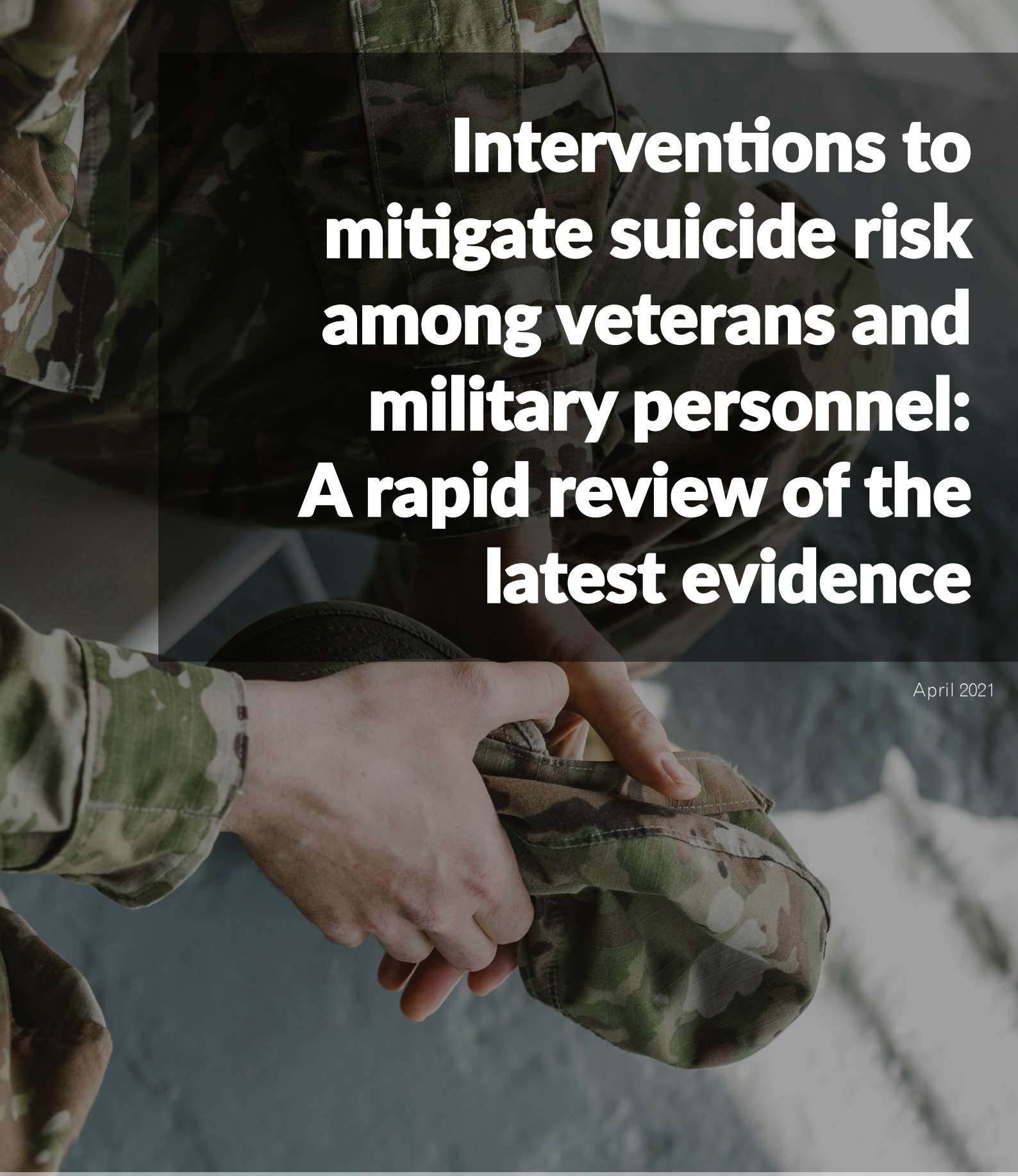

Interventions to mitigate suicide risk among veterans and military personnel: A rapid review of the latest evidence

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Scottish Government's National Suicide Prevention Leadership Group

National Suicide Prevention Leadership Group

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This rapid review report was commissioned by the Action 7 Delivery Leads of the Scottish Government's Suicide Prevention Action Plan and prepared by:

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Warning message and help resources:

Some readers may find the contents of this report upsetting. The International Association for Suicide Prevention provides a list of national helplines, support organisations, and online crisis intervention services at https://www.iasp.info/resources/Crisis_Centres/

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Executive summary

- The latest evidence on self-harm in the UK military suggests[1] that, for serving personnel, lifetime self-harm increased significantly from 1.8% in 2004-2006 to 4.2% in 2014-2016. For veterans, the prevalence of lifetime self-harm went from 3.8% in 2004-2006 to 6.6% in 2014-2016. Veterans were significantly more likely to report lifetime self-harm than serving personnel. When examining potential risk factors, higher levels of perceived social support were found to be protective for both suicide attempt and self-harm. Stigmatising beliefs and more negative attitudes about mental disorders and perceived barriers to care were associated with greater frequency of self-harm.
- The aim of this report is to examine the latest evidence on effective interventions that could help to mitigate suicide risk among veterans in Scotland and in the rest of the United Kingdom. We conducted a rapid review of reviews published in the past decade (2010-2021) on preventative interventions designed to prevent suicide among veterans and military personnel. Four relevant reviews were identified[2–5] and their findings are presented and discussed.
- Interventions are grouped under universal, selective and indicated strategies. Universal strategies include psychoeducation, screening for mental illness, training programmes, surveillance systems tracking mental health and suicide risk, and management of access to firearms. Selective interventions include clinical interviews to diagnose mental illness, referrals and treatment of mental illness and risk factors for suicide (e.g., substance abuse, PTSD, gambling, pending legal problems, financial strain, social isolation, sleep problems). Indicated strategies include psychological treatments (psychotherapy), crisis management interventions, pharmacotherapy, and follow-up contact.
- Most of the evidence on suicide prevention interventions summarised in the reviews focuses on active armed forces personnel. Despite the differences between this group and veterans, it is possible that the results of the interventions tested with active personnel could be extended to veterans, given that both groups share similar lived experiences within the armed forces. This assumption, however, should be informed by further evidence derived from studies which test those interventions in both groups separately, examining the role of specific factors for each population. The findings of the reviews included in this report highlight the need for more intervention studies among veterans.
- There is some evidence that suicide prevention programmes which combine multiple strategies simultaneously are more likely to be successful than single-strategy interventions in preventing suicidal behaviour and suicide deaths.

