Health Promotion Journal of Australia

WILEY

Health Promotion Journal of Australia | Australian Health Promotion Association

REVIEW OPEN ACCESS

Social Determinants of Suicide and Suicidality in Serving Military Personnel: A Global Scoping Review

Nathan G. Dawes[1] | Stephanie M. Topp[1] | Brittany J. Fullagar[2] | Jason Selman[2] | Anton Pak[3,4] | Susan G. Devine[1]

[1]College of Medicine and Dentistry, James Cook University, Townsville, Queensland, Australia | [2]Australian Army, Australia | [3]Centre for the Business and Economics of Health, The University of Queensland, Brisbane, Queensland, Australia | [4]Australian Institute of Tropical Health and Medicine, James Cook University, Townsville, Queensland, Australia

Correspondence: Nathan G. Dawes (nathan.dawes@jcu.edu.au)

Received: 21 September 2023 | **Revised:** 18 October 2024 | **Accepted:** 23 February 2025

Funding: The authors received no specific funding for this work.

Keywords: health promotion | military | social determinants | suicidality | suicide

ABSTRACT

Issue Addressed: Nearly a million people die by suicide annually, with military personnel being at heightened risk. For every suicide, about 20 cases of suicidality, including ideation and attempts, are reported. Social determinants of health may influence suicide risk factors, but research within military contexts, particularly in Australia, is scarce. This review aimed to scope global literature and synthesise current knowledge on the social determinants of suicide and suicidality among serving military members, focusing on the Australian military.

Methods: A systematic review was conducted using the social determinants of health framework to analyse contemporary peer-reviewed articles and grey literature on military suicide and suicidality. Thematic analyses and critical appraisals were performed to identify key themes and assess the quality of the literature. The review included grey literature specific to the Australian military population.

Results: Fifteen peer-reviewed articles were included, predominantly from the United States, with one each from South Korea and Israel. Five Australian military grey literature studies were also reviewed. The findings suggest a link between social support, addiction, socioeconomic status, education and occupational factors with suicide and suicidality.

Conclusions: This review provides an update on the evidence regarding the social determinants of suicide and suicidality in military personnel. While some evidence links social support with suicidality, the research outside the United States remains limited.

So What? The review highlights the need for further research to identify effective health-promotion strategies and interventions addressing social determinants in military contexts.

1 | Background

Almost one million people die by suicide each year, with a global mortality rate of 10.7 per 100 000 [1]. The suicide rate in Australia is above the global average, with a mortality rate of 12.0 per 100 000 people, or 1.8% of all Australian deaths [2]. For every death by suicide, there are approximately 20 cases of reported suicidality, including suicidal ideation and suicide plans and attempts [1, 3]. Studies show that while mental health is a risk factor for suicidality, there is also a range of social determinants of suicide risk [3]. Certain sub-groups within populations show an increased risk of suicide, with serving and ex-serving military members identified as being at particular risk [4]. The rate of suicide (3.5%) in the serving and ex-serving military populations

in the United States, for example, is much higher than that of the adjusted general population (1.4%) [5], and the prevalence of suicidality in current U.S. service members (30%) is more than double that in the general community (11%) [6].

In Australia, it was previously considered that the official suicide rate of serving members was less than that of the general population; however, rates of suicide ideation and planning were higher among Australian Defence Force (ADF) personnel (4.0%) relative to an Australian community sample (1.8%) [7]. More recently, research conducted in support of the Australian Royal Commission into Defence and Veteran Suicide (RCDVS) demonstrated a higher suicide rate for male serving members of the ADF when compared to the Australian *employed* male population. The research contained the first comparison between the suicide rate for permanently serving ADF members and the wider population of Australian-employed males and showed male service personnel are 30% more likely to die by suicide than Australian-employed males (The small number of suicide deaths among serving females during the same time period prevented valid analysis) [8]. Empirical evidence identified individual, interpersonal and systemic factors contributing to military suicide [9]. While there are also findings linking specific social determinants to military suicide and suicidality, the exact nature of this association is less well defined [10].

Factors contributing to military suicide and suicidality can be diverse and influenced by a complex interplay of individual, systemic and social factors [9]. At an individual level, factors including combat exposure, multiple deployments, traumatic experiences, mental health conditions (e.g., post-traumatic stress disorder, depression), substance abuse, access to lethal means (e.g., firearms) and difficulties transitioning back to civilian life can contribute to an increased risk of suicide, particularly among younger military populations [11]. In 2013, a study in the United States found that certain administrative and military organisational factors can also impact the prevalence of suicidal thoughts and behaviours among current service members [9]. These include limited access to mental health services, the stigma surrounding help-seeking, inadequate support during and after service and challenges in obtaining timely and appropriate care [12]. In 2021, the RCDVS described multiple barriers in the Australian setting to accessing effective rehabilitation services following an attempted suicide, often resulting in an individual's health deterioration and inability to return to service [4]. In Canada, the *House of Commons—Mental Health and the Armed Forces Committee* also reported concerns regarding the adequacy and accessibility of suicide prevention services within the Canadian Armed Forces. The same committee detailed a range of sociodemographic and social risk factors connected to suicide and suicidality in serving and ex-service members [3, 13].

There is growing evidence that the social determinants of health, including income, employment status, loneliness and substance addiction, may play a role in determining the risk factors influencing suicide and suicidality [3]. This is particularly evident in high-risk occupations like law enforcement, emergency services and the military [14, 15]. The experiences of people serving in these occupations are unlike those in most traditional workplaces, meaning that certain societal and psychosocial risk factors for suicide and suicidality are often unique [16]. Military service, in particular, can expose an individual to traumatic incidents and conflicts, resulting in potentially traumatic events (PTEs) and occupational-related stress [9]. Furthermore, involuntary discharge can shorten individual careers, including for psychological reasons triggered by military service. Recent findings from Australia indicate that a greater proportion of ex-service members who completed suicide had mental and behavioural disorders due to the extensive use of or addiction to alcohol and other drugs [7, 17]. As per the general population, other social determinants, such as social isolation, exclusion and rejection, are strongly linked to cases of suicide and suicidality for ex-service members [18, 19]. Despite these recent findings, much of this evidence is context-specific to the United States, with limited applicability to other national/sub-national settings with distinct organisational, regulatory, political, demographic and cultural factors in play.

Against the backdrop of increasing rates of military suicide and suicidality worldwide, we sought to (i) scope the global literature and synthesise current knowledge concerning the social determinants of suicide and suicidality in serving military members and (ii) outline the implications of these findings for the design and implementation of suicide prevention services for active serving personnel. Here, we define the social determinants of health as the conditions in which people are born, live, learn, work, play, worship and age, affecting a wide range of health, functioning and quality-of-life outcomes and risks [20]. We refer to Wilkinson and Marmot's ten social determinants of health. Those determinants are social gradient, early life, stress, social exclusion, work, unemployment, social support, addiction, food and transport [20].

2 | Methods

A scoping review was conducted and guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines for Scoping Reviews [PRISMA-ScR] (Appendix 1) [21]. A scoping review methodology was chosen to provide an overview of existing research literature, including formulating research inquiries, identifying key studies, charting the data using thematic analysis, and, ultimately, compiling, summarising and reporting the findings [22]. This process enabled the authors to synthesise existing knowledge, identify gaps in the current literature and describe the need for future research concerning the topic area [23]. In the current study, the scoping review process is anticipated to contribute to the knowledge base, informing future research, practice and policy concerning the design and implementation of evidence-based mental health services that address the social determinants of suicide and suicidality within the military context.

