



Research Paper

Associations between Adverse Childhood Experiences (ACEs) and Complex-PTSD, moral injury and perceived social support: A latent class analysis

David Turgoose^{a,*}, Dominic Murphy^{b,c}^a Leeds Institute of Health Sciences, University of Leeds, Leeds, UK^b King's Centre for Military Health Research, King's College London, London, UK^c Combat Stress, Tyrwhitt House, Leatherhead, UK

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ABSTRACT

Background: Adverse Childhood Experiences (ACEs), including childhood abuse and neglect, are consistently linked to poorer mental health and psychosocial outcomes in adulthood. Complex-posttraumatic stress disorder (C-PTSD) and moral injury are two conditions which can cause significant distress and functional impairment in individuals affected by trauma. However, not much is known about the complex relationships between ACEs, C-PTSD and moral injury. Furthermore, while perceived social support is a commonly cited protective factor for C-PTSD, there is little understanding about how it relates to ACEs in traumatised populations. The aim of this study was to investigate ACEs in a trauma-affected sample of UK military veterans using latent class analysis. Secondly, the study tested for associations between latent classes of ACEs, severity of C-PTSD and moral injury, and levels of perceived social support.

Method: Data was collected from a UK military veterans mental health charity, from a clinical sample ($N = 336$) who were receiving treatment for mental health difficulties. Participants completed standardised measures of ACEs, C-PTSD, moral injury, and perceived social support. Data was analysed using a bias-adjusted 3-step approach latent class analysis. Wald statistics were used to test for associations between classes of ACEs and C-PTSD, moral injury and perceived social support.

Findings: A two-class model was found to be the best fit for the data, which depicted two classes of ACEs within the sample. The classes showed a distinction between a group of participants who were more likely to endorse experiencing high levels of ACEs, and a separate group who endorsed relatively lower levels of ACEs. As such, the model was interpreted as depicting a *low-ACEs* (class 1) vs. *high-ACEs* (class 2) distinction. 56 % of participants fell into class 1 (low ACEs) with 44 % in class 2 (high ACEs). Participants in class 2 (high ACEs) were significantly more likely to score highly for symptoms of C-PTSD and moral injury, and to report lower levels of perceived social support.

Conclusion: The present study is the first to report a two-class model of low vs high-ACEs in a clinical sample of UK military veterans. It also describes how membership of the high-ACEs class was significantly associated with higher scores for key mental health and psychosocial variables in C-PTSD, moral injury and perceived social support. The findings have important clinical implications in highlighting the possible role of ACEs in understanding the aetiology of psychopathology in military populations affected by trauma. It also adds to the growing literature which demonstrates how many military personnel experience significant levels of pre-existing trauma and adversity before entering service, and how this can contribute to the development of complex mental health outcomes in adulthood.

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* Corresponding author.

E-mail addresses: D.turgoose@leeds.ac.uk (D. Turgoose), Dominic.murphy@combatsstress.org.uk (D. Murphy).

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1. Introduction

Adverse Childhood Experiences (ACEs) is a collective term used to describe a variety of negative events which can occur in childhood. These include different types of abuse and neglect, plus issues relating to family circumstances which may also have an adverse impact on the child, such as domestic violence, or family mental health difficulties (Felitti et al., 1998). ACEs are consistently linked to psychosocial difficulties in adulthood, such as mental health problems (Lee et al., 2020; Schilling et al., 2007; Sheffler et al., 2020), education (Hardcastle et al., 2018), employment (Topitzes et al., 2016; Ulusoy & Akcan, 2022) and suicidality (Chipalo & Jeong, 2023; Jones et al., 2024; Lee et al., 2022).

One area often linked with ACEs is Post-Traumatic Stress Disorder (PTSD). PTSD is a diagnostic label used to describe adverse psychological reactions that some people develop following exposure to an extremely threatening or horrific event or series of events (ICD-11; World Health Organization, 2019), and includes symptoms such as hyperarousal, intrusive re-experiencing of the traumatic event(s), and emotional and/or behavioural avoidance of stimuli related to the traumatic event(s). Literature consistently shows that individuals who experience a higher number of ACEs are more likely to develop PTSD (Karatzias et al., 2020). ACEs themselves could be classified as traumatic events (e.g. witnessing domestic violence).

