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SYSTEMATIC REVIEW

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Adjustment disorder in the Armed Forces: a systematic review

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ABSTRACT

Background: In the UK military, adjustment disorder (AjD) is reported as one of the most diagnosed mental disorders, alongside depression, in personnel presenting to mental health services. Despite this, little is understood about what may predict AjD, common treatment or outcomes for this population.

Aim: The systematic review aimed to summarise existing research for AjD in Armed Forces (AF) populations, including prevalence and risk factors, and to outline clinical and occupational outcomes.

Method: A literature search was conducted in December 2020 to identify research that investigated AjD within an AF population (serving or veteran) following the PRISMA guidelines.

Results: Eighty-three studies were included in the review. The AjD prevalence estimates in AF populations with a mental disorder was considerably higher for serving AF personnel (34.9%) compared to veterans (12.8%). Childhood adversities were identified as a risk factor for AjD. AjD was found to increase the risk of suicidal ideation, with one study reporting a risk ratio of 4.70 (95% Confidence Interval: 3.50–6.20). Talking therapies were the most common treatment for AjD, however none reported on treatment effectiveness.

Conclusion: This review found that AjD was commonly reported across international AF. Despite heterogeneity in the results, the review identifies several literature gaps.

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KEYWORDS
Adjustment disorder; armed forces; veterans; military personnel; systematic review

Background

Armed Forces (AF) personnel are often required to work in challenging environments which may impact their physical and psychological health. Research has identified several occupational stressors which may increase the risk of psychological ill-health including deployment, combat experience, lack of leadership support and role conflict (Brooks & Greenberg, 2018; Campbell & Nobel, 2009). In 2021, Defence Statistics data indicated that 1 in 10 UK AF personnel were seen by an AF clinician for mental health reasons (Ministry of Defence, 2021). Of those seen by a clinician, 33% were initially found to be experiencing adjustment disorder (AjD). Of the whole AF population AjD (0.6%) was as frequently diagnosed as depression (0.6%) and seen more frequently than Post-Traumatic Stress Disorder (PTSD) (0.2%) and substance misuse (0.1%).

The tenth edition of the International Classification of Diseases (ICD-10) identifies symptoms of AjD as: anxiety, depressed mood and worry, and an inability to cope (World Health Organization (WHO), 1993). The main distinction between AjD and other mental disorders is the exposure to a specific external stressor which triggers the symptomology and significantly impacts the individual's ability to cope (Carta et al., 2009; Casey, 2009; Kazlauskas et al., 2018; Reid, 2018). The exact nature of the external stressor can vary from a serious accident (Kühn et al., 2006), to a bereavement (Greis, 2012), financial issues or a divorce (Glaesmer et al., 2015). Much like PTSD, individuals are aware of the stressor, which must be identified before making a diagnosis (Casey, 2009). However, there are differences which separate PTSD from AjD (Zelviene & Kazlauskas, 2018). The stressful event for PTSD can be unexpected, traumatic, stressful or life-threatening event where the individual may have episodes of reliving the event (i.e. flashbacks) (World Health Organization (WHO), 1993). In comparison, for AjD the individual's response to a significant life event needs to exceed a "normal" reaction if others were experiencing the same event (Gradus et al., 2010) and symptoms can be directly linked to the event (World Health Organization (WHO), 1993).

Despite AjD's prevalence within the AF population, little research has been conducted into the disorder. This contrasts the substantial body of literature exploring risk factors, outcomes, and treatment for other mental disorders such as depression and PTSD. Research beyond the UK AF has been conducted to explore potential AjD risk factors, however, all report mixed findings (Chen et al., 2011;

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Haskell et al., 2011; Yaseen, 2017). Yaseen (2017) identified that individuals who had a low educational level, who were single, between 15 and 25 years old or a student had an increased risk of AjD. However, it is unclear whether this risk profile would accurately translate to an AF population. Further, literature identifies talking therapies and self-help tools are the most common treatment used for AjD in the general population (O'Donnell et al., 2018, 2019), however, there is no "gold-standard". In fact, AjD remains one of the last disorders without treatment recommendations in The National Institute for Health and Care Excellence (NICE) Guidelines. Without an up-to-date literature summary for AjD in military populations there is a lack of clarity around typical symptom presentation and potential outcomes, increasing the difficulty to develop appropriate treatment pathways. Further, this hinders capacity to adjust military policies and practices appropriately; for example, should personnel with AjD be allowed access to firearms or deploy to conflict zones?

This review has three aims; (1) to summarise existing research conducted into AjD on AF populations (both AF personnel and veterans), (2) to outline any clinical or career implications that AjD may have for AF personnel and veterans and, (3) to identify areas needed for future explorative research to progress our understanding of AjD in AF population. The review includes eligible studies that report on the prevalence, risk and protective factors, symptomology, comorbidities, outcomes, and treatment pathways for AjD in AF populations.

Methods

Search strategy

The review followed guidelines outlined by PRISMA for conducting systematic reviews. Electronic databases were searched for eligible studies in December 2020. Databases included Embase, Medline, Global Health, PsycINFO, PubMed, Web of Science and ASSIA. Database search terms included adjustment disorder ("adjustment disorder" OR "adjustment disorder with" OR F43.2 (ICD code)) AND military ("military" OR "armed forces" OR "army" OR "navy" OR "air force" OR "US coast guard" OR "marine*" OR "veteran*" OR "defence" OR "military personnel*" OR "soldier*" OR "ex-military" OR "ex-service" OR "new recruits" OR "conscript*").

Eligibility criteria

The following review eligibility criteria were applied:

a. AjD was featured in the study results.
b. The study population included either AF personnel or veterans.
c. Participants had a formal diagnosis of AjD (i.e. given by a clinical professional), a self-reported diagnosis of AjD or were identified with a probable AjD using an AjD assessment measure (e.g. General Health Questionnaire).
d. The study was published in English (although studies could be conducted in any country).
e. The study was conducted from 1980 onwards (when the term "adjustment disorder" was first included in a diagnostic manual (Diagnostic and Statistical Manual of Mental Disorders (DSM, 2013)).
f. The full-text version of the study is freely available or could be retrieved.

The study reported on peer-reviewed, empirical research thereby excluding:

- Case reports
- Literature reviews
- Conference proceedings
- PhD dissertations
- Book chapters
- Study protocols

This review uses the term "adjustment disorder" throughout which also includes sub-types that fall under the code F43.2 in the ICD-10 (World Health Organization (WHO), 1993). Qualitative and quantitative studies were included in the review.

Study quality

Quality assessment of all eligible AF personnel and veteran studies was primarily conducted by AM and reviewed by an independent reviewer (BC). The National Heart, Blood and Lung Institute's Study Quality Assessment Tools (National Institutes of Health, 2014) were employed to assess study quality and any risk of bias. This tool examines specific study designs and assigns a score of either "good", "fair" or "poor". Those studies which were assigned a score of "poor" were excluded from the review. Where reviewers disagreed on scores, they were reassessed, and a consensus reached.

Data extraction

The following data were extracted from included studies: author, publication date, location of study, population and participant characteristics, sample size, study methodology, AjD diagnosis, presence and characteristics of a control group, other mental disorders reported on, study design, and study outcomes.

Data synthesis

Narrative synthesis (Popay et al., 2006) was used to review and provide a summary of the included studies focusing on the following outcomes: AjD prevalence estimates, risk factors (including protective factors), symptoms, comorbidities, outcomes, and treatment. The review also included military Service subcategories for the study populations (i.e. serving,

ex-serving, new recruits, conscripts) and separately examined the outcomes for veterans and AF personnel. There are discrepancies between the definition of a military veteran across different countries. In the United States (US), a veteran is defined as an AF personnel who has been deployed at least once, whereas in the UK a veteran is defined as an ex-serving Armed Forces personnel who served in any military Service as a regular or reserve for at least one day. Where applicable odds ratios (OR), adjusted odds ratios (AOR) or unadjusted odds ratio (UOR) and 95% confidence intervals (CI) were extracted for AjD risk and protective factors.

Results

Study sample

Eighty-three papers published between 1984 and 2020 were included in the final analysis (Figure 1). Of the studies included, the majority (fifty-four studies) were conducted in the United States (US). Other study locations included the United Kingdom (UK), Turkey, Taiwan, Croatia, Denmark, Finland, Germany, Greece, Israel, Korea, Sweden, and Sri Lanka. Sixty-seven studies used a cohort or observational design, and sixteen studies used a case-control design.