2.1 | Search Strategy

Before developing a formal search strategy, a preliminary scoping search was conducted to ensure the inclusion of all relevant terms. The search involved the following key phrases: *suicide* or *suicidal behaviour* or a *suicide attempt* or *suicidal ideation* or *suicidality*; *social determinants* or *social factors* or *social conditions* or *social determinants of health* or *social need* or *socio-economic*

factors; and *military* or *Defence Force* or *combat** (Full search strategy—Appendix 2). CINAHL, Emcare, PubMed Medline Ovid, PsychInfo, Scopus and Web of Science were searched for literature related to the research topic. Following that, a search limited explicitly to peer-reviewed journals was conducted using Google Scholar and OneSearch version 2.0, which explores the [institutions] library catalogue (Tropic at), over 90% of [institutions] journal articles, Libguides, eBooks, the eJournal portal and ResearchOnline@ [institution]. The searches were completed on June 16, 2023.

2.2 | Inclusion and Exclusion Criteria

Peer-reviewed journal articles investigating the link between the social determinants of health and suicide or suicidality, both in qualitative and quantitative research, globally, were included for review (Table 1). Grey literature sources, including publicly available Australian government-sponsored research reports (such as those completed as part of the RCDVS), were also prioritised as part of a targeted and pragmatic approach. This focus aligns with the review's emphasis on the Australian military context, utilising publicly available literature for relevance and accessibility. The study population included current service members. We also defined a specific exclusion criterion to maintain the review's specificity. We excluded studies focusing on veterans, ex-serving military personnel and other professionals within the military setting. Additionally, research exploring the link between psychological and physical risk factors and suicide or suicidality among these populations was not considered. The review also excluded studies examining the link between social determinants of health and other mental health conditions, such as Post Traumatic Stress Disorder [PTSD], anxiety, and depression. Articles not written in English and grey literature sources including internal military reports with sensitive information and limited public accessibility were excluded.

2.3 | Data Extraction, Synthesis and Screening Process

The authors [authors initials] evaluated all potential literature, which involved independent assessment of the titles, abstracts, full texts and reference lists following predefined criteria (Figure 1). Data extracted included the country of study, type of military service, research design, study aims, findings, the relevant social determinants of health linked to suicide or suicidality and methodological quality. There were no major conflicts between reviewers during the literature selection process. Any minor discrepancies were resolved through discussion and consensus. The use of a pre-defined set of inclusion and exclusion criteria also helped to guide decisions (Table 1). In rare cases where agreement wasn't initially reached, a fourth reviewer [authors initials] was consulted to ensure consistency and accuracy in the final selection. Both critical appraisal of research quality and thematic analysis were undertaken. Thematic analysis was employed and guided by the study objectives to identify patterns and meanings within the dataset [24]. The following process was customised to ensure a comprehensive thematic analysis: (i) becoming familiar with the data, (ii) searching for data

TABLE 1 | Inclusion and exclusion criteria.

Inclusion	Exclusion
Study populations, including serving Defence Force members.	Study populations only exploring veterans, ex-serving military personnel or other professionals working within the military setting but not actively serving personnel (e.g., non-ranking staff or civilian employees).
Peer-reviewed journal articles that describe an association between the social determinants of health and suicide or suicidality.	Research exploring the association between psychological and physical risk factors associated with suicide or suicidality.
Empirical studies, including qualitative and quantitative peer-reviewed research articles	Research exploring the impacts of the social determinants of health and suicide or suicidality in other sectors or organisations outside the Defence Force context, such as law enforcement and emergency services.
Peer-reviewed articles from all countries were included for analysis.	Research exploring the associations between social determinants of health and other mental health conditions, including PTSD, anxiety and depression.
	Peer-reviewed articles not written in the English language.
Research published until 2023. This infinite date range was applied to capture an extended period of developments following the initial scoping search and to ensure the inclusion of several clusters of publications relevant to the review's focus.	
Publicly available Australian government-sponsored research into suicide and suicidality of the Australian military population.	Non-Australian and non-public grey literature sources were excluded due to limited public accessibility to internal military reports containing sensitive information about suicide and suicidality.

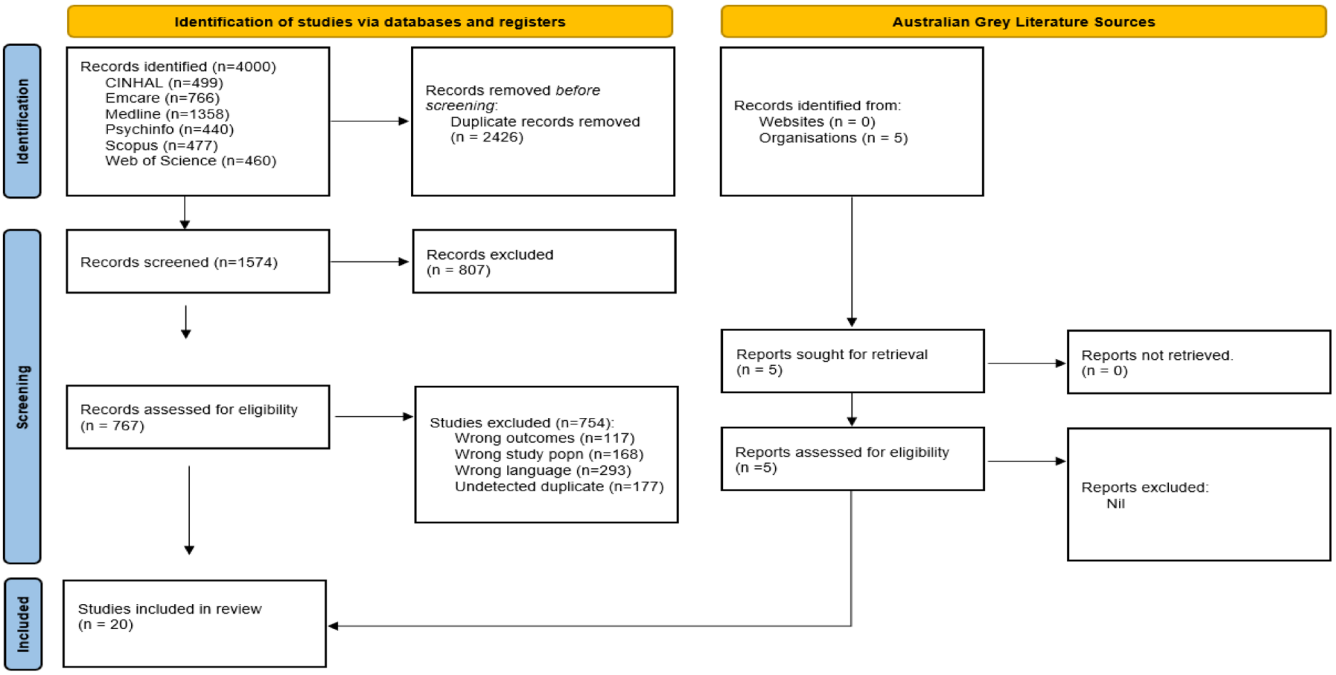

FIGURE 1 | PRISMA-ScR flow chart.

themes, (iii) reviewing the themes, (iv) aligning themes with Wilkinson and Marmot's ten social determinants of health and (v) organising the data. The analysis aimed to gather common themes derived from the research question [22].

To evaluate the research studies and considering the presence of qualitative and mixed-method journal articles, the Mixed Methods Appraisal Tool (MMAT) was utilised for critical assessment [25]. The MMAT guidelines assisted the authors in assessing the quality of each study, and all literature that met the eligibility criteria was included in the data analysis. As part of the analysis, the findings incorporated limitations identified by applying the critical appraisal tool (Table 2). Specifically, the breadth of articles, depth of information, relevance of data to the research topic, and gaps in the form of relevant questions for further research recommendations were evaluated.