Complex-PTSD (C-PTSD) is a new diagnostic term used to describe a cluster of psychological symptoms, also in response to a traumatic event or series of events. These include the core symptoms of PTSD, plus additional *Disturbances of Self-Organisation* (DSO) symptoms: emotional dysregulation, interpersonal difficulties, and negative self-concept (ICD-11; World Health Organization, 2019). Complex trauma is a condition in which individuals develop psychological difficulties which go beyond PTSD, particularly in cases of multiple and/or interpersonal traumas, and/or trauma experienced in childhood (Herman, 1992; van der Kolk, 2005). Recent research has begun to investigate associations between ACEs and C-PTSD (Frewen et al., 2019; Zerach, 2023), but because C-PTSD is still relatively new, research in this area is still in its infancy.

One population who is at increased risk of developing C-PTSD is military personnel (Murphy et al., 2021; Williamson et al., 2023). Military personnel have an increased risk of historical trauma exposure and are also more likely to experience a traumatic event in their military service, such as through combat or witnessing humanitarian crises. Research suggests that military veterans are more likely than the general public to report higher rates of ACEs (Katon et al., 2015), and that childhood trauma is second only to combat exposure when considering the most common forms of trauma exposure in veterans (Miles et al., 2016).

Veterans with C-PTSD are more likely to have functional difficulties and co-morbid anxiety (Letica-Crepulja et al., 2020), with many seeking formal psychological interventions. Trauma treatments often focus on the presenting trauma and associated symptoms, which may mean that early life adversity might be neglected. As such, it is important to understand more about the role of ACEs in mental health difficulties for military veterans, including how different profiles of ACEs might relate to C-PTSD and other common mental health difficulties in this population.

Moral injury is another condition which is often associated with experiencing traumatic events. Potentially Morally Injurious Events (PMIEs) include acts of commission or omission which might violate a person's moral or ethical code (Litz et al., 2009; Williamson et al., 2020). Moral injury describes psychological reactions to PMIEs, which can include feelings of shame, guilt, anxiety or anger about something that was done to or by an individual, or something witnessed by the individual being done by another (Griffin et al., 2019). Research has suggested that moral injury is associated with other mental health conditions, such as depression (Khan et al., 2023; Thomas et al., 2024), PTSD (Békés et al., 2023; Mordeno et al., 2022) and C-PTSD (Currier et al., 2021). Moral injury has also been related to ACEs, such as moral

injury mediating the link between ACEs and psychopathology in adulthood (Roth et al., 2022). It has also been proposed that ACEs play a predisposing role in the development of moral injury, such as in the way ACEs influence one's moral development and interpersonal beliefs (Bonson et al., 2023; Tezel et al., 2015; Zyromski et al., 2020).

A commonly reported protective factor for PTSD is perceived social support (Brewin et al., 2000; Galovski et al., 2023; Ozer et al., 2003). Different mechanisms via which social support protects against PTSD have been proposed. These include the notion that social support can increase an individual's ability to cope and reduce negative appraisals of the event via *stress buffering* (Cohen & Willis, 1985), and the idea that social support can encourage resilience in individuals affected by trauma (Sippel et al., 2015). There is also growing evidence for the positive influence of peer support in people with PTSD (Drebing et al., 2018; Greden et al., 2010; Hundt et al., 2015; Jain et al., 2016; Weir et al., 2019), pointing to the protective nature of having a shared experience with others. More recently, perceived social support has been associated with C-PTSD, particularly in those experiencing difficulties in relationships (Simon et al., 2019).

1.1. Aims

The aim of the current study was to investigate latent classes of ACEs in a clinical sample of UK military veterans receiving treatment for their mental health. Additionally, we investigated whether the identified latent classes were associated with mental health and psychological variables, specifically C-PTSD, moral injury, and perceived social support. It was hoped that the identification of latent classes, and any associated psychological or mental health risks, would help inform clinical practice when treating this group. Despite there being a proliferation of LCA studies in ACEs research in recent years (Wang et al., 2023), research into ACEs in the UK military population remains scarce. The present study therefore aimed to add to the understanding of the role of ACEs within the UK military veteran population.

2. Method

The data for this study was collected as part of a previous project whereby a 'Patient Needs Survey' was circulated to veterans attending a UK-based veteran's mental health charity for mental health treatment (Combat Stress). A random sample of 989 veterans attending Combat Stress were asked to complete a battery of measures on a range of health and well-being variables, with 428 being completed. Those who completed the measures tended to be older than those who did not respond. Otherwise, there were no differences between responders and non-responders. Missing data was not included in the analyses (see Williamson et al. 2023).