- The studies included in the reviews examined here do not provide any data on interventions to prevent and reduce suicidal behaviour among armed forces personnel and veterans in the UK. As this report includes only published reviews and searches for individual studies were not carried out, it is possible that recent intervention studies in the UK may have been missed. It should be noted, however, that the most current review included in this report was published in 2021[5]. Interventions on suicide prevention among UK veterans and armed forces personnel are needed, particularly in light of the importance of differences in cultural context highlighted in this report.

1. Introduction

Internationally, suicide risk among veterans and armed forces personnel has been widely investigated[6]. This is true particularly in the United States, where it is estimated that over a fifth of all suicides in the country are by veterans or current army members[7]. According to the Department of Veterans Affairs, 22 American veterans on average take their own lives each day. These alarming statistics have prompted government investment in basic and applied research aiming at understanding and preventing suicides within this population. Given that risk and protective factors for suicide are contingent upon cultural context, the generalisability of research findings from the USA to other nations cannot be assumed. An example of a unique US characteristic is the wide availability of firearms, which is strongly associated with suicide mortality in the country[8]. Suicide deaths also vary according to sex, age, and other sociodemographic factors across different cultures.

In the UK, a large retrospective study[9] was conducted in 2008 investigating incidence, timing, and risk factors for suicide among 233,803 individuals who had left the armed forces during the period of 1996–2005. While the overall suicide mortality rate was no greater than that in the general population, the suicide risk in younger male veterans (≤ 24) was found to be approximately two to three times higher than the risk for the same age groups in the general and serving populations. The risk of male suicide was highest during the first two years after discharge in comparison with subsequent years; and suicide risk was also greatest among those with a short length of service. The authors propose three (not mutually exclusive) possible explanations for increased suicide risk: (unspecified) difficulties associated with the transition from leaving the armed forces to civilian life; potentially adverse experiences while in the army; and previous vulnerability[10,11].

A recent retrospective 30-year cohort study[12] investigated the risk of suicide among 56,205 Scottish veterans born 1945-1985 and 172,741 matched nonveterans. Overall, the findings show no significant difference in suicide risk of veterans compared to non-veterans. As in previous research[9], some differences emerged during the subgroup analysis. Only those veterans born between 1950 and 1954 were at significantly higher risk when compared with non-veterans, regardless of their level of exposure to socioeconomic deprivation. Female veterans were at increased risk compared with non-veteran females. Within the non-veterans subsample, females were at lower suicide risk than males; within the veterans subsample, both sexes had comparable suicide risk. The method of suicide did not differ significantly between veterans and non-veterans for either males or females.

Studies on self-harm in the UK military have investigated a range of risk factors. In 2011, Pinder et al.[13] conducted a survey of 821 armed forces personnel and found a lifetime prevalence of 5.6% for intentional self-harm (self-harm or attempted suicide). Self-harm was associated with psychological morbidity (in particular, post-traumatic stress disorder) and adverse childhood experiences. Veterans reported more than double the lifetime prevalence of self-harm compared to serving personnel (10.5% vs 4.2%, respectively). The authors also found that participants reporting self-harm were younger than those who had not reported self-harm.

In a more recent study conducted in 2013 with 9,803 participants, Hines et al.[14] reported an overall self-harm prevalence of 2.3% among UK armed forces. While self -harm was not associated with deployment, the following risk factors were found to be significantly associated with self-harm: being discharged, separated, of lower rank, female and younger age, reporting no close friends or family, reporting fewer social activities, having spent time in local authority care as a child, and having adversity in family relationships as a child. The authors concluded that factors associated with self-harm in the armed forces reflected those found within the general population.

The latest evidence on self-harm in the UK military suggests[1] that, for serving personnel, lifetime self-harm increased significantly from 1.8% in 2004-2006 to 4.2% in 2014-2016; and for veterans, the prevalence of lifetime self-harm went from 3.8% in 2004-2006 to 6.6% in 2014-2016. Veterans were significantly more likely to report lifetime self-harm than serving personnel. Higher levels of perceived social support were found to be protective for both suicide attempt and self-harm. Stigmatising beliefs and more negative attitudes about mental disorders within the military and perceived barriers to care were associated with greater frequency of self-harm. Based on these results, the study authors suggest that efforts to prevent suicide and self-harm among UK military armed forces should concentrate on: alleviating mental health symptoms and encouraging distressed individuals to engage with mental health care; reducing stigma and negative perceptions about mental disorders within the armed forces; and providing enhanced social support.

Comparing veterans and matched non-veterans (born 1945-1985) within the Scottish military context, Bergman et al.[15] found that non-fatal self-harm (including suicide attempt) was more prevalent among veterans (2.90%) than non-veterans (2.45%). Self-harm risk was highest for the oldest veterans (born 1945-1949) and for early service leavers who did not complete initial training. Risk of self-harm reduced with longer service and in the intermediate birth cohorts (born between 1965 and 1979) but increased again in the youngest cohort (born 1980-1985).

Although the available UK epidemiological evidence suggests a similar level of suicide risk among veterans and the general population, one could ask what would be the specific factors associated with risk for the former group when compared to the latter. In the USA research has been undertaken in order to understand how specific aspects of the military context (e.g., deployment; exposure to wars, death, killing, injury, and life-threatening situations; military training and culture) and individual factors (e.g., past history of mental illness; adverse childhood experiences; personality factors) play a role in increasing risk of suicide among armed forces personnel and veterans[6].

Understanding the epidemiology, risk and protective factors associated with suicide, non-fatal self-harm (including suicide attempt) and suicidal thoughts is of paramount importance when designing and planning interventions. Albeit there are differences between active military personnel and veterans, the contents of the current rapid review will include evidence for both groups for two reasons: first, both groups were exposed to the same context (armed forces) and, therefore, share common risk and protective factors related to that context; second, most of the research does not distinguish between those two groups (although relevant evidence will be highlighted, when available).