3 | Results

The initial database search yielded 4005 results. After a full-text screening and application of the inclusion and exclusion criteria by the authors, 20 studies (fifteen peer review articles and five Australian grey literature sources) met the conditions for full analysis. There were no conflicts between the authors in accepting articles that met all selection criteria. Of the 20 included in this review, 13 (65%) were studies conducted in the United States, one in South Korea (0.5%), one in Israel (0.5%) and five (25%) were grey literature. Two studies employed qualitative and 18 (90%) quantitative research methodologies. In total, eleven (55%) studies discussed the social determinant *social support*, while four (25%) described the influence of prolonged substance abuse (*addiction*) on suicide and suicidality in current-serving military populations. Three (15%) papers examined the association between socioeconomic status, while nine (45%) studies described the influence of [occupation, level of educational attainment and social exclusion] and the risk of suicide. Key findings within these broad categories will be elaborated in the following section and are summarised in Table 2.

3.1 | Perceived Levels of Social Support and Relationship Distress

Eleven studies examined the influence of social support on the prevalence of suicide and suicidality in serving military members. A majority of these ($n=8$) examined the link between intimate relationship distress and suicide; one paper examined the association between perceived levels of social support and suicidal ideation in serving Defence Force personnel. One qualitatively explored the sentiments of serving members perceiving themselves as a burden to others (perceived burdensomeness) and lack of social connectedness (thwarted belongingness) as underlying constructs to suicide. Most of the studies were conducted in the United States ($n=6$) and one in South Korea. Four of the five ADF-specific research reports identified difficulties in social support (spousal, family and social circle) as contributing to suicide and suicidality.

Yoon et al. investigated the relationship between suicidal ideation—perceived levels of social support, potential adverse events (PAE) that had occurred within the preceding 12 months and accumulated lifetime trauma (ALT) [26]. This recent study, conducted with members of the Korean Armed Forces, revealed that individuals who experience suicidal ideation had an accompanying history of PAE and ALT. Those with higher vulnerability to mental illness showed the strongest associations with increased suicidal ideation; however, those with higher perceived social support were often at decreased risk of experiencing suicidal ideation [26]. Similarly, in the United States, Lusk et al. found a connection between an individual's perceived levels of social support and suicide risk [34]. Their research applied

TABLE 2 | Included literature.