2.1. Measures

As above, all data collected was contained within the larger Patient Needs Survey distributed by Combat Stress. Demographic data was collected on age, gender, employment status, relationship status, housing status, reasons for leaving the military, and whether they were an early service leaver (defined by leaving the military prior to completing four years of continuous service). Additionally, contained within the battery of measures were measures of ACEs, C-PTSD, moral injury, and perceived social support.

ACEs were measured using the Adverse Childhood Experiences Questionnaire (Felitti et al., 1998). This 10-item questionnaire asks respondents to complete 10 yes/no response items, each relating to a different ACE. These cover three types of ACE: abuse (physical, emotional and sexual), neglect (emotional and physical), and family dysfunction (divorce, domestic violence, family alcohol or substance misuse, family mental health, and family member imprisonment). The measure gives an overall score out of 10 which denotes the number of

ACEs the respondent reports having experienced.

Complex-PTSD was measured using the International Trauma Questionnaire (ITQ; Cloitre et al., 2018), a screening measure which has been validated in a clinical sample of military veterans (Murphy et al., 2021). Comprising 16 items, the ITQ gives an overall score to indicate probable C-PTSD by combining two separate sub-scales for PTSD and DSO symptoms. For each subscale, the maximum total score for C-PTSD is 48, and 24 for PTSD and DSO respectively. Higher scores indicate worse difficulties reported.

Moral injury was measured using the Moral Injury Outcome Scale (MIOS; Litz et al., 2022; Yeterian et al., 2019). The MIOS firstly asks respondents whether they have been exposed to a potentially morally injurious event (PMIE) and then asks 14 further questions about symptoms relating to moral injury. A higher MIOS score indicates more severe moral injury difficulties, with a maximum score of 56.

Perceived social support was measured using the Oslo Social Support Scale (OSSS; Dalgard, 1996). Total scores can be categorised to indicate low, moderate or high levels of social support, with lower scores suggesting lower levels of social support. The maximum score is 14.

2.2. Analysis

Firstly, descriptive data was calculated using IBM SPSS Statistics (Version 28). Latent class analysis (LCA) was then performed using Latent Gold 5.1 (Vermunt & Magidson, 2016). The LCA followed a bias-adjusted 3-step approach as recommended by Bakk et al. (2013). This involved three steps: 1) identifying the latent class model, 2) obtaining predictions for class membership scores, and 3) investigating associations between class membership and other variables. The ten ACEs (binary coded for yes/no if experienced by each participant) were used as indicators in the LCA.

Models with up to four classes were tested, with various statistics used to determine the most appropriate model for the data. The Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) were considered for determining the model with the best fit, as well as the log-likelihood ratio and entropy values.

We then included several dependent variables in the selected model to investigate if perceived social support, moral injury, C-PTSD symptoms, PTSD symptoms and DSO symptoms were predicted by and dependent on class membership. This was done using the Bolck–Croon–Hagenaars (BCH) approach which adjusts for classification errors (Bolck et al., 2004) and is used where dependent variables are continuous (Vermunt, 2010). Wald statistics were used to determine whether class membership was significantly predictive of each dependent variable. We also looked at the relative proportion of cases in each class for each dependent variable and reported the mean scores for each class.

3. Results

Of the 428 survey respondents, 92 did not complete the ACEs questionnaire section and were therefore removed from this study. Most of the sample were White male (97 % male, 95 % White British). Most participants were in older age categories (37 % were 55+, 10 % being under 35). A large minority of the sample were currently unemployed (44 %) and 10 % reported being homeless. 65 % were currently in a relationship, 4 % reported being an early service leaver, and 55 % left the military voluntarily, as opposed to non-voluntary or medical discharge.

3.1. Descriptive statistics

The mean ACEs score was 2.69 (SD=2.45), ranging from 0 to 10. Table 1 displays a breakdown of ACEs reported. The mean score for C-PTSD was 32.20 (SD=11.04), PTSD 15.81 (SD=5.87), DSO 16.39 (SD=6.19), moral injury 33.94 (SD=10.22) and perceived social support 7.26 (SD=2.47).

Table 1

Rates (%) of ACEs in current sample ($N = 336$).