Fifty-three studies examined current AF personnel across military Services (Army, Navy, Air Force, Marines and Coast Guard) (Table 1). Thirteen of these studies included personnel from two or more Service branches, twenty studies used only Army personnel in the sample and three studies were comprised of Air Force personnel only, the remaining studies did not specify which Service branch personnel served in. Thirty-one studies included both males and females in the study sample, with the frequency of male participants in each sample varying from 55% to 99%. Nineteen studies had a male-only sample, one study had a female-only sample, and two studies did not report the gender of participants. Three of the studies recruited only AF

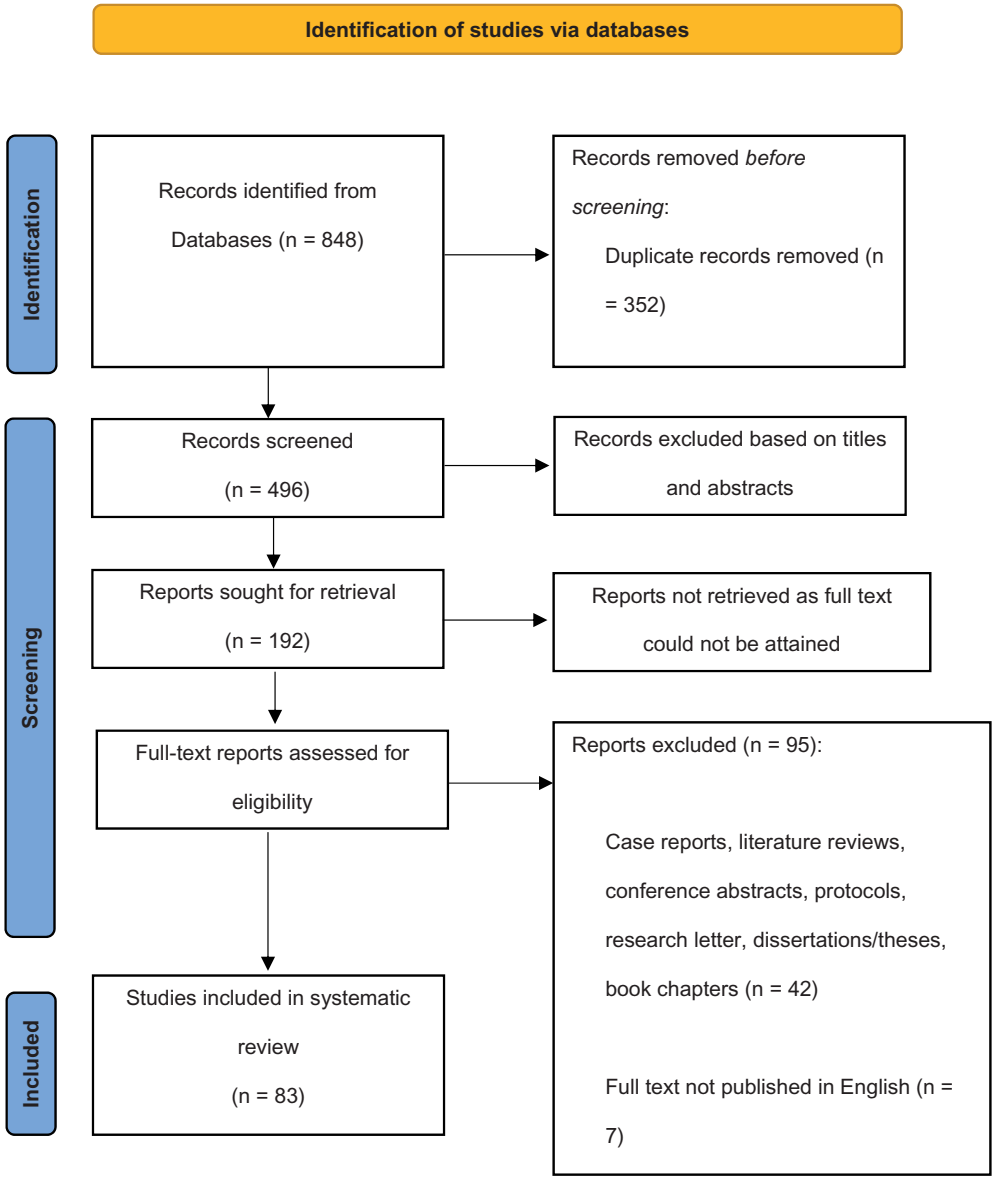

Figure 1. A PRISMA 2020 flow diagram for the review's study identification, screening, and inclusion process.

Table 1. List of studies with AF personnel as the study population that was included in the final synthesis ($n = 53$).

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
Apter et al. (2008)	Israel	Cohort study	214	A cross-sectional sample of AF personnel who had attempted suicide	100.0	18 – 21	Israel Defence Force	AjD comorbidities: Adjustment disorder most associated with suicidal ideation but less associated with successful suicide.	Good
Bachynski et al. (2012)	United States	Cohort study	255	A cross-sectional sample of AF personnel who had attempted suicide	95.0	18 – 24 ($N = 114$)/ 25 – 34 ($N = 73$)/ 35+ ($N = 68$)	Army	AjD comorbidities: Adjustment disorder significantly increased the risk of suicide (RR: 4.7, 95% CI: 3.5 – 6.2).	Good
Balandiz and Bolu (2017)	Turkey	Cohort study	167	A cross-sectional sample of AF personnel who had experienced a traumatic life event	98.8	M = 25.6 (SD:5.7)	Army	AjD: 3.6% had diagnosed adjustment disorder. AjD risk factors: Of those participants with an adjustment disorder, one participant had an adjustment disorder after an assault, two after an explosive materials injury, three participants after firearm injury.	Fair
Britt et al. (2018)	United States	Cohort study	1,115	A cross-sectional sample of Army personnel who received a mental health diagnosis	88.9	M = 34.9 (SD:8.0)	Army	Prevalence estimate of AjD: Adjustment disorder was the common disorder (38%) of all psychiatric disorders. Military attrition: Personnel with an adjustment disorder were significantly more likely to be given a Service waiver compared to other disorders ($p < 0.001$).	Good
Chang et al. (2008)	Taiwan	Cohort study	463	A cross-sectional sample of conscript who were medical discharged from Service	100.0	M = 21.8 (SD:2.2)	Army/Navy/RAF	AjD comorbidities: 20.1% were diagnosed with adjustment disorder comorbid with mental insufficiency. Significantly more outpatients diagnosed with an adjustment disorder compared to inpatients ($p < 0.001$).	Good
Chen et al. (2011)	Taiwan	Case-control	313	Case group: conscript AF personnel with adjustment disorder ($n = 158$) Control group: healthy AF personnel ($n = 155$)	100.0	Case group: M = 21.4 (SD:2.3) Control group: M = 22.9 (SD:2.2)	National Service	AjD risk factors: Being younger, having neurotic traits, greater psychological distress and greater alexithymia traits were significantly associated with an adjustment disorder ($p < 0.001$).	Good
Cigrang et al. (1998)	United States	Cohort study	1,138	A cross-sectional sample of AF trainees going through Basic Military Training	66.0	M = 20 (no SD reported)	Air Force	AjD commonality: Adjustment disorder second most common disorder behind depression (no figure given). Military attrition: 20% of trainees who did not return to Service were diagnosed with adjustment disorder. 63% of those not recommended for duty were diagnosed with adjustment disorder.	Good
Doruk et al. (2008)	Turkey	Case-control	140	AF personnel receiving care for mental ill-health. Cases: AF personnel with adjustment disorder ($n = 71$) Controls: healthy AF personnel ($n = 69$)	100.0	Cases: M = 21.2 (SD:1.6) Controls: M = 21.5 (SD:1.7)	Not reported	AjD comorbidities: Adjustment disorder group had significantly more suicide attempts ($p < 0.01$). AjD symptoms: 57.7% of adjustment disorder group had moderate symptom severity. Covariates of AjD: Adjustment disorder group had significantly more life stressors ($p < 0.001$).	Good
Eick-Cost et al. (2017)	United States	Cohort study	367,840	A cross-sectional sample personnel who were mefloquine, doxycycline or atovaquone/proguanil	85.0	17 – 40+	Army/Navy/Air Force/ Marine Corps / Coast Guard	Protective factors of AjD: Non-deployed personnel who received mefloquine were less likely to develop an adjustment disorder (IRR: 0.69, 95% CI: 0.60 – 0.80).	Good
Elonheimo et al. (2007)	Finland	Cohort study	2,712	10-year longitudinal study that sampled AF conscripts	100.0	At baseline, all participants were aged and aged 18 at 10-year follow-up	National Service	Prevalence estimate of AjD: $N = 35$ had diagnosed adjustment disorder. AjD comorbidities: 5.7% with adjustment disorder had substance use disorder. Covariates of AjD: Crime accounts were associated with an increased likelihood of having an adjustment disorder (OR: 3.1, 95% CI: 1.5–6.1).	Good
Englert et al. (2003)	United States	Cohort study	2,018	1,680 basic trainees and 338 military technical school students who were seen at	55.2	Not reported	Air Force	Prevalence estimate of AjD: Adjustment disorder was the most common disorder for basic trainees with psychiatric ill health (46%). Military attrition: The most common diagnosis for	Good

(*continued*)

