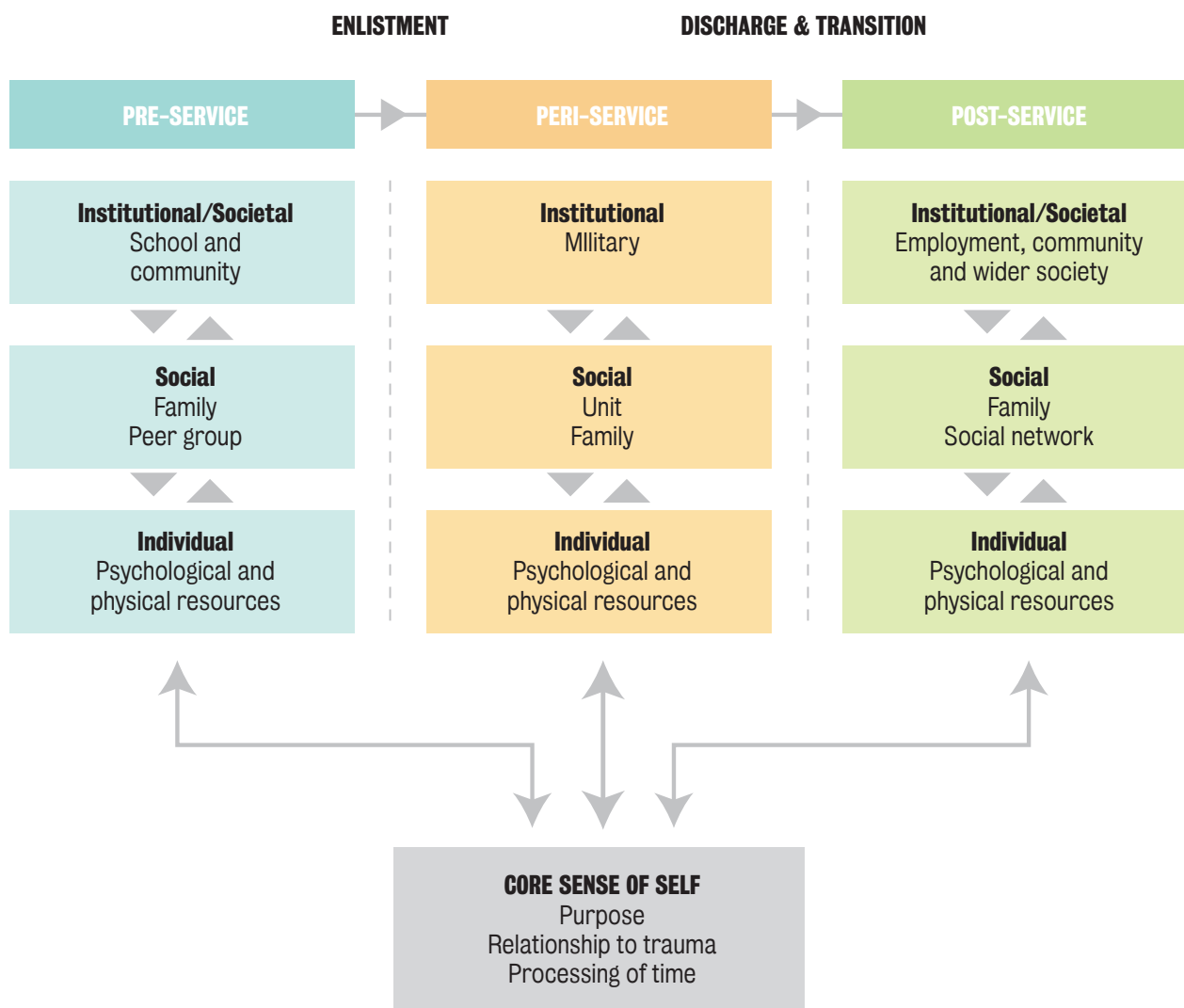
'Pre-service' principally reflected childhood and adolescence as the sample enlisted before the age of 21 years (12 enlisted before the age of 18 years).

To explore the role of military holding structures in more detail, we can examine how these structures can hold (or contain) the rupture during two of most influential contexts of trauma for the present sample: 1) **Childhood** and 2) **Deployment**.

Ruptures in childhood

Military enlistment appeared to introduce holding structures that helped both the symptom and no symptom groups to contain the effects of previous ruptures from childhood.

- Overall, **9** out of the **10** in the symptom group described childhood ruptures, ranging from paternal abandonment, parental alcoholism and strained relationships which had a substantial effect upon their childhood wellbeing.

- **5** out of the **10** experienced serious child

protection issues, including paternal physical abuse (sometimes resulting in hospitalisation) and paternal sexual abuse in the symptom group. Other stressors included growing up in a culture with the continuous presence of violence and bombings, childhood homelessness and institutionalisation.

- **3** of the **7** in the no symptom group described childhood ruptures ranging from disharmony at home, poverty, sexual abuse and bullying, but noted other supportive structures, such as support from other family members or school. The presence of holding structures were more common in the no symptom group.

To describe the holding process in more detail, we have extrapolated the themes connected to rupture experienced in childhood among the sample and how these challenges were contained by military holding structures when participants enlisted.

Figure 4: How pre-service rupture is contained by military holding structures

Enlistment
↓

	Examples of pre-service rupture	Examples of military holding structures
Institutional/ social	Themes of **poverty, deprivation and community exclusion** and **barriers to education/ employment** indicated common reasons for enlistment (e.g. to escape socioeconomic difficulties and cultural exclusion). Other stressors included exposures to bombings, homelessness and institutionalisation.	New support structures including **practical support and structures** (e.g. healthcare, food, clothing and vocational training) may address educational and social disadvantages and family neglect; **being included in a culture/ community with robust values**, and **fair and supportive leadership**. The latter may be especially holding for those who experienced paternal problems in childhood.
Social	Themes included **antisocial peer groups** and **paternal abandonment and physical and sexual abuse**. **9** of the **10** in the symptom group experienced these family exposures. **5** experienced serious child protection issues.	**Experiential kinship** within the unit may offer pseudo-family structures that are especially supportive for those who experienced family problems in childhood. The theme **collective mentality** describes the deindividuation process upon enlistment; emphasis away from the individual may defer the effects of past trauma.
Individual	Themes included **emotional numbing** arising from challenges and abuse in childhood and **antisocial or aggressive tendencies**.	Normalisation of violence in the family/ community and emotional numbing may inadvertently act as a resource that is harmonious with the **military psychological toolkit**. Speaking about his experiences of childhood abuse, Matthew (symptom group) describes: *"It probably gave me a reasonably decent survival instinct, how to take a beating and keep on ticking... And it served me. Yes, very early. And I would say it stood me in good stead... the only thing is now I can't switch off"*

Key terms

- **Deindividuation** is derived from social psychology (Festinger, 1950) and refers to the process of developing a collective mentality over individual identity. This process was evident in participants' data.

Ruptures on deployment

The second context to explore the concept of rupture is military deployment. This appeared to place pressure upon all military and individual holding structures. Participants' **index events** provided the best opportunity to examine this process. We therefore analysed all reported index events and characterised them by the following themes: **ethically problematic, visceral and vivid, prevented real-time processing** and **revealed the limits of training**.

Characteristics of index events

1 **Ethically problematic**, included events such as the killing of children or civilians:

"there was a f---ing 8 year old suicide bomber that came up to my checkpoint and it was ridiculous... A lot of them didn't want to f---ing die, but they were just f----ing using them for an end...I did things that I wouldn't necessarily agree with but it was sort of policy" (Matthew, symptom group)

2 **Visceral and vivid**; as in events that were graphic and potentially overwhelming on a sensory level:

"If you ever had to deal with a casualty that's a burns victim, you can't do anything for them... So, all you can do is talk to him, watching somebody go into shock where it changes the whole facial expression... When somebody is on fire and they inhale the flames, the noise they make you will never, ever forget" (Dan, symptom group)

3 **Prevented real-time processing**. These included events mainly related to **exhaustion**:

"it's difficult trying to split that tour down into just like a sequence of events... The stuff that happened was so frequent that what might happen to one person over their whole military career happened almost daily in the space of five months... So I think it's just processing all that when you get back... I found quite difficult" (Freddie, symptom group)

4 **Revealed the limits of training** dovetailed with the other themes and was evidenced most

succinctly by infantry personnel who provided pre-medical care to severe injuries resulting in death. This was related to the subthemes of **survivor's guilt** and **rupture to loyalty**:

"I actually felt guilty that my medical knowledge even though it was quite good wasn't good enough" (Chris, symptom group):

"It took the back of his head off, so I was holding the back of his head where his brain was exposed, we had to bandage it up, kept him alive... he didn't survive... That's the main one I just keep seeing that in my head. What, if I got there faster what more could I have done? I have a lot of survival guilt. That was that one" (Tom, symptom group)

Deployment holding structures

Holding structures such as training, decompression, Trauma Risk Management (TRiM) and rest and relaxation (R&R) were identified as helping to contain or process deployment exposures and contributed to a sense of **preparedness**:

"We'd done an excellent build up with an extremely professional group of people. My own team was drilled to perfection and we were 100% ready for what was coming" (Andrew, no symptom group)