Category of ACEs exposure	%
Abuse type	
Emotional	43.7
Physical	44.0
Sexual	13.5
Neglect type	
Emotional	41.1
Physical	18.7
Household dysfunction type	
Parental divorce	37.1
Family alcohol or substance misuse	22.1
Domestic violence	24.7
Family mental illness	21.3
Family member in prison	5.5

3.2. Latent class analysis

For larger sample sizes ($N > 300$), the BIC has been found to perform better than the AIC in indicating the best model fit (Nylund-Gibson & Choi, 2018; Sinha et al., 2021). Therefore, this was the primary consideration in determining the best model fit. Here, the 2-class model had the lowest BIC, as well as a significant Vuong-Lo-Mendel-Rubin value (VLMR; $p < 0.01$) and the highest entropy value of the different models. Overall, it was therefore decided that the 2-class model was the best fit (see Table 2).

The two-class model yielded two separate classes as depicted in Fig. 1. Class 1 shows a class of participants who were less likely to endorse experiencing ACEs than those in class 2. As such, the model could be interpreted as depicting a *low-ACEs* (class 1) vs. *high-ACEs* (class 2) distinction.

Table 3 shows the percentage of cases and relative size of each class, i.e. 56 % of participants fell into class 1 (low ACEs) with 44 % in class 2 (high ACEs). It also shows the relative probability of endorsing each ACE for both classes. Generally, the data shows a trend towards a higher probability of endorsing ACEs for class 2 (high ACEs), except for the experience of having a family member in prison, where the probability is very similar between both classes.

Wald statistics suggested that all the dependent variables of perceived social support, moral injury, C-PTSD symptoms, PTSD symptoms and DSO symptoms were predicted by class membership (see Table 4). Table 4 shows that participants in class 2 (high ACEs) were significantly more likely to score higher for symptoms of C-PTSD, PTSD, DSO and moral injury. Additionally, participants in class 2 (high ACEs) were significantly more likely to report lower levels of perceived social support. Table 5 shows the comparative mean scores for each variable by class. Again, it shows that participants in class 2 (high ACEs) reported lower mean scores for perceived social support, and higher scores for C-PTSD, PTSD, DSO and moral injury symptoms.

4. Discussion

This study is the first of its kind to show a high vs low ACEs dichotomy in a clinical sample of UK military veterans. Previous literature shows that veterans are generally more likely to report high ACEs compared to the general population, but this study shows that within this population there are relative differences in ACEs endorsement. We found a roughly equal split between high and low ACEs, despite the fact that all of this sample were presenting with mental health difficulties. Scores were high for C-PTSD and moral injury across the sample, but those who reported high ACEs had significantly higher scores, and the lowest scores for perceived social support; a well-established protective factor.

The two latent classes were distinguished by one (class 1) generally reporting lower rates of each ACE, with the other (class 2) generally reporting higher rates of each ACE. For most ACEs, the distinction was

Table 2
Indicators of fit for the latent class models.

		LL	BIC(LL)	AIC(LL)	AIC3(LL)	Npar	L ²	df	p-value	Max. BVR	VLMR	p-value	Class.Err.	Entropy R ²
Model1	1-Cluster	−1803.1	3664.4	3626.2	3636.2	10	960.1	325	5.4e-64	164.5			0.000	1.0000
Model2	2-Cluster	−1540.9	3204.0	3123.9	3144.9	21	435.7	314	6.2e-6	11.6	524.3	0.0000	0.044	0.8444
Model3	3-Cluster	−1513.0	3211.9	3089.9	3121.9	32	379.7	303	0.0018	7.5	55.9	0.0017	0.099	0.7503
Model4	4-Cluster	−1484.5	3219.1	3055.1	3098.1	43	322.9	292	0.10	4.7	56.7	0.0000	0.094	0.7894