Table 1. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
				the Behavioural Analysis Service				basic trainees recommended for separation from the military was an adjustment disorder.	
For-Wey et al. (2002)	Taiwan	Case-control	60	Cases: AF personnel with adjustment disorder ($n = 36$) Controls: healthy AF personnel ($n = 24$)	100.0	Cases: M = 22.1 (SD:3.4) Controls: M = 21.7 (SD:1.4)	National Service	AjD risk factors: Reduce mother and father care, and mother and father protect was significantly associated with an adjustment disorder ($p < 0.05$). Personnel with an adjustment disorder were significantly less extroverted compared to controls ($p < 0.05$). Personnel with an adjustment disorder were significantly more neurotic ($p < 0.05$). AjD symptoms: Those with an adjustment disorder significantly scored higher on the Chinese health questionnaire ($p < 0.05$).	Good
Freese et al. (2018)	Germany	Cohort study	127	Cross-sectional sample of AF personnel who attended the Centre for Mental Health at the German Armed Forces Hospital Hamburg	83.5	M = 30.5 years (SD: 9.1)	Not reported	Prevalence estimate of AjD: 35.4% diagnosed with an adjustment disorder – less common than PTSD but more common than depression. AjD symptoms: Most with adjustment disorder had non-trauma related dreams. Adjustment disorder patients experienced significantly more non-replicative nightmares than depression or PTSD ($p < 0.001$).	Good
Gale et al. (2010)	Sweden	Cohort study	1,049,663	22.6-year longitudinal study that sampled military conscripts	100.0	M = 18.3 (no SD reported)	National Service	Prevalence estimate of AjD: 14% of all disorders was an adjustment disorder (5th most common). AjD protective factors: The risk of hospital admission increased with each point IQ score decrease and associated with hospital admission. AjD comorbidities: Adjustment disorder often comorbid with mood disorders, alcohol, and other SUDs.	Good
Garvey Wilson et al. (2009)	United States	Cohort study	1.35 mil	Cross-sectional sample of military personnel who accessed ambulatory care in military treatment facilities	Mixed (Not specified)	17 – 65 years	Army/Air Force/ Marines/Navy	AjD: $N = 23,385$ had adjustment disorder who visited a health centre. AjD treatment: Of those with adjustment disorder, most attended behavioural health clinics and the average number of health clinic visits was 2.	Good
George et al. (2019)	United States	Cohort study	955	Cross-sectional sample of AF personnel hospitalized for suicidal ideation or suicidal attempts.	68.8	M = 26.3	Army/Navy/Air Force/ Marine Corps/Coast Guard	AjD comorbidities: Adjustment disorder most common diagnosis linked to suicide attempt and ideation. Adjustment disorder with depressed mood more likely to be in suicide ideation group than attempt group ($p < 0.05$). No other disorder saw a difference between suicide attempts and suicidal ideation.	Good
Giotakos and Konstantakopoulos (2002)	Greece	Case-control	132	Cases: AF personnel with adjustment disorder ($n = 54$) Controls: healthy AF personnel matched for age and education ($n = 78$)	100.0	Adjustment disorder case group: M = 20.4 (SD:2.2) Controls: 20.5 (SD:1.8)	Army/Navy/Air Forces	AjD: Most common adjustment disorder subtype was with depressed mood (38.8%). AjD risk factors: Parental abuse was reported more in the case group. Father abuse also correlated with SCL-90 scores ($p < 0.001$). AjD symptoms: Somatization, obsessive compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic, anxiety and paranoid ideation all significantly increased for adjustment disorder patients ($p < 0.01$). Severity of symptoms can be predicted by father's	Good

(*continued*)

Table 1. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
								abuse ($p < 0.05$). Separation anxiety can be predicted by mother's protection ($p < 0.05$).	
Goodman et al. (2011)	United States	Cohort study	4,122	Cross-sectional sample of AF personnel deployed to Iraq	92.1	M = 27.0	Army	Military attrition: Most of those with adjustment disorder returned to duty and were not discharged (95%).	Good
Gould et al. (2008)	UK	Cohort study	409	Cross-sectional sample of AF personnel attending a DCMH Centre	82.0	M = 29.0	Royal Marines/Air Force/ Navy/Army	Prevalence estimate of AjD: 10% of patients at a DCMH had an adjustment disorder.	Good
Gubata et al. (2013)	United States	Cohort study	11,369	Cross-sectional sample of military basic trainees. The sample was divided into weight-qualified group (subjects meeting weight-for-height and body fat standards) and exceeds body fat group but deemed physically fit.	86.2	18 − 25+	Army	AjD commonality: For the whole sample, adjustment disorder most common disorder (no overall figure given). Prevalence estimate of AjD: For personnel who met the weight qualifications, 8.5% had adjustment disorder. For personnel who did not meet the weight qualifications, 12.1% had an adjustment disorder. Covariates of AjD: A significant increase in incidences of adjustment disorder for those who exceeded body fat allowance but were physically fit (IRR: 1.22, 95% CI: 1.01–1.48).	Good
Hageman et al. (2008)	Denmark	Cohort study	399	Cross-sectional sample of all conscripts were referred to the Military Psychiatric Department	100.0	M = 19.7	National Service	Prevalence estimate of AjD: Adjustment disorder was the most common disorder diagnosed for conscripts (52.9%) but only 8 diagnosed with the disorder 10 years later.	Good
Hansen-Schwartz et al. (2005)	Denmark	Cohort study & case-control study	132	Case: AF personnel referred to a psychiatric centre ($n = 68$) Control: healthy AF personnel ($n = 64$)	100.0	M = 20.1	National Service	Prevalence estimate of AjD: Most common diagnosis was an adjustment disorder of the case group (77%). Covariates of AjD: Higher reports of adverse events for whole cohort compared to conscripts in general. Military attrition: For the whole cohort, 87% found permanently unfit for Service	Good
Jones et al. (2009)	United Kingdom	Cohort study	384	Cross-sectional sample of AF personnel who had been inpatients for mental health care	90.0	20 − 39+	Army	Prevalence estimate of AjD: Adjustment disorder was the third most prevalent disorder (N = 54). Military attrition: 59% of those with adjustment disorder were discharged from Service.	Good
Jones et al. (2010)	United Kingdom	Cohort study	825	Cross-sectional sample of AF personnel who develop mental health problems when operationally deployed	88.1	<20 − 35+ (66% under 30 years)	Army	Prevalence estimate of AjD: Adjustment disorder was the most common disorder (51.7%).	Good
Kelley et al. (2020)	United States	Cohort study	114	Cross-sectional sample of AF personnel who had been prescribed SSRIs	85.0	M = 37.7	Army	Prevalence estimate of AjD: Adjustment disorder with depressed mood was the least common disorder to use SSRIs ($N = 12$).	Good
Kochanski-Ruscio et al. (2014)	United States	Cohort study	423	A cross-sectional sample of AF personnel who had attempted suicide	62.2	M = 25.6 (SD:7.2)	Army	Prevalence estimate of AjD: Adjustment disorder most common disorder associated with suicide attempts (53.2%).	Good
Kozarić-Kovačić and Kocijan-Hercigonja (2001)	Croatia	Case-control study	698	Case: AF personnel who experienced combat/war stress who were being reviewed for PTSD compensation ($n = 502$) Controls: AF personnel with	100.0	M = 30.1 (SD:16.8)	Not reported	AjD comorbidities: 5% of those with PTSD also had an adjustment disorder compared to 1% of control group who had adjustment disorder and no PTSD.	Fair

(*continued*)

