Evidence Compass

Technical Report

What is the prevalence rate for substance use disorder in contemporary ex-serving veterans?

A Rapid Evidence Assessment

August 2013

Australian Government
Department of Veterans' Affairs

Disclaimer

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Please forward any comments or queries about this report to at-ease@dva.gov.au

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Executive Summary

- Contemporary conflicts, such as the Iraq/Afghanistan wars which have been in operation for over a decade, expose veterans to trauma, injury and stress. Substance use disorder is one of the psychiatric disorders that veterans may experience after leaving military service.
- The aim of this rapid evidence assessment was to provide an assessment of the current prevalence rate of substance use disorder in contemporary ex-serving veterans. Literature searches were conducted to collect studies published from 1999-2013 that investigated substance use disorder in veterans, with a focus on contemporary ex-serving veterans.
- Disorders of interest included nicotine use disorder, alcohol use disorder (including alcohol abuse disorder and alcohol dependence disorder), drug use disorder (including drug abuse disorder and drug dependence disorders) and substance use (alcohol *or* drug abuse or dependence disorder, or alcohol *and* drug abuse disorder or dependence disorder).
- Studies were excluded if the sample population included veterans with a diagnosed physical or mental health disorders or non-contemporary veterans. Studies were assessed for quality of methodology, risk of bias, quantity of evidence, and generalisability to the population of interest, and then collated for each substance use disorder to determine an overall ranking of certainty surrounding the purported prevalence rate.
- Rankings were: ‘High certainty’ –high degree of certainty that the findings from the studies report a prevalence rate the represents the actual prevalence rate of the target population; ‘Moderate certainty’ -moderate degree of certainty that the findings from the studies report a prevalence rate the represents the actual prevalence rate of the target population; ‘Low certainty’ – low degree of certainty that the findings from the studies report a prevalence rate the represents the actual prevalence rate of the target population.
- Fifteen studies met the inclusion criteria for review, which included investigation of veterans and substance use disorder. All of the studies originated from the USA.
- The results showed that 15 per cent of US contemporary veterans had nicotine use disorder. This could be generalised to Australian contemporary ex-serving veterans with moderate certainty.
- Seven per cent of US contemporary veterans had alcohol use disorder, which can be generalised to Australian contemporary ex-serving veterans with moderate certainty.
- Three per cent of US contemporary veterans had drug use disorder, which can be generalised to Australian contemporary ex-serving veterans with moderate certainty.

What is the prevalence rate for substance use disorder in contemporary ex-serving veterans?

- Between 7-11 per cent of US contemporary veterans had a substance use disorder, which can be generalised to Australian contemporary ex-serving veterans with moderate certainty.
- Rates are higher in men and appear to have increased over the past decade.
- Studies are needed on Australian veteran populations and in high-risk veteran populations, such as those with physical and psychological health disorders.
- Substance use and misuse rates are typically higher than diagnosed substance use disorder rates, so capturing these behaviours in other research is essential to understanding the scope of these problems in a population.

Introduction

Substance use disorders are serious psychiatric conditions that place a significant burden on the individual and the healthcare system. For example, smoking is the leading cause of death worldwide in developed countries, with alcohol and illicit use of drugs also appearing in the top ten[1]. In addition, substance use is a common, but maladaptive way in which individuals manage the psychological burdens associated with other psychiatric disorders. As such, substance use disorders have been shown to be highly comorbid with other mental health disorders[2-6].

The prevalence of substance use disorders has been found to be high in veterans after leaving the military. For example, in a study conducted in 1996 with Australian Vietnam veterans the lifetime prevalence of alcohol use disorders was 41 per cent, and of substance use disorders was 3 per cent[7]. Certain populations of veterans, such as those with other psychological disorders or physical health problems, may be particularly vulnerable to developing substance use disorders. A recent comprehensive investigation into Australian military serving populations has shown that while high rates of alcohol use occur, active serving members are less likely to have an alcohol use disorder than civilians[8]. However, these rates may change once veterans leave the military, as ex-serving veterans may have less stigma or career-related concerns than active-duty members in disclosing substance use[9].

There is much evidence to suggest that substance use disorders are more prevalent in contemporary veterans. In modern conflicts such as the operations in Iraq (Operation Iraqi Freedom - OIF) and Afghanistan (Operation Enduring Freedom - OEF), deployed military personnel are exposed to extreme levels of stress. Furthermore, military personnel are often deployed multiple times, compounding the psychological demands placed on an individual. They are also exposed to injury events with many more military personnel surviving life-threatening injuries than in previous conflicts[10]. Subsequently, since the Iraq operation began in 2001, increasing numbers of contemporary veterans have presented with psychiatric and physical disorders such as depression, anxiety, posttraumatic stress disorder (PTSD), traumatic brain injury (TBI), and chronic pain[11-15]. For those veterans who do not experience such disorders, simply adjusting to life post-deployment can pose a significant challenge. As such, there has been increasing concern regarding the maladaptive coping strategies involving substance use that veterans may use post-deployment[16].

The aim of this review is to determine the prevalence rate of substance use disorders in contemporary ex-serving veterans. Specifically, nicotine, alcohol, drug, and non-specified substance use disorder prevalence rates will be reviewed. These findings will be used to highlight areas in the literature where a more thorough investigation needs to be conducted and identify those veteran sub-populations with elevated prevalence rates. Identifying such populations may assist with the recognition and management systems of DVA healthcare providers.