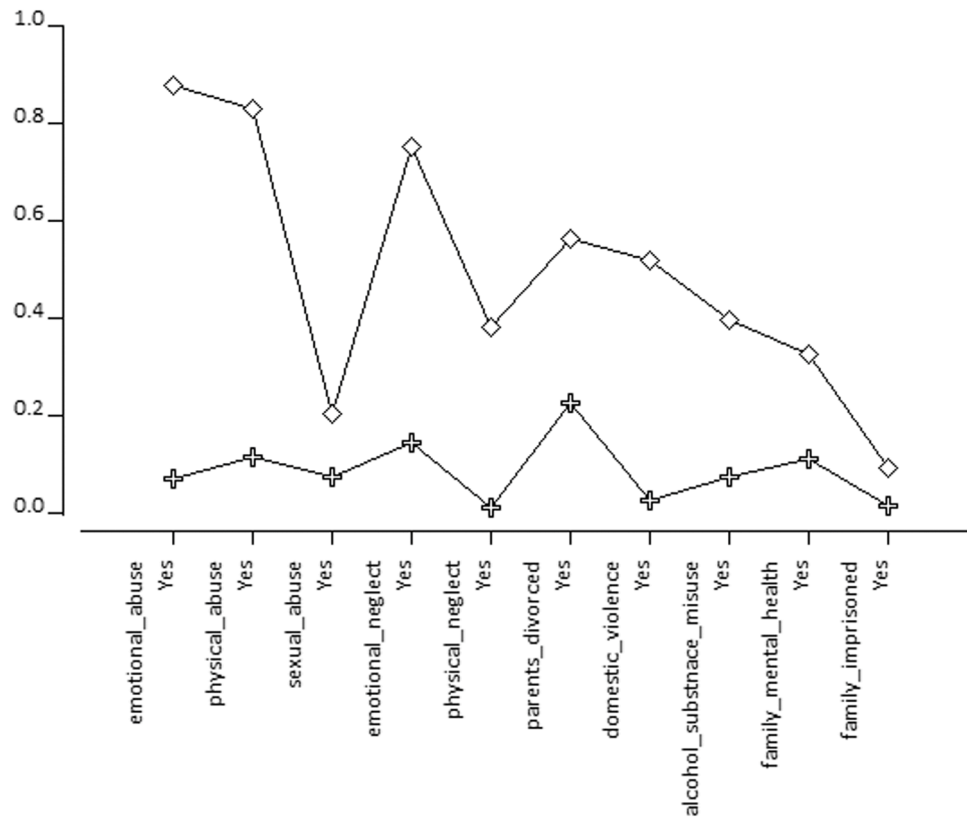


Fig. 1. Endorsement of different ACEs by class.
Low ACEs class High ACEs class .

very clear. For example, the likelihood of reporting emotional abuse in the low-ACEs class was 7.6 %, compared to 87.2 % in the high-ACEs class. Similar figures were found for other ACEs, such as physical abuse (12 % low-ACEs vs 82.6 % high-ACEs), emotional neglect (14.8 % low-ACEs vs 75.3 % high-ACEs), and witnessing domestic violence (3.2 % low-ACEs vs 52.1 % high-ACEs). For other ACEs, the distinction was smaller, but still noteworthy, e.g. sexual abuse (7.8 % low-ACEs vs 20.1 % high-ACEs), parental divorce (22.8 % low-ACEs vs 56.3 % high-ACEs), and family alcohol or substance abuse (7.9 % low-ACEs vs 40.1 % high-ACEs). The only ACE where the distinction between classes was much smaller was family member imprisonment (1.8 % low-ACEs vs 9.8 % high-ACEs).

The relative size of each class is of interest, showing a roughly equal split in the number of participants in each class (56 % low-ACEs vs 44 % high ACEs). This could be interpreted as showing a high proportion of the sample experiencing high ACEs. Research in other populations has tended to show smaller proportions in high-ACEs classes, e.g. in a sample of US college students, 8–9 % were in the high-ACEs class (Merians et al., 2019), with another study of young adults suggesting 16 % were in the high-ACEs class (Shin et al., 2018). In these studies, there were higher numbers of classes which partly explains the relatively lower proportions of participants in each class. Nevertheless, previous research has suggested that military personnel, including veterans, are

at higher risk of experiencing ACEs (Katon et al., 2015), which is supported by the present findings. Studies reporting on specific ACEs also suggest that, comparatively, this clinical sample of veterans are at higher risk. For example, compared to 13.5 % in this sample, studies estimating experiences of sexual abuse have reported 2–4 % in a general UK sample (Bellis et al., 2014) and 10 % in an international sample of young adults (Villanueva et al., 2023). The same studies report physical abuse at rates of 15.2 % (Bellis et al., 2014) and 16.3 % (Villanueva et al., 2023) compared to 44 % in this sample; and for witnessing domestic violence, 14.1 % (Bellis et al., 2014) and 2.6 % (Villanueva et al., 2023), compared to 24.7 % in this sample.