Participants reported lower preparedness in relation to the early operations in Iraq (2003-4) which was defined by a **lack of protection, resources and training** and to a particular period in Afghanistan (2007-10)[2] which appeared to involve more **complex and extreme exposures**, **bereavement in-theatre** and **physical injury**. Participants recognised the introduction of new structures, such as **TRiM**, as the conflicts intensified, however there were indications that the intensity of these deployments may have exceeded the available deployment holding structures:

"I mean it's funny because it's a lovely theory and it works brilliantly if you are dealing with individuals but when you are dealing with a company sized group of 120 all of whom are absolutely red flags on the TRIM management scale, the formal procedures within an operational theatre where you are living this every day and continuing it... [TriM assessments] become almost irrelevant" (Jordan, no symptom group)

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[2]*Casualties and deaths increased from 2007-2010 according to 'Ministry of Defence (2010) Op HERRICK casualty and fatality tables up to 15th January 2010. Accessed on 16/08/2020'*

The theme **ideological and ethical sense-making systems** refers to a holding structure that helped participants understand the purpose and rationale of their deployments. These contributed to whether exposures negatively impacted participants and, in some cases, they were sufficient in avoiding rupture:

"*[On being in Afghan] We made a positive impact and I think if I didn't feel that, it would sit with me very, very differently today having... seen some of the things I've seen*" (Rachel, no symptom group)

In contrast, sense-making systems were tested by the **futility/failure of operations** and by **complex or extreme exposures** which made it harder for participants to reconcile and accept their experiences:

"*I don't know why that one affected me. I'd even seen worse than that... I don't know whether it's because he was reasonably young... Is it because when we came back and we'd not found any weapons of mass destruction? I thought, well, that was a needless death*" (Mike, symptom group)

Table 4: Sample differences between individual processes and core sense of self

	Symptom group	No symptom group
Individual level (psychological factors)	Exhibited a **prolonged sense of helplessness** yet **strong personal responsibility**: "*He crushed his skull and he died. That could have quite easily have been me, but it wasn't, because I let him go instead*" (Beth, symptom group)	Exhibited a **higher locus of control** and **acceptance of their limits** which allowed for participants to be more adaptive and accepting: "*Ultimately when you are in that situation... you react as best you can*" (Craig, no symptom group)
	Demonstrated more **introspective and reflective** thinking and described events viscerally	Reported the use of **cognitive and solution-focused** styles of thinking and used more operational language
Core sense of self: Relationship to trauma	**Trauma transforms the sense of self**. Many described "*I was a different person*"	**Trauma is integrated/compartmentalised**. Traumatic experiences do not have as profound effect upon the sense of self. Participants appeared to have either **integrated** their traumatic experiences: "*I learnt to see it as part of who I am*" (Jordan, no symptom group), or continued to **compartmentalise** them and so reported being unaffected
Sense of time	Participants described **a sense of stasis** and not having moved on from their traumatic experiences, which was exemplified by their use of the present tense: "*It's still difficult to process now*" (Freddie, symptom group)	Participants were able to **move on and adapt**: "*Life has enabled me to move on*" (Jordan, no symptom group)

What explains the groups' differences?

Overall, the symptom group described more frequent or intense traumatic events in childhood and on deployment than the no symptom group. However, this may not reflect the objective reality of what was experienced by the two groups. Participants in the no symptom group often framed traumatic experiences using operational language and in a detached, descriptive way; some events may also have been omitted from narratives if they were not perceived as personally significant. Rather than tallying the number, or assessing the magnitude of traumatic events, we can instead consider the **quality of holding structures** in both groups:

- **Among the no symptom group, holding structures remained intact, adapted or compensated;** this allowed individuals to integrate traumatic experiences or to continue compartmentalising:

  "Life has enabled me to move on and love and people" (Jordan, no symptom group).

- **Among the symptom group, institutional, social and individual holding structures weaken**; this explains the point of 'collapse' and their eventual 'conscious realisation'. In addition, a unique 'exposure' of the symptom group is the experience of symptoms themselves (e.g. anger and withdrawal) and these affect all holding structures, including relationships with leadership and partners/spouses. Rupture is therefore repercussive and has a profound effect upon the sense of self.

Paradoxical holding structures

By pursuing a more complex analysis, we were able to consider elements that complicated the binary of negative 'vulnerability' factors and positive 'protective' factors. For instance, there was evidence that some military structures have a holding effect but might contribute to rupture in the long-term by preventing the processing of traumatic experiences.

Compartmentalisation: Symptom or skill?
Compartmentalisation was reported by participants as an essential part of the **military psychological toolkit** and allowed for the **automation of military training** in-theatre. In other words, compartmentalisation allowed participants to remain emotionally detached in threatening scenarios:

"When you are in the middle of a combat situation you are looking at the most effective way of destroying the enemy and cutting them down. You become extremely clinical... and you feel no compassion towards those individuals whatsoever. You just cut them down because that's the only way you can deal with it" (Andrew, no symptom group)

"You have this professionalism. You just blank out all emotion type of thing but then when you get back it's trying to let it go if you know what I mean" (Chris, symptom group)

"You just had to crack on and get on with the job" (Craig, no symptom group)

"At first, I completely shut off to it because it was almost the training that you had done the repetitive nature of it just kicks in straight away and I just cracked on with what I had to do" (Freddie, symptom group)

Compartmentalisation was the reason why some in the no symptom group reported being unaffected by potentially traumatic experiences and a precursor in the symptom group for developing PTSD symptoms. Whilst a functional skill in-theatre, this ability may contribute to emotional numbing or dissociation in others.

Deployment as both holding and rupture
Participants described the positive aspects of deployment as providing **opportunities, preoccupation, structure** and **meaning**, which not only fed into a **core sense of self** (i.e. 'purpose') but sometimes led to the reduction in symptoms:

"I was so fixated, and I was so switched on in terms of my job... I got myself into a good routine, I was... in the best shape that I've ever been in my life... No distractions from anywhere else let's just do my job and then I can get home" (Jimmy, symptom group)

For some, deployments met needs of **sensation-seeking** which might be driven by **individual predispositions** such as **desiring challenge** but this could also be linked to risk-taking and arousal intrinsic to PTSD:

"I was in hell, in my element" (Mike, symptom group).

Despite some positive perceptions of deployment, these inevitably included further traumatic exposures which sometimes introduced additional index events.

Alcohol use
Participants described how alcohol use mimicked dissociation and emotional numbing: "Alcohol numbs all of my feelings. I didn't really feel at all" (Beth, symptom group). Drinking appeared to contribute to the individual's ability to compartmentalise earlier experiences in service.

POST-SERVICE

Discharge circumstances

Symptom group:
4 left via medical discharge
4 left via Premature Voluntary Release (PVR)
2 reached the end of their contract

No symptom group:
1 left via medical discharge
5 left via PVR
1 reached the end of their contract

Reasons for not extending contracts/signing off voluntarily included:

- 'Dissatisfaction or unfair treatment' (symptom group, N=2; no symptom group, N=1)
- 'Avoiding risks of deployments' (symptom group, N=1; no symptom group, N=2)
- 'Family reasons' (symptom group, N=2; no symptom group, N=2)

Only **2** participants in the symptom group reported that their mental health status influenced their discharge: **1** developed PTSD and a serious medical injury resulting in medical discharge and 1 was concerned about risks of further deployments:

"A lot of your friends have been injured or people had been killed. Is your luck going to run out at some point?... I probably made that right decision because I think my mental health probably would have deteriorated if I'd done a further three or four more tours" (Freddie, symptom group)

Trauma out of context

Leaving the military represented ruptures not only from the practical infrastructures of healthcare, housing and occupation but also important cultural and social contexts (Table 5, p. 43). For example, leaving service marked a separation from ideological sense-making frameworks (i.e. **operational language** and the **logic/psychology of warfare**) which help to organise **complex and extreme exposures** on deployment. Participants in the no symptom group tended to retain, or integrate, some of these frameworks (indicated by their speech patterns) and reported more contact with ex-serving colleagues/peers where some of these cultures may continue than the symptom group.

Upon leaving service, participants lost the unit's '**experiential kinship**' (i.e. family-like bonds created by experience). This included losing contexts where traumatic experiences were common, familiar and understood (**normalisation of traumatic experiences**). Reflecting on his mood, Ali (symptom group) described:

"When I was back in the Army, I was OK. It was when I was away from the army that I felt that. When I was back in camp, I was sound... I was with my mates, lads who are going through the same thing. You know what you are doing, you know what you've got to do. More settled because you are where you should be."

"...we all experienced the same things and I think we just talked about it and got through it" (Andrew, no symptom group)

The unit may therefore enact as another **paradoxical holding structure** as, whilst social bonds may be protective and supportive of mental health, the **normalisation of traumatic experiences** may prevent problems from being detected, thus contributing to a delay:

"[On his emerging symptoms] no one ever noticed because everyone was the same" (Tom, symptom group)

The buffer of the unit may also act as a barrier to participants processing traumatic experiences on an individual level. Participants described an 'individualising' process upon leaving service (i.e. departure from a collective to individual identity):

"While you are in there you don't necessarily feel it as much as when you come out and that's when you cast off on your own" (Ali, symptom group)

We propose that leaving the military environment where deployment trauma is understood and shared may result in such experiences feeling dissonant and anomalous, and this individualising process, may contribute to the resurfacing and conscious realisation of traumatic memories in post-service life.

The repercussive nature of holding and rupture

The post-service period best exemplified how holding and rupture that occurred on one level (i.e. individual, social or institutional) was repercussive. In other words, that support or disturbances on one level had a subsequent impact on all others. In the post-service period, we focus specifically upon **employment** and **family life** to illustrate these interrelationships (summarised in Table 5) and describe how these invariably impacted participants' **core sense of self**.