Method

This project utilised a rapid evidence assessment (REA) methodology. The REA is a research methodology which uses similar methods and principles to a systematic review but makes concessions to the breadth and depth of the process, in order to suit a shorter timeframe. The advantage of an REA is that it utilises rigorous methods for locating, appraising and synthesising the evidence related to a specific topic of enquiry. To make an REA rapid, however, the methodology places a number of limitations in the search criteria and in how the evidence is assessed. For example, REAs often limit the selection of studies to a specific time frame (e.g., last 10 years), and limit selection of studies to peer-reviewed published, English studies (so therefore not including unpublished pilot studies, difficult-to-obtain material and/or non-English language studies). Also, while the strength of the evidence is assessed in a rigorous and defensible way, it is not necessarily as exhaustive as a well-constructed systematic review. A major strength, however, is that an REA can inform policy and decision makers more efficiently by ranking and synthesising the evidence in a particular area within a relatively short space of time and at less cost than a systematic review.

Defining the research question

The components of this question were precisely defined in terms of the population and the outcomes (see Appendix 1). Operational definitions were established for key concepts for each question, and specific inclusion and exclusion criteria were defined for screening studies for this REA. As part of this operational definition, the population of interest was defined as contemporary veterans (see below for further details), and the outcome was defined as investigation of substance use disorder.

Defining the population

Contemporary, ex-serving veterans were the target population for this review, therefore, only studies that used the term ‘veteran’ were included. In order to capture the contemporary population, studies that utilised a population of veterans who served in conflicts prior to 1999 were excluded. Studies were also excluded when the sample was made up of 100 per cent Vietnam veterans (or older conflict veteran populations). Studies comprising samples that were a mix of veterans exposed to older and/or contemporary conflicts were included and are identified specifically in this review. In studies where the conflict was not reported, mean age of the sample was restricted to less than 55 years of age, excluding studies with older populations. In order to capture ex-serving populations, studies that comprised 100 per cent still serving veterans were excluded. Studies that had combined current-serving and ex-serving participants were included and are identified throughout the review. Studies that did not state ex-serving or still-serving status were included and are identified throughout. Thus, only studies that clearly did not meet our selection criteria were excluded from the review. Studies with insufficient information to make a clear exclusion decision were included in the review. These ‘uncertain’ studies are highlighted throughout the review, and the level of uncertainly about their results was taken into consideration when assessing the evidence.

Search strategy

A search strategy was developed using relevant subject headings for each database and additional free text words. The search strategies also included a filter to identify relevant publication types.

To identify relevant literature for the rapid evidence assessment, systematic bibliographic searches were performed to find relevant trials from the following databases: EMBASE, MEDLINE (PubMed), PsychINFO.

Search terms

The search terms specific to prevalence rates for substance disorders in contemporary ex-serving members that were included in searching the Title/s, Abstract/s, MeSH terms, Keywords lists and Chemical were:

Veteran or war veteran or combat veteran or soldier or ex-service or military or military personnel or armed force

Illicit drug or drug abuse or drug misuse or substance abuse or substance use or substance abuse disorder or alcohol disorder or tobacco or tobacco smoke or tobacco dependence.

An example of the search strategy conducted in the Embase database appears in Appendix 2.

Paper selection

Studies were evaluated according to the following inclusion and exclusion criteria.

Included:

1. Internationally and locally published peer-reviewed research studies
2. Research papers that were published after **1st January 1999** until **19th April 2013**
3. Human adults (i.e. ≥ 18 years of age)
4. English language
5. Population was contemporary veterans (serving post-Vietnam OR under the age of 55)
6. If mixed sample (veteran and other), stratification of data for veterans was required
7. Veterans were healthy or had no known diagnosed disorders
8. Substance use disorder(s) was measured in the sample

Excluded:

1. Non-English papers
2. Sources published prior to 1999
3. Papers where a full-text version was not readily available
4. Validation study
5. Animal studies
6. Stand-alone methods paper
7. Grey literature (e.g. media: newspapers, magazines, television, conference abstracts, theses)
8. Sample consisted of children (Mean age of sample ≤ 17 years)
9. Sample consisted of older adults (Mean age of sample ≥ 55 years of age)
10. No investigation of substance use disorders
11. Sample included Vietnam veterans or earlier conflicts only
12. Sample included active-duty veterans only
13. Sample only included veterans who had a diagnosed mental health or physical health disorder
14. No useable data in the study

Information management

A screening process was applied to code the eligibility of papers acquired through the literature search. The content of the screening form at the title and abstract screening stage is presented in Appendix 3.

Papers were directly imported into EPPI-Reviewer 4 software. All records that were identified using the search strategy were screened for relevance against the inclusion criteria. Initial screening for inclusion was performed by one reviewer, and was based on the information contained in the title and abstract. Full text versions of all studies which satisfied this initial screening were obtained.

In screening the full-text paper, the reviewer made the decision on whether the paper should be included or excluded, based on criteria for the specific question. If the paper met the criteria for inclusion, then it was subject to data abstraction.

At this stage in the information management process, 10 per cent of the articles being processed were randomly selected and checked by two independent reviewers. In the case of discrepancies regarding inclusion/exclusion, discussions were held between the two independent reviewers and also the lead researcher and the discrepancies reconciled. Studies that made it to the final stage of inclusion are presented in detail in Appendix 4, where specific details of each study are reported.

Evaluation of the evidence

There were four key components that contributed to the overall evaluation of the evidence.

- quality and risk of bias
- data source (primary or secondary)
- quantity of evidence
- the generalisability of the body of evidence to the target population (i.e., Australian contemporary ex-serving veterans).

Quality and risk of bias reflected the scientific benchmarks for prevalence studies where randomly selected samples, clear definitions of population and disorder/topic of interest, utilisation of validated tools, and reporting of information on non-responders, all constituted a ‘gold standard’ quality of evidence (see Appendix 5 for modified version of a checklist for prevalence studies)[17]. Bias was also assessed via **data source**, which reflected whether data collected in each study was primary (e.g., clinical interview) or secondary (e.g., medical chart review). Primary data sources are collected with purposeful intention by researchers to

measure a particular phenomenology of interest, meaning the researcher can control or manipulate relevant variables to increase the likelihood of obtaining the true prevalence rate[18]. In comparison, secondary data sources are collected at a time point after the diagnosis was made, where at the time of diagnosis, neither the patient nor the clinician were aware that the diagnosis would be used for research purposes. Therefore, by nature, secondary data sources are opportunistic, which may increase or decrease risk of bias depending on the phenomenology of interest. Mental health disorders, including substance use disorders, may be underdiagnosed in some settings (for example, someone presenting to an emergency department of a hospital for an injury may not be routinely asked about whether they have a substance use disorder). The data source was therefore taken into consideration when ranking the evidence in this REA in order to account for this potential bias.