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Yoon et al. (2021) [26]	South Korea—Armed Forces	Cohort study—Document review	To determine the link between past year adverse events and the level of social support to suicidal ideations in the Korea armed forces.	– A significant relationship between past-year adverse events and suicide ideations. – Association between accumulated lifetime trauma and suicidal ideation. – The presence of mental illness was the most significant association with suicidal ideation. – Perceived levels of social support are potentially linked.	Social support (perceived levels of social support)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a nonresponse bias. v. Appropriate statistical analysis relevant to the research question.
Crowell-Williamson et al. (2019) [27]	United States—Marines	Cross-sectional design—Questionnaire	To evaluate the association between workplace bullying and suicidal ideation via perceived burdensomeness and thwarted belongingness, hypothesised to mediate this association.	– Perceived burdensomeness was a significant mediator of the association between workplace bullying and the level of suicidal ideation. – Thwarted belongingness was not a significant mediator of the association between workplace bullying and suicidal ideations.	Social exclusion (perceived burdensomeness and workplace bullying)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. iv. Low risk of a nonresponse bias. v. Appropriate statistical analysis relevant to the research question.
Goodin and Prendergast (2019) [28]	United States—Army	Observational and retrospective design—Document reviews	To examine data on suicide and suicide attempt cases in the Department of Defence Suicide Event Report compared with service members who did not have recent suicidal behaviour.	– Financial distress had a weak association with suicide and suicide attempts. – Relationship problems and substance abuse history have strong associations with suicidal behaviour.	Social support (relationship problems) Addiction (substance abuse history)	i. Relevant multiple sampling strategies utilised (probability, stratified sampling). ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of nonresponse bias. v. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Stokes et al. (2019) [29]	United States—Army Reservist Component	Longitudinal, retrospective cohort study—document review	To examine suicide attempt risk factors and timing among RC enlisted soldiers.	Suicide attempts are more likely among soldiers who are women, in their first two years of service, currently married or less than high school-educated.	Education (level of education attained) Social support (intimate relationships)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a nonresponse bias. v. Appropriate statistical analysis relevant to the research question.
Skopp et al. (2019) [30]	United States- Army	Cohort study—document review	To gain a better understanding of military suicide by examining suicide narratives extracted from the Department of Defence Suicide Event Report (DoDSER) and the Centers for Disease Control and Prevention's (CDC) National Violent Death Reporting System (NVDRS).	We identified five common proximal circumstances: intimate partner relationship problems, mental health/substance abuse, military job-related, financial and criminal/legal activity.	Addiction (prolonged substance abuse) Socioeconomic (financial) Social support (intimate relationship problems)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a nonresponse bias. v. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Love et al. (2017) [31]	United States—Army	Cohort study—document review	To examine if romantic relationship factors (i.e., hostile disagreements and relationship distress) were linked with suicidal thoughts in Army soldiers and if these associations were moderated by a recent separation or divorce.	– Hostile disagreements and relationship distress were linked with suicidal thoughts in Army soldiers Amplified in magnitude following separation and divorce.	Social support (relationship distress)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a nonresponse bias. v. Appropriate statistical analysis relevant to the research question.
Ursano et al. (2016) [32]	United States—Army	Longitudinal, retrospective cohort study—document review	To examine socio-demographics, service-related and mental health predictors of suicidal ideation from 2006 to 2009.	– Those more prone to suicidal ideations were more likely than controls to be female, younger, older when entering service, less educated, never or previously deployed, and have a recent mental health diagnosis. – Risk among enlisted soldiers peaked in the second month of service and declined steadily, whereas risk among officers remained relatively stable. – The risk of SI is highest among enlisted soldiers early in Army service, females and those with a recent mental health diagnosis.	Occupation (duration of employment)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a nonresponse bias. v. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Shelef et al. (2017) [33]	Israel—Army	Case–control study—Document review	The present study aimed to assess additional risk factors for suicide in the Israeli army.	– Country of origin was linked to increased risk of committing suicide. – Low socioeconomic status linked to increased risk of suicide. – Low adjustment difficulties linked to increased risk of suicide.	Socioeconomic status (income)	i. Relevant multiple sampling strategies utilised (probability, stratified sampling). ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of nonresponse bias. v. Appropriate statistical analysis relevant to the research question.
Lusk et al. (2015) [34]	United States—Army	Qualitative—semi-structured interviews	To explore potential constructs underlying suicide according to the interpersonal–psychological theory of suicide (IPTS); these include burdensomeness, failed belonging and acquired capability.	– Chronic emotional and physical pain can contribute to the acquired capacity for lethal self-harm. – Some Soldiers spontaneously linked experiences of burdensomeness and lack of belonging in conjunction with emotional distancing, transitioning to garrison life and care-seeking experiences following combat.	Social support (difficulties reintegrating into family and society)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a non-response bias. v. Appropriate statistical analysis relevant to the research question.
Logan et al. (2015) [35]	United States—Army	Longitudinal, retrospective cohort study—document review	To compare suicide events between active-duty U.S. Army and civilian descendants, identify differences and inform military prevention efforts.	– Intimate partner problems were the most common precipitating factors involved in suicide for army personnel. – Pre-existing mental health issues linked to suicide and suicidal behaviours.	Social support (intimate partner relationships)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a non-response bias. v. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Ursano et al. (2015) [36]	United States—Army	Observational retrospective case study—Document reviews	To examine trends and sociodemographic correlates of suicide attempts, suspicious injuries and suicide ideation among regular Army soldiers.	– Incidence rates of suicide ideation and attempts increased annually among regular Army soldiers during the years 2004 through 2009. – Increased risk of all outcomes among those who were female, non-Hispanic White, never married, lower ranking enlisted, less educated and of younger age when entering the Defence Force.	Occupation (level of rank) Education (level of education attained)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a non-response bias. v. Appropriate statistical analysis relevant to the research question.
Cirang et al. (2015) [37]	United States—Air Force Security Forces	Cross-sectional correlational study—Questionnaire	To test the predictive validity of the most commonly identified factors associated with suicide behaviours among military members.	– Intimate partner relationship distress and social support factors not linked to suicidality. – Reintegration into society following deployment linked to suicide. – Problematic drinking is linked to predicting and relating to suicidal ideations.	Addiction (problematic drinking)	i. Relevant sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. iv. Low risk of non-response bias. v. Appropriate statistical analysis relevant to the research question.
Kochanski-Ruscio et al. (2014) [38]	United States—Military	Retrospective chart review	To determine demographic, diagnostic and psychosocial differences, based on suicide attempt status, among military inpatients admitted for suicide-related events.	– Those with multiple suicide attempts were significantly more likely to have documented childhood sexual abuse, problem substance use, mood disorder diagnosis, substance disorder diagnosis, personality disorder not otherwise specified diagnosis.	Addiction (prolonged substance abuse)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a non-response bias. v. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Nock et al. (2013) [9]	United States—Army	Literature review (non-systematic)	This paper reviews psychosocial factors known to be associated with the increased risk of suicidal behaviour in general and describes how some of these factors may be especially important in understanding suicide among soldiers.	Additional research aimed at (a) better describing when, where, and among whom suicidal behaviour occurs; (b) using exploratory studies to discover new risk and protective factors, (c) develop new methods of predicting suicidal behaviour that synthesises information about modifiable risk and protective factors from multiple domains and (d) understanding the mechanisms and pathways through which suicidal behaviour develops.	Occupation (stress-related events arising from workplace responsibilities)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a non-response bias. v. Appropriate statistical analysis relevant to the research question.
Nock. et al. (2014) [39]	United States—Army	Representative cross-sectional survey	To estimate the lifetime prevalence and sociodemographic, Army career and psychiatric predictors of suicidal behaviours among non-deployed U.S. Army soldiers.	– Women soldiers have an increased risk of suicidal ideation. – Never married or previously married solider at lower risk of suicidality. – Rank is a consistently significant predictor of post-enlistment suicidal behaviour.	Occupation (rank)	i. Sample is representative of the target population. ii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iii. Low risk of a non-response bias. iv. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
McFarlane et al. (2010) (MilHOP) [40]	Australian Defence Force	Self-report screening questionnaire. Subset of respondents were interviewed.	To establish the baseline prevalence of mental disorder, to refine current mental health detection methods and to investigate the specific occupational stressors that influence mental health in ADF members.	– Male ADF members found to have a significantly lower prevalence of alcohol disorders. – The prevalence of suicidal ideation was significantly higher in the ADF compared to the Australian community. – ADF members were equally likely to attempt suicide but less likely to complete the act compared to the Australian community.[a]	Occupation (time away from primary social support networks)	i. Sample is representative of the target population (sample was the target population). ii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iii. Low risk of a non-response bias. iv. Appropriate statistical analysis relevant to the research question.
AIHW (2022) [41]	Australian Defence Force	Matched data from Australian government and ADF databases	To provide an annual update on the levels of suicide among permanent, reserve and ex-serving ADF members. In addition, to assess the effectiveness of enablers of suicide prevention.	– ADF males are about half as likely to die by suicide as Australian males.[a] – 41% of ADF males who died by suicide had problems in spousal. relationship circumstances. – 38% of ADF females who died by suicide had problems in spousal relationship circumstances.	Social support (spousal relationships) Occupation (employment and underemployment)	i. Relevant multiple sampling strategies utilised. ii. The sample is representative of the target population. iii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iv. Low risk of a non-response bias. v. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Van Hooff et al. (2019) (TWRP) [8]	Australian Defence Force	Longitudinal analysis of the 2010 MilHOP cohort and new 2015 cross-sectional survey	To examine the impact of military service on the mental, physical and social health of serving and ex-serving ADF members and their families.	– Effects of deployment and combat exposure were cumulative, time dependent and emerged across multiple domains. – Suicidality in the last 12 months was reported by almost 10% of serving members. – Overall higher rates of suicide ideation in serving personnel than the general community.	Socioeconomic (housing and financial) Social support (family and social relationships)	i. Sample is representative of the target population (sample was the target population). ii. Measurements are valid and reliable. iii. No risk of a non-response bias. iv. Appropriate statistical analysis relevant to the research question.
Sadler et al. (2023) (RCDVS) [4]	Australian Defence Force	Analysis of the 2010 MilHOP and 2015 TWRP data	The use of Machine Learning to identify predictive variables from the 2010 and 2015 data sets.	– Suicidality in serving members is greater than that in the general community. – Serving individuals' perceived ability to function in professional and/or social environments was the greatest risk factor. – Perception that service had negatively impacted mental health and that mental health symptoms were negatively impacting work and social functioning,	Occupation (poor mental health)	i. Sample is representative of the target population (sample was the target population). ii. Measurements are valid and reliable. No evidence of questionnaire pre-testing. iii. Low risk of a non-response bias. iv. Appropriate statistical analysis relevant to the research question.

(Continues)

TABLE 2 | (Continued)

Study	Study coverage [country, military service type]	Research design and data collection methods	Study aim	Key findings (thematic)	Social determinants linked to suicide or suicidality	Methodological quality criteria (MMAT 2018)
Varker et al. (2023) (RCDVS) [42]	Australian Defence Force	Literature review (last 10years)	To provide the RCDVS with the latest research into suicide and self-harm among current and ex-serving ADF members.	– Relationship problems were identified in about 40% of ADF suicides. – Problems relating to employment and unemployment were identified in about 25% of ADF suicides. – Acute alcohol use and intoxication was associated with suicide among male ADF members.	Social support (family relationships) Occupation (poor mental health) Addiction (problematic drinking)	i. Relevant sampling strategies utilised. ii. The sample is representative of the target population. iii. Appropriate statistical analysis relevant to the research question.

[a]More recently, RCDVS research has shown that male service personnel are 30% **more likely** to die by suicide than Australian-employed males.

the interpersonal-psychological theory of suicide (IPTS) to explore potential constraints underlying suicide, including perceived burdensomeness and belongingness. Findings indicated that soldiers often experience changes to their self-identity following combat experiences, which occasionally present a challenge to reconnecting with families and the broader community following deployment. The authors concluded that soldiers transitioning after deployment are at increased suicide risk during this period. Published research from the Australian RCDVS also found that soldiers are at higher risk of suicide soon after transition [4, 8].

Seven studies explored the association between relationship distress, suicide and suicidality. The first article, conducted by Goodin and Prendergast, compared data from the United States Department of Defence Suicide Event Report (DoDSER) regarding suicide and suicide attempts among serving military members [28]. Their findings suggested that relationship problems resulting in decreased social support had stronger associations with suicidal behaviour [28]. Skopp and colleagues also identified proximal circumstances associated with military suicide, including intimate partner relationship difficulties [30]. These findings were consistent with those presented by Love et al., who found that hostile disagreements and relationship distress were connected to suicidal thoughts and that the intensity of these thoughts was amplified following separation or divorce [31].