Employment

Positive experiences of employment provided holding at all levels from practical **stability and structure** (institutional/ occupational) and **camaraderie** (social) to a sense of **purpose** (individual). Conversely, ruptures affecting employment disrupted other levels. The most extreme examples were found in the symptom group (N=3) where physical disabilities were so severe that participants could no longer work. This had a detrimental effect upon participants' role in the family and sense of self:

"Yes, because I felt like a failure, I couldn't support my family. Sometimes I still feel like that now and we struggle because obviously I'm classed as disabled as well now" (Tom, symptom group)

"My quality of life has gone" (Mike, symptom group)

Employment also appeared to alleviate some of the withdrawal and avoidance elements of PTSD:

"While I'm there there's somebody in charge of me, I've got to do a job, I've got to do this, I've got to do that. But then when I'm away from it, I'm left to my own devices" (Ali, symptom group)

Participants often found **meaningful work** in other high-risk occupations like the emergency services. This is potentially another example of **paradoxical holding** as, although Freddie reports, it *"keeps you on the straight and narrow"*, it also led to participants being exposed to other index events, such as dealing with suicides and road traffic accidents.

Family and social networks

Whilst many participants in the no symptom group described a wide support network, e.g.:

"I had quite a strong family network outside of the Army and I'm also still very good friends with the people I was friends with at school. So I always had that friendship network and that family network outside that I could draw on. So I never lost that. Some people haven't got that and I can imagine their situation is probably different to mine" Jordan (no symptom group)

Most in the symptom group reported **shrunken social networks**, which were compounded by participants' symptoms of withdrawal and avoidance:

"My friends, the circle just got smaller and smaller. So my standard of living was shockingly bad" (Dan, symptom group)

"I've become a bit of a loner; I don't have any real friends that I spend an awful lot of time with other than my wife" (Matthew, symptom group)

Matthew's quote exhibits the pressure placed upon the family to enact as the central holding structure for individuals. This was described by the overarching theme **Family support: Canaries in the coal-mine**. This theme showed how partners/ spouses were **detectors of problems** before participants themselves become consciously aware and therefore **bore the brunt of symptoms** (as described under 'Collapse' on p. 31). With partners/spouses acting as the main providers of **physical and/or emotional support**, dynamics of the partnership evolved into a *"carer and patient"* (Dan, symptom group) and consequently impacted participants' sense of selves. The role of the family is explained further on p. 47.

Table 5: A focus on post-service holding and rupture: Themes and subthemes

- 43 -

	Examples of post-service holding structures	Examples of post-service rupture
Institutional/ occupational	• Congruent cultures and camaraderie in employment • Stability and structure • Meaningful and well-paid work • Continuation/ replacement of values and sense-making frameworks	• Unemployment due to deployment-related physical and mental health problems. • Loss of rewarding work culture/ job role • Loss of/ distance from values and sense-making frameworks

Social	• Positive and balanced relationships with family
	• Wider peer group/ social network
		• Family support: Canaries in the coalmine
		  - Detector of problems
		  - Bearing the brunt of symptoms
		  - Physical and/ or emotional support: a "carer and patient" dynamic
		
		• Shrunken social networks

Individual	• Coping strategies intact
	  - Cognitive, solution-focused thinking
	  - Continued compartmentalisation for some
	• Physical fitness
		• Ongoing symptoms and physical limitations interfere with coping strategies

Core sense of self	• High purpose • Trauma is integrated within/ compartmentalised from sense of self • Processing of time: Ability to move on	• Low purpose • Trauma dominates sense of self • Processing of time: Feelings of stasis and trauma being present

Spotlight on support and help-seeking

This section focuses upon the fourth research question, asking:

4 **What are the facilitators and barriers to help-seeking and support in transition and post-service?**

Themes may refer to both general support and those specific to approaches for treating PTSD. We highlight how these might work on both institutional (formal) and social levels (informal). Themes reflect the perceptions of participants.

Institutional

Fair and supportive leadership was considered a vital holding structure in service. If participants required more specialist support (like mental health treatment), holding was facilitated by 'smooth links between Chain of Command and specialist services'. In contrast, the 'breakdown of relationships with leadership' was deemed to be a key rupture; examples included incidents of mismanagement and unfair treatment and resulted in **dismissive treatment** and **blocks to early intervention**, including requests for help not being taken seriously:

"I said, 'Sir I've got a drink problem' and he basically turned around and went 'Corporal, piss off you haven't got a drink problem, you just can't handle your drink'" (Brandon, symptom group)

Poor experiences of help-seeking enacted as a barrier for seeking help in the future. This is evident in the theme 'mistrust of services':

"I didn't want people to know because I didn't want to feel betrayed again" (Freddie, symptom group)

Another overarching theme was a **tension between individual and institutional needs**, an example being the tension between **conformity and care** where early signs of PTSD (aggression, drinking and lack of care for consequences) were interpreted and addressed as issues of discipline:

"I bottled it up from that point onwards which affected my work big style… but I wouldn't tell anyone why. They just thought I was being insubordinate all the time" (Tom, symptom group)

With regards to deployment, tensions were also perceived between **warfare and welfare**. A participant who served as an officer expressed the difficulties of balancing opportunities to talk about traumatic experiences (in the case via TRiM) with the need for continued operational performance:

"We worked very much off the basis that we encouraged people to talk about what had happened but equally we required people to hold it together and keep pushing forward…From our perspective, our prime focus actually, I know this is going to sound really brutal, it was to get [soldier with symptoms] out the way. We saw him as somebody that from an operational fighting capacity was going to reduce our fighting ability and was potentially going to endanger people. So we felt we had to separate him as quickly as possible from these guys, which of course looking back on my own experiences for him personally was probably one of the worst things we could have done to him; cut him out from his support base, his unit" (Jordan, no symptom group)

In a general sense, those in the no symptom group drew upon their own support structures or benefited from military-wide provisions. Whilst some military provisions were deemed as not needed[3] on a personal level by some in the no symptom group, many in the symptom group described the opposite and this was represented by the theme **deficiencies in support**. This referred to a lack, or 'not enough', a thread that was evident throughout peri-service, transition and post-service periods. When experiencing the **first signs** of PTSD (p. 30), for example, participants reported receiving only short-term interventions, leading to perceptions that the military were 'putting on a band-aid' just to get them back to work:

"[The Community Psychiatric Nurse] just filled my head full of fluff basically, obviously then someone said I was better after three months. I just went back and tried to carry on as normal and I got posted and it was just getting worse and worse" (Tom, symptom group)

The theme **deficiencies in support** also related to physical healthcare. Four participants in the symptom group experienced severe injuries and multimorbidity as a result of deployments (including musco-skeletal, gastrointestinal and spinal injuries, and arthritis), and described not receiving appropriate care, especially during their medical discharges. The physical limitations of such injuries (in addition to the psychological effects of the deployment trauma) worsened over time and appeared to contribute to the chronicity of PTSD symptoms. For example, physical injury prevented individuals relying upon previous coping strategies, such as exercise (individual), being socially active (social) and sometimes being able to work (institutional/societal).

Deficiencies in support were also described by two Early Service Leavers[4] in the symptom group as, due to their length of service, they were **not eligible** for resettlement support. Lack of provision translated to **not feeling supported or cared for**. Others reported deficiencies in cultural and psychosocial support during transition:

"They take the civvy mentality out of you in your basic training but then they don't turn around and put it back into you. I came out and I struggled. I still find it struggling now" (Brandon, symptom group)

Post-service 'deficiencies in support' included **a lack of access to services** either due to **not being eligible/ meeting criteria** for certain services or because of **geographical limitations**. Access issues, in turn, led to delays in receiving support meaning some participants experienced **delays in receiving a diagnosis**, and **disjointed care**:

"It's impossible. I get to see [the Community Psychiatric Nurse] once a month. There's nothing up here… the Government have pulled their funding so they're back to square one… If you live outside the big cities, you are screwed" (Matthew, symptom group)

"I started getting passed from pillar to post on who would turn around and take over treatment" (Brandon, symptom group)

"I went and contacted veterans something or other, it was quite a while ago now, and they put me in contact with somebody else who put me in contact with somebody else who then put me in contact with somebody else" (Beth, symptom group)

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[3] Note: support structures (decompression, TRiM, etc.) may still have played a preventative role despite individuals not noticing personal benefits

[4] Early Service Leavers (ESL) are defined as personnel who served a maximum of 4.5 years for Royal Navy/ Marines personnel, 4 years for Army personnel and 3 years for RAF personnel. Resettlement support is graduated based on length of service. ESLs are now eligible for a basic package of support from the Careers Transition Partnership.

Social

For both groups, the most consistent social support (outside of the unit) was provided by the family.

Positive and supportive relationships with partners/spouses were identified as one of the primary reasons those in the no symptom group attributed to not experiencing mental health problems. A strategy that worked for Steve (no symptom group) was to debrief with his wife after each deployment: *"I suppose my release were talking to my wife... I've used that method ever since on deployment"*.

Conversely, as described on , the overarching theme of **canaries in the coalmine** demonstrated how relying upon the family had a negative impact upon relationships when needs were too great or if no other supports were available; as Dan (symptom group) reports: *"it changed the whole dynamic of the relationship"*. Indicated by the subtheme of **detectors of problems**, partners/ spouses recognised when participants were worsening:

"my wife... is also ex-army hence why she knows when I'm having an episode" (Chris, symptom group).