Quantity of evidence reflected the number of studies that were included as the evidence base for each ranking. Importantly for prevalence studies, the quantity assessment also took into account the number of participants included in the study.

Generalisability covered how well the participants and settings of the included studies could be generalised to the target population. Population issues that might influence this component included gender, age, ethnicity, or level of care (e.g., community or hospital).

Ranking the evidence

After each paper was individually evaluated, all papers on the topic were considered together to rank the overall evidence base (see Appendix 7 for a list of citations for each ranking). A judgement was made about the total body of evidence, taking into account the quality and risk of bias, data source, quantity and generalisability of the body of evidence. Evidence was ranked on a scale from high certainty to low certainty. Agreement was sought between three independent raters and consensus about the level of certainty that applied to the prevalence rate (Figure 1 below).

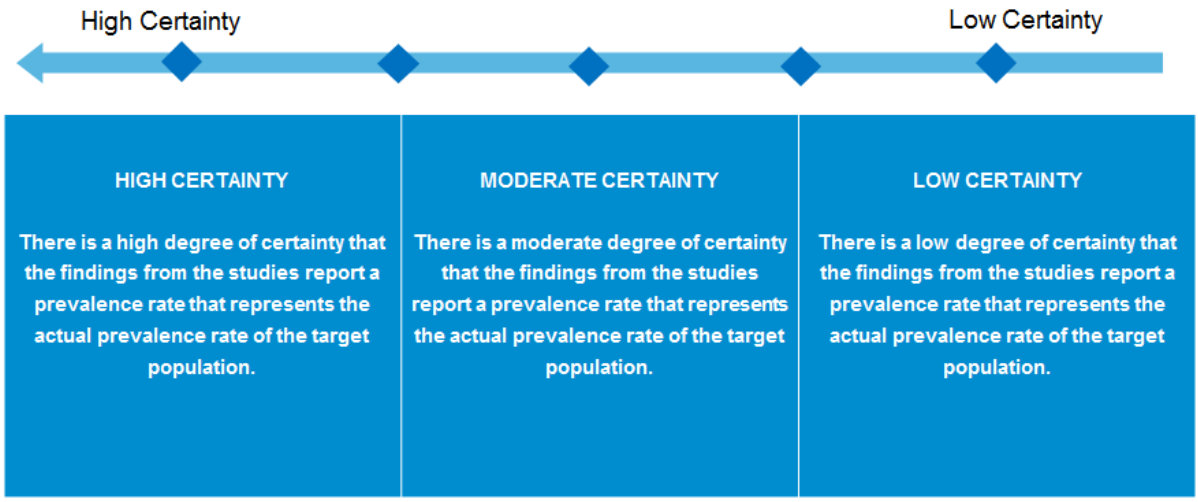

Figure 1. Continuum of certainty for prevalence rates

High Certainty category

The level of evidence supporting the prevalence rate of a disorder was categorised into the High Certainty category if each of the following set of criteria was found to be present in the prevalence study(ies):

- there was at least one study with a 'Good' quality rating
- the study(ies) rated as 'Good' must have had a sample size that was deemed large enough to reliably identify the phenomenology of interest, AND must have involved a primary data source (i.e. lower risk of bias)
- the findings of the study(ies) rated as 'Good' were from the population of interest, OR were highly generalisable to the population of interest.

Moderate Certainty category

The level of evidence supporting the prevalence rate of a disorder was categorised into the Moderate Certainty category, if

- there was at least one study with a 'Good' quality rating
- the study(ies) rated as 'Good' must have had a sample size that was deemed large enough to reliably identify the phenomenology of interest
- the findings were moderately generalisable to the population of interest.

Low Certainty category

The level of evidence supporting the prevalence rate of a disorder was categorised into the Low Certainty category, if each of the following set of criteria was found to be present in the relevant prevalence study(ies):

- at least one study with ‘Good’ quality but low generalisability OR
- at least one study with a ‘Fair’ quality rating and had findings that were highly generalisable to the population of interest.

Results

Type of evidence

The following section presents figures pertaining to the volume of records identified at each stage of the REA (see Figure 2), the source of the records, and the year of publication to indicate the scope and extent of the literature that the evidence base was extracted from. From all the sources searched, a total of 15 papers met the inclusion criteria and were included in the final report. Of the 15 studies selected for review, 100 per cent originated from the USA. The year in which the included studies were published is presented in Figure 3 below. More studies have been conducted in recent years, coinciding with the timeframe of the OEF/OIF conflicts.