In earlier work, Logan et al. examined suicide events between active-duty U.S. Army personnel and civilian decedents [35]. Results from this longitudinal retrospective cohort study were again consistent with recent empirical evidence (Love et al. and Skopp et al.), highlighting intimate partner problems as the most common precipitating factor for suicide in U.S. Army personnel. The empirical evidence presented by Cirang et al. was more mixed, however, with some describing the influence of social support on suicidality among serving military members [37]. Specifically, the authors found mixed associations between psychosocial factors and suicidal ideation, including no significant link between intimate partner relationship distress levels or perceived social support and suicidal ideation. Four of the five ADF-specific research reports reported a range of social relationship difficulties as contributory to suicide and suicidality, with relationship problems identified in up to 40% of ADF suicides [42].

3.2 | Addiction and Socioeconomic Status

Seven studies described the relationship between addiction and socioeconomic status on suicide and suicidality in serving Defence Force members. Four examined the influence of prolonged substance abuse on suicide risk, including suicidal behaviours, with all of the studies conducted in the United States. Two articles reviewed the influence of socioeconomic status on suicide risk, with one conducted in Israel and the other in the United States. Goodin et al. examined financial hardship as a risk factor, categorised here as low socioeconomic status, for suicidal behaviour [28]. The authors found that financial distress had a weak association with suicide, and its relationship to suicide attempts was not statistically significant [28]. Conversely, findings presented by Shelef et al. indicated significant risk

factors for suicide in the Israeli army, which included having a lower socioeconomic status and household income [33].

Addiction, which is well recognised as a social determinant of health, was linked to suicide and suicidal behaviours among serving members of the United States Army. Kochanski-Ruscio et al. conducted a retrospective chart review to determine the demographic, diagnostic and psychosocial differences, based on suicide attempt status, among military inpatients admitted for suicide-related events [38]. It found that those with multiple suicide attempts were significantly more likely to have documented substance misuse (or abuse), mood disorder diagnosis, substance disorder diagnosis, personality disorder and have experienced childhood sexual abuse. Following a data extraction exercise from the Department of Defence Suicide Event Report and the Centres for Disease Control and Prevention (CDC) National Violent Death Reporting System, Skopp et al. identified five common proximal circumstances linked to suicide narratives. Of those who had suicided, 52% of soldiers experienced substance abuse [30]. This evidence aligns with the findings from Cirang's 2015 study, which also demonstrated that addiction and problem drinking were significant independent predictors of suicidal ideation for United States Army members, particularly those who had recently returned from deployment.38 Work by Goodin et al. also describes a strong association between serving Defence Force members with a substance abuse history and suicidal behaviours [28].

Reports produced by the Transition & Wellbeing Research Program (TWRP) and the RCDVS have found that members who transition from the ADF have poorer health and wellbeing outcomes, with veterans reporting concerns with employment, housing and finances [42]. Service has been generally found to be a protective factor, with psychologically healthier individuals tending to continue to serve. At the same time, those who are more symptomatic are more likely to be discharged [8]. More recently, when suicide by male ADF service members was compared to suicide against employed Australian males—rather than all Australian males—serving members were found to be 30% *more likely* to die by suicide. Thus, as previously thought, service may be a risk rather than a protective factor [42].

3.3 | Education and Occupational-Related Factors

Nine articles examined the association between education and occupation-related factors influencing suicide and suicidal behaviours in serving military personnel. Two described a link between a serving member's level of educational attainment and the risk of suicide or suicidality, with both studies being conducted in the United States. Stokes et al. examined suicide attempt risk factors and timing among Army Reservist Components using a longitudinal, retrospective cohort study design [29]. In their first two years of service, the authors found that reservists who were less than high school educated and female were at higher risk of suicide than their colleagues. Ursano and colleagues also found an association between the level of educational attainment and the risk of suicide attempts, ideation or suspicious injuries among regular U.S. Army soldiers, with those being less educated more likely to experience suicidality [32]. Parallel to the evidence presented by Stokes et al., it was found that serving members who had not completed high school were at greater risk of suicide or suicidality. While education level was collected as part of the demographics of respondents in the ADF MilHOP and TWRP research programmes, these and the other Australian-specific studies reported no correlation between schooling level and suicidality [8, 40].

Five studies examined factors directly associated with military occupations and employment. Crowell-Williamson et al. evaluated the association between workplace bullying and suicidal ideation via perceived burdensomeness and thwarted belongingness, which were hypothesised to mediate this association [27]. Findings demonstrated that perceived burdensomeness was a significant mediator of the association between workplace bullying and the level of suicidal ideation. Conversely, thwarted belongingness did not significantly mediate the association between workplace bullying and suicidal ideations [27]. Ursano evaluated the trends and sociographic correlates of suicide attempts and ideation among regular Army soldiers by examining the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) [32]. This study also linked occupational-related factors to suicidality and found that lower-ranking army personnel, compared to higher-ranking officers, were more likely to experience suicidal ideation [32]. Findings presented by Nock et al. also aligned with those by Ursano and colleagues by demonstrating that U.S. Army soldiers who are lower ranking or have previously deployed were at greater risk of suicidality or suicidal behaviours. The study in 2016 by Ursano et al. built on these 2015 findings and found that the duration of employment within a military occupation also influenced suicide risk, peaking in the second month of service and declining steadily after that for enlisted soldiers, compared to risk among officers remaining relatively stable over time [36].

Occupational-related stress and other stressful life events were also linked to an increased risk of suicide and suicidality among current service members. Nock et al. reviewed psychosocial risk and protective factors of suicide among U.S. Army personnel [9]. They found suicidal behaviours were often preceded by acute and chronic stressful life events, including stressful events associated with military training and practice in general, such as combat exposure, injury, bereavement, adverse unit climate or a feeling of having let the unit down. Ursano et al. also indicated that stressful events associated with military occupation could influence suicidal behaviours, particularly among female populations [36]. The authors noted the elevated risk among females highlights the potential role of gender differences in interpersonal and occupational stressors experienced before and during deployment (e.g., sexual abuse and assault, harassment and discrimination, types of combat experiences and level of social support) [36].

In four of the five Australian-specific studies included in this review, occupational factors were identified as determinants of suicide and suicidality. AIHW reported problems related to employment and unemployment were among the six most common risk factors for ADF females (27%) and ADF males (24%); however, there were no further details. Likewise, there were no further details in the other Australian studies regarding occupation as a risk factor—although later publications reflect the possibility of service as a risk factor rather than a protective factor.

4 | Discussion

This review provides an important update on the state of evidence regarding which social determinants are associated with suicide and suicidality in serving military personnel. Using a systematic search method, the research findings revealed only 15 published, peer-reviewed journal articles globally investigating this important issue. Most articles were conducted in the United States, and none related to military settings in low- and middle-income countries. There were five published reports specific to the Australian military population that described the influence of social determinants of suicide and suicidality in serving military personnel. In the context of increasing trends of suicide and suicidality in low- and middle-income settings and limited evidence of effective suicide prevention strategies and interventions that address social and psychosocial determinants specific to serving military members, this dearth of empirical evidence is concerning. The current RCVDS in Australia is expected to go much further in recommendations of strategies for the prevention and treatment of suicidality in ADF members and veterans than has been done before.