This translated into family members **bearing the brunt of symptoms**:

"I came home, the kids were messing around, weren't behaving, weren't doing as they were told, I then flipped and then I realised there was an issue" (Jimmy, symptom group)

In addition to providing **physical and emotional support**, participants regularly cited partners/ spouses as incentivising them to seek help:

"I didn't really go for myself to be honest, she sort of made me" (Ali, symptom group).

By meeting a multitude of needs, family support appeared to substitute the social network and formal services and, in line with the concept of **paradoxical holding**, may act as a barrier against participants expanding their support networks.

Individual

The theme **problems with detection** highlighted how, before conscious realisation, early symptoms were undetected for long periods of time. Collapse marked a key moment where participants voluntarily sought help:

"I didn't realise anything about mental health. I didn't realise why things are happening because they were, but I just muddled through it, I just got through it, which then after a few years later, I'm talking maybe 3½ years later everything came to a basically downward spiral where it was uncontrollable" (Jimmy, symptom group)

The theme **not being able to talk** highlighted how the disorientation, dissociation and distress connected to PTSD may prevent participants from seeking help, including lower-level peer support:

"It was hard to explain because people did ask but I could never explain it. I took an overdose a few weeks after I got out... Again, they asked me there... but it's just hard to pinpoint what was actually the problem. I knew I wasn't myself and I knew there was something going on with me" (Ali, symptom group)

Ali (symptom group) also described the idea of talking as unappealing due to a fear of vulnerability:

"I just didn't like it at all and I didn't feel ready to sit and actually tell somebody the bare bones of me"

Another individual barrier related to a **high severity of need** which resulted from problems with detection and not being able to access lower-level support.

1 **How do participants experience the evolution of their PTSD symptoms over time?**

Symptoms of PTSD emerged in a **protracted** way when participants were no longer able to **compartmentalise** their traumatic experiences. The first signs reported were anger, hypervigilance, lack of care for consequences (relating to drinking and fighting), nihilistic tendencies, emotional numbing and withdrawal. The hallmarks of PTSD, such as flashbacks, re-experiencing nightmares, and subsequently the avoidance of triggers, tended to occur when there was a **conscious realisation** of traumatic experiences at later periods. Such realisations often occurred once participants had left service when military holding structures had ruptured and when trauma was out of context.

2 **What are the pre-, peri- and post-service experiences participants ascribe to their PTSD symptoms?**

Via the **ecological model of PTSD symptom development**, we demonstrated how vulnerability and protective factors interplay in a process of holding and rupture over time. In this way, those who later developed symptoms experienced traumatic exposures that could not be held by available holding structures. A key example was when participants left service; the loss of critical holding structures, including practical supports, the collective of the unit and the sense-making frameworks previously containing traumatic experiences, led to the consequences of trauma coming to the fore and the worsening of PTSD symptoms. A range of vulnerability and protective factors were identified throughout the lifespan (listed in full in Figure 1, Appendix). Examples included:

Holding structures

+ Practical structures (including deployment-related support)
+ Fair and supportive leadership - smooth links between Chain of Command and care pathways
+ Military values, ideologies and ethical sense-making systems
+ Preparedness and training
+ The kinship of the unit
+ Family support
+ Physical fitness
+ Absence of symptoms themselves

Events causing rupture

+ Paternal abuse and abandonment (index event)
+ Childhood deprivation and community exclusion
+ Breakdown in relationships with leadership
+ Complexity and extremities of war - exposures that were ethically problematic, difficult to process in real-time, were vivid, and/ or reveal limits to training
+ Futility/ failure of deployment operations
+ Removal from unit
+ Family strain
+ Physical injury
+ Symptoms themselves

Via the 'ecological model of PTSD symptom development', we demonstrated that vulnerability and protective factors interplay in a process of holding and rupture over time. We found that those with emerging symptoms experienced leaving service as a profound rupture of practical supports and also the cultural contexts, the collective unit and sense-making frameworks that previously contained traumatic experiences.

3 **What differentiates those who do and do not develop symptoms of PTSD over time?**

Those who did not experience symptoms reported robust holding structures which were able to stay intact or adapted or compensated when participants encountered challenging experiences. Any ruptures experienced in childhood, on deployment and during transition could therefore be 'held at bay'. The ability to draw on such holding structures may have allowed this group to process trauma in real-time or, in some cases, to continue compartmentalising their traumatic experiences.

Those who did develop symptoms conversely reported significant ruptures to all holding structures from individual capacities through to institutional provisions. Whilst the traumatic experience is the original cause of PTSD, the effects of symptoms themselves appeared to cause additional ruptures to holding structures.

4 **What are the facilitators and barriers to help-seeking and support in transition and post-service?**

• From our findings, the first symptoms of PTSD appeared to start in service, yet participants reported poor experiences of mental health support as a main barrier to in-service help-seeking. These involved breakdowns in relationships with leadership that prevented referral to appropriate care, the short-term nature of interventions and a mistrust or disbelief about the military's welfare priorities reported as the main barriers to help-seeking.

• Whilst access to specialist services was important for those with complex needs, softer structures, such as feeling supported and cared for by leadership, were still influential for this group.

• For those who go on to develop symptoms, themes of 'not enough' were applicable in service, transition and post-service life. Central to this was the lack of long-term and joined-up care to meet the severe and complex needs of participants.

• Partners/spouses were key facilitators of care by introducing participants to formal services (especially before participants' were conscious of their problems); however, by substituting both the social network and formal support services, the family could become overburdened and also become a barrier in participants seeking other modes of support.

Discussion

The 'Traumatic exposures in Iraq & Afghanistan and responses of distress' (TRIAD) study has sought to better understand the higher rates of PTSD in some subgroups of the UK Armed Forces (in particular deployed ex-regulars who served in combat roles) by examining how PTSD has progressed throughout the duration of the cohort study.

The following discussion will be structured by the three overarching research objectives:

1 To investigate the evolution of PTSD symptoms over time

2 To identify pre, peri- and post-service vulnerability and protective factors influencing the development of PTSD symptoms

3 To explore post-service outcomes among ex-serving personnel with PTSD symptoms, including the facilitators and barriers to accessing mental health services

Why do ex-serving personnel have worse PTSD outcomes than currently serving personnel?

We found evidence that most of the ex-serving personnel interviewed experienced their first symptoms of PTSD during military service. The development of symptoms appeared protracted over time. Leaving the military marked the loss of many of protective buffers (holding structures) that were supporting the individual's ability to compartmentalise their traumatic experiences and keeping symptoms from worsening. Flashbacks and nightmares post-service suggested that the conscious realisation of traumatic experience may be most pronounced post-service.

1 How PTSD symptoms develop over time

Our findings confirmed that most UKAF personnel do not experience PTSD, as evidenced by other studies (6, 9, 44-50). Although trajectory analyses do not involve calculation of prevalence rates, this method allowed us to estimate how many within the UKAF sample experienced probable PTSD at least at one time point over the twelve-year period. Like another US study (54), we found no substantial differences in patterns of the disorder when comparing those in service and those who had left. Despite these similarities, more ex-serving personnel (13%) reported probable PTSD compared to those still in service (10%). In addition, a greater proportion of the ex-serving group worsen or persist in their PTSD symptoms than recover. This is harmonious with other studies identified by a systematic review of the literature that was conducted within this project. These studies found that higher proportions of samples deployed to Iraq or Afghanistan remained symptomatic compared to the proportions who recovered, irrespective of the time-period studied (44-49). Our study therefore confirmed that the poorer PTSD outcomes of ex-serving personnel reported by cross-sectional research (6) were also evident longitudinally.

The qualitative component of this project explored how PTSD symptoms developed according to lived experiences. The present research suggests that those with multiple deployments may experience a protracted onset of PTSD. In this way, traumatic experiences were largely compartmentalised during the military career, but early symptoms appeared to worsen with further deployment exposures or when leaving the military. Although findings from this study represent only the experiences of a subsample interviewed, this could provide insight into a

timeline of symptoms that could apply to others, and especially for complex PTSD (cPTSD) where onset is linked to multiple traumatic exposures (18). This may be especially pertinent for military populations where childhood trauma appears to be common (51) and where cPTSD is thought to be more prevalent than 'simple' PTSD (52).

The timeline of symptom development in our sample strongly resonated with a study of Swiss civilian inpatients with cPTSD (53). Charting the process following a traumatic event, Stadtman et al. (2018) outlined the first stage of emotional ignorance (where patients experienced symptoms but did not connect them to trauma), followed by overcompensation (relating to patients' attempts to control symptoms). These processes mirror the period before conscious realisation in the present study and participants' attempts at compartmentalisation. A third process was paroxysm, an outburst or exhaustion of strategies which gave way to new perspectives. This process is similar to the concepts of collapse and conscious realisation that eventuated in traumatic memories coming to the fore in the present study. Whilst findings were almost identical to our own, the uniqueness of the ecological model we present is in representing the individual's psychological processes alongside other external factors such as their social networks and institutional contexts.

❷ Pre, peri- and post-service vulnerability and protective factors

Because of the scope of our study, we identified many through-life factors (quantitative: p. 26; qualitative: p. 33 onwards and in detail in Figure 1 of the Appendix) contributing to the development of PTSD. A strength of the qualitative model is in

presenting the interplay of these factors over time. The following section discusses the quantitative and qualitative findings corresponding to three key areas: childhood, deployment and social support.