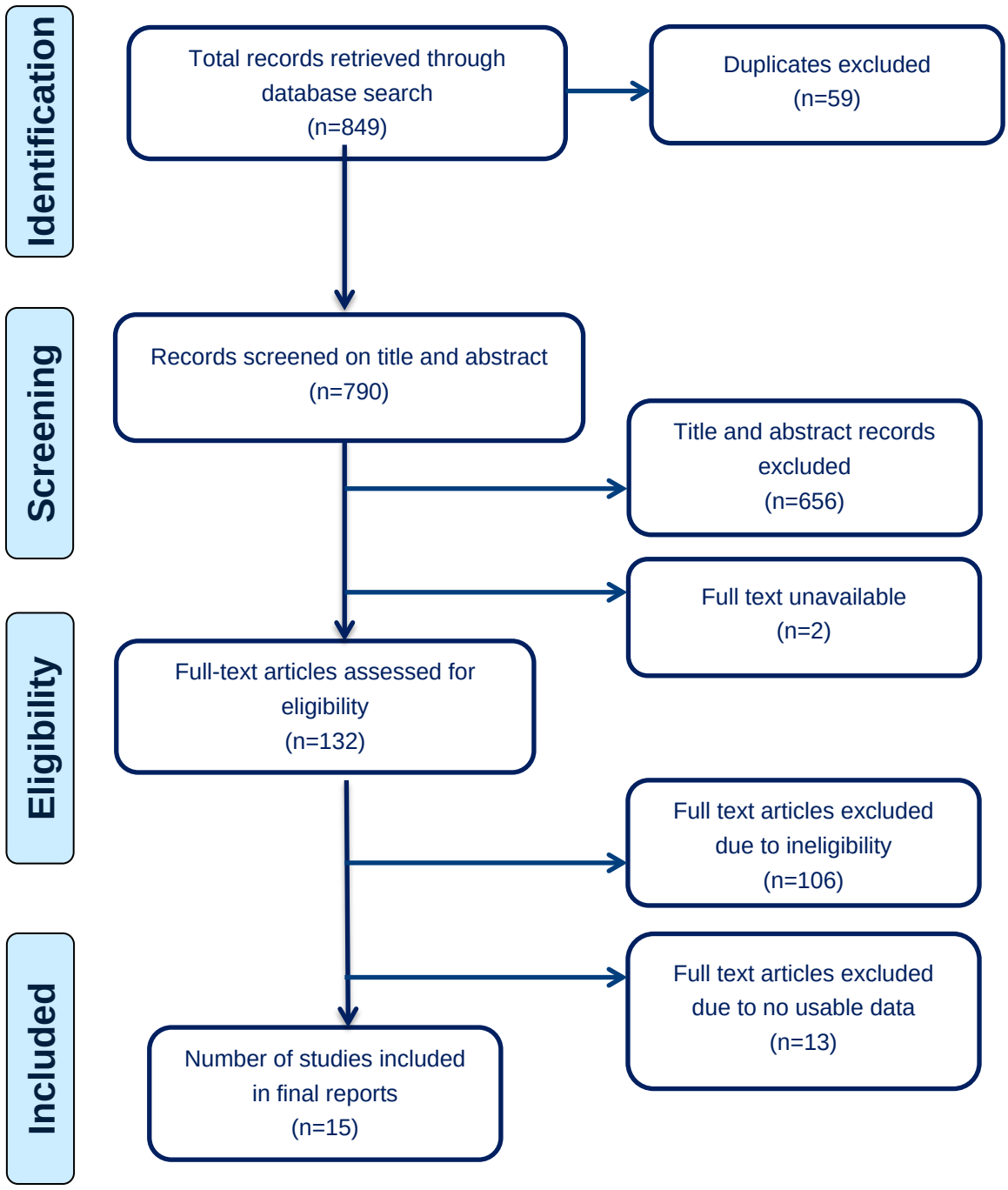

Figure 2. Flowchart representing the number of records retrieved at each stage of the rapid evidence assessment

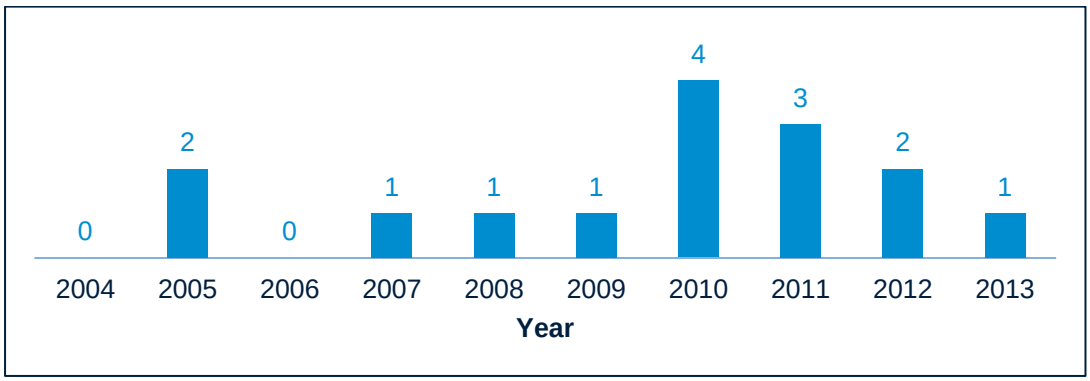

Figure 3. Year of publication of studies included in the rapid evidence assessment.

Summary of the evidence

A total of 15 papers met inclusion criteria for the review. The diagnosed use disorders specifically focussed on in this review are: nicotine use disorder, alcohol use disorders (including alcohol abuse disorder and alcohol dependence disorder), drug use disorders (including drug abuse disorder and drug dependence disorders), and substance use disorders (including substance abuse disorder and substance dependence disorder). The drug use disorder section refers to drug use disorders (excluding alcohol) and specific substance use disorders such as cannabis use disorder, cocaine use disorder, and opioid use disorder. The substance use disorders section refers to studies where authors did not distinguish between alcohol and drug use disorders, which prevented grouping these studies into the nicotine, alcohol or drug groups.

Typical ways in which substance use prevalence is defined is by current, past 12 month and lifetime prevalence rates. A current prevalence rate refers to the number of individuals at the current point in time (often defined as last four weeks) that has a substance use disorder. Past 12 month rates refers to the number of individuals who have, or have had, a substance use disorder within the past 12 months. Lifetime prevalence rates refer to the number of individuals who have ever had a substance use disorder, up until the time point of interest. Lifetime rates are typically higher than current prevalence rates. The majority of studies that met inclusion criteria for this review measured current prevalence rates. Therefore, the rates presented below refer to current prevalence rates unless otherwise stated. Substance use disorder rates can vary according to how they are assessed, with self-report measures typically reporting higher rates than structured clinical interview rates. Where relevant in this review, these aspects of studies will be highlighted.