The aim of this rapid review is to examine the evidence published in the past decade (2010-2021) relating to the following research question: What can the latest evidence tell us about effective interventions that could help to mitigate suicide risk among veterans in Scotland and in the United Kingdom? To achieve this aim, this rapid review starts by providing a brief introduction on specific risk factors for suicide within this population and how they can be theoretically interpreted in light of the evidence. Subsequently, we describe our search strategies, following by presentation and brief discussion of the findings.

2. Specific Risk Factors

Symptoms experienced by soldiers during wars and by veterans after discharge/retirement ('war syndromes') have been documented for centuries but largely without being formally acknowledged by the military[16–18]. From a US perspective, Sheykhani et al.[18] provide a brief summary of the war syndromes reported during the 1900s and the army's response to those occurrences. In the First World War (WWI), war-related mental distress indicated by sleep problems, nervous exhaustion and movement impediments were labelled 'shell shock' and assumed to have an organic origin (e.g., brain injury)[19]. Shell shock was often perceived as malingering, a sign of weakness, or an endeavour to escape military services and duties[16,19]. In some ways, it was believed that only the mentally weakest and highly 'unfit' men were disposed to 'crack' under the pressure of combat[18].

These beliefs were carried into the Second World War (WWII). Large psychiatric screening programmes were employed to identify and recruit those who were mentally stronger and, in theory, able to handle the stresses of war. It was believed that this approach would also reduce the number of premature discharges from the army[20]. In the US, approximately 12% of the men examined (nearly 2.5 million) were rejected due to 'psychological defects'[21]. In the UK, the screening programme had a different aim: to ensure that servicemen were assigned to suitable jobs or positions rather than focusing exclusively on the identification of potential psychiatrically vulnerable individuals. Psychiatrists from the British Army determined that around 4% of all applicants were unsuitable for combatant units, and rejected far fewer recruits (about 1.4%) than the US Military[22].

The failure of screening programmes soon became evident. In the US, more than a third of wounded soldiers presented with mental illness in some combat sites[23], and the prevalence rate for combat-related psychological symptoms (including exhaustion, memory and concentration problems, somatic pains, and sleep disruptions) was more than double the rate reported in WWI[18,21]. In the UK, considerable problems of misplacement (servicemen assigned to unsuitable jobs or positions) within the British Army were identified and evidence began to accumulate that the deployment of manpower resources in the military was inadequate. Alongside the obvious implications for operational efficiency, the problems with misplacement affected soldiers' morale, since men often became maladjusted through being employed either above or below their capacity, occasionally resulting in psychiatric breakdowns[24].

In response to the unprecedented attrition of the workforce and the problems caused by psychological symptoms, research and new treatment approaches were developed and implemented. There was evidence that, for about two-fifths (41%) of US WWII army personnel and veterans with psychological problems, the source of their symptoms was the stress associated with military service[17,18]. According to Sheykhani et al.[18], the research developed during WWII helped to improve understanding of mental health problems among soldiers and veterans in two significant ways: first, the shift from the focus on the problems of the "abnormal mind in normal times to problems of the normal mind in abnormal times"[25, p.12]; and second, the discovery that group cohesion and emotional bonds between soldiers are important determinants of soldiers' overall capabilities to succeed in a war zone[23].

The recognition of risk factors for mental illness specifically related to military service has been important not only for understanding how psychological problems develop within this population, but also for the advancement of customised treatments and preventative measures. Recent investigative work has endeavoured to expand theoretical models of suicide to address the question: how and why does exposure to stressful military operations have a suicidogenic effect? The Interpersonal-Psychological Theory of Suicide (IPTS)[26] has been the most employed model to understand the specific risk factors associated with military personnel and veterans'

suicidal thoughts and behaviours.

The IPTS posits that suicidal thoughts are more likely to emerge when an individual experiences the psychological states of *perceived burdensomeness* and *thwarted belongingness*[26]. The former refers to a sense that one does not add to, but rather undermines, the wellbeing and/or safety of close ones and society in general, despite the existence of contradictory evidence. Death is perceived as necessary to minimise the burden on others, thus guaranteeing the maintenance of the group's wellbeing and security. In fact, research has shown that almost half of soldiers interviewed after surviving a suicide attempt reported perceiving themselves "like a burden to others" on the day they attempted to take their own life[27], and 16.9% explicitly reported that their suicide attempt was partially propelled by the necessity "to make others better off"[28]. Similar findings on perceived burdensomeness have been reported by veterans[29–31]. *Thwarted belongingness* is understood as a lack of meaningful social connection, despite attempts to establish and strengthen relationships with other people. This is also translated into an absence of social support or simply the feeling of being detached from family, friends, and significant others. Observational data provide some support for the hypothesis that loneliness and lack of social connection are associated with suicidal thoughts among military veterans[32–34].

Although the association between *perceived burdensomeness* and *thwarted belongingness* increases the likelihood of someone experiencing suicidal thoughts, the IPTS[26] posits that the interaction between these factors is not sufficient to explain the emergence of a suicide attempt, which requires a third factor: *acquired capability for suicide*. This factor includes *lowered fear of death* (when the individual experiences suicidal thoughts and is not afraid of dying or engaging in behaviours to kill themselves) and *elevated physical pain tolerance* (when individuals have the capacity to handle physical pain, which makes them more prone to employ highly lethal means of suicide). *Acquired capability for suicide* is understood to be developed through exposure and habituation to painful and adverse experiences, including childhood maltreatment, exposure to suicide or suicidal behaviour, previous suicide attempt, impulsivity, and combat exposure. Studies which have tested the *acquired capability* hypothesis among military personnel and veterans have shown mixed results[35–38].

Although military service can affect *acquired capability* in several ways[35], the IPTS includes a specific element that is more frequently experienced by those in the military or veterans: combat exposure. It has been suggested that combat exposure is indirectly associated with increased suicide risk, mediated by repeated exposure to traumatic events. It is hypothesised that greater exposure to combat increases the likelihood that the combatant will witness traumatic events, such as wounds, dead bodies, loss of colleagues in the battlefield, killing others, or torture. These experiences could habituate armed forces personnel to death and increase their ability to tolerate pain and suffering, hence increasing *acquired capability for suicide*. Although theoretically logical, the evidence is inconclusive and more research is needed[35].