Childhood
Childhood interpersonal stress or violence was quantitatively associated with experiencing symptoms compared to those without, and was a factor in developing 'full' PTSD if some mild distress was already present. Qualitatively, participants shared accounts of paternal physical and sexual abuse and these were more common among the symptom group. Childhood adversity consistently predicts the development of PTSD and cPTSD (9, 54, 55) including after a deployment (56). However, most participants in the qualitative study perceived their PTSD to be connected to combat events rather than serious abuse in childhood. This could be because of the links between childhood abuse and dissociation which may impair perceptions about their relationship to present problems (57) or a perceived resolution due to the wrap-around holding structures of the military (including provision of safety, opportunities and a pseudo-family). In our qualitative subsample, we found that those with early traumas developed psychological defences which may have enabled them to thrive in service. For example, it has been found that children with adverse childhood experiences may exhibit early emotional numbing, sensation-seeking and hypervigilance (58) and such characteristics may be helpful in deployment settings. In this case, whilst personnel with such backgrounds may have qualities rendering them more suitable for military service (particularly on deployment), the rupture of childhood trauma appeared to contribute to participants' vulnerability

in the long-term and supports the notion proposed by this study that some vulnerability/ protective factors may be more complex and paradoxical by perhaps acting as both.

Deployment

Overall, we found deployment led to an easing of symptoms for some participants by providing focus and purpose. This was evidenced also in a trajectory study of Danish veterans showing numerous subgroups who experience 'benefit' effects of deployment and an alleviation of PTSD symptoms (59). Despite this, both quantitative and qualitative findings indicated the detrimental impact of certain combat exposures. Literature from our systematic review supported this where more samples who had been exposed to combat demonstrated worsening/ chronic symptoms over time (10, 48, 60).

Overall, mixed method findings indicated that exposures relating to harm to others were most influential in the development of PTSD. Violent combat exposures, which included exposure to small arm fire, mortar fire and discharging a weapon, appeared to act as a barrier to recovery rather than being a precipitating event, according to our quantitative results. A study using the cohort data found that violent combat could be related to the symptom domain of numbing, which may actually support compartmentalisation in some respects (61). Qualitatively, exposure to violent combat was not generally perceived as causal, but there was evidence that further deployment exposures exacerbated symptoms or continued to erode existing holding structures over time. Rather, most index events involved exposure to vivid scenes of injury or death, inflicting harm in ways that were ethically problematic, not having an opportunity to process witnessing harm to others and not being able to treat the effects of harm due to the limitations of training. It would therefore appear that the most influential exposures in the development of PTSD involved perceived relational transgressions invoking guilt along with strong visual images; both of which may incite dissociation/ prevent processing in the moment. This fits with literature that points to the development of PTSD as related to dissociative states in situ (11), the development of 'flashbulb' memories (where there is high emotion/ vivid stimuli) (62), and to existential, moral and interpersonal dynamics (17).

Social Support

Mixed method findings found social support was a key protective factor and, conversely, ruptures to these networks played a pivotal role in PTSD symptoms developing. In this regard, inconsistent or shrunken social support structures (whether including family members, civilian or military peers) were related to the worsening of symptoms. The loss of the military social network was related to worsening mental health in another UKAF study (38), as well as negative social reintegration in an Israeli study (60).

As found in other research (63), personal networks appeared to be more influential than formal support. Within this, we found that family support was the principal post-service holding structure. The fact that partners/spouses may detect problems before participants become conscious of them demonstrates their vital role, however our study found this can lead to great personal costs in terms of personal resources and negative family dynamics. This is similar to findings from other qualitative studies focusing upon military partners (64, 65). We further highlighted that the capabilities of the family may inadvertently act as a barrier to the expansion of other networks of support.

③ Post-service outcomes

The present research found that PTSD symptoms were linked to problems with employment, financial problems and other negative life events. The ecological model of PTSD symptom development highlighted how participants' outcomes were mutually reinforcing and so rupture at one level negatively impacted all other post-service holding structures. Similar processes are demonstrated by the cumulative advantage/disadvantage model (66) which highlights that health and economic (dis)advantage tends to beget more of the same over time.

Themes surrounding help-seeking were similar to those found in other research, including problems with access and delaying help-seeking until experiencing crises (67-69). Notably, there were few references to stigma as a barrier to help-seeking in the present study. Other programmes of work have focused on issues of stigma and its relationships to help-seeking elsewhere (67, 70). The majority of themes from the current analysis instead related to practical barriers like a lack of long-term or continued care both for physical and mental health needs. These themes were evident throughout the peri- and post-service periods. We further found that individuals' recognition of mental health problems occurred after points of collapse and was most obvious after the conscious realisation stage. Recognition appeared essential for seeking and engaging with services; until this point, it is possible participants and those around them did not realise their issues were related to mental health. This was found in another study based on UK ex-serving personnel (68).

Participants described their first symptoms starting in service. Whilst early indicators, such as emerging anger, increased drinking and emotional withdrawal, may be timely points for early intervention, participants reported poor experiences when they did seek help in service. At this point, breakdowns in relationships with leadership appeared to have started, treatments were generally short-term or limited and there was a mistrust/disbelief in the military's welfare priorities. Whilst strong leadership and social cohesion are already known protective factors (71), a novel finding in the present study was that effective leadership and the peer group perform effective holding functions, even among those who require specialist support for their complex needs.

Findings on reserves

Reserve status was consistently associated with PTSD symptoms in the present study compared to regulars. We did not interview reserves in the qualitative component because they were not the sample of interest. However, the systematic review we conducted found that studies based on UK and US reserves/National Guards showed greater numbers with increasing symptoms over time than mixed/ only regular samples (72, 73) and only one of the four studies (73) identified a group who recovered from probable PTSD (74). The risks of PTSD in reserves post-deployment have also been reported elsewhere (6, 29); these findings confirm that further investigation into the nature of PTSD among reserves is required.

Strengths and limitations

A strength of the present study was in our ability to identify the main courses of PTSD within a large sample of the UKAF over 12 years from 2004 to 2016. This represents a key period of interest as it spans the duration of the Iraq and Afghanistan conflicts. Our analyses allowed us to examine the factors associated with following different courses of the disorder and, as a result of the mixed methods approach, factors of interests were identified from the ground-up via the qualitative interviews. By separating samples by serving status in both quantitative and qualitative components, we were able to interrogate the potential differences between those who had left and those who remained in service.

The qualitative exploration formed the first investigation into the at-risk group with the highest rates of PTSD. The biographical range enabled a detailed analysis of through-life factors in a specific sample, which allowed us to identify the stressors participants perceived had most profoundly impacted them and how PTSD symptoms emerged over time. Subjective interpretations not only have clinical utility considering that the stories underpinning traumatic events are key areas of focus in talking therapies, but how central a traumatic event is to one's life story and identity is also thought to influence trajectories of post-traumatic stress. A study of participants affected by the 2011 Oslo terrorist attack found that perceiving an event as central 1-2 years after the bombing related to higher levels of post-traumatic stress (75). Limitations of this approach can be the problem of recall bias, which might especially affect the reporting of childhood adversity (either via questionnaire or interview) (76, 77).

By establishing the ecological model of PTSD symptom development, we were able to present a potential framework for bringing together other multiple interdisciplinary concepts, spanning psychotherapeutic concepts, such as Winnicott's concept of containment (78); biosocial models such as the vulnerability (or diathesis) stress model (79, 80) and those in social science, including reverse culture shock (80), the social buffering hypothesis (81) and Military Transition Theory (82). Unfortunately, qualitative data collection was cut short due to COVID-19. As a result, there were discrepancies between the no symptom and symptom group in terms of rank (where three commissioned officers were interviewed in the former and none in the latter).

Steps forward

The implications of our findings were discussed in two virtual stakeholder workshops in August 2020 (see Acknowledgements on p. 4). Two themes from these discussions included the importance of both **continuity** and **diversifying** holding structures.

Promoting continuity and refining transition pathways:

Some cohorts may require a more graduated withdrawal during their transition from military service to civilian life. Ideas included:

- Extending the transition process to incorporate a post-service holding period where both military and civilian support structures can be accessed and to ease the 'shock' of transition;
- Facilitating peer transition networks beyond the base or unit to build links between service leavers with shared experiences, whether this be related to their future employment, health needs or resettlement locations;
- Exploiting pre-existing support structures through consolidating and promoting the suite of welfare support that already exists for those with additional or complex needs.

Continuity in healthcare: Handovers and step-downs:

This topic spanned in-service, transition and post-service contexts. As PTSD progresses, interventions effective at one point of the disorder do not have the same efficacy when symptoms become chronic:

- Given our knowledge of the poor outcomes among those with chronic and complex PTSD, including treatment resistance, extended care for this group may place less burden on services in the long-term;
- Brief, short-term therapeutic interventions in service and post-service led to repeated and isolated contacts with different professionals or services. Handover and stepdown interventions or planned follow-ups may promote continuity;
- Although the first signs of PTSD started in service participants in the qualitative study did not tend to become aware of their mental health problems until after the transition period. Services like the Transition, Intervention and Liaison Service (TILS) and the Veterans' Mental Health Complex Treatment Service (CTS) have been recently implemented to meet the needs of ex-serving personnel experiencing mental health problems. Our findings indicate that provisions like these should work from a long-term basis, being available in the years preceding transition and many years into post-service life. Stakeholders further discussed the possibility of a financial incentive for service leavers' engagement;
- Continuity can also be promoted in the transfer of records, particularly from in service Defence Medical Psychiatry to NHS Psychiatry, in order to ensure that 1) care is 'joined up', and 2) background histories are available for future contacts with services.