The included studies also sourced their samples from two pools of veterans: those with a normal variation in health status, or veterans accessing the USA Veterans Affairs (VA) services. Terms are defined as follows.

Otherwise healthy

Veterans in these studies were recruited from the general population of veterans. It is assumed that this group includes a typical range of health statuses. As such, substance use disorder prevalence rates in these studies represent those of an 'average veteran'.

Accessing VA services

Veterans in these studies were either enrolled in, seeking use of, or receiving care from VA services, and all studies were conducted on US, ex-serving samples. These samples include veterans who were accessing healthcare services, mental health services, or unspecified services that the VA provides to veterans. Studies which utilised this group of veterans were included because nearly half of veterans access VA services and it therefore represents a large proportion of US veterans[19,20]. However, when studies utilised a sample of veterans who were seeking care, it was often not known at the time of the study what specific issue a veteran was seeking care for. This is important to note, as prevalence rates of substance use disorders may be higher in those accessing services, compared to healthy veterans [3,21,22].

Prevalence rates

Nicotine use disorder

The search criteria identified one study that addressed the current prevalence of nicotine use disorder in veterans[23]. The study methodology was evaluated as having good quality and low bias, according to the criteria[17] utilised in this REA. The study was conducted on US veterans of all conflicts, however, prevalence rates for OEF/OIF veterans were stratified and comprised a large sub-sample size (n=200,300). The veterans were accessing health services through the VA and the reason for accessing these services was not reported. Although the study utilised a secondary data source of VA administrative data files, exposing it to some risk of bias for measurement of substance use disorder rates, it did utilise diagnostic criteria to identify the disorder of interest, and it captured the whole population of veterans accessing health services in the US VA in the fiscal year 2009. The prevalence rate of nicotine use disorder identified in the sub-sample of these OEF/OIF veterans was 15 per cent.

The generalisability of these findings to Australian ex-serving contemporary veterans was deemed as moderate. From one large-scale, good quality study, using secondary data with moderate generalisability, we have a **moderate degree of certainty** in the applicability of a nicotine use disorder prevalence rate of 15 per cent to Australian ex-serving contemporary veterans.

Alcohol use disorder

The search criteria identified 10 studies that investigated the prevalence of alcohol use disorders[9,20,23-30]. These studies received a range of rankings from good to poor quality, and investigated a range of veterans. Four studies, similar in methodology, were rated as having good quality and low risk of bias, according to the methodology criteria[17] utilised in this REA. In a study of 289,328 OEF/OIF veterans who were first-time users of VA services, prevalence rates were determined via administrative chart review for diagnostic codes of alcohol use disorder for the years 2002-2008[9]. Alcohol use disorder rates were 1 per cent in 2002 and 7 per cent in 2008. Rates were also estimated for pre- and post-Iraq war (1% and 5%, respectively). The second study used the same population of OEF/OIF veterans, but with a larger sample (N= 456,502), in which authors reviewed administrative data for alcohol use disorder codes up until 2010 to determine prevalence rates[20]. Overall, 10 per cent of the sample received an alcohol use disorder diagnosis, with rates higher for men (11%) than women (5%). A range of military characteristics was also used to differentiate alcohol use disorder rates in certain populations of veterans. A further two studies with the same populations of OEF/OIF veterans accessing VA services described above, and with large sample sizes, also reviewed administrative data for the years 2001-2010 for prevalence rates[28,29]. Both studies also investigated differences in rates of alcohol use disorder in men and women. In the 2010 study, rates were 3 per cent for women and 8 per cent for men. In the 2012 study, rates were 5 per cent for women and 12 per cent for men. In sum, four well-conducted, large-scale studies found consistent prevalence rates in populations rated moderately generalisable to the population of interest. Although all four studies sourced from secondary sources via administrative records of veterans enrolled in VA healthcare services, exposing the study to some risk of bias, they all used diagnostic criteria to identify alcohol use disorder (ICD-9 CM).

A further three studies also received a good quality and low bias rating for their methodology and also had large sample sizes, two in excess of a million veterans[23-25]. However, all three studies had lower generalisability because they did not sufficiently capture the population of interest. One study restricted their sample to US adults aged 21-34 who reported serving in the military and found past-year alcohol use disorder rates of 15 per cent[25]. Alcohol use

disorder was determined via diagnostic interview. The study conducted a secondary analysis of a nation-wide survey on drug and alcohol use, which contained an item that queried whether the individual had ever served in the US armed forces. No further information was given about veteran status and purported veteran status cannot be verified. Therefore, there remains uncertainty about the generalisability of this sample. Despite the lower generalisability, the past-year reported rate of alcohol use disorder is not inconsistent with the current 7 to10 per cent range reported above. The remaining two studies more explicitly defined veterans, however, their samples included non-contemporary veterans. For example, the same study as discussed in the nicotine use disorder section above also investigated alcohol use disorder[23]. The reported alcohol use disorder rate was 6 per cent. However, for alcohol use disorder, unlike nicotine use disorder, rates were not stratified by conflict. Therefore, as only 20 per cent of the sample was under the age of 50, the majority of the sample was not considered contemporary and thus determined to have low generalisability to the population of interest. A second study reviewed administrative data from veterans who accessed VA mental health services and reported an alcohol use disorder rate of 18 per cent[24]. Seventy per cent of the sample was aged greater than 50 years, which impacted on the generalisability of the study findings to the population of interest. The higher rate in this sample may be attributable to the mental health seeking status of the veterans.