Table 1. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
				combat experience with no psychiatric history ($n = 196$)					
Larson et al. (2011)	United States	Cohort study	1,078	A cross-sectional sample of AF personnel who were deployed to Iraq and used mental health services	89.0	M = 26.9 (SD:5.8)	Marines, 65%/Army, 23%/Navy, 11%/Air Force, <1%	Prevalence estimate of AjD: 23% of participants who had no previous diagnosed mental disorders were diagnosed with adjustment disorder – the second most common disorder. For those with previous mental health diagnoses, 32% had adjustment disorder, fifth most common disorder. AjD risk factors: Adjustment disorder was significantly higher for Army, compared to other Services ($p < 0.001$).	Good
Lev-Tzion et al. (2007)	Israel	Cohort study	195,903	A cross-sectional sample of AF personnel. The sample was divided into: 1) No asthma ($n = 176,692$), 2) lifetime asthma ($n = 19,211$), 3) no current asthma ($n = 156,723$), and 4) current asthma ($n = 12,898$)	100.0	Not reported	Army	Covariates of AjD: Current active asthma was associated with an increased likelihood of adjustment disorder (OR: 1.43, 95% CI: 1.26–1.62).	Good
Li et al. (2017)	N/A	Case-control study	62	Cases: New recruits with adjustment disorder ($n = 31$) Controls: Healthy new recruits ($n = 31$)	100.0	18 – 22	Army	AjD symptoms: Symptom checklist scores (SCL-90) were significantly increased in the adjustment disorder group ($p < 0.05$). Compared to controls, cases had significantly lower regional homogeneity in left posterior cerebellar lobe, bilateral medial orbitofrontal cortex, bilateral caudate and left middle temporal gyrus, whereas increased regional homogeneity included bilateral posterior cingulate gyrus for cases. Adjustment disorder was associated with decreased functional connectivity between the left posterior cerebellar lobe and bilateral supplementary motor area ($p < 0.05$).	Good
Lindstrom et al. (2006)	United States	Cohort study	73,777	A cross-sectional sample of Navy and Marine Corps women. The sample was divided into two categories: 1) combat support ($N = 10,299$), and 2) non-combat support occupations ($N = 63,478$)	0 (100% female)	19 – 23+ (47% were age 19 years or younger)	Navy and Marine Corps	Prevalence estimate of AjD: For those in combat support roles, $n = 37$ (0.3%) had adjustment disorder compared to non-Combat Support roles $n = 513$ (0.8%). Adjustment disorder most the common mental disorder for the whole sample and second most common for combat support roles. AjD protective factors: Obtaining a combat support role was suggested as being protective of adjustment disorder (HR: 0.49, 95% CI: 0.35–0.69).	Good
Manos et al. (2002)	United States	Cohort study	594	A cross-sectional sample of AF personnel attending crisis invention programmes for mental disorders	100.0	Inpatients group: 22.7 (SD: 3.7) Outpatients group: 24.6 (SD: 5.2)	Not reported	Prevalence estimate of AjD: 41% of both groups were diagnosed with an adjustment disorder, making it the most prevalent disorder.	Fair
Melcer et al. (2013)	United States	Case-control study	656	Cases: Combat amputees ($n = 382$) Controls: No combat amputations but with combat injuries ($n = 274$)	99.0	Group one – Combat Amputee: M = 26.0 (18–48) Group two – Nonamputee Extremity Injury: M = 24.1 (18–49)	Army / Marine Corps / Other	Covariates of AjD: For amputees, 24.3% were diagnosed with an adjustment disorder (second most common behind an anxiety disorder). Compared to non-amputees, 20.4% had adjustment disorder (fourth most common).	Good
Melcer et al. (2019)	United States	Cohort study	318	A cross-sectional sample of AF personnel who sustained combat injuries in the Afghanistan or Iraq	Not reported	Group one – Above elbow amputation: M = 25.7 (SD:23.6) Group two – Below Elbow	Not reported	AjD commonality: Adjustment disorder was third most common mental disorder across all groups. The above elbow amputee group had higher	Good

(*continued*)

Table 1. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
						amputation: M = 26.3 (SD:25.8) Group three – No amputation: M = 25.0 (SD:22.9)		proportion of adjustment disorder one or more years after the injury.	
Mergui et al. (2018)	Israel	Cohort study	124	A cross-sectional sample of AF personnel referred for psychiatric assessment	66.1	M = 19.6 (SD:1.4)	Army	Prevalence estimate of AjD: Adjustment disorder was diagnosed in 103 participants (83.1%). Of adjustment disorder, 56.5% had unspecified adjustment disorder, 13.7% had adjustment disorder with anxiety, 9.7% had adjustment disorder with depression, and 4% had adjustment disorder with mixed anxiety and depression. AjD comorbidities: There was a significant correlation between suicidal ideation and adjustment disorder ($p < 0.05$).	Fair
Morgan et al. (2019)	United States	Cohort study	470	A cross-sectional sample of AF personnel who either met the DSM criterion for PTSD or scored PTSD caseness on the PTSD checklist (PCL) scale	82.0	65% were 35 or younger	Army	AjD commonality: For those without a confirmed diagnosis of PTSD, most had an adjustment disorder. Participants were significantly more likely to be diagnosed with an adjustment disorder if without PTSD compared to those with PTSD ($p < 0.01$).	Good
Na et al. (2012)	Korea	Case-control study	172	Case: conscripts with diagnosed adjustment disorder ($n = 86$) Controls: matched healthy conscripts ($N = 86$)	100.0	M = 21.0 (SD:1.6)	National Service	AjD risk factors: Cases with an adjustment disorder with depressed mood scored significantly higher scores on harm avoidance, and lower scores on self-directedness, cooperativeness, and self-transcendence ($p < 0.0001$).	Good
Na et al. (2013)	Korea	Case-control study	184	Cases 1: AF personnel with adjustment disorder ($n = 92$) Case 2: AF personnel with adjustment disorder without a history of suicide ($n = 92$) Controls: healthy AF personnel ($n = 92$)	100.0	M = 20.9 years (SD:1.4)	National Service	AjD risk factors: Participants with an adjustment disorder and a history of suicide attempts had significantly increased alexithymia compared to without a suicidal history and controls ($p < 0.0001$). Adjustment disorder groups scored significantly higher on harm avoidance and reward dependence traits and significantly lower on self-directedness and self-transcendence compared to healthy controls.	Good
Neal et al. (2003)	United Kingdom	Cohort study	309	Part 1: A cross-sectional study of AF personnel discharged from a psychiatric hospital but retained in the Army. Part 2: A case-control sample taken from the main sample ($n = 309$) of those who attended a Military Training and Rehabilitation Unit which assists with occupational health and rehabilitation ($n = 35$) and controls ($n = 35$)	93.5	M = 26.4 years (SD: 6.9)	Army	Covariates of AjD: For part 2 of the study, adjustment disorder the most common mental disorder diagnosed (34%) for both cases and controls - no significant difference found.	Fair
Niebuhr et al. (2006)	United States	Cohort study	2,889	A cross-sectional sample of military trainees discharged from Fort Leonard Wood	Not reported	Not reported	Army	Military attrition: Adjustment disorder was the most common mental disorder for personnel recommended for late discharge.	Fair
Oh et al. (2018)	Korea	Case-control study	93	Cases: AF personnel who attended an outpatient psychiatric facility for adjustment disorder ($n = 33$)	100.0	Adjustment disorder case group: M = 20.2 (SD: 1.0)	Not reported	AjD risk factors: Adjustment disorder group had significantly higher scores for the Beck Depression Inventory (BDI), The State-Trait Anxiety Inventory (STAI-S &STAI-T),	Good

(*continued*)

Table 1. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
				Controls: healthy AF personnel ($n = 60$)		Control group: M = 20.7 (SD: 1.6)		Symptom Checklist scale (SCL-90-R), and Stress Response Inventory (SRI) compared to control ($p < 0.001$). Healthy controls significantly reported higher levels of education (university) compared to cases ($p < 0.01$). Significant differences reported in past psychiatric history with healthy control group reporting no past psychiatric history ($p < 0.01$).	
Perera et al. (2004)	Sri Lanka	Cohort study	76	A cross-sectional sample of AF personnel referred to outpatient psychiatry clinics over a period of 9 months.	100.0	18 − 40+	Air Force	Prevalence estimate of AjD: 25% of participants were diagnosed with an adjustment disorder Military attrition: 84.2% of those with adjustment disorder an returned to work.	Good
Peterson et al. (2018)	United States	Cohort study	7023	A cross-sectional sample of AF personnel who received a psychiatric evaluation	83.9	<25 − 40+	Army (77.1%) / Marine Corps/Air Force/Navy	Prevalence estimate of AjD: 17.6% were diagnosed with an adjustment disorder (second most common disorder behind depression). For outpatients, 22% were diagnosed with an adjustment disorder (the most common disorder amongst outpatients) AjD symptoms: Most with an adjustment disorder had moderate adjustment disorder symptoms (17.8%).	Good
Prier et al. (1991)	United States	Cohort study	2,839	Cases: HIV infected AF personnel ($n = 573$) Controls: healthy AF personnel ($n = 2,266$)	96.0	58% Were between the ages of 24 and 35	Army	Covariates of AjD: For HIV case participants, AjD was the second most common disorder (9.9%). For controls, adjustment disorder was the most common disorder with 3.7% diagnosed. AjD risk factors: HIV cases were significantly more likely to be diagnosed with an adjustment disorder compared to controls (RR:2.69, 95% CI: 1.3 − 6.0).	Fair
Ristkari et al. (2006)	Finland	Cohort study	2,348	A longitudinal 10 year follow up study for Finnish conscripts	100.0	Participants examined at age 8 and follow-up 10 years later	National Service	Prevalence estimate of AjD: Of the whole sample, 1.3% were diagnosed with an adjustment disorder. AjD symptoms: Adjustment disorders were associated with somatic complaints (OR: 1.8, 95% CI: 1.3–2.5).	Good
Schmitz et al. (2012)	United States	Cohort study	1,336	A cross-sectional sample of deployed AF personnel seeking treatment for mental ill health.	89.7	M = 25.9 (SD: 6.3)	Marines (60%)/Army (29%)/Navy (11%)/Air Force (0.2%)	Prevalence estimate of AjD: 26.9% had an adjustment disorder (most common disorder). AjD comorbidities: Adjustment disorder most comorbid with an alcohol-use disorder (24.0%) depression (14.2%), and relationship problems (11.4%). AjD treatment: 24.7% of the sample were receiving psychotherapy/ counselling for adjustment disorder. 18.1% were receiving behavioural modification help (e.g. substance abuse class, coping skills training). 14.7% of participants were prescribed medication only. 6.7% were receiving medication and therapy for an adjustment disorder.	Good
Shelef et al. (2015)	Israel	Case-control study	246,184	Cases: AF personnel who have made a suicide attempt ($n = 2,310$)	60.2	Not reported	Army (national Service)	AjD comorbidities: Adjustment disorders were associated with a higher risk for suicide attempt (RR: 2.26).	Good