Notwithstanding the limited geographic scope and varied methodologies used by studies in this review, we found evidence relating to three themes relevant to the question: *What are the social determinants of health linked to suicide and suicidality in serving military personnel?* These were: (i) a link—albeit still poorly defined—between suicide and perceived levels of social support among serving military members, (ii) the impact of addiction and socioeconomic status on military suicide and suicidality and (iii) education and occupational-related factors relating to suicide in the military context.

This review presents evidence indicating a potential relationship between social support, suicide and suicidality among serving military personnel, with a primary focus on the association between intimate relationship distress and its link to death by suicide. Of the articles included for review, findings consistently identified that service members experiencing relationship issues (e.g., conflict with intimate partners) also reported lower levels of perceived social support, which correlated with higher rates of suicidal behaviours [8, 28, 30, 41]. Particularly noteworthy were the challenges recently deployed service members faced in reconnecting with family and intimate partners, leading to decreased perceived social support and increased suicidal ideation and attempts among this specific cohort.35 However, the review highlights a potential evidence gap exploring other aspects of the role of social support in current service members' mental health and well-being, including the role of military colleagues and health professionals in forming supportive networks for individuals at risk of suicide and suicidality. Additionally, all the studies discussing this theme were conducted in the United States, potentially limiting the generalisability of the findings to other contexts. Further research is necessary to better understand the multifaceted role of social support in the context of suicide and suicidality among military personnel, considering diverse settings, including lower and middle-income nations.

A second emerging theme from this review relates to addiction, specifically the impact of prolonged substance abuse on the rate of suicide and suicidality among serving military members. The included studies, all of which were conducted with U.S. Army personnel, consistently showed a link between self-reported substance abuse and suicide attempts. Additionally, evidence indicated that a majority of military personnel who died by suicide had a history of substance abuse during their service [28, 37]. These findings parallel patterns seen in other 'high-risk' occupations (e.g., those with twice the national rate of total reportable injuries and illnesses), including those within the construction industry. Milner et al. found that for Australian construction workers, substance misuse and other mental health issues were prominent factors linked to death by suicide or reported suicidal ideations [43]. While general population studies have demonstrated that effective suicide prevention services address addiction and prolonged substance abuse across multiple industries, including construction, insufficient evidence remains specific to the military context [44].

The impact of educational attainment and occupation-related factors, such as professional role or ranking, on suicide and suicidal behaviours has been extensively discussed across various occupation types in the global literature [18]. In this review, studies also explored these factors within the military context, although to a limited extent. Our review surfaced some studies showing that service members with lower levels of education are at a heightened risk of suicide and exhibit higher tendencies towards suicidal behaviours [29, 36]. Similarly, soldiers with lower ranks or prior deployments are more susceptible to experiencing suicidal behaviours [36, 39]. These findings align with the Australian *RCVDS—Interim Report*, which reported an increased suicide risk among lower-ranked service members compared to officers (RCDVS, 2021)—although this is not necessarily indicative of education or schooling levels. The RCDVS also found a higher suicide rate among ex-serving females compared to both currently serving females and females in the general population, similar to several studies in this review indicating elevated suicide risk among currently serving females and highlighting the potential impact, but limited exploration to date, of gender differences in interpersonal and occupational stressors experienced before and during deployment.

4.1 | Implications for Designing and Implementing Suicide Prevention Services in the Military Context

Military populations worldwide continue to experience rising rates of suicide and suicidality, emphasising a critical need to better understand the role and function of evidence-based services to address this concern and to avoid further loss.

Our review emphasises a limited body of research and insufficient evidence outside of the United States regarding the social determinants of suicide and suicidality within serving military populations. While some social risk factors, including reduced social support and addiction, have been studied, we still have limited knowledge about other social factors, such as stress, income and social exclusion, and how these interact to influence military suicide and suicidality. By incorporating successful approaches from both local and international contexts, conducting additional research to investigate health-promoting initiatives and clinical interventions that target the social determinants

influencing suicide and suicidality could have benefits for serving and ex-serving military populations and globally. To achieve this, however, a number of key questions require urgent attention.

First, detailed national and sub-national research is essential to empirically identify the social and psychosocial risk factors influencing suicide and suicidality within this population. Second, an extensive investigation is needed to identify and prioritise effective health-promoting initiatives and clinical interventions targeting the social determinants and protective factors of suicide and suicidality within this unique context. Lastly, there is the need to explore the design of an evidence-based service model by mapping these interventions, which can effectively respond to the identified risk factors for suicidality and address the unmet needs of serving military personnel. While the Australian RCVDS has offered some insights thus far in the identification of social determinants of suicide and suicidality, it remains to be seen as to the level of detail and depth of the recommendations by the RCVDS—as well as the government's response to the recommendations.

5 | Limitations

This review included studies that utilised different concepts and terms to define the social determinants of health influencing suicide and suicidality for serving military personnel. This variability in terminology is a potential limitation of the review, as it may affect the consistency of the findings. The authors tried incorporating inclusive search terms, but the results might have differed if alternative words or forms were used. Furthermore, the review focused exclusively on peer-reviewed journal articles and grey literature from publicly available government-sponsored research specific to the Australian military population. This decision was driven by the limited accessibility of internal military reports containing sensitive information about suicide and suicidality in countries other than Australia. While other grey literature could provide valuable insights, the lack of public access raises concerns about transparency and the ability to verify the data. As a result, the review focused on utilising peer-reviewed and publicly accessible sources to maintain the integrity and comprehensiveness of the study.

6 | Conclusion

This review provides an essential update on the state of evidence regarding the social determinants linked to suicide and suicidality in serving military personnel. Using a systematic search, the research findings revealed 15 peer-reviewed journal articles globally investigating this critical issue and five grey literature reports specific to the Australian military population. Findings provide some, but not sufficient, quality evidence acknowledging the link between perceived levels of social support and the prevalence of suicide and suicidality. Much has been written about socioeconomic status and addiction and the impacts these social determinants have on suicide in the general population; however, much of this evidence remains inconclusive in the military setting. A third theme emerging from this review is the relationship between levels of education and other occupational-related factors influencing suicide and suicidal behaviours in serving military personnel. Military populations worldwide continue to experience rising rates of suicide and suicidality, with cases linked to various social determinants. However, the form and function of an evidence-based service model to address these social risk factors is yet to be determined.

Acknowledgements

The authors have nothing to report. Open access publishing facilitated by James Cook University, as part of the Wiley - James Cook University agreement via the Council of Australian University Librarians.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

1. World Health Organization, Suicide, 2019, https://www.who.int/news-room/fact-sheets/detail/suicide.

2. Australian Institute of Health and Welfare (AIHW), Suicide Deaths Over Time, https://www.aihw.gov.au/suicide-self-harm-monitoring/data/deaths-by-suicide-in-australia/suicide-deaths-over-time.

3. G. Wang and L. Wu, "Social Determinants on Suicidal Thoughts Among Young Adults," *International Journal of Environmental Research and Public Health* 18, no. 16 (2021): 8788, https://doi.org/10.3390/ijerph18168788.

4. Royal Commission Into Defence and Veteran Suicide. Interim Report, 2023, https://defenceveteransuicide.royalcommission.gov.au/system/files/2023-05/interim-report-dvsrc-may-2023.pdf.

5. B. A. Griffin, G. E. Grimm, R. Smart, et al., "Comparing the Army's Suicide Rate to the General U.S. Population: Identifying Suitable Characteristics, Data Sources, and Analytic Approaches," *RAND Health Quarterly* 9, no. 2 (2021): 8, https://doi.org/10.7249/RR4915.