Three final studies had low generalisability and received ‘poor quality’ ratings which was attributed to the limitations in study design[26,27,30]. The reported prevalence rates of alcohol use disorder (14-35%) in these studies may be attributable to how the veterans were sourced and how the study was conducted. For example, one study used a primary data source to investigate alcohol use disorder rates in ethnic minority US veterans. However, the population was acquired using convenience sampling, creating a risk of bias from low representativeness, and more information was needed about the methodology to accurately rate quality and bias[30]. Furthermore, the specificity of the population meant low generalisability to the current population of interest. Another two studies used secondary data sources with low representativeness[26,27]. One provided limited information about the sample, whilst the other utilised secondary data from two different sources for veterans who had previously been screened for alcohol misuse by the VA, exposing it to high bias which may have resulted in the higher reported rates of alcohol use disorders[26].

In considering the studies of good quality, and with moderate generalisability and consistency of the reported prevalence rates, we have a **moderate degree of certainty** in the applicability of an alcohol use disorder current prevalence rate of 7 to10 per cent to

Australian ex-serving contemporary veterans. Rates tend to be higher in men than in women. These current prevalence rates should be considered alongside the recognition that they were generalised from medical records of US OEF/OIF help-seeking veterans which impacted on the certainty with which they can be generalised to Australian contemporary veterans.

Drug use disorders

A total of nine studies that investigated drug use disorders met the inclusion criteria for this review[9,20,23-29]. Of these, four studies[9,20,28,29] using secondary data sources had their methodology rated as good quality and low risk of bias, according to the methodology criteria[17]. All four studies had large sample sizes and investigated the population of interest. These were the same four studies ranked highest in the alcohol use disorder prevalence rates (discussed above) and therefore, had the same strengths. Importantly, the drug use disorder prevalence rates in these studies followed a consistent pattern, with the lowest rate of 0.2 per cent reported for veterans in 2002, and the higher rate of 5 per cent reported in 2010. Whether this increase over time is significant is unclear.

A further three studies[23-25] received a similar 'good quality and low risk of bias' rating for their methodology, and consisted of large sample sizes, however, all three studies had lower generalisability and higher risk of bias for diagnosing substance use disorder rates, according to the assessment criteria in this REA. These were the same three studies discussed in the alcohol use disorder section above. In the study that reviewed secondary data on respondents purporting to be veterans, past year illicit drug use disorder was 5 per cent[25]. Cannabis use disorders were 3 per cent. The other two studies more explicitly defined veterans, however, their samples included non-contemporary veterans. One study reported a drug use disorder rate of 4 per cent, however, only 20 per cent of the sample was under the age of 50, meaning the majority of the sample was not considered contemporary and thus had a low generalisability to the population of interest[23]. The second study reported a drug use disorder rate of 15 per cent in veterans who were users of VA mental health services[24]. The sample consisted of veterans of whom 70 per cent were older than 50. The higher rate in this sample may be attributable to the mental health seeking status of the veterans.

Two final studies received 'poor quality and high risk of bias' rankings for their methodology. Specifically, the samples had potentially low representativeness. Both studies investigated specific drug use disorders, such as cannabis or cocaine use disorder. For example, in

OEF/OIF men, rates of cannabis use disorders were 4 per cent and cocaine use disorders were 3 per cent. In women, rates were 4 per cent and 1 per cent, respectively[26].

In considering the studies with good quality, and with moderate generalisability and consistency of the reported prevalence rates, we have a **moderate degree of certainty** in the applicability of a drug use disorder prevalence rate of 3 to 5 per cent in Australian ex-serving contemporary veterans. Rates in women (2-3%) appear to be lower than for men (3-5%). These current prevalence rates need to be considered alongside the recognition that they were generalised from the medical records of US ex-serving OEF/OIF help-seeking veterans which has impacted on the certainty in which they can be generalised to Australian, ex-serving contemporary veterans.

Substance[a] use disorder

The evidence review identified nine studies that investigated substance use disorders in which authors combined alcohol and other drug use disorders, or in some instances, measured those with dual diagnosis of alcohol and drug use disorders[19,20,25,26,30-34]. Of these studies[19,20] two were rated as having 'good quality and low risk of bias'. One had a large sample size (N= 456,602) and reviewed administrative records for evidence of diagnostic identification of substance use disorders in OEF/OIF veterans. The substance use disorder current prevalence rate was 11 per cent. The second study had a small sample size (N= 754) which used sophisticated random sampling to determine the final population and obtain primary data, and also used secondary data sourced from the VA healthcare administrative data and diagnostic criteria to identify substance use disorder. The population targeted were OEF/OIF combat veterans and substance use disorder rates were 7 per cent.

A further two studies were rated as having 'good quality', however, had lower generalisability[25,33]. Specifically, the populations investigated in the studies were not comparable to ex-serving, contemporary Australian veterans. In the study discussed in both alcohol and drug use disorder sections, where veteran status was not well-defined, substance use disorder prevalence rates were 17.7 per cent[25]. The other study reviewed administrative data for OEF/OIF veterans accessing VA services who received screening for military sexual trauma, and thus generalisability to all veterans was unclear[33]. Overall substance use disorder rates were not provided for this group, only rates for veterans with and without military sexual trauma.

[a] In this instance, substance use disorder is used to refer to combined alcohol and other drug use disorders.

Two further studies received a 'fair quality and bias' rating for their methodology[32,34]. One study used a primary data source with simple random sampling and conducted interviews with 745 veterans with an average age of 55 years[34]. There were limitations in how the population was defined and in the information provided on survey respondents and non-respondents. Theatre of conflict, for example, was unknown. Reported substance use disorder rates for veterans aged 18 to 44 years was 4 per cent. The second study collected the veteran sample based on whether they responded to an earlier survey, and linked data with VA administrative records, increasing risk of bias[32]. OEF/OIF status was reported but rates specifically for these veterans were not provided. Prevalence rates of substance use disorders were 7 per cent and veterans were 55 years of age, on average.

A final three studies received a 'poor quality and high risk of bias' rating[26,30,31]. Two studies used primary data sources on ethnic minority veterans and there was insufficient information provided on how data was collected to accurately rate the methodology. Additionally, both studies had samples of veterans with the majority over the age of 40.