(*continued*)

Table 1. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age (years)	Service	Results	Quality rating
				Controls: healthy AF personnel ($n = 244,504$)				Adjustment Disorders were associated with an increased risk for moderate attempts. Non-severe suicidal attempts were more common for adjustment disorder.	
Shrestha et al. (2018)	United States	Cohort study	70,664	A cross-sectional sample of Army personnel who had completed an online self-report assessment reflecting on their psychological strengths	88.2	17 − 50+	Army	Prevalence estimate of AjD: Of the total sample, adjustment disorder was the most common (16.8%). AjD protective factors: Optimism, positive affect, reduced catastrophic thinking, and decreased loneliness afforded the most protection against psychiatric disorders including adjustment disorder ($p < 0.01$).	Good
Turner et al. (2005)	United Kingdom	Cohort study	116	A cross-sectional sample of AF personnel sent to a UK military psychiatric in-patient facility	87.0	M = 28.2 (SD not reported)	68% Army/16% Royal air Force/16% Navy/ 21% reservists	Prevalence estimate of AjD: 50.8% were diagnosed with an adjustment disorder. Most common disorder with no psychiatric disorder and second most common outcome (30.2%).	Good
Walter et al. (2018)	United States	Cohort study	52,626	A cross-sectional sample of AF personnel examined for PTSD from 2006 to 2013.	65.4	56% Younger than 20 years	Navy and Marine Corps	Prevalence estimate of AjD: A diagnosis of an adjustment disorder alone accounted for 7.4% of the sample. AjD comorbidities: PTSD comorbid with an adjustment disorder was reported in 37%. Adjustment disorder was also commonly trimorbid with PTSD and depression (39.4%); PTSD and alcohol misuse disorder (24.3%); and PTSD and generalised anxiety disorder (29.8%). Adjustment disorder was significantly more likely to be diagnosed in personnel with PTSD compared to those without PTSD (OR: 7.39, 95% CI: 7.1 − 7.7).	Good
West et al. (2014)	United States	Cohort study	399	A cross-sectional sample of AF personnel receiving mental health treatment	83.9	43.1% Between 18 and 24 years old	Army	Prevalence estimate of AjD: Adjustment disorder was the most common diagnosed disorder (32.9%).	Good
Yacobi et al. (2013)	Israel	Case-control study	168	Cases 1: AF personnel who had attempted suicide ($n = 58$) Controls 1: AF personnel treated by mental health professionals with no suicide history ($n = 58$) Control 2: matched healthy AF personnel ($n = 50$)	59.5	M = 19.7 (SD:1.0)	Army	AjD comorbidities: Amongst suicide attempts, adjustment disorder was the second most common disorder (24.1%) which was significantly more compared to those without a history of suicide attempts.	Good
Zrihen et al. (2007)	Israel	Cohort study	453	A cross-sectional sample of AF personnel inpatients at hospitals.	86.0	83% Were 24 years old or younger	Not reported	AjD treatment: Personnel with adjustment disorder stayed longer in psychiatric hospitals compared to general hospitals.	Good

personnel but employed a longitudinal cohort study design meaning participants had often left the military (became veterans) at follow-up (Elonheimo et al., 2007; Gale et al., 2010; Ristkari et al., 2006).

Thirty of the studies included in the review sampled veteran participants, and all employed a cohort design (Table 2). As all thirty veteran studies were conducted in the US, the US definition of veteran will be employed. Most veteran studies included a study sample with both males and females ($N = 24$), although most participants in these studies were male (80–98%). Three studies included female veterans only and one study examined a male-only sample. All data for veteran studies were extracted from the US Veteran's Affairs (VA) database.

Adjustment disorder prevalence estimates

Forty-one of the 83 studies included in this review reported on the prevalence of AjD. As most studies were conducted in the US ($N = 30$), the AjD prevalence estimates reported in this review predominantly reflect the US military population. Over half of the studies included in this review reported on participants who were serving members of the AF at the time of data collection ($n = 27$).

Of the studies included in this review on AF personnel that reported AjD estimates ($n = 27$), twenty-two reported AjD as either the most reported, or second most reported mental disorder for AF personnel compared to other commonly assessed mental disorders such as depression, anxiety, and PTSD. Only six studies reported AjD prevalence in a general AF population (including healthy AF personnel), with AjD prevalence ranging from 0.7 to 16.8% (M = 7.4%). In comparison, where AF personnel all had a mental disorder ($n = 19$), a mean prevalence of 34.9% was reported. Two studies reported AjD with depressed mood (Giotakos & Konstantakopoulos, 2002) and AjD with mixed disturbance of emotion and conduct (George et al., 2019) as the most common AjD subtypes.

For studies where the sample consisted of veterans with a mental disorder ($n = 8$), AjD prevalence ranged from 4.3 to 34% (M = 12.8%).

Risk factors and protective factors of adjustment disorder

Sixteen studies discussed risk and protective factors ($n = 16$). Most of these studies ($n = 13$) used an AF personnel sample, with four studies using veteran samples. It should be noted that there was a lack of homogeneity between studies of the risk factors investigated. Childhood adversity ($n = 2$) and personality traits ($n = 2$) were examined as pre-enlistment risk factors associated with AjD in later life. Specifically, increased parental abuse (Giotakos & Konstantakopoulos, 2002), reduced paternal care and protection (For-Wey et al., 2002), and increased neuroticism, alexithymia traits and decreased extroversion (Chen et al., 2011; For-Wey et al., 2002) were associated with AjD. However, both Chen et al. (2011) and For-Wey et al. (2002) were conducted in Taiwan where AF personnel were conscripts. Conscripted personnel have limited comparability to the UK AF which is voluntary[1] as military experiences and length of time served can differ. Haskell et al. (2011) reported being female increased the risk of developing AjD (unadjusted OR: 1.19, 95% CI: 1.10–1.28) (adjusted OR: 1.24, 95% CI: 1.14–1.34). Larson et al. (2011) found that Army personnel were significantly more at risk of developing AjD, and Jones et al. (2010) identified AjD as the most common mental disorder amongst deployed Army personnel.

Protective AjD factors were discussed ($n = 4$) including a higher level of education and increased IQ[2] (Gale et al., 2010), and AF personnel not deployed (Eick-Cost et al., 2017). Shrestha et al. (2018) found that increased optimism, coping, adaptability, positive affect, spirituality, and life meaning, minimal catastrophic thinking, and reduced loneliness significantly reduced the likelihood of AjD or reduced the severity of AjD symptoms (Shrestha et al., 2018). Lindstrom et al. (2006) found a negative association between combat support roles and adjustment disorder for female AF personnel compared to other military roles. However, the study does not clearly state which regiments were categorised as combat support roles and other occupational roles.

Adjustment disorder symptoms

Eight studies discussed symptoms of AjD. Two of the eight studies reported that most AF personnel experience moderate AjD symptoms (Doruk et al., 2008; Peterson et al., 2018). Other symptoms for AjD described by studies included dysphoria (Baker & Miller, 1991), non-replicative nightmares[3] (Freese et al., 2018) and somatic complaints (Ristkari et al., 2006). One study reported a significant increase in harm avoidance, and reduced self-directedness, cooperativeness, self-transcendence compared to healthy controls (Na et al., 2012). Oh et al. (2018) found AF personnel with AjD had significantly higher scores on the Beck Depression Inventory (BDI), The State-Trait Anxiety Inventory (STAI-T/S), Symptom Checklist-90 (SCL-90-R), and the Stress-Response Inventory (SRI) when compared to healthy controls.[4] The study also found significant increased physical measures of stress (e.g., skin temperature), in comparison to healthy controls when performing a stress task. Giotakos and Konstantakopoulos (2002) found from the SCL-90-R symptom checklist that somatization, obsessive compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic, anxiety and paranoid ideation all significantly were increased for AjD patients compared to healthy controls.

Comorbidities

Twenty-eight studies commented on AjD comorbidities. Of the veteran studies ($n = 10$), most commented on AjD comorbid with PTSD. When compared to other disorders, AjD had lower PTSD comorbidity (5.6%) when compared

Table 2. List of studies with military veteran participants as the study population that were included in the final synthesis ($n = 30$).