There are some similar examples of studies reporting latent class analyses of ACEs in military samples. One study investigated ACEs in a US military veteran sample and their association with incarceration, finding a four-class model, similarly showing a high vs low adversity distinction, but also two further classes which described more subtle difference in household dysfunction and substance misuse (Ross et al., 2018). A similar study of UK veterans described a five-class model. In this study, specific class membership was not significantly associated with any mental health or psychosocial variables, although regression analyses in the same sample showed that PTSD and common mental health disorders were related to higher ACEs scores (Ross et al., 2022). The present study confirms previous work demonstrating the impact of

Table 3
Probability of ACE endorsement by cluster membership.

	Cluster1 Low ACEs	Cluster2 High ACEs	Overall
Cluster Size	0.5586	0.4414	
Indicators			
Emotional abuse			
No	0.9244	0.1218	0.5702
Yes	0.0756	0.8782	0.4298
Physical abuse			
No	0.8798	0.1715	0.5672
Yes	0.1202	0.8285	0.4328
Sexual abuse			
No	0.9224	0.7939	0.8657
Yes	0.0776	0.2061	0.1343
Emotional neglect			
No	0.8524	0.2468	0.5851
Yes	0.1476	0.7532	0.4149
Physical neglect			
No	0.9831	0.6156	0.8209
Yes	0.0169	0.3844	0.1791
Parental divorce			
No	0.7718	0.4367	0.6239
Yes	0.2282	0.5633	0.3761
Domestic violence			
No	0.9680	0.4792	0.7522
Yes	0.0320	0.5208	0.2478
Family alcohol or substance misuse			
No	0.9212	0.5993	0.7791
Yes	0.0788	0.4007	0.2209
Family mental health			
No	0.8858	0.6711	0.7911
Yes	0.1142	0.3289	0.2089
Family member in prison			
No	0.9816	0.9016	0.9463
Yes	0.0184	0.0984	0.0537

Table 4
Wald statistics for dependent variable by cluster.

Models for Dependents	Cluster1	Cluster2	Wald	p-value
Perceived social support (OSS)				
	0.7079	−0.7079	18.7750	0.000015
Moral injury (MIOS)				
	−2.7397	2.7397	16.2504	0.000056
PTSD symptoms (ITQ)				
	−0.8924	0.8924	5.2279	0.022
DSO symptoms (ITQ)				
	−1.4698	1.4698	16.9699	0.000038
Complex-PTSD (ITQ)				
	−2.3622	2.3622	11.7592	0.00061

Table 5
Comparative mean scores for dependent variables by cluster.

	Cluster1	Cluster2	Overall
Cluster Size	0.5552	0.4448	
Variables			
Perceived social support (OSS)			
Mean	7.8656	6.4497	7.2358
Moral injury (MIOS)			
Mean	31.5409	37.0204	33.9782
PTSD symptoms (ITQ)			
Mean	15.4768	17.2617	16.2707
DSO symptoms (ITQ)			
Mean	16.0593	18.9989	17.3668
Complex-PTSD (ITQ)			
Mean	31.5361	36.2605	33.6376

ACEs on mental health. It is also the first in UK veterans to highlight a distinct, two-class model, and the first to demonstrate the predictive value of a high-ACEs class in relation to C-PTSD, moral injury, and

perceived social support.

In this study, we found that membership of the high-ACEs class was significantly associated with having higher self-reported C-PTSD (including higher scores on both the PTSD and the DSO symptom clusters), as well as higher levels of moral injury. Previous studies have shown similar associations between ACEs and C-PTSD in large representative community samples (McCutchen et al., 2022). Studies using military veteran samples have also consistently demonstrated a dose-response link between ACEs and PTSD, whereby higher ACEs relates to higher levels of PTSD symptoms (Moye et al., 2022; Murphy & Turgoose, 2019; Wooldridge et al., 2020), although these studies did not use latent class analyses.

There is some evidence from prior research linking ACEs and moral injury (Williamson et al., 2021), however the literature in this area, particularly regarding UK veterans, is still in its infancy. Therefore, the present findings represent an important addition to understanding moral injury in this population.