With two studies rated good quality, with moderate generalisability and of sufficient quantity, we have a **moderate degree of certainty** in the applicability of a substance use disorder prevalence rate of 7 to 11 per cent in contemporary, ex-serving Australian veterans. These current prevalence rates need to be considered alongside the recognition that they were generalised from the medical records of US OEF/OIF help-seeking veterans which has impacted on the certainty in which they can be generalised to Australian contemporary veterans.

Discussion

The aim of this review was to investigate the rate of substance use disorder in contemporary ex-serving veterans. With moderate certainty, it could be estimated that 15 per cent of Australian contemporary ex-serving veterans may have nicotine use disorder, at least 7 per cent may be dealing with alcohol use disorder, and 3 per cent may have drug use disorder. Moreover, rates are higher in men and appear to be increasing over the past decade. The moderate certainty rankings for the current prevalence rates identified for all four disorders (nicotine, alcohol, drug, and substance use) were the result of an overall evidence base of studies with significant strengths. Multiple studies were conducted on ex-serving, contemporary veteran populations with large sample sizes which provided a consistent picture of alcohol use and substance use disorder rates in US populations. The frequency of

studies conducted over the past ten years means that patterns of use over time can be observed with some confidence.

There were some limitations of the evidence base. A significant limitation was that the majority of studies relied on secondary data sources, typically, reviews of administrative records. The limitation in this instance is that secondary data sources are opportunistic, and for mental health disorders, likely to have higher levels of bias as clinicians are less likely to identify the disorders in certain healthcare settings. The accuracy of prevalence rates in secondary data source studies hinges upon disorders being identified and diagnosed correctly, which cannot be guaranteed[18]. In contrast, we can be more confident of the rates cited in primary studies that directly assess their populations. For those studies that reviewed administrative data, the samples were always veterans accessing healthcare services through the VA. Around half of OEF/OIF veterans are enrolled in VA[19], which may suggest that prevalence rates in these studies will not necessarily generalise to all OEF/OIF veterans, but rather, only to those who are seeking care. Additionally, for studies that reviewed secondary data from administrative records, it was often unclear if only veterans were included in the study, or whether all individuals eligible to use VA services, such as spouses and other dependents, were included.

It was difficult to capture the specific population of interest (Australian, contemporary, ex-serving veterans) accurately. The literature frequently did not identify theatre of conflict and none of the studies were conducted on Australian populations, so the generalisability to the population identified by the literature review question (Australian ex-serving contemporary veterans) needs to be considered when interpreting the results. It is likely that prevalence rates found in US studies are comparable to Australian prevalence rates, however, it is not known whether this is the case. Additionally, the experiences of Australian veterans may be unique as compared to veterans in other countries. For example, the military factors that appear to increase the likelihood of an individual developing substance use disorder are level and intensity of combat exposure. These variables may differ for the Australian military compared to the US.

General trends in substance misuse and substance use disorders

The rapid evidence assessment results showed that temporally, prevalence rates for alcohol and drug use disorders may be increasing in contemporary veterans. In general, men tended to have higher overall substance use disorder rates compared to women, consistent with civilian populations[35]. While gender-related factors are likely to play a significant role in this difference, military-related factors, such as combat exposure, may also contribute.

For specific drug use disorders, marijuana and cocaine use disorders had higher prevalence rates than opioid, amphetamine and other drug use disorders. Comorbidity appeared to influence prevalence rates, with the presence of an addictive behaviour increasing the likelihood that another would be observed. For example, in gamblers, lifetime substance use disorder rates were 58 per cent, whereas they were 33 per cent in non-gamblers[30]. Veterans who had a diagnosis of both alcohol use disorder and drug use disorder were 3 per cent of OEF/OIF populations accessing VA services[20].

A final point of note is the very nature of substance use and problems researchers face when investigating prevalence rates in veterans. Addictive behaviour is marred by poor introspection and denial, meaning that measuring the behaviour is problematic. Additionally, veterans may have emotional or financial reasons for not disclosing substance use, meaning that tapping into true prevalence rates of these behaviours poses a significant challenge.

Implications

There is evidence from comparable US veteran studies that substance use disorders are a significant problem for veterans and prevalence rates appear to be increasing steadily, coinciding with the timing of the OEF/OIF operations. Moreover, there is evidence that for veterans with psychological and physical health issues, the likelihood of developing a substance use disorder increases. Substance misuse, such as binge drinking, or other excessive substance use behaviours, is higher in prevalence than diagnosed substance use disorders, meaning substance misuse is likely to be an even greater problem for veterans.

In addition to a need for Australian-based studies to determine true prevalence rates in contemporary veterans, these findings also highlight the need to target vulnerable individuals. Male veterans appear to be particularly vulnerable to developing a substance use disorder. The studies included in this review found that consistent military risk factors included combat exposure and intensity of combat experiences, measured directly or via proxy variables such as age, rank, branch of military and number of deployments (see Appendix 4 for further details on military variables in the studies). Healthcare services targeting these populations may need to consider increased risk of substance use disorders. Additionally, it is important to note that the focus of substance use in the military appears to have shifted from alcohol towards illicit substances such as cannabis, abuse of prescription drugs, and nicotine use. These trends in US data need to be investigated and confirmed in Australian veterans.

It is important to remember that determining the true prevalence rate of substance use disorder in veterans is challenging, particularly when the substance use equates to illegal activity. Substance use disorders are characterised by poor introspection and denial of problematic behaviour by the individual. Veterans may have legal concerns inhibiting discussing their substance use. Additionally, individuals may have emotional or financial reasons for not disclosing substance use, such as stigma or fear of consequences. Finally, substance use is frequently a secondary disorder, used as a coping mechanism to manage psychological disorders or chronic health issues, meaning that care providers might give less consideration to recording substance use disorder than to the primary diagnosis. All of these factors impact the ability to obtain a true prevalence rate of substance use disorder in veterans.