According to Bryan et al.[35], post-traumatic stress disorder (PTSD) plays a key role in suicide risk among many military personnel and veterans, particularly when it is combined with depression. Bryan and Anestis[39], for example, have found that re-experiencing PTSD symptoms contributes to higher levels of *fearlessness of death* and *pain tolerance*, suggesting that military personnel and veterans who repeatedly re-live or re-experience a violent or traumatic event are, in essence, acquiring a greater capability for suicide. According to these authors, the re-experience of those traumatic events over time may create habituation to the fear of death, increasing suicide risk[35,39]. However, further evidence is needed to confirm this hypothesis.

When designing and implementing interventions for veterans and military personnel, risk factors specifically related to the experiences in the army should be considered alongside more general, population-wide risk factors for suicide, e.g., psychopathology, deprivation, socioeconomic inequalities, past history of non-fatal self-harm / suicide attempt, perceptions of defeat and entrapment, and access to means of suicide.

3. Method

3.1. Search strategy

In order to address our research question, a search strategy was employed to identify (systematic and non-systematic) reviews and meta-analyses including the following concepts: suicidal behaviour, veterans, intervention, review, and United Kingdom (details of concepts can be found in Table 1).

3.2. Eligibility criteria

Eligibility was determined using the following inclusion criteria: (1) the publication should be a review of studies (all types: narrative, systematic, scoping, rapid, mapping, etc.) or meta-analysis; (2) the publication should be published between 2010 and 2021; (3) the publication should focus on suicide, non-fatal self-harm (including suicide attempt), and suicidal thoughts/ideation; (4) the publication should focus on evidence-based interventions (including prevention or postvention); (5) the publication should focus on veterans or military personnel; (6) the publication should be in English. Exclusion criteria were: (1) literature that is concerned with mental health (e.g., specific mental disorders, or mental health in general) as the outcome; (2) reviews focusing exclusively on risk and protective factors for suicidal behaviour among military personnel and veterans.

Table 1. Search strategy, concepts, and key search terms

Search	Concept	Key search terms
#1	Suicidal behaviour	suicide OR suicides OR "suicide attempt" OR "attempted suicide" OR parasuicide OR self-harm OR "self harm" OR "self injury" OR self-injury OR "self-injurious behavior" OR "self-injurious behaviour" OR "self injurious behavior" OR "self injurious behaviour"
#2	Veterans	veteran* OR military OR servicemen OR serviceman OR servicewomen OR servicewoman OR servicemember* OR navy OR naval OR army OR air force OR airforce OR soldier* OR marines OR marine corp OR "marine corps" OR corpsmen OR corpsman OR airmen OR airman OR "flight crew" OR sailor* OR submariner* OR reserves OR infantry* OR deployment* OR postdeployment* OR post deployment* OR war OR warfare OR warfighter* OR combat OR "armed conflict*" OR "active duty" OR armed OR defense OR security OR coastguard OR "Department* of Defense"
#3	Intervention	prevention OR preventative OR intervention OR treatment OR program OR programme OR control OR strategy OR management OR counseling OR counselling OR therapy OR psychotherapy OR "means safety" OR "means restriction" OR "safety planning" OR "safety plan" OR "crisis management"
#4	Review	"systematic review" OR review OR meta-analysis OR "literature review" OR "review of literature" OR "scoping review" OR meta-synthesis OR "rapid review"
#5	United Kingdom	"united kingdom" OR uk OR britain OR british OR scotland OR scottish OR england OR english OR wales OR welsh OR "northern Ireland"
#6	Strategy	#1 AND #2 AND #3 AND #4 AND #5

3.3. Exposure and outcomes

Exposure is characterised by being a current or former member of the armed forces in any capacity, placement or role. Conditions were defined as: (1) receiving a treatment/intervention, (2) not receiving a treatment/intervention (control group), (3) receiving treatment as usual.

Suicidal behaviour included suicide deaths, non-fatal self-harm (including attempted suicide), and suicidal ideation (thoughts) among veterans and active military personnel. We employed the following terminology and definitions: (1) Suicide: intentional fatal self-harmful act undertaken with at least some intent to die; (2) Attempted suicide: intentional nonfatal self-harmful act undertaken with at least some intent to die; (3) Suicidal thoughts/ideation: thoughts, considerations, or contemplation of suicide or of killing oneself or ending one's life, which may include the wish or desire to end one's life, and may include the presence of a suicide plan and/or preparations; (4) any intentional non-fatal self-harmful act, irrespective of motivation or intention, typically involving self-poisoning with (prescribed or non-prescribed) medication or self-injury (e.g., by cutting). Self-harm excludes the following behaviours: overeating, body piercing, body tattooing, excessive consumption of alcohol or recreational drugs, starvation arising from anorexia nervosa or accidental harm to oneself.

3.4. Information sources

The following databases were searched on 10th March 2021: MEDLINE, EMBASE, PsycInfo, PsycArticles, CINAHL, and Web of Science (including Web of Science Core Collection, BIOSIS Citation Index, BIOSIS Previews, CABI: CAB Abstracts, Current Contents Connect, Data Citation Index, Derwent Innovations Index, KCI-Korean Journal Database, Russian Science Citation Index, SciELO Citation Index, Zoological Record).

3.5. Study selection

Duplicate studies identified by the main search were cross-checked and removed. Publication titles and abstracts were first screened by TZ, and full-text publications were independently assessed by all authors to determine suitability for inclusion.

3.6. Data synthesis and narrative review

The findings of this rapid review are structured according to the types of interventions employing the Institute of Medicine's 1994 classification of preventive strategies[40] (also used by the World Health Organisation[41]): universal, selective, and indicated (Box 1).

Box 1. Institute of Medicine's 1994[40,41] strategy classification to counter suicide risk, including Bruce's[42] identification of specific factors for veterans.

Universal prevention strategies: intended to cover an entire population (e.g., all military personnel and veterans), aiming to improve access to health care, psychoeducation to promote positive mental health and reduce stigma, screening for risk factors, decrease harmful alcohol consumption, limit access to means of suicide.