Diversifying holding structures

This study emphasised the importance of ensuring holding structures do not work in isolation and are present on various ecological levels. Expanding holding structures into multiple streams will theoretically take the pressure off any one structure - especially the family. Ideas included:

- Involving partners/spouses or other family members in both the planning of discharge at earlier points in service, and through the delivery of additional psychoeducation, peer support and links with civilian services during transition (highlighted also in other reports (83)

- Ensuring pre-existing support structures are accessible in service and during transition, including independent telephone helplines, apps and a more comprehensive map of veterans' networks that provide 'bottom-up' peer support for younger generations of ex-serving personnel.

Conclusion

Whilst not a common outcome, PTSD represents a concern for the UKAF both because personnel are more likely to be exposed to traumatic experiences than other groups and because of its serious and debilitating effects. The present research reiterates that most who serve in the military do not experience PTSD, yet we have identified at-risk cohorts who have left service with repeated traumatic exposures from period(s) on deployment, as well as from their childhoods, and potentially complex physical multimorbidities and chronic (even increasing) PTSD symptoms. Whilst there were multiple barriers detecting who might develop persisting symptoms (not least individuals' own recognition of their prob-

lems), qualitative data showed potential opportunities in service to support the healthy processing of trauma. By viewing the various contextual influences upon how PTSD develops, we were able to identify a range of holding structures that can support ex-serving personnel in navigating the profound series of ruptures during the transition from military to civilian life when many protective buffers can be lost. This research highlights an urgent need for promoting continuity of informal and formal holding structures and an approach which considers diversifying holding structures on all levels (individual, the immediate social network, institutional and societal) among this cohort.

Appendix

Table 1: Characteristics of the PTSD trajectory classes (N, %)

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	Total sample N (%)	No-low symptoms N (%)	Mild distress N (%)	Worsening symptoms N (%)	Improving symptoms N (%)	Chronic symptoms N (%)
	7357 (100.0)	5246 (71.3)	1273 (17.3)	362 (4.9)	342 (4.7)	134 (1.8)
Age group at phase 1						
18-24 years	911 (12.4)	574 (10.9)	175 (13.8)	68 (18.8)	73 (21.4)	21 (15.7)
25-39 years	4494 (61.1)	3175 (60.5)	799 (62.7)	226 (62.4)	199 (58.2)	95 (70.9)
40+ years	1952 (27.5)	1497 (28.5)	299 (23.5)	68 (18.8)	70 (20.5)	18 (13.4)
Sex at phase 1						
Male	6566 (89.3)	4677 (89.2)	1142 (89.7)	325 (89.8)	298 (87.1)	124 (92.5)
Rank at phase 1						
Other ranks	5693 (77.4)	3871 (73.8)	1053 (82.7)	323 (89.2)	319 (93.4)	127 (94.8)
Engagement type at phase 1						
Regulars	6141 (83.5)	4392 (83.7)	1053 (82.7)	307 (84.8)	276 (80.7)	113 (84.3)
Relationship status at phase 1						
In a relationship	5777 (78.6)	4188 (79.8)	983 (77.3)	281 (77.6)	233 (68.1)	92 (68.7)
Single	1095 (14.9)	745 (14.2)	208 (16.4)	50 (13.8)	64 (18.7)	28 (20.9)
Separated/ widowed/ divorced	482 (6.6)	311 (5.9)	81 (6.4)	31 (8.6)	45 (13.2)	14 (10.5)
Branch of service						
Royal Navy and Royal Marines	1200 (16.3)	924 (17.6)	157 (12.3)	51 (14.1)	50 (14.6)	18 (13.4)
Army	4659 (63.3)	3161 (60.3)	885 (69.5)	273 (75.4)	236 (69.1)	104 (77.6)
RAF	1498 (20.4)	1161 (22.1)	231 (18.2)	38 (10.5)	56 (16.4)	12 (9.0)
Alcohol misuse (≥16)						
Yes	1002 (13.7)	445 (8.5)	284 (22.5)	78 (21.9)	138 (40.7)	57 (42.9)
Childhood interpersonal stress/physical violence						
Yes	2568 (35.2)	1573 (30.2)	559 (44.2)	170 (46.8)	188 (55.5)	78 (58.7)

	Total sample N (%)	No-low symptoms N (%)	Mild distress N (%)	Worsening symptoms N (%)	Improving symptoms N (%)	Improving symptoms N (%)
	7357 (100.0)	5246 (71.3)	1273 (17.3)	362 (4.9)	342 (4.7)	134 (1.8)
Deployed sample only	5329 (100.0)	3742 (70.2)	961 (18.0)	278 (5.2)	246 (4.6)	102 (1.9)
Perceptions of post-deployment social support						
Consistent support	700 (13.4)	626 (17.1)	55 (5.8)	7 (2.6)	9 (3.7)	3 (3.0)
Perceptions of post-deployment military support						
Consistent support	2116 (40.7)	1705 (46.7)	287 (30.4)	65 (23.9)	47 (19.4)	12 (12.1)
Experience being in proximity of wounding/death						
Exposed	3174 (60.5)	2022 (54.9)	669 (70.4)	218 (80.4)	176 (72.1)	89 (89.9)
Experience of violent combat						
Exposed	4105 (78.2)	2793 (75.8)	792 (83.3)	240 (88.2)	190 (77.9)	90 (90.9)
Ex-serving serving	3,548 (100.0)	2434 (68.6)	613 (17.3)	225 (6.3)	185 (5.2)	91 (2.6)
Time since leaving service						
Up to 4 years	699 (20.4)	499 (21.1)	113 (18.9)	50 (24.0)	29 (17.0)	8 (9.3)
4-7 years	912 (26.6)	642 (27.2)	155 (25.9)	66 (31.7)	33 (19.3)	16 (18.6)
8-11 years	1511 (44.1)	1007 (42.7)	277 (46.3)	86 (41.4)	90 (52.6)	51 (59.3)
12+ years	301 (8.8)	212 (9.0)	52 (8.9)	6 (2.9)	19 (11.1)	11 (12.8)
Discharge type						
End of contract	1675 (53.0)	1207 (55.7)	288 (51.6)	76 (39.6)	71 (43.6)	33 (40.7)
Premature Voluntary Release	942 (29.8)	658 (30.3)	165 (29.6)	57 (29.7)	46 (28.2)	16 (19.8)
Medical discharge	206 (6.5)	81 (3.7)	36 (6.5)	42 (21.9)	21 (12.9)	26 (32.1)
Other	340 (10.8)	223 (10.3)	69 (12.4)	17 (8.9)	25 (15.3)	6 (7.4)

Table 2: Model fit statistics for latent growth mixture models with 1-6 classes for the full sample and current and ex-serving samples

No. of classes	1	2	3	4	5	6
Full sample						
AIC*	116692.978	112123.414	111081.089	110458.537	109908.206	109690.759
BIC**	116727.495	112178.641	111157.027	110555.185	110025.564	109828.827
SABIC***	116711.606	112153.219	111122.071	110510.696	109971.542	109765.272
Entropy	-	0.91	0.88	0.904	0.805	0.783
LMR-LRT****	-	<0.0001	0.0000	0.4953	<0.0001	0.0078
Currently serving sample						
AIC	55241.791	53498.059	53130.258	52831.535	52612.434	52501.306
BIC	55273.017	53548.020	53198.954	52918.967	52718.601	52626.208
SABIC	55257.129	53522.600	53164.001	52874.481	52664.583	52562.657
Entropy	-	0.898	0.901	0.853	0.754	0.738
LMR-LRT	-	<0.0001	0.1786	0.2200	0.0002	0.0797
Ex-serving sample						
AIC	61203.365	58481.699	57825.189	57492.139	57176.118	57057.146
BIC	61234.236	58531.092	57893.105	57578.577	57281.078	57180.628
SABIC	61218.348	58505.672	57858.152	57534.092	57227.061	57117.078
Entropy	-	0.910	0.887	0.910	0.850	0.808
LMR-LRT	-	<0.0001	<0.0001	0.2715	0.0002	0.2732

*AIC, Akaike Information Criterion

**BIC, Bayesian Information Criterion

***SABIC, Sample Size Adjusted BIC

**** LMR-LRT, Lo-Mendell-Rubin Adjusted Likelihood Ratio Test

Table 3. Factors associated with PTSD trajectory classes (N=7,357)