Study	Location	Design	*N*	Sample	Males (%)	Age	Service	Results	Quality rating
Babson et al. (2018)	United States	Cohort study	6,261	A cross-sectional sample of women using Veteran Health Administration (VHA) and divided into those with insomnia (47.4%) and without insomnia (52.6%)	0 (100% female)	Insomnia: M = 48.3 (SD:22.6) No insomnia: M = 51.7 (SD:22.5)	Not reported	AjD comorbidities: Significantly more female veterans with insomnia were diagnosed with adjustment disorder compared to those without insomnia ($p < 0.001$).	Good
Baker and Miller (1991)	United States	Cohort study	80	A cross-sectional sample of patients at a veteran care centre	95.0	20 − 99 (60 − 79 years N = 52)	Not reported	AjD subtypes: 12% patients had adjustment disorder with depressed mood (second most common). AjD symptoms: All patients with an adjustment disorder with depressed mood scored for dysphoria.	Fair
Beehler et al. (2013)	United States	Case-control	1,584	Cases: veterans with musculoskeletal condition ($n = 792$) Controls: healthy veterans ($n = 792$)	Cases: 93.8 Controls: 94.6	Cases: M = 55.6 (SD:12.4) Controls: M = 56.1 (SD:12.2)	Not reported	Covariates of AjD: Significantly more cases (15.9%) were diagnosed with adjustment disorder compared to controls (12%) ($p < 0.05$). AjD treatment: Those with musculoskeletal conditions and adjustment disorder were significantly more likely to help seek and use care available compared to other disorders (OR: 1.89, 95% CI: 1.0–3.49).	Good
Black et al. (2006)	United States	Case-control	576	Veterans who served during the Gulf war. Case group 1: BPD 1–2 criterion met ($n = 182$) Case group 2: BPD 3–4 Criterion met ($n = 50$) Case group 3: >5 criterion met ($n = 15$). Controls: healthy veterans ($n = 329$)	91.4	Group 1: BPD 0 criteria M = 39.9 (SD:0.5) Group 2: BPD 1–2 criteria M = 39.4 (SD:0.6) Group 3: BPD 3-4 criteria M = 35	Army (69.6%) Air Force Marines Navy and Coast Guard	AjD comorbidities: Control group − 0.6% had an adjustment disorder and 2.2% of case group 1 had an adjustment disorder. All other groups reported no accounts of an adjustment disorder.	Good
Blonigen et al. (2017)	United States	Cohort study	226,122	A cross-sectional sample of veterans who had at least one emergency department visit with a psychiatric diagnosis	90.3	18 − 55+ (Of the whole sample, most were 55+ (46%))	Not reported	Prevalence estimate of AjD: 14.7% were diagnosed with an adjustment disorder in total sample.	Good
Callegari et al. (2014)	United States	Cohort study	103,950	A cross-sectional sample of female veterans who attended at least one visit to a primary care clinic or designated women's health primary care clinic	0 (100% female)	18 − 45	Not reported	Prevalence estimate of AjD: Of those with mental ill health ($N = 34\ 358$), 13.4% had adjustment disorder. AjD comorbidities: Of those with substance use disorders, 13.3% had an adjustment disorder	Good
Callegari et al. (2015)	United States	Cohort study	9,780	A cross-sectional sample of females who attended at least one Veteran Affairs (VA) primary care clinic or women's health clinic for contraception	0 (100% female)	18 − 45	Not reported	Covariates of AjD: In whole sample, 7% had an adjustment disorder diagnosis. Fourth most common behind depression, anxiety and PTSD. AjD comorbidities: Of those who had a mental health issue with a substance use disorder, 12.6% had an adjustment disorder.	Good

(*continued*)

Table 2. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age	Service	Results	Quality rating
Cohen et al. (2009)	United States	Cohort study	303,233	A cross-sectional sample of new users of Veteran Affairs health care	88.0	M = 31 (SD:9.0)	Not reported	AjD comorbidities: For those with PTSD, 26% also had an adjustment disorder (third most common).	Good
Dinapoli et al. (2016)	United States	Cohort study	879	A cross-sectional sample of veterans with a newly reported mental health diagnosis	98.1	M = 76.50 (SD:6.3)	Not reported	Prevalence estimate of AjD: The third most common disorder was adjustment disorder: (12.3%). AjD treatment: For those with an adjustment disorder, the following treatment was reported: any sedative hypnotic (22.2%); Z drugs (3.7%); trazodone (8.3%); on-label benzo (5.6%); off-label benzo (3.7%); Hydroxyzine (2.8%).	Good
Dobscha et al. (1999)	United States	Cohort study	241	A cross-sectional sample of veterans whose outpatient appointments were monitored for 12 weeks following emergency department visits	Not reported	Not reported	Not reported	AjD treatment: 50% of those with an adjustment disorder were initially adherent to outpatient treatment	Good
Ecker et al. (2020)	United States	Cohort study	258,055	A cross-sectional sample of outpatients and inpatients within the Veteran Health Administration (VHA)	92.9	M = 48.5 (SD:13.7)	Not reported	AjD comorbidities: Of those who attended the VHA with a substance use disorder, 17.3% had comorbid adjustment disorder.	Good
Etingen et al. (2019)	United States	Cohort study	159,581	A cross-sectional sample of veterans who used "My HealtheVet" for various mental health diagnoses	93.0	60–69 (37.8%)	Not reported	Prevalence estimate of AjD: Adjustment disorder accounted for 7.5% (6th most common). Adjustment disorder most prevalent in 60–69 years (25.3%) and 50–59 years (23.7%). AjD comorbidities: 63.4% reported comorbidities with adjustment disorder. AjD treatment: Having an adjustment disorder was associated with increased likelihood of "My HealtheVet" registration (OR: 1.16, 95% CI: 1.11–1.21).	Fair
Funderburk et al. (2011)	United States	Cohort study	180	A cross-sectional sample of veterans who had at least one initial visit with a behavioural health provider in primary care	88.0	M = 57 (SD:21)	Not reported	Prevalence estimate of AjD: 11.1% of sample had an adjustment disorder. AjD treatment: Of those with an adjustment disorder, 5 (8.3%) were receiving prescribed intervention from a behavioural health provider, 15 (12.5%) non prescribing behavioural health provided including patient education (33.3%) and supportive therapy (33.3%).	Fair
Gerson et al. (2004)	United States	Cohort study	839	A cross-sectional sample of veterans who were screened for depression and anxiety symptoms upon	96.3	M = 69 (SD:6.7)	Army/Navy/Air Force/ Marine Corps/Coast Guard/Other	Covariates of AjD: Adjustment disorder was the most common disorder (21.8%). An adjustment disorder diagnosis	Good

(*continued*)

Table 2. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age	Service	Results	Quality rating
				admission to acute medical/surgical units				occurred typically 3 months after hospital admission for the acute stress.	
Goldstein et al. (2010)	United States	Cohort study	3,595	A cross-sectional sample of homeless veterans from the Veterans Integrated Services Network 4 including current or recently homeless veterans	96.7	50.2% were over 47 years	Not reported	AjD: Of those with a psychiatric or medical illness, 36.9% had an adjustment disorder (no total *N* given for psychiatric/medically ill participant group, so cannot be included in estimate). Covariates of AjD: Adjustment disorder significantly linked to cardiac problems ($p < 0.05$).	Good
Haskell et al. (2011)	United States	Cohort study	163,812	A cross-sectional sample of personnel discharged from the U.S. military and use the Veteran Affairs (VA) services	88.0	M = 31.0	Army/Navy/Air force/ Marines/National Guard	AjD risk factors: Female veterans had an increased likelihood of an adjustment disorder (OR: 1.24, 95% CI: 1.14–1.34)	Good
Hefner and Rosenheck (2019)	United States	Cohort study	638,451	A cross-sectional sample of veteran patients with a PTSD diagnosis	90.3	PTSD alone group: M = 56.0 (SD:15.8) PTSD +1 other disorder group: M = 54.7 (SD:15.1) PTSD +2 other disorders group: M = 53.1 (SD:14.9) PTSD + >3 other disorders group: M = 50.7 (SD:14.4)	Not reported	AjD comorbidities: There is an increased risk of an adjustment disorder and PTSD with two other mental disorders (RR: 5.38 (no CI reported), compared to adjustment disorder or PTSD alone or with one other disorder.	Good
Ho and Rosenheck (2018)	United States	Cohort study	5,452,308	A cross-sectional study of veterans diagnosed with cancer	96.6	Group one – Cancer with (SUD): M = 62.8 (SD:8.6) Group two – Cancer only: M = 71.7 (SD:10.8) Group three – SUD only: M = 53.5 (SD:12.8)	Not reported	AjD comorbidities: Veterans with a substance use disorder and cancer were more likely than those with cancer alone to have an adjustment disorder (OR: 1.14, 95% CI: 1.08–1.20, $p < 0.05$)	Good
Hoff and Rosenheck (2000)	United States	Cohort study	73 455	A cross-sectional sample of veteran outpatients treated in mental health clinics	96.1	M = 50.9 (SD not reported)	Not reported	Prevalence estimate of AjD: 4.9% were diagnosed with an adjustment disorder. AjD treatment: Having adjustment disorder significantly predicts higher usage of VA system for two months and six months ($p < 0.01$).	Good
Hunt et al. (2019)	United States	Cohort study	No total N reported but at baseline *n* = 4,830,564	A longitudinal study examining behavioural health diagnosis for veteran VHA services users	Not reported	Not reported	Not reported	Prevalence estimate of AjD: On average, the rate of adjustment disorder across the seven-year study was 4.1% (No total N reported so excluded from prevalence estimates analysis)	Good

(*continued*)