Selective prevention strategies: aim at vulnerable groups such as those with lived experience of trauma or abuse, affected by conflict or disaster, veterans presenting known risk factors for suicide including psychopathology, and individuals bereaved by suicide. This strategy consists of training *gatekeepers* to assist those vulnerable people and offering helping services such as helplines and evidence-based psychological treatments.

Indicated strategies: designed to assist specific vulnerable people experiencing suicidal thoughts and behaviours. These strategies focus mostly on suicide risk, not only on risk factors. They may include community support, tracking and providing help for those discharged from health-care institutions, educating and training health workers on specific suicide-related interventions, evidence-based assessment and treatment of suicide risk (pharmacotherapy and psychotherapy), implementing safety planning, restricting access to means of suicide. Indicated prevention strategies can also be enhanced by encouraging the development of protective factors such as solid personal relationships, a personal belief system and positive coping strategies.

4. Results

4.1. General description

A total of 86 reviews was identified by the main search. Six publications were removed after deduplication, 81 abstracts were screened, 12 of them were full-text assessed, resulting in the final inclusion of seven publications[2–5,43–45] (2010-2021). Out of the included reviews, four[2–5] assessed the evidence on interventions for military personnel and veterans, and three[43–45] provided recommendations based on the risk factors. The results section focuses on the reviews that provide evidence-based information on interventions (Bagley et al.[2], Harmon et al.[3], Nelson et al.[4], and Rostami et al.[5]).

Most of the interventions included in the selected reviews cover multiple strategies simultaneously, i.e., universal, selective, and indicated strategies are generally applied at the same time in order to maximise the overall effectiveness of a suicide prevention programme. Although the interventions are didactically organised according to different strategies (see Box 1), most authors acknowledge the importance of a multi-level approach to suicide prevention within military personnel and veteran populations.

4.2. Universal strategies

Universal strategies are fundamental to suicide prevention programmes among armed forces personnel and veterans. Bagley et al.[2] included seven empirical studies in their review, all of which included some universal strategy. The study by James and Kowalski[46] described a multifactorial and multidisciplinary approach to a suicide prevention programme in an infantry division in the early 1990s in the US Army. Their programme included the following universal strategies: psychoeducation (e.g., lectures on suicide risk factors and help-seeking taught by chaplains; training programmes for commanders and enlisted soldiers); and written material (pocket-sized cards with warning signs and contact information for emergency services). Bagley et al.[2] highlight the study's methodological problems, including unreported sample size, lack of formal evaluation of the intervention, and unclear baseline comparison rate, which compromises reaching any conclusions about effectiveness. James and Kowalski[46] stated that "the suicide rate has decreased to three in the past 2 years" after the implementation of the intervention. A similar study included in Bagley et al.'s review[2] – conducted by McDaniel et al.[47] in 1986 in a US Navy training command – targeted petty officers and chief petty officers (instructors at the command), who received psychoeducation on how to recognise risk factors among military students (e.g., recent interpersonal losses, substance abuse, social isolation, personality disorders, psychiatric illness), and to maintain/increase group cohesiveness. Several methodological problems were identified by Bagley et al.[2], weakening the study's conclusions despite a statistically significant inverse association between the number of instructors trained and the monthly suicide rate.

Jones et al[48] employed psychoeducation as the main universal strategy within the US Navy and Marine Corps through the development of a training video for all personnel, which included information on risk factors and emphasised positive role models and early identification by co-workers of those at risk. The video was included as part of the required annual general military training within the organisation in 2000. The authors attributed a reduction in suicide rates in the navy, "the lowest in 10 years", to the effectiveness of the programme. Research design issues, such as unreported baseline rate and lack of group comparison, were highlighted by Bagley et al.[2].

In Ukraine, Rozanov et al.[49] described an intervention conducted with 10,000 soldiers in one of the national army units. The main strategy utilised in the programme was the training of four different groups of gatekeepers (I: all soldiers; II: 'formal gatekeepers' including officers, warrants, and sergeants; III:

chaplains, educational officers, psychologists, social workers, medical officers, psychiatrists; and IV: 'professional gatekeepers' including psychiatrists, psychologists, and social workers). The contents of the training, including information on risk factors, myths about suicide, identification of warning signs, symptoms, precipitants of suicide, appropriate actions in response to at-risk individuals, risk assessment, internal procedures and governance, were customised for each group. Training booklets were also distributed. The pre-implementation suicide rates in the years 1988-1999 (32.6 per 100,000) were compared to the post-training rates (2000 and 2001, 0 and 16.7 respectively), suggesting a positive impact of the programme.

Similar approaches to psychoeducation were employed by Knox et al.[50] in their suicide prevention programme, mainly designed to reduce stigma and risk factors and strengthen protective factors through a universal-level strategy among US-based air force personnel (N = 5,000,000). The programme comprised 11 components, including training, screening for suicide risk among personnel under investigation for legal problems, referrals, design of internal procedures of care, and the establishment of a suicide event surveillance system to track suicide risk factors. There was a reduction in the suicide rate over time, with a 33% decrease compared to baseline (average pre-intervention rate of 13.5 per 100,000 and a post-intervention rate of 9.2). This study and programme influenced Gordana & Milivoje[51], who implemented a very similar approach in Serbia and Montenegro. Besides psychoeducation, the intervention included screening during selection (to identify recruits with serious mental illness). The programme, implemented in 2003, was associated with a reduction in the suicide rate: pre-intervention (1999-2003) 13 deaths per 100,000 and post-intervention (2004) 5 deaths per 100,000). Sample sizes were not reported.

Harmon et al.'s review[3] assessed five intervention studies, of which three were included in Bagley et al.'s review[2] (James and Kowalski[46], McDaniel et al.[47], and Knox et al.[50]). One of the other studies in the review reported on a multi-strategy programme (Warner et al.[52]). Alongside indicated strategies (e.g., psychological and pharmacological treatments), universal strategies included psychoeducation (recognition and response training) for personnel and their family members prior, during, and after deployment, and screening for mental illness and suicide risk. Harmon et al.[3] identified several methodological limitations, such as unreported sample size and suicide rates, lack of comparison group (single-arm study) and baseline comparison rates, preventing a conclusive finding of the programme's effectiveness on the reduction of suicide mortality among deployed soldiers.