Note: Reference category was no-low symptom class

	Mild distress aOR (95% CI)	Worsening aOR (95% CI)	Improving aOR (95% CI)	Chronic aOR (95% CI)
Phase 1 rank*				
Other ranks	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Officer	0.29	0.04	0.01	0.002
	(0.23-0.38)	(0.02 to 0.07)	(0.01 to 0.03)	(0.001 to 0.009)
Phase 1 engagement type*				
Regulars	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Reserves	1.45	1.43	2.79	2.44
	(1.13 to 1.87)	(0.73 to 2.78)	(1.76 to 4.43)	(1.21 to 4.92)
Phase 1 relationship status*				
In a relationship	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Single	0.93	0.81	1.31	1.40
	(0.73 to 1.18)	(0.44 to 1.50)	(0.85 to 2.01)	(0.76 to 2.58)
Separated/ widowed/ divorced	1.14	2.69	4.62	3.27
	(0.82 to 1.58)	(1.21 to 5.99)	(2.73 to 7.80)	(1.38 to 7.75)
Branch of service*				
Royal Navy and Royal Marines	0.54	0.28	0.47	0.49
	(0.42 to 0.57)	(0.16 to 0.50)	(0.27 to 0.84)	(0.22 to 1.08)
Army	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
RAF	0.56	0.15	0.56	0.27
	(0.43 to 0.73)	(0.07 to 0.31)	(0.32 to 0.97)	(0.08 to 0.91)
Alcohol misuse (≥16)*				
Yes	6.61	17.85	38.1	29.75
	(5.38 to 8.13)	(10.20 to 31.25)	(24.28 to 59.72)	(12.02 to 73.59)
No	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Childhood interpersonal stress/violence*				
Yes	2.51	6.54	6.78	6.74
	(2.11 to 2.99)	(3.87 to 11.07)	(4.40 to 10.46)	(2.64 to 17.21)
No	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)

Contiued overleaf

*Adjusted for relationships status, rank, engagement type, branch of service, alcohol use and childhood interpersonal stress

	Mild distress aOR (95% CI)	Worsening aOR (95% CI)	Improving aOR (95% CI)	Chronic aOR (95% CI)
Deployed sample (N=5,329)				
Perceptions of post-deployment social support				
Consistent support	0.14 (0.09 to 0.22)	0.02 (0.01 to 0.06)	0.02 (0.01 to 0.07)	0.04 (0.01 to 0.16)
Inconsistent support	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Perceptions of post-deployment military support				
Consistent support	0.29 (0.22 to 0.38)	0.07 (0.03 to 0.17)	0.06 (0.02 to 0.14)	0.08 (0.03 to 0.17)
Inconsistent support	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Experience being in proximity of wounding/death				
Exposed	2.58 (2.02 to 3.31)	10.28 (5.46 to 19.36)	5.76 (3.08 to 10.76)	14.04 (6.32 to 31.22)
Unexposed	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Experience of violent combat				
Exposed	0.77 (0.57 to 1.04)	0.79 (0.33 to 1.91)	0.33 (0.14 to 0.72)	1.17 (0.51 to 2.71)
Unexposed	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Ex-serving sample (N= 3,548)				
Time since leaving service				
Up to 4 years	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
4-8 years	1.19 (0.63 to 1.75)	1.03 (0.39 to 2.71)	0.90 (0.39 to 2.07)	2.73 (1.17 to 6.35)
>8-12 years	1.42 (1.00 to 2.01)	0.70 (0.30 to 1.60)	2.15 (1.18 to 3.95)	6.14 (3.41 to 11.03)
12+ years	1.08 (0.63 to 1.90)	0.12 (0.03 to 0.46)	1.61 (0.56 to 4.58)	8.59 (3.22 to 22.92)
Discharge type				
End of contract	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Premature Voluntary Release	1.38 (1.02 to 1.86)	3.61 (1.58 to 8.23)	1.77 (0.99 to 3.17)	1.12 (0.59 to 2.13)
Medical discharge	5.17 (3.21 to 8.32)	163.50 (71.63 to 373.22)	24.95 (11.31 to 55.04)	40.21 (20.11 to 80.40)
Other	1.72 (1.14 to 2.59)	2.01 (0.63 to 6.44)	2.58 (1.23 to 5.41)	1.30 (0.51 to 3.31)

Table 4. Head to head analyses of factors leading to worsening and chronic trajectories in the full sample (N=7,357) and ex-serving sample (N=3,538)

	Worsening (compared to mild distress) aOR (95% CI)	Chronic class (compared to improving) aOR (95% CI)
Phase 1 rank		
Other ranks	1.00 (ref)	1.00 (ref)
Officer	0.13 (0.08 to 0.24)	0.16 (0.05 to 0.52)
Phase 1 engagement type		
Regulars	1.00 (ref)	1.00 (ref)
Reserves	0.99 (1.55 to 1.77)	0.87 (0.43 to 1.78)
Phase 1 relationship status		
In a relationship	1.00 (ref)	1.00 (ref)
Single	0.88 (0.50 to 1.52)	1.07 (0.56 to 2.06)
Separated/ widowed/ divorced	2.36 (1.16 to 4.81)	0.71 (0.31 to 1.61)
Branch of service		
Royal Navy and Royal Marines	0.66 (0.40 to 1.10)	1.04 (0.45 to 2.35)
Army	1.00 (ref)	1.00 (ref)
RAF	0.26 (0.14 to 0.49)	0.48 (0.15 to 1.56)
Alcohol misuse (≥16)*		
Yes	2.70 (1.64 to 4.44)	0.78 (0.33 to 1.84)
No	1.00 (ref)	1.00 (ref)
Childhood interpersonal stress/violence		
Yes	2.61 (1.64 to 4.15)	0.99 (0.42 to 2.43)
No	1.00 (ref)	1.00 (ref)

Contiued overleaf

	Worsening (compared to mild distress) aOR (95% CI)	Chronic class (compared to improving) aOR (95% CI)
Deployed sample		
Perceptions of post-deployment social support[X]		
Consistent support	0.15 (0.05 to 0.46)	2.01 (0.48 to 8.42)
Inconsistent support	1.00 (ref)	1.00 (ref)
Perceptions of post-deployment military support[X]		
Consistent support	0.32 (0.09 to 1.16)	1.39 (0.68 to 2.87)
Inconsistent support	1.00 (ref)	1.00 (ref)
Experience being in proximity of wounding/death[X]		
Exposed	3.14 (2.02 to 4.86)	2.43 (1.02 to 5.83)
Unexposed	1.00 (ref)	1.00 (ref)
Experience of violent combat[X]		
Exposed	1.27 (0.50 to 3.25)	3.52 (1.46 to 8.45)
Unexposed	1.00 (ref)	1.00 (ref)
Ex-serving sample		
Time since leaving service†		
Up to 4 years	1.00 (ref)	1.00 (ref)
4-7 years	0.87 (0.39 to 1.95)	0.50 (0.07 to 3.60)
8-11 years	0.49 (0.24 to 1.00)	1.59 (0.25 to 10.27)
12+ years	0.11 (0.03 to 0.36)	1.91 (0.56 to 6.55)
Discharge type†		
End of contract	1.00 (ref)	1.00 (ref)
Premature Voluntary Release (PVR)	2.64 (1.27 to 5.46)	0.67 (0.28 to 1.60)
Medical discharge	31.69 (15.83 to 63.44)	2.11 (0.75 to 5.88)
Other	1.17 (0.42 to 3.31)	0.55 (0.17 to 1.79)

*Adjusted for relationships status, rank, engagement type, branch of service, alcohol use and childhood interpersonal stress

X Adjusted for all other deployment variables, relationships status, rank, engagement type, branch of service, alcohol use and childhood interpersonal stress or violence

† Adjusted for all other discharge variables, relationships status, rank, engagement type, branch of service, alcohol use and childhood interpersonal stress or violence

Table 5: Associations showing the influence of PTSD trajectories upon post-service outcomes among the ex-serving sample (N=3,538)

	Total sample N=3,538 (100%)	No-low symptoms N=2,434 (68.6%)	Mild distress N=613 (17.8%)	
	N (%)	N (%)	N (%)	aOR (95% CI)
Financial problems				
Yes	473 (17.5)	191 (10.1)	131 (27.3)	1.00 (ref)
No	2,229 (82.5)	1703 (89.9)	350 (72.8)	2.94 (2.21 to 3.91)
Employment status				
Employed	2,346 (86.0)	1,659 (86.8)	422 (86.7)	1.00 (ref)
Not in employment	383 (14.0)	252 (13.2)	65 (13.4)	1.17 (0.85 to 1.63)
Frequency of negative life events				
0-2	2,045 (78.9)	1,613 (88.1)	304 (65.4)	1.00 (ref)
3-4	414 (16.0)	201 (11.0)	118 (25.4)	2.81 (2.11 to 3.75)
5+	132 (5.1)	17 (0.9)	43 (9.3)	16.30 (8.61 to 30.84)

*Adjusted for all factors in the original models and ex-serving variables of discharge type and time since leaving service

	Improving symptoms N=185 (5.21)		Worsening symptoms N=225 (6.3%)		Chronic symptoms N=91 (2.5%)	
	N (%)	aOR (95% CI)	N (%)	aOR (95% CI)	N (%)	aOR (95% CI)
Financial problems						
Yes	37 (32.7)	1.00 (ref)	76 (47.2)	1.00 (ref)	38 (71.7)	1.00 (ref)
No	76 (67.3)	3.07 (1.90 to 4.96)	85 (52.8)	6.75 (4.52 to 10.06)	15 (28.3)	14.92 (7.64 to 29.11)
Employment status						
Employed	100 (86.2)	1.00 (ref)	131 (80.9)	1.00 (ref)	34 (64.2)	1.00 (ref)
Not in employment	16 (13.8)	1.17 (0.62 to 2.22)	31 (19.1)	2.06 (1.28 to 3.33)	19 (35.9)	3.20 (1.48 to 6.92)
Frequency of negative life events						
0-2	59 (56.7)	1.00 (ref)	56 (37.6)	1.00 (ref)	13 (31.0)	1.00 (ref)
3-4	35 (33.7)	3.68 (2.19 to 6.18)	49 (32.9)	6.95 (4.33 to 11.17)	11 (26.2)	5.06 (2.04 to 12.55)
5+	10 (9.6)	15.18 (6.11 to 37.68)	44 (29.5)	87.77 (43.23 to 178.16)	18 (42.9)	105.20 (38.59 to 286.79)