6. K. B. Fehling and E. A. Selby, "Suicide in DSM-5: Current Evidence for the Proposed Suicide Behavior Disorder and Other Possible Improvements," *Frontiers in Psychiatry* 11 (2020): 499980, https://doi.org/10.3389/fpsyt.2020.499980.

7. Australian Institute of Health and Welfare (AIHW), A Profile of Australia's Veterans, 2018, https://www.aihw.gov.au/getmedia/1b8bd886-7b49-4b9b-9163-152021a014df/aihw-phe-235.pdf.aspx?inline=true.

8. Australian Royal Commission into Defence and Veteran Suicide, Service and Suicide—Fresh Insights, 2024, https://defenceveteransuicide.royalcommission.gov.au/publications/service-and-suicide-fresh-insights.

9. M. K. Nock, J. G. Green, I. Hwang, et al., "Prevalence, Correlates, and Treatment of Lifetime Suicidal Behavior Among Adolescents: Results From the National Comorbidity Survey Replication Adolescent Supplement," *JAMA Psychiatry* 70, no. 3 (2013): 300–310, https://doi.org/10.1001/2013.jamapsychiatry.55.

10. J. R. Blosnich, A. E. Montgomery, M. E. Dichter, et al., "Social Determinants and Military Veterans' Suicide Ideation and Attempt: A Cross-Sectional Analysis of Electronic Health Record Data," *Journal of General Internal Medicine* 35, no. 6 (2020): 1759–1767, https://doi.org/10.1007/s11606-019-05447-z.

11. E. B. Elbogen, S. Fuller, S. C. Johnson, et al., "Improving Risk Assessment of Violence Among Military Veterans: An Evidence-Based

Approach for Clinical Decision-Making," *Clinical Psychology Review* 30, no. 6 (2010): 595–607, https://doi.org/10.1016/j.cpr.2010.03.009.

12. C. Henderson, S. Evans-Lacko, and G. Thornicroft, "Mental Illness Stigma, Help Seeking, and Public Health Programs," *American Journal of Public Health* 103, no. 5 (2013): 777–780, https://doi.org/10.2105/AJPH.2012.301056.

13. Government of Canada, Expert Panel on Suicide Prevention, 2017, https://www.canada.ca/content/dam/dnd-mdn/migration/assets/FORCES_Internet/docs/en/about-reports-pubs-health/expert-panel-suicide-prevention-2016.pdf.

14. R. E. Marshall, J. Milligan-Saville, K. Petrie, R. A. Bryant, P. B. Mitchell, and S. B. Harvey, "Mental Health Screening Amongst Police Officers: Factors Associated With Under-Reporting of Symptoms," *BMC Psychiatry* 21 (2021): 135, https://doi.org/10.1186/s12888-021-03125-1.

15. A. B. Adler and I. A. Gutierrez, "Acute Stress Reaction in Combat: Emerging Evidence and Peer-Based Interventions," *Current Psychiatry Reports* 24, no. 4 (2022): 277–284, https://doi.org/10.1007/s11920-022-01335-2.

16. C. Inoue, E. Shawler, C. H. Jordan, et al., "Veteran and Military Mental Health Issues," in *StatPearls* [Internet] (StatPearls Publishing, 2023), https://www.ncbi.nlm.nih.gov/books/NBK572092/.

17. M. Van Hooff, E. Lawrence-Wood, N. Sadler, et al., *Transition and Wellbeing Research Programme Key Findings Report* (Department of Defence and Department of Veterans' Affairs, 2019), https://www.dva.gov.au/documents-and-publications/transition-and-wellbeing-research-programme-key-findings-2020.

18. C. Motillon-Toudic, M. Walter, M. Séguin, J. D. Carrier, S. Berrouiguet, and C. Lemey, "Social Isolation and Suicide Risk: Literature Review and Perspectives," *European Psychiatry* 65, no. 1 (2022): e65, https://doi.org/10.1192/j.eurpsy.2022.2320.

19. D. Dunt, *Independent Study Into Suicide in the Ex-Service Community* (Department of Veterans' Affairs, 2009), https://www.dva.gov.au/documents-and-publications/independent-study-suicide-ex-service-community-2009.

20. World Health Organization (WHO), The Solid Facts, 2003, https://apps.who.int/iris/bitstream/handle/10665/326568/9789289013710-eng.pdf?sequence=1&isAllowed=y.

21. M. J. Page, J. E. McKenzie, P. M. Bossuyt, et al., "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews," *BMJ* 372 (2021): n71, https://doi.org/10.1136/bmj.n71.

22. L. S. Nowell, J. M. Norris, D. E. White, and N. J. Moules, "Thematic Analysis: Striving to Meet the Trustworthiness Criteria," *International Journal of Qualitative Methods* 16, no. 1 (2017): 3–11, https://doi.org/10.1177/1609406917733847.

23. M. T. Pham, A. Rajić, J. D. Greig, J. M. Sargeant, A. Papadopoulos, and S. A. McEwen, "A Scoping Review of Scoping Reviews: Advancing the Approach and Enhancing the Consistency," *Research Synthesis Methods* 5, no. 4 (2014): 371–385, https://doi.org/10.1002/jrsm.1123.

24. S. Dawadi, "Thematic Analysis Approach: A Step by Step Guide for ELT Research Practitioners," *Journal of NELTA* 25, no. 1–2 (2021): 62–71.

25. P. Pluye and Q. N. Hong, Mixed Methods Appraisal Tool (MMAT) Criteria Manual, 2018, http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/fetch/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf.

26. C. Yoon, J. Jung, J. H. Yoon, D. Lee, H. Jeon, and S. Y. Lee, "How Is the Suicide Ideation in the Korean Armed Forces Affected by Mental Illness, Traumatic Events, and Social Support?," *Journal of Korean Medical Science* 36, no. 15 (2021): e96, https://doi.org/10.3346/jkms.2021.36.e96.

27. G. A. Crowell-Williamson, M. Fruhbauerova, C. R. DeCou, and K. A. Comtois, "Perceived Burdensomeness, Bullying, and Suicidal Ideation in Suicidal Military Personnel," *Journal of Clinical Psychology* 75, no. 12 (2019): 2147–2159, https://doi.org/10.1002/jclp.22836.

28. C. A. Goodin, D. M. Prendergast, L. D. Pruitt, et al., "Financial Hardship and Risk of Suicide Among U.S. Army Personnel," *Psychological Services* 16, no. 2 (2019): 286–292, https://doi.org/10.1037/ser0000201.

29. C. M. Stokes, J. A. Naifeh, R. C. Kessler, et al., "Risk Factors and Timing of Suicide Attempts Among US Army Reserve Component Soldiers During Deployment to the Afghanistan and Iraq Wars: Results From the Army Study to Assess Risk and Resilience in Servicemembers," *Psychiatry* 82, no. 3 (2019): 240–255, https://doi.org/10.1080/00332747.2019.1653056.

30. N. A. Skopp, K. M. Holland, J. E. Logan, C. L. Alexander, and C. F. Floyd, "Circumstances Preceding Suicide in U.S. Soldiers: A Qualitative Analysis of Narrative Data," *Psychological Services* 16, no. 2 (2019): 302–311, https://doi.org/10.1037/ser0000221.

31. H. A. Love, J. A. Durtschi, L. M. Ruhlmann, and B. S. Nelson Goff, "Army Soldiers and Suicidal Thoughts: The Impact of Negative Relationship Dynamics Moderated by the Dissolution of Romantic Relationships," *Journal of Marital and Family Therapy* 44, no. 2 (2018): 265–276, https://doi.org/10.1111/jmft.12252.