Rostami et al.'s review[5] included 18 studies examining preventative interventions for suicide among military personnel. Four of these publications investigated universal strategies aiming to prevent and reduce suicidal thoughts, non-fatal self-harm (including suicide attempts), and suicide deaths. Two of these publications[50,51] are discussed above. One of the studies assessed by Rostami et al.[5] was conducted within the Israeli Defense Forces by Shelef et al.[53] and involved two cohorts of army mandatory service soldiers: the first inducted before (1992-2005, n = 766,107), and the second subsequent to (2006-2012, n = 405,252), the launch of the intervention. The multicomponent suicide prevention programme was introduced in 2006, and outcomes were suicide mortality rates and time of occurrence of suicides in both unexposed and exposed cohorts. Universal strategies included restriction of weapon accessibility, screening for mental illness and suicidal thoughts, psychoeducation, and increased availability of mental health officers in various military units and human resources division. Shelef et al.[53] found a 57% reduction in suicide mortality following the implementation of the intervention among male soldiers. Female combatants accounted for only 8% of all suicides, which made it difficult to detect the effect of the programme for them. Regarding the mean time lag until suicide, no differences were found when comparing the periods before and after the intervention. Methodological limitations of this study include: first, lack of random assignment and a parallel comparison group; second, the study, based on a quasi -experimental design, was unable to establish causal links between the intervention and outcomes; and, third, as noted by the authors, restriction of access to firearms (one of the components of the programme) could have accounted for the entire effect of the intervention, since prior to the introduction of the programme 84% of suicides were use of firearms.

A pre/post quasi-experimental study carried out by Smith-Osborne et al.[54] investigated the effect of psychoeducation (Applied Suicide Intervention Skills Training - ASIST) on hopelessness, resilience, suicidal thoughts, suicide attempts and suicide deaths among 131 US-based army personnel. The intervention period lasted four months. Outcomes in platoons in which fewer than 80% of members received training during the calendar year (defined as 'low training groups') were compared to outcomes in platoons in which all staff were trained ('high training groups'). The level of hopelessness reduced over the intervention period for both groups, and those in the high training group presented fewer cases of suicide attempts and suicidal ideation compared to those in the low training group. The study also found that post-intervention levels of positive future expectations increased. Methodological limitations include lack of randomisation, the absence of a control group, and small sample size.

4.3. Selective strategies

Selective strategies target veterans and military personnel who may not have experienced suicidal thoughts, but are potentially affected by known risk factors for suicide (e.g., PTSD, depression, and other psychological disorders)[42]. In the publications included in the present rapid review[2–5], all assessed interventions incorporated components of selective strategies in their suicide prevention programmes. Most of these strategies included screening for (or conducting clinical interviews to investigate the presence of) risk factors, such as depressive symptoms, substance abuse, pending legal problems (irrespective of severity level), relationship problems, financial strain, work-related difficulties, gambling problems, PTSD symptoms, changes in mood, social isolation, levels of stress, personality disorders and serious psychiatric illnesses, eating habits, and sleep pattern/quality. These assessments were used to inform internal procedures of referral to mental health care within the military system and to identify and treat personnel who might be at high risk of suicide.

According to Bruce[42], the inclusion of selective strategies has great significance in preventing suicides not only among active armed forces personnel, but also among veterans in all age cohorts. To enhance the effectiveness of suicide prevention for veterans, access to evidence-based psychological treatments should be widened. Screening for and treating veterans at risk of mental illness can be implemented though primary care and community services, a task that can be carried out by a collaborative effort between the armed forces, the health system, and the third sector[55].

Although Nelson et al.'s review[4] concentrates on veterans only, it also contains studies that do not focus on this population but whose methods of screening for psychopathology and suicide risk indicate potential usefulness as a selective strategy among veterans. Some of these methods include the use of known risk assessment questionnaires such as SAD PERSONS[56], Suicide Opinion Questionnaire[57], Personality Assessment Inventory[58], Affective Intensity Rating Scale[59]. Although psychometric instruments to screen, assess and monitor psychopathological symptoms and suicide risk have been widely used within the field of evidence-based psychological treatments, important caveats should be highlighted here. Recent evidence[60] suggests that these methods should be used with caution, as individual risk prediction scales do not offer sufficient diagnostic accuracy to inform clinically useful decision-making[61,62]. If screening instruments are used as the main tool for assessment and monitoring, they will fail to identify many of those vulnerable veterans and active personnel who may attempt suicide in the future, and thus miss the opportunity to intervene and treat those most in need[60]. Instead, a thorough and compassionate psychosocial clinical interview, focused on the mitigation of suicide risk[63], should be undertaken; psychometric instruments should be used as additional resources, not as the main information source for decision-making.

4.4. Indicated strategies

Indicated prevention interventions, for which there is a larger amount of evidence relating to the armed forces personnel and veterans, focus on reducing suicidal thoughts and behaviours rather than on their proximal

risk factors[40–42]. Bruce[42] proposes that indicated strategies should be understood at two levels, that of the system and of the patient. At the system level, suicide prevention programmes should include especial training for clinicians on suicide risk management and provide support of suicide crises lines for veterans. At the patient level, interventions should include intense monitoring and safety plans, evidence-based psychological treatments developed specifically to mitigate suicide risk, and evidence-based pharmacotherapy. In all publications included in the current rapid review, indicated strategies were an essential part of the suicide prevention programmes. Rostami et al.[5] included eleven studies testing the effectiveness of psychotherapy (five quasi-experimental studies[64–68], four randomised controlled trials[69–73], and one retrospective study[74]), one publication on crisis management[75], one on the effectiveness of pharmacotherapy[76], and one on follow-up contact[77]. Most of these focused on soldiers and military personnel.