Table 6. Head to head analyses of how post-service outcomes for chronic and worsening classes among the ex-serving sample (N=3,538)

	Chronic (ref: improving) aOR (95% CI)	Worsening (ref: mild distress) aOR (95% CI)
Financial problems		
Yes	4.86 (2.29 to 10.31)	2.33 (1.53 to 3.55)
No	1.00 (ref)	1.00 (ref)
Employed		
Yes	2.73 (1.06 to 7.06)	1.76 (1.02 to 3.02)
No	1.00 (ref)	1.00 (ref)
Negative life events		
0-2	1.00 (ref)	1.00 (ref)
3-4	1.38 (0.51 to 3.70)	2.47 (1.50 to 4.07)
5+	6.93 (2.35 to 20.41)	5.39 (3.08 to 9.42)

*Adjusted for all factors in the original models and ex-serving variables of discharge type and time since leaving service

Figure 1: Ecological model of PTSD symptom development (with themes and subthemes)

PRE-SERVICE	
HOLDING	**RUPTURE**
INSTITUTIONAL/SOCIETAL Inclusion at school and community	**INSTITUTIONAL/SOCIETAL** Poverty, deprivation and community exclusion Barriers to education
SOCIAL Supportive and stable family Military family history	**SOCIAL** Paternal abandonment, physical and sexual abuse Antisocial peer groups Normalisation of violence
INDIVIDUAL Coping strategies Predispositions: • High tolerance of stress • Desire for challenge	**INDIVIDUAL** Developmental process of adolescence Emotional numbing Antisocial or aggressive tendencies

CORE SENSE OF SELF
Purpose
Relationship with trauma
Processing of time

Note: themes and subthemes in red font refer to those which may enact as paradoxical holding structures (see p.39)

PERI-SERVICE

HOLDING	RUPTURE

INSTITUTIONAL
Practical support and structures
- **General:** Fair and supportive leadership
- **Deployment:** training, decompression, R&R, TRiM
- **Help-seeking:** Smooth links between CoC and care pathways

Cultural values, ideological & ethical sense-making frameworks
- Operational language
- **Deployment:** Logic/psychology of warfare

INSTITUTIONAL
Practical support and structures
General: Breakdown in relationships with leadership
Deployment: Lack of protection, equipment & training
Help-seeking: blocks to early intervention; dismissive treatment; stigma; deficiencies in support

Cultural values, ideological & ethical sense-making frameworks
Deployment: Futility/failure of operations; Complexities and extremities of war
Help-seeking: Tensions between institutional & individual needs » Conformity & care; Warfare & welfare lack of help-seeking culture; putting on a band-aid;

SOCIAL
General:
- Experiential kinship
- Immediate context » Normalisation of trauma

SOCIAL
General:
- Family strain
- Breakdown of unit relationships » Accusations

Deployment:
- Bereavement in-theatre
- Survivor's guilt & rupture to loyalty
- Distance from family

INDIVIDUAL
General
- Physical fitness
- Military psychological toolkit » Cognitive solution-focused thinking; compartmentalisation; deindividuation
Higher locus of control
Acceptance of limits
Deployment:
Opportunity; preoccupation; structure; sensation-seeking; meaning

INDIVIDUAL
General
- Physical injury
- Coping strategies – alcohol use
- Post-traumatic symptoms

Deployment:
- Memories of index events

CORE SENSE OF SELF

Purpose
Sense of purpose v. loss of purpose

Relationship with trauma
Trauma is integrated/compartmentalised v. Trauma transforms sense of self

Processing of time
Moving on and adaptation v. sense of stasis (present tense)

Note: themes and subthemes in red font refer to those which may enact as paradoxical holding structures (see p.39)

POST-SERVICE

HOLDING	RUPTURE
INSTITUTIONAL/SOCIETAL **Practical structures of employment:** • Meaningful, stable and well-paid **Cultural values, ideological & ethical sense-making frameworks:** • Congruent cultures and camaraderie • Continuation/ replacement of values and sense-making frameworks	**INSTITUTIONAL/SOCIETAL** **Practical structures of employment** • **General:** Difficulties finding/ keeping meaningful, stable and well-paid work » Further traumatic exposures in high-risk jobs • Being unable to work **Help-seeking:** Deficiencies in support » disjointed services: pulled from "pillar to post"; lack of access to services; not being eligible/ meeting criteria; geographical limitations; delays in receiving care & diagnosis **Cultural values, ideological & ethical sense-making frameworks:** • Rewarding work culture not replaced • Loss of/distance from values and sense-making frameworks
SOCIAL • Positive and balanced relationships with family • Wider peer group/ social network	**SOCIAL** • Family support: Canaries in the coalmine » Physical and emotional support; Detectors of symptoms; Bearing the brunt of symptoms • Shrunken social networks
INDIVIDUAL • Physical fitness • Coping strategies intact » Cognitive, solution-focused thinking; continued compartmentalisation (for some)	**INDIVIDUAL** • Individuation post-service • Physical limitations • Ongoing symptoms • Introspective reflective thinking • Help-seeking: Mistrust of services

CORE SENSE OF SELF
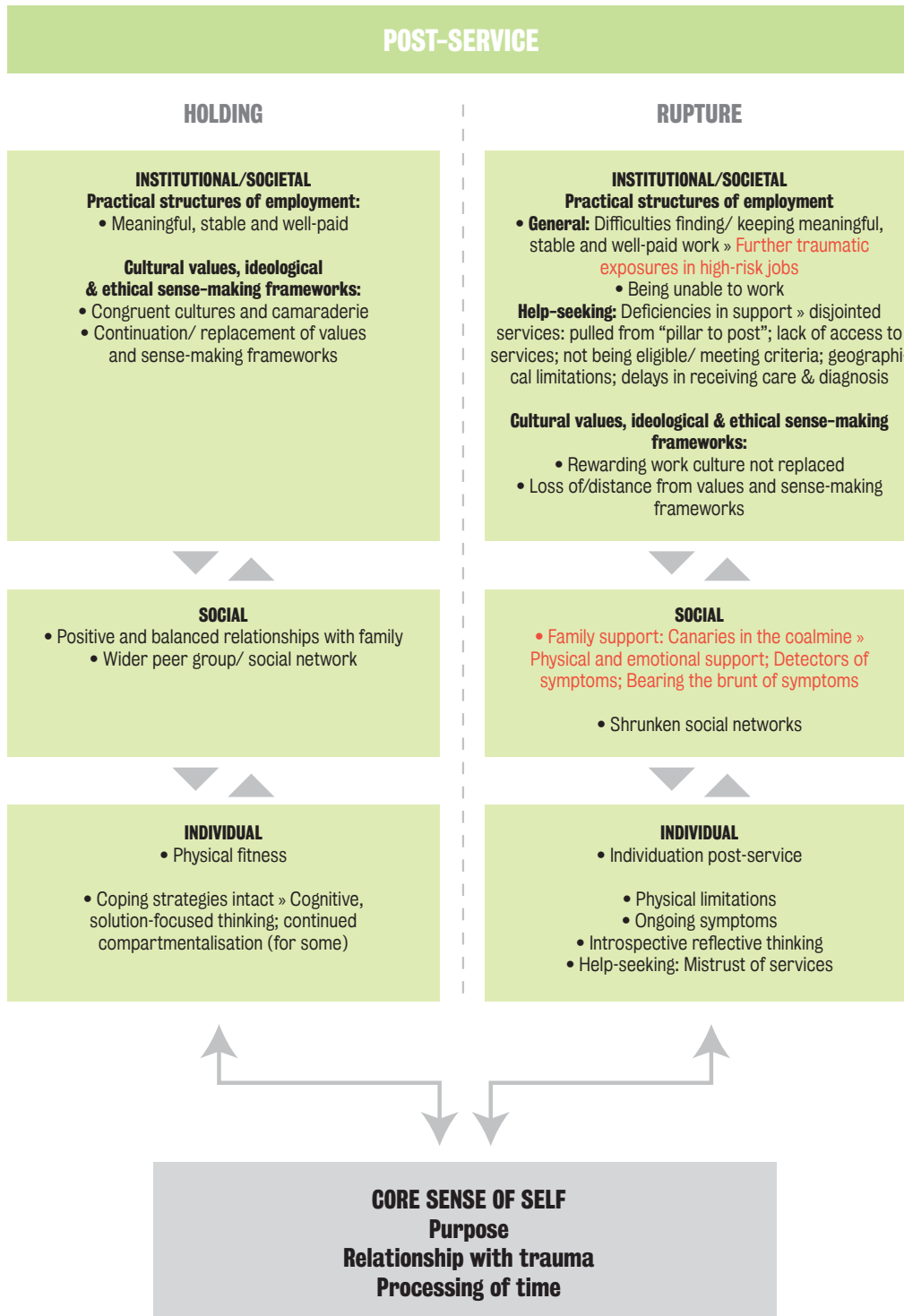**Purpose**
Relationship with trauma
Processing of time

Note: themes and subthemes in red font refer to those which may enact as paradoxical holding structures (see p.39)

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