It is not possible to draw conclusions regarding causality from the present study's design. However, there are some theoretical possibilities in explaining the links between ACEs, C-PTSD and moral injury. For example, the cognitive theory of PTSD suggests that individuals experiencing trauma are likely to have changes in cognitions about the self, others and the world in general, such as thoughts relating to risk, worthlessness, shame and guilt (Ehlers & Clark, 2000). Individuals experiencing multiple ACEs might be more likely to have such cognitions from a young age and therefore be more susceptible to the types of cognitions associated with PTSD and moral injury. It has also been suggested that experiencing adversity in childhood affects an individual's ability to regulate their emotions, which may also be a risk factor for developing C-PTSD and/or moral injury (Cloitre et al., 2019).

We also reported that lower perceived social support was significantly associated with high-ACEs class membership. This represents an important finding given that social support is widely reported as a protective factor in physical (Vasan et al., 2023) and mental health difficulties (Castarlenas et al., 2023; Tutzer et al., 2023), including PTSD (Ozer et al., 2003). Similar studies have investigated the link between ACEs and perceived social support, for instance showing that perceived social support has a moderating effect on the relationship between high ACEs and C-PTSD (McCutchen et al., 2023). Previous studies have investigated ACEs in relation to social support, finding for example that adulthood depression is worse in those with high ACEs and low perceived social support (Von Cheong et al., 2017), although other studies have not found perceived social support to moderate this relationship (Racine et al., 2020).

The present study has several implications. The findings highlight, for the first time, an association between a distinct class of individuals reporting high ACEs, and several psychosocial outcomes known to be prevalent in treatment-seeking veterans. These associations are important for clinical practice. For example, clinicians working with this population, perhaps treating C-PTSD or moral injury, would be advised to incorporate a detailed assessment of childhood adversity. Patients experiencing C-PTSD, for example, might have additional difficulties with moral injury and perceived social support which would warrant consideration from clinicians. Also, clinicians treating veterans with C-PTSD or moral injury may benefit from knowing this population have an increased chance of having experienced childhood adversity, which may be important to capture in a psychological formulation and in understanding the aetiology of the presenting difficulties. Clinicians should not assume however that all veterans with C-PTSD or moral injury have high levels of ACEs, as the findings here showed that those in the low-ACEs class were experiencing high levels of symptoms.

The present study also has limitations. Previous LCA studies have reported a higher number of clusters, perhaps illustrating a degree of complexity and subtlety that is perhaps missing in the present study's findings. It is possible that the high vs low-ACEs distinction is oversimplistic. Also, whilst the association between ACEs and

psychopathology is important, it was beyond the scope of the present study to investigate mechanisms via which ACEs increase the chances of individuals developing C-PTSD, moral injury and lower perceived social support. Future research could look at possible mechanisms in more detail, such as cognitive appraisals or emotion regulation. Finally, ACEs data was collected via self-report and retrospectively. A large proportion of participants were over 55, raising the possibility of recall bias. The study also relied on screening measures for psychiatric conditions, whereas as future research would benefit from using more robust diagnostic tools. Additionally, the dichotomous nature of items on the ACEs questionnaire is limited because it fails to capture frequency and severity. Similarly, the MIOS measure did not allow us to relate experiences of moral injury to specific events, so it was not clear if participants were experiencing moral injury relating to something they experienced in childhood or as an adult, e.g. in their military service.

The present study is the first to report a two-class model of low vs high-ACEs in a clinical sample of UK military veterans. It also describes how membership of the high-ACEs class was significantly associated with worse outcomes for key mental health and psychosocial variables in C-PTSD, moral injury and perceived social support. A large proportion of participants comprised the high-ACEs class, in-keeping with previous literature reporting high prevalence of ACEs in this population. The findings have important clinical implications in highlighting the possible role of ACEs in understanding the aetiology of psychopathology in military veterans seeking help for their mental health. Literature is now consistently demonstrating that military personnel are at increased risk of entering service carrying a significant level of pre-existing trauma and adversity. When combined with a high chance of further trauma exposure during service, this can lead to the development of complex mental health difficulties. This study adds to the weight of evidence demonstrating how what happens before an individual enters the military can have a significant impact on their mental well-being after they leave.

CRedit authorship contribution statement

David Turgoose: Writing – original draft, Resources, Methodology, Investigation, Formal analysis, Conceptualization. **Dominic Murphy:** Writing – review & editing, Resources, Methodology, Investigation, Conceptualization.

Declaration of competing interest

None.

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