32. R. J. Ursano, R. C. Kessler, M. B. Stein, et al., "Risk Factors, Methods, and Timing of Suicide Attempts Among US Army Soldiers," *JAMA Psychiatry* 73, no. 7 (2016): 741–749.

33. L. Shelef, G. Tomer, L. Tatsa-Laur, R. Kedem, O. Bonne, and E. Fruchter, "Risk Factors for Suicide in the Israeli Army Between the Years 1992–2012: A Case–Control Study," *European Psychiatry* 39 (2017): 106–113.

34. J. Lusk, L. A. Brenner, L. M. Betthauser, et al., "A Qualitative Study of Potential Suicide Risk Factors Among Operation Iraqi Freedom/Operation Enduring Freedom Soldiers Returning to the Continental United States (CONUS)," *Journal of Clinical Psychology* 71, no. 9 (2015): 843–855.

35. J. E. Logan, N. A. Skopp, M. A. Reger, et al., "Precipitating Circumstances of Suicide Among Active Duty US Army Personnel Versus US Civilians, 2005–2010," *Suicide & Life-Threatening Behavior* 45, no. 1 (2015): 65–77.

36. R. J. Ursano, S. G. Heeringa, M. B. Stein, et al., "Prevalence and Correlates of Suicidal Behavior Among New Soldiers in the US Army: Results From the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS)," *Depression and Anxiety* 32, no. 1 (2015): 3–12.

37. J. A. Cigrang, C. Balderrama-Durbin, D. K. Snyder, et al., "Predictors of Suicidal Ideation Across Deployment: A Prospective Study," *Journal of Clinical Psychology* 71, no. 9 (2015): 828–842.

38. K. M. Kochanski-Ruscio, J. T. Carreno-Ponce, K. DeYoung, G. Grammer, and M. Ghahramanlou-Holloway, "Diagnostic and Psychosocial Differences in Psychiatrically Hospitalized Military Service Members With Single Versus Multiple Suicide Attempts," *Comprehensive Psychiatry* 55, no. 3 (2014): 450–456.

39. M. K. Nock, M. B. Stein, S. G. Heeringa, et al., "Prevalence and Correlates of Suicidal Behavior Among Soldiers: Results From the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS)," *JAMA Psychiatry* 71, no. 5 (2014): 514–522.

40. A. McFarlane, S. E. Hodson, M. Van Hooff, and C. Davies, *Mental Health in the Australian Defence Force: 2010 ADF Mental Health and Wellbeing Study: Full Report* (Department of Defence, 2011), https://www.defence.gov.au/defence-activities/research-innovation/research-projects/military-health-outcomes-program.

41. Australian Institute of Health and Welfare (AIHW), *Serving and Ex-Serving ADF Members Who Have Served Since 1985: Suicide Monitoring 1997 to 2020* (Cat. No. PHE 315) (AIHW, 2022), https://www.aihw.gov.au/reports/veterans/serving-and-ex-serving-adf-suicide-monitoring-2022/contents/about.

42. T. Varker, E. Lawrence-Wood, L. Watson, et al., "ADF Members and Ex-Members Suicide Literature Review: An Update," 2023 Report Prepared for the Royal Commission Into Defence and Veteran Suicide, https://defenceveteransuicide.royalcommission.gov.au/publications/adf-members-and-ex-members-suicide-literature-review-update.

43. A. Milner, H. Maheen, D. Currier, and A. D. LaMontagne, "Male Suicide Among Construction Workers in Australia: A Qualitative Analysis of the Major Stressors Precipitating Death," *BMC Public Health* 17, no. 1 (2017): 1–9.

44. D. M. Stone and A. E. Crosby, "Suicide Prevention: State of the Art Review," *American Journal of Lifestyle Medicine* 8, no. 6 (2014): 404–420.

Appendix 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) Checklist

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3/4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4/5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	24-28
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5-6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6/7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	10-14
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Click here to enter text.

St. Michael's
Inspired Care.
Inspiring Science.

1

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	15-19
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	10-14
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	10-14
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	15-19
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	15-19
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	19-22
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	10-14
Limitations	20	Discuss the limitations of the scoping review process.	9
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	22
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	N/A

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Appendix 2

Search Strategy [Example: Medline Ovid]

1. (military or service member*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word].
2. (current* military or current* service member).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
3. Social determinants of health.mp. or "Social Determinants of Health"/
4. (social* need* or social* determinant* or social* stab* or social* instab* or social* unstab* or social* capital*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
5. (Housing or Public Housing or Homeless Persons).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
6. (housing* or housed* or unhoused* or homeless* or home-less*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
7. (Food Insecurity or Food Security or Hunger or Nutritional Status or Malnutrition).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
8. (food* or hunger* or nutrition* or malnutrition* or malnourish*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
9. (Social Support or Psychosocial Support Systems).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
10. (social* or psychosocial* or family* or families* or communit* or peer* support*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
11. (social support* or psychosocial support* or family support* or community support* or peer* support*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
12. (Employment or Unemployment).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
13. (employ* or unemploy* or underemploy* or job assist* or job security*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
14. (Poverty or Financial Stress).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
15. (poverty* or impoverish*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
16. (financial* adj3 (stab* or instab* or unstab* or strain* or stress* or securit* or insecurit* or status*)).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
17. (financial* stab* or financial* instab* or financial* unstab* or financial* strain* or financial* stress* or financial securit* or financial insecurit* or financial status*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
18. exp. Socioeconomic Factors/
19. ((socioeconom* or econom* or social*) adj3 (factor* or class* or status* or level* or advantage* or disadvantage*)).mp. [mp = title,

book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]

20. ((socioeconom* or econom* or social*) adj3 (factor* or class* or status* or level* or advantage* or disadvantage*)).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
21. (socioeconom* factor* or socioeconom class* or socioeconom* status* or socioeconom* level* or socioeconom* advantage* or socioeconom* disadvantage* or econom* factor* or econom* class or econom* status* or econom* level* or econom* advantage* or econom* disadvantage* or social factor* or social class* or social status* or social level* or social advantage* or social disadvantage*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
22. (income* adj3 (equal* or inequal* or inequit* or level* or status*)).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
23. (income equal* or income inequal* or income inequit* or income level* or income status*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
24. exp. Education/
25. educat*.mp.
26. exp. Violence/
27. Violence/or violen*.mp.
28. Mental Health.mp. or Mental Health/
29. (mental* adj3 (health* or well-being* or wellbeing* or well* or unwell*)).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
30. (mental* health* or mental* well being* or mental* well being* or mental* well* or mental* unwell*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
31. exp. Psychotic Disorders/
32. exp. Stress, Psychological/
33. (stress* or burnout* or burn-out* or burned out*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
34. (substance* abus* or substance* misus* or substance* mis-us* or substance* disorder* or substance dis-order* or substance dependenc* or drug* abus* or drug* misus* or drug* misus* or drug* disorder* or drug dis-order* or drug dependenc* or alcohol* abus* or alcohol* misus* or alcohol* mis-us* or alcohol* disorder* or alcohol* dis-order* or alcohol dependenc*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
35. ((substance* or drug* or alcohol*) adj2 (abus* or misuse* or misuse* or disorder* or disorder* or dependenc*)).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
36. (alcoholic* or alcoholism* or binge* drink* or addict*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
37. exp. Suicide/
38. exp. Substance-Related Disorders/
39. 1 or 2
40. 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
41. 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38
42. 39 and 40 and 41
43. (Young adult* or 17–24 years old or Emerging adult* or Post adolescence or Early adult* or Young adult develop* or Mental health in young adults or young*).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
44. 39 and 40 and 41 and 42 and 43
45. Australia/or Australia*.mp.
46. 44 and 45