4.4.1. Psychotherapy

The quasi-experimental studies[64–68] included a variety of interventions and were conducted within the Iranian army. Anisi et al.[65] employed a brief problem-solving training based on D'Zurilla and Goldfried's[78] model throughout six sessions with 90 Iranian soldiers (n = 45 assigned to treatment and n = 45 assigned to the control group, which received routine care and training provided in military settings). Findings indicated significant lower levels of suicidal ideation among members of the intervention group. This approach was replicated by Zahed and Khedri[68] with 32 Iranian soldiers, but with eight instead of six sessions; the authors reported similar findings. Three additional and different interventions were tested within the Iranian armed forces. Rahnjet et al.[64] recruited 24 soldiers ($n_{treatment}$ = 12; $n_{control}$ = 12, who received routine psychiatric treatments, such as medication) and compared the effect of ten sessions of hardiness intervention, which included psychoeducation on the concepts of stress, hardiness, mental imagery, strategies of anxiety management, healthy diet, and regular exercise. The findings suggested lowered suicidal thoughts for the intervention group. Goudarzi et al.[66] tested the effectiveness of a Mindfulness-based stress reduction (MBSR) training throughout eight sessions with 40 Iranian soldiers ($n_{treatment}$ = 20; $n_{control}$ = 20, who received routine care and training provided in armed forces settings), also finding reduced levels of suicidal ideation for the treatment group. Finally, Karkhaneh et al.[67] evaluated the impact of ten sessions of psychodrama intervention, training participants how to "relive" their psychological and social difficulties associated with their suicidal thoughts employing different psychodrama techniques. Twenty Iranian soldiers participated ($n_{treatment}$ = 10; $n_{control}$ = 10, who received routine care and training provided in military settings), and the findings suggested a significant reduction of suicidal thoughts among those who received the intervention. Although these quasi-experiment studies employed brief interventions that could be more easily applied when compared to other long-term treatments, these studies have several methodological limitations, such as small sample sizes, making it very difficult to detect an effect and increasing the likelihood of false-positive results, lack of randomisation and follow-up assessment months after the treatment termination. Hence, these findings should be treated with caution.

The randomised controlled trials[69–73] were conducted in the US. Bryan et al.[69] and Rudd et al.[73] tested the effectiveness of the Brief Cognitive-Behavioural Therapy (BCBT) with 152 soldiers ($n_{treatment}$ = 76; n_{TAU} = 76, who received treatment as usual). The intervention comprised 12 sessions, once or twice a week, in three phases: Phase I (five sessions) focused on the evaluation and conceptualisation of the treatment; Phase II (five sessions) focused on applying the strategies learnt throughout the intervention; and Phase III (two sessions) concentrated on relapse-prevention activities. Both treatment and TAU groups were followed up 24 months after treatment termination, with results suggesting a significant reduction in suicide attempts (eight attempts in the treatment group versus 18 in the TAU group).

In another pilot trial, LaCroix et al.[72] tested the effectiveness of the Post-Admission Cognitive Therapy (PACT) versus Enhanced Usual Care (EUC) among 36 soldiers (n_{PACT} = 18; n_{EUC} = 18) psychiatrically hospitalised due to either a recent suicide attempt or

suicide ideation with a history of a prior suicide attempt. The intervention included six sessions (60-90 minutes) in three phases: phase I focused on case conceptualisation and engagement with the treatment; phase II concentrated on training and application of cognitive and behavioural skills; and phase III was designed to increase skills retention and relapse prevention. Blinded follow-up assessments were conducted at one, two and three months post-psychiatric discharge. No significant between-group differences relating to post-treatment suicide attempt and ideation were found. Ghahramanlou-Holloway et al.[70] replicated this trial with 24 US-based service members ($n_{PACT+EUC}$ = 12; n_{EUC} = 12) psychiatrically hospitalised at an army medical clinic due to a recent suicidal crisis. Again, no statistically significant between-group differences were found. Some of the limitations of the PACT pilots include small sample sizes and participant drop-out over the follow-up period, making it difficult to detect significant differences between groups.

Jobes et al.[71] compared the effectiveness of the Collaborative Assessment and Management of Suicidality (CAMS) with enhanced usual care (EUC) among 148 US Army soldiers (n_{CAMS} = 73; n_{EUC} = 75) at four post-treatment follow-up assessments (one, three, six, and 12 months). CAMS is a suicide-specific treatment that employs the use of a multipurpose assessment, treatment planning, tracking, and outcome tool (Suicide Status Form). No between-group differences were found in terms of post-treatment suicidal ideation: both groups demonstrated comparable improvements over time. Participants assigned to CAMS treatment were significantly less likely to have any suicidal thoughts by three months in comparison to those in EUC group.

The effectiveness of the CAMS intervention was also assessed by Jobes et al.[74] in a retrospective study with 55 air force personnel, of whom 30 were offered treatment as usual (TAU) (n_{CAMS} = 25; n_{TAU} = 30). Those in the treatment group resolved their suicide risk significantly more quickly than those in the TAU group. CAMS was also associated with reduced use of medical care in the six months following the start of treatment. Among the limitations of this study is the lack of randomisation of patients to treatments and the lack of measures of treatment fidelity.

4.4.2. Crisis management interventions

Rostami et al.[5] included a randomised controlled trial by Bryan et al.[75], which tested the effectiveness of crisis response planning (CRP) in two forms (standard and enhanced) versus contracts for safety (CFS) on suicide risk (treatment as usual) among 97 army soldiers (n_{CRP} = 32; $n_{E\text{-}CRP}$ = 33; n_{TAU} = 32) with active suicidal ideation and history of suicide attempt. The crisis response planning included elements such as evaluation of suicide risk, supportive listening, alarming symptoms, self-management skills, social support, crisis resources, and referral for therapy (a similar approach to the Safety Planning Intervention[79,80]). The enhanced version of the CRP included a discussion on reasons for living. From baseline to the six-month follow-up, three participants receiving CRP (estimated proportion: 5%) and five participants receiving CFS (estimated proportion: 19%) attempted suicide, which indicates a 76% reduction in suicide attempts in the CPR group. The use of CRP was associated with significantly faster reduction in suicide thoughts and fewer inpatient hospitalisation days. No differences were found between the enhanced and standard CRP conditions. Methodological limitations include small sample size with low statistical power, and problematic generalisability of findings to other populations (e.g., veterans).