Table 2. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age	Service	Results	Quality rating
								Adjustment disorder had the second largest increase in prevalence (61%), with PTSD having the largest increase.	
Johnson-Lawrence et al. (2012)	United States	Cohort study	243,806	A cross-sectional sample of veteran patients with a mental health diagnosis	93.0	18 − 65+	Not reported	Prevalence estimate of AjD: For veterans in primary Care–Mental Health Integration (PC-MHI) programs, 4.3% diagnosed with adjustment disorder and 2% diagnosed with adjustment disorder in primary care only.	Good
King et al. (2015)	United States	Cohort study	476	A cross-sectional sample of veterans 65+ who had at least one visit to a Veteran Affairs GEM clinic and had a diagnosis of a cognitive impairment	95.0	M = 81.4 (SD:5.8)	Air Force/Army/Marine Corps/Navy/Other	Covariates of AjD: 6.1% of sample were diagnosed with an adjustment disorder.	Good
Koo et al. (2015)	United States	Cohort study	792,663	A cross-sectional sample of veterans who had recently left military Service after being deployed to Iraq and Afghanistan and had enrolled into the Veteran Administration healthcare system	87.9	18 − 40+	Army/Air Force/Marines/ Navy/coast guard	Prevalence estimate of AjD: 10.4% were diagnosed with an adjustment disorder (fourth most common disorder). AjD risk factors: For women, adjustment disorder was most common for veteran Native Americans or Alaska Native (12.3%) and African Americans (12.6%). For men, adjustment disorder was most common for veteran African Americans (11.7%).	Good
Krishnan et al. (1984)	United States	Cohort study	24	A cross-sectional sample of veteran outpatients at a narcolepsy clinic. The sample were divided into two subgroups: (1) narcoleptic patients ($n = 5$) and (2) narcoleptic and cataplectic patients ($n = 19$)	100.0	M = 50 (34 − 68)	N/A	Covariates of AjD: $N = 7$ participants had diagnosed adjustment disorder. Of the 7, 5 participants had an adjustment disorder with depressed mood. Narcoleptic/cataplectic group had significantly more diagnosed adjustment disorder compared to the narcoleptic only group ($p < 0.05$).	Fair
Maguen et al. (2012)	United States	Cohort study	314 717	A cross-sectional sample of veteran outpatients who were deployed to Iraq and/or Afghanistan who enrolled in the Veteran Affairs health care system with a psychiatric diagnosis	88.0	Median = 26 (22-35) – mean age not reported	Army/Air Force/ Marines/Navy/Coast Guard	Prevalence estimate of AjD: 34% of the sample were diagnosed with an adjustment disorder. Adjustment disorder significantly associated with early presentation to a mental health outpatients centre (HR: 1.40, $p < 0.001$).	Good
Mathew and Rosenheck (2016)	United States	Cohort study	4,969,587	A cross-sectional sample of veteran outpatients attended a Veteran Affairs care service	90.0	Group one –No opioid prescriptions: M = 54.0 (SD:15.3) Group two –>20 opioid prescriptions: M = 55 (SD: 11.2)	Not reported	AjD treatment: More adjustment disorder patients were prescribed opioid treatment (7.8%) than not (6.8%) but this finding was not significant.	Good
McDonald et al. (2018)	United States	Cohort study	280	A cross-sectional sample of veteran spinal cord outpatients who were completing an annual clinical interview evaluation	96.1	M = 58.1 (SD:13.0)	Not reported	Prevalence estimate of AjD: 6.8% of the sample were diagnosed with an adjustment disorder (fifth most common disorder).	Good

(*continued*)

Table 2. Continued.

Study	Location	Design	*N*	Sample	Males (%)	Age	Service	Results	Quality rating
O'Donovan et al. (2015)	United States	Cohort study	666,269	A cross-sectional sample of veterans under 55 who were deployed to Iraq and/or Afghanistan and had enrolled in the Veteran Affairs healthcare system	87.9	M = 31.2 (SD:8.7)	Army (54.7%)/Air Force/ Marines/Navy	AjD comorbidities: Of those with diagnosed PTSD, 31% also had an adjustment disorder (3rd highest comorbid with PTSD behind depression and anxiety).	Good
Smith et al. (2016)	United States	Cohort study	96,249	A cross-sectional sample of veterans who were aged 50+ and had received a PTSD diagnosis	97.9	79.1% were 50 − 64 years old	Not reported	AjD comorbidities: Of those with a PTSD diagnosis, 5.6% had a diagnosis of an adjustment disorder. AjD treatment: 93% of veterans with an adjustment disorder and PTSD received treatment. Having comorbid adjustment disorder with PTSD was a significant predictor for treatment (OR: 4.26, 95% CI: 3.82–4.76, $p < 0.001$). For treatment of comorbid PTSD and AD, 66.7% received therapy and medication, 28.3% received therapy only and 5% received medication only.	Good
Tsai et al. (2014)	United States	Cohort study	30,348	A cross-sectional sample of incarcerated veterans. The sample was subdivided into four categories: 1) Not homeless ($n = 21$ 747); 2) Transiently homeless ($n = 2$ 351); 3) Episodically homeless ($n = 3$ 427); 4) Chronically homeless ($n = 3$ 423)	98.0	Group one – Not homeless: M = 48.48 (SD:11.1) Group two – Transiently homeless: M = 48.1 (SD:9.5) Group three – Episodically homeless: M = 47.7 (SD:9.2) Group four – Chronically homeless: M = 49.0 (SD:8.6)	Not reported	Covariates of AjD: Across the four groups, adjustment disorder proportions were as follow: 1) not homeless (20.6%); 2) transiently homeless (18.7%); 3) episodically homeless (22.5%); 4) chronically homeless (17.5%). AjD risk factors: Compared to veterans who were episodically homeless, chronically homeless veterans were significantly less likely to have an adjustment disorder (OR: 0.65; 95% CI: 0.53–0.79). Similar findings were found for veterans who were not homeless vs. transiently homeless (OR: 0.71, 95% CI: 0.59–0.85) and not homeless vs. chronically homeless (OR: 0.61, 95% CI: 0.52–0.72).	Good

to depression (12.7%) and anxiety (14.9%) (Smith et al., 2016). Similar results were found in two other studies (Cohen et al., 2009; O'Donovan et al., 2015). Hefner and Rosenheck (2019) reported a significantly higher risk for veterans to be diagnosed with AjD, if diagnosed with PTSD and two other mental disorders compared to PTSD alone (RR: 2.27). Babson et al. (2018) found that significantly more insomniac case participants had an AjD compared to participants that did not report insomnia.

For AF personnel, Walter et al. (2018) reported that AjD was the second most common mental disorder comorbid with PTSD (37%) with most common being depression (49%). Similar findings were found for AF personnel where comorbid PTSD and AjD were reported more frequently than AjD alone (Kozarić-Kovačić & Kocijan-Hercigonja, 2001) and personnel were significantly more likely to receive an AjD diagnosis if also diagnosed with PTSD.

Substance misuse was often identified as comorbid with AjD ($n = 6$); however, no studies reported significant associations. Ho and Rosenheck (2018) did report an increased risk of being diagnosed with AjD for veterans if diagnosed with both cancer and a substance use disorder compared to just cancer alone (RR: 3.16). Doruk et al. (2008) found similar results, reporting that 33.8% of AF personnel with AjD reported a history of substance misuse compared to controls (4.3%) ($p < 0.0001$). Doruk et al. (2008) also reported more significant life events were experienced by AjD personnel with a history of substance misuse. Links between substance misuse, AjD and significant life events may be suggestive of harmful behaviours used as a coping mechanism for a precursor stressor.

Suicidal ideation and suicide attempts were discussed in relation to AjD ($n = 9$) in AF personnel only. Seven studies reported a significant increase of suicidal ideation or attempts for AjD AF personnel compared to healthy controls, with one study reporting a risk ratio of 4.70 (95% CI: 3.50–6.20) (Bachynski et al., 2012). The remaining two studies found that suicide attempts were significantly associated with AjD (George et al., 2019; Kochanski-Ruscio et al., 2014). Kochanski-Ruscio et al. (2014) study found over half of personnel with AjD (57%) had attempted suicide at least once and 48% had multiple attempts. Na et al. (2013) found that significantly more personnel with AjD who had a history of suicidal ideation scored for alexithymia (an inability to identify one's emotions) compared to personnel with AjD but without a history of suicide attempts and healthy controls.

Effect of adjustment disorder on military attrition

Six studies examined AjD and personnel attrition in the military, with most studies ($n = 5$) reporting higher rates of discharge or recommendation for separation from Service for AF personnel with AjD when compared to other mental disorders (Cigrang et al., 1998; Englert et al., 2003; Hansen-Schwartz et al., 2005; Jones et al., 2009; Niebuhr et al., 2006). Studies investigating early career personnel (i.e., basic trainees and conscripts) had higher discharge because of AjD (Cigrang et al., 1998; Englert et al., 2003; Hansen-Schwartz et al., 2005; Niebuhr et al., 2006). However, Britt et al. (2018) found that AF personnel diagnosed with AjD were significantly more likely to be given a waiver to still be able to join the military compared to any other mental disorders.