4.4.3. Pharmacotherapy

A proof of concept randomised controlled trial by Burger et al.[73] tested the effect of ketamine (*N*-methyl-*D*-aspartate antagonist ketamine – a drug primarily utilised for inducing and maintaining anaesthesia) in a convenience sample of active military personnel admitted to emergency department (ED) and meeting criteria for inpatient psychiatric hospitalisation due to depression and suicidal ideation. The sample was randomised to receive either a sub-dissociative dose (0.2 mg/kg) of IV ketamine (n = 3) or equivalent volume of normal saline (placebo; n = 7). Participants were assessed for symptoms throughout a four-hour Emergency Department (ED) presentation at hospital discharge and two weeks later. Two of three who

received ketamine experienced considerable reduction in suicidal thoughts and levels of hopelessness within 40 minutes. These improvements were not seen in any of seven controls over the four-hour assessment. No clinically significant difference was identified between the groups at discharge from ED. The study has serious methodological limitations, including very small sample size.

4.4.4. Follow-up contact

A community-based intervention study included in Rostami et al.'s review[5] (besides other studies already discussed above) was a randomised trial, conducted by Comtois et al.[77], which tested the effectiveness of a brief caring text messages for suicide prevention. The intervention included text messages received by the participants every day, every week, or every 1-4, 6, 8, 10, or 12 months and on birthdays. The messages were irregular, did not ask anything from the participants, and only expressed care or worry. A total of 657 soldiers from the US army and US marines were included (n = 329 in the treatment, and n = 328 in the control / treatment as usual group). Findings suggest no differences in reduction of frequency and severity of suicidal ideation, suicide risk factors, and ED admissions between groups. The intervention group (provided with 11 text messages sent over a year) had reduced odds of any suicidal ideation and suicide attempt when compared to the treatment as usual group. The study provides inconsistent results on the effectiveness of this intervention.

A feasibility study was conducted in the US by Luxton et al.[81] (included in Harmon et al.'s review[3]) to investigate the acceptability of the Caring Letters Programme (CLP), which consists of the mailing or emailing of letters to patients after a psychiatric hospitalisation. The letters contained personalised messages about the information collected during structured interviews and had questions about hobbies, support networks, and coping skills. A sample of 110 active military personnel took part in the study and received personalised handwritten letters or e-mails at regular intervals following discharge. A total of 15 participants in the study was subsequently readmitted to emergency department, compared to 20 nonparticipating inpatients. Given the small sample size, lack of control group, and absence of data on suicidal behaviour among participants, it is not possible to determine whether the intervention had any effect on the readmission rate.

In 2020, Luxton at al.[82] conducted a randomised controlled trial testing CLP for both active military personnel and veteran psychiatric inpatients (N = 1,318; n_{CLP} = 652, n_{TAU} = 666). The intervention group received 13 emails after being discharged from the inpatient unit during the following two years (monthly for four months, then every two months for eight months, and then every three months; researchers sent one additional email during the first week after hospital discharge). There was no statistically significant difference between groups with regard to suicide rates, hospital readmission, suicide attempts, suicidal ideation, or any other outcomes. Limitations of the study highlighted by authors include insufficient sample size to examine mortality data, unsatisfactory discrimination of the type of post-randomisation hospitalisation, a small follow-up rate for the survey-based outcome data, and an inability to ascertain the number of emails that were received and read.

5. Discussion

Most of the evidence on suicide prevention interventions summarised by the reviews included in the current report focuses on active armed forces personnel. Despite the differences between this group and veterans, it is possible that the results of the interventions tested with active duty personnel could be extended to veterans, given that both groups share similar lived experiences within the armed forces. This possibility should, however, be examined through studies testing interventions separately in each group. The evidence collated by the reviews included in this report highlight the need for more intervention studies to be conducted among veterans.

Although the effectiveness of the strategies explored in the current review is variable, the evidence seems to suggest that suicide prevention programmes that combine multiple strategies simultaneously are more likely to be successful. A prime example is the programme developed by Knox et al.[50] which comprised a range of strategies across different levels, including leadership involvement, psychoeducation within the institution, guidelines and internal procedures of prevention, community preventive services, community education and training of staff and gatekeepers, survey and screening for mental illness and suicide-specific risk factors, provision of multidisciplinary teams with mental health care specialists, policies on access to means and firearms, inclusion of family and social networks in the mental health care provision of those receiving treatment, surveillance system and other strategies. However, as highlighted by Bagley et al.[2], there are still several unresolved questions about the relative value of each individual element, or the possible increase in effectiveness resulting from the addition of other components and enhancing the effectiveness of each added element. Harmon et al.[3] note that, regardless of the implementation of any strategy, interventions need to be tailored to the context of a particular military setting, circumstance, occupation, or status (active or veteran).

Box 2. Report's key messages.

- Most of the evidence on suicide prevention interventions summarised in the reviews focuses on active armed forces personnel. Despite the differences between this group and veterans, it is possible that the results of the interventions tested with active personnel could be extended to veterans, given that both groups share similar lived experiences within the armed forces. This assumption, however, should be informed by further evidence derived from studies which test those interventions in both groups separately, examining the role of specific factors for each population. The findings of the reviews included in this report highlight the need for more intervention studies among veterans.
- To enhance the effectiveness of suicide prevention for veterans, access to evidence-based psychological treatments should be widened. Screening for and treating veterans at risk of mental illness can be implemented though primary care and community services, a task that can be carried out by a collaborative effort between the armed forces, the health system, and the third sector.
- There is some evidence that suicide prevention programmes which combine multiple strategies simultaneously are more likely to be successful than single-strategy interventions in preventing suicidal behaviour and suicide deaths.
- The studies included in the reviews examined here do not provide any data on interventions to prevent and reduce suicidal behaviour among armed forces personnel and veterans in the UK. As this report includes only published reviews and searches for individual studies were not carried out, it is possible that recent intervention studies in the UK may have been missed. It should be noted, however, that the most current review included in this report was published in 2021. Interventions on suicide prevention among UK veterans and armed forces personnel are needed, particularly in light of the importance of differences in cultural context highlighted in this report.

Unfortunately, the studies included in the reviews examined here do not provide any data on interventions to prevent and/or reduce suicidal behaviour among armed forces personnel and veterans in the Scottish or UK context. As this report includes only published reviews and searches for individual studies were not carried out, it is possible that recent intervention studies published in the UK recently were missed. It should be noted, however, that the most current review included in the report was published in 2021[5]). Interventions on suicide prevention among UK veterans and armed forces personnel are needed, particularly in light of the importance of differences in cultural context previously highlighted in this report.

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