Adjustment disorder treatment

Over half of the studies discussing help-seeking for treatment and treatment of AjD ($n = 20$) used veteran samples ($n = 13$). AjD had the strongest significant association with mental health outpatient care (Maguen et al., 2012) and an increased likelihood of help-seeking through veteran programmes when compared to other disorders (Etingen et al., 2019; Hoff & Rosenheck, 2000). Smith et al. (2016) found that veterans received a diagnosis more frequently and quicker if AjD was comorbid with PTSD. Gerson et al. (2004) reported the typical AjD duration for veterans as three months from stressor to diagnosis, and of patients receiving care at medical units, AjD was the most frequently diagnosed mental disorder after discharge.

In terms of treatment pathways, psychotherapy or counselling were the most frequently reported treatment options for AjD (Funderburk et al., 2011; Schmitz et al., 2012), behavioural modification training (e.g. substance abuse class, coping skills training) or a combination of psychotherapy and psychotropic medication (Schmitz et al., 2012; Smith et al., 2016). No studies investigated the effectiveness of AjD treatment in a AF population.

Discussion

Adjustment disorder prevalence estimates

From the review, the overall AjD prevalence estimate for AjD in both AF personnel and veterans is comparable, whilst there are notable differences in AjD prevalence estimates for those with a recognised mental disorder (AF personnel studies 35.7 vs. 12.8% for veterans).

Increased prevalence estimates of AjD amongst diagnosed AF personnel compared to veterans may suggest "stressors" that precursor AjD are more common in and specific to military life. Since experiences of military stressors are collectively shared amongst AF personnel (e.g., deployments), and stressors may be more persistent and ongoing (e.g., continuous deployment posts), meaning symptoms of AjD are slower to be relieved and more accepted as the "norm". Although, most studies included in the review were conducted in the US and relevance to the UK AF population, and specifically the stressors experienced, are limited as military experiences can differ between the UK and the US (Sundin et al., 2014).

However, this does not explain why differences in AjD prevalence estimates between AF personnel and veterans are only apparent amongst those with mental disorders, and not within the wider community. It could be argued that higher AjD estimates are reported for AF personnel with mental

disorders as AjD is often described as a less "severe" disorder compared to other mental disorders. For instance, the DSM-5 diagnostic criterion outlines that an AjD diagnosis can only be given once all other potential mental disorders are screened out (American Psychiatric Association, 2013). Perhaps AjD diagnoses may not be as accurate as first thought. An AjD diagnosis may act as a "last case" diagnosis to offer, which in turn, increases prevalence. This is further supported by the results reported by Britt et al. (2018) where personnel were more likely to receive a waiver for AjD compared to any other mental disorder, suggesting personnel are less likely to be discharged and retained in the military more easily. However, the restructuring of the diagnostic criterion for AjD in the new ICD-11 which will bring AjD more in line with other disorders such as depression and PTSD, may counteract this argument if prevalence estimates remain relatively similar.

Predictive factors of adjustment disorder

Pre-enlistment risk factors for AF personnel with AjD were discussed including personality traits and experiences of childhood adversity, specifically parental abuse, and neglect (Chen et al, 2011; For-wey et al., 2002; Giotakos & Konstantakopoulos, 2002). Childhood adversity is often associated with a multitude of mental disorders in AF personnel (Montgomery et al., 2013) including PTSD (Ozer et al., 2003), psychosis (Rössler et al., 2014), and anxiety (Sareen et al., 2013). Applewhite et al. (2016) found that 85% of AF personnel help-seeking for a mental health issue reported at least one account of childhood adversity, with 40% reporting four or more accounts. However, links between childhood adversity and AjD require further exploration to unpick which features (e.g., abuse, neglect) put someone significantly more at risk later in adulthood. McLaughlin et al. (2010) reported an increased risk for depression among individuals who had three or more accounts of childhood adversity and experienced a stressful life event in the past year (27.3%) compared to those without childhood adversity (14.8%). However, this study did not include explorations of association between AjD, childhood adversity and stressful life events, considering the importance of a stressful event in the AjD diagnostic criterion.

Despite the paucity of studies reporting military risk factors compared to non-military risk factors, the findings cannot be disregarded. Several studies highlighted that basic trainees or conscripts with AjD were often recommended for separation of duty or discharged (Cigrang et al., 1998; Englert et al., 2003; Hansen-Schwartz et al., 2005; Niebuhr et al., 2006). This suggests a potential association between new recruits, enlisting and AjD. However, research exploring new recruits and AjD is scarce and is recommended to explore which experiences specifically increase the risk of AjD for new recruits. The breadth of the review topic meant studies which investigated predictive factors of AjD contained a multitude of methodological practices, sample sizes and aims. As a result, a meta-analysis approach could not be employed which would provide a more scientific comparison of predictive factors for AjD between studies.

Suicidal ideation

Significant associations with suicidal ideation were discussed. Suicidal ideation is often described in general population studies as a common symptom for AjD (Carta et al., 2009; Fielden, 2012; Gradus et al., 2010). There is a surprising lack of inclusion of AjD in research which examines mental disorders and suicidal ideation in the general population and AF population, although some studies suggest that suicidal ideation can be as common in AjD as it is in depression (Polyakova et al., 1998). Despite suicidal ideation reoccurring in literature included in this review, current diagnostic manuals (ICD-10 and DSM-5) do not identify suicidal ideation as a symptom of AjD. It is clear the association between suicidal ideation and AjD requires serious consideration and research focus to emphasise suicidal risk as part of the AjD diagnostic criterion for clinical practice. Including suicidal risk in the AjD diagnostic description will not only help clinicians identify those at greater risk but also the correct treatment pathway. However, this could have significant implications on personnel attrition and increased military discharge for AjD personnel with suicidal ideation. Occupational outcomes such as this may be perceived as negative, but AjD patients would have the opportunity to recover away from military duties, resulting in a quicker recovery if the AjD precursor stressor is specific to military experience. It is recommended that future research lends itself to understanding the link between AjD and suicidal ideation and the impacts this may have on treatment options, recovery, and career outcomes.

Treatment

Treatment for AjD has previously been highlighted as an under-researched area for the general population (Carta et al., 2009) and even more so for AF population as highlighted in this review. Psychotherapy and self-help tools are the most frequently given treatment for AjD (O'Donnell et al., 2018, 2019). Across all studies in the current review, no specific treatment stood out as most used and this reflects the lack of standardised clinical practice for AjD. For example, in the UK there is currently no guidance given by NICE to advise clinicians on AjD treatment. Research is needed to develop an evidence-based treatment framework for AjD and to contribute to the development of NICE guidelines.

Little is known about the effectiveness of AjD treatment and prognosis for AF populations. The reduction in evidence-based AjD treatment research could be explained due to the disorder's relatively "short" symptom duration typically lasting up to six months (World Health Organization (WHO), 1993). Capturing participants when experiencing AjD symptoms provides a relatively short window, increasing research difficulty. Forming evidence-based guidelines for AjD treatment will help inform military healthcare

policies to guarantee that patients are provided with the most effective care. This will benefit the patient as well as the military as an institution by preventing money and resources being wasted on AjD treatment for which the evidence on effectiveness is lacking. By guaranteeing the same standards of care and attention are provided to AjD as they are to other mental disorders, AjD awareness may increase and encourage help-seeking for AF personnel who experience AjD symptoms. Furthermore, without research into AjD prognosis, the implications of being diagnosed with AjD on clinical and career outcomes are still unknown. Future explorative research should follow AF personnel with AjD overtime to understand what implications AjD may have on career progression, recovery, and future mental disorder occurrence.

Conclusion

The systematic review aimed to summarise existing AjD research for AF populations, to outline clinical or career implications that AjD may have, and to identify areas needed for future exploration. Overall, AjD presented as a common mental disorder for AF populations across nations, and specifically for active AF personnel. Mixed risk and protective factors for AjD were identified, however, further investigations into military-specific risk factors is warranted as this research area was limited. Similarly, little research attention was afforded to exploring the implications AjD may have on clinical or career outcomes and the effectiveness of treatment, nevertheless the review findings suggest associations between AjD and increased military attrition which should be explored further.

Notes

1. Conscripts are often of a younger age demographic, and this is reflected in the participant samples for both studies as the mean age was 22 years, compared to the average age of UK military personnel being 31 years (Ministry of Defence, 2020).
2. Gale et al. (2010) reported that for each one-point decrease on the nine-point IQ scale, there was an increased risk of hospital admission for AjD (HR: 1.75, CI: 1.70–1.80).
3. Freese et al. (2018) describe non-replicative nightmares, for the specific purpose of their study, as a nightmare that is not an exact replica of a traumatic event the patient has experienced but the nightmare is symbolic of a traumatic event and has associations with their diagnosis.
4. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the International Classification of Diseases (ICD-10), adjustment disorder often mirrors symptoms of other mental disorders such as depression and anxiety and symptoms for adjustment disorder include depressed mood, anxiety, and worry.

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