Limitations of the rapid evidence assessment

The findings from this REA should be considered alongside its limitations. In order to make this review ‘rapid’, some restrictions on our methodology were necessary. These limitations included: the omission of potentially relevant papers that were published prior to or after the defined search period; the omission of non-English language papers; and reference lists of included papers were not hand-searched to find other relevant studies. Similarly, although we did evaluate the evidence in terms of its strength, consistency, and generalisability, these evaluations were not as exhaustive as in a systematic review methodology. Finally, we made a qualitative judgement based on the level of evidence about the certainty of our estimates of prevalence. We did not use a meta-analysis methodology to combine or synthesise the results in a statistical way.

The information presented in this REA is a summary of information presented in available papers. We recommend readers source the original papers if they would like to know more about a particular area.

Conclusion

This rapid evidence assessment concludes that nicotine, alcohol, and drug use disorders may be a significant problems for Australian contemporary, ex-serving veterans, particularly for younger male veterans. Substance use disorders have been increasing steadily in the past decade and substance misuse rates are likely to be higher. Future military research needs to consider the contemporary shift in substance misuse from alcohol to other substances, and consider the different rates in vulnerable populations of veterans, such as

those with physical or mental health disorders, to obtain a comprehensive understanding of substance use disorders rates.

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Appendix 1

PICO

This question was formulated within a Population Intervention Comparison Outcome (PICO) framework. Application of a PICO framework helps to structure, contain and set the scope for the research question. Inclusion of intervention and comparison components is dependent on the question asked, and may not be appropriate for all question types.

- **What are the prevalence rates for substance use disorders in contemporary ex-serving members?**
  - **PICO format:** In contemporary, ex-serving members of the armed forces, who were members of a defence/military force from 1999 onwards, what is the incidence of substance use disorders?

P Patient, Problem, Population	**I** Intervention	**C** Comparison (*optional*)	**O** Outcome *when defining "more effective" is not acceptable unless it describes **how** the intervention is more effective*
Contemporary ex-serving members: Adults who were members of a defence/military force from 1999 onwards AGE: ≥18years GENDER: No restrictions COUNTRY: OECD countries only DISORDER: Investigated substance use disorders	None	None	Prevalence rates for substance use disorders

Appendix 2

Information retrieval/management

The following is an example of the search strategy conducted in the Embase database:

Step	Search Terms	No of records
S1	Substance abuse/	36153
S2	(veteran or soldier or GI or Green Beret or air force member or cadet or gunner or cavalry person or commando or conscript or draftee or enlisted person or infantry or infantryperson or marine or military person or officer or paratrooper or private or recruit or serviceperson or soldier or soldier-at-arms or trooper of warrior or reservist).af.	346208
S3	1 and 2	1315
S4	Prevalence.af.	551396
S5	3 and 4	221
S6	Limit 5 to (human and English language and yr=”2003- Current” and journal and (adult<18 to 64 years> or aged <65+ years))	90

Appendix 3

Screening form

The screening form was designed to be used to code the eligibility of references acquired through search paradigms. The content of the screening form at the title and abstract screening stage was as follows:

Screen on title & abstract

1. EXCLUDE Language: *Exclude if non-English*
2. EXCLUDE Date: *Exclude if published prior to 1999*
3. EXCLUDE Study Type: *validation study, animal study, stand-alone methods paper, qualitative study*
4. EXCLUDE Publication Type: *Exclude if it is not a peer-reviewed article, e.g., media, newspapers, magazines, television, conference abstracts, theses, editorial, book chapter, book review, book chapter review*
5. EXCLUDE Age: *Exclude if mean age of participants < 18*
6. EXCLUDE Disorder: *Exclude if study has not investigated substance use disorder*
7. EXCLUDE Sample: *Exclude if sample is non-veterans OR 100 per cent Vietnam or older conflicts OR Exclude if mean age is 55 years or older (if no information is given on conflict) OR Exclude if data was collected prior to 1999 OR Exclude if sample is 100 per cent still-serving veterans*
8. EXCLUDE Country: *Exclude if not-OECD country*
9. EXCLUDE Incidence: *Exclude if study measured incidence, not prevalence*
10. INCLUDE based on title & abstract: *Cannot be excluded so is marked as INCLUDE. Will require retrieval of full paper.*

Appendix 4

Evidence Profile

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
Otherwise healthy									
Otherwise healthy	Golub, Vazan, Bennett & Liberty, 2013	Cross-sectional secondary data source; self-report	US	Veterans* interviewed as part of a national drug and alcohol use survey between 2004 - 2010 Age was restricted to 21-34 year olds to capture the OEF/OIF population	- Substance use disorder (DSM criteria) - Alcohol use disorder (DSM criteria) - Drug use disorder (DSM criteria) - Marijuana use disorder (DSM criteria) - Pain killer use disorder (DSM criteria) Psychotherapeutic use disorder (DSM criteria) - Past month alcohol misuse (non-validated measures) - Past month use of marijuana; cocaine;	Depression, anxiety	Secondary analysis of nationwide US survey of drug and alcohol use employing multilevel stratified hierarchical sampling procedure with a response rate of 74-77%	N= 3,826	28.7 F= 18% M= 82%

[2] Theatre of conflict is specified where reported- no information means theatre was not reported
= Mixed active duty and ex-serving; ^ = veteran status clearly defined (i.e., information was provided about their deployments; theatre; status; * = veteran status not clearly defined (i.e., authors simply used the word 'veteran' and provided no further information)
[3] Substance use disorders, unless specified, refers to both abuse of and dependence on alcohol and other drugs
[4] Mean age and SD is given when provided, alternatively age range is provided

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
					hallucinogens; pain killers (non-validated measures)				
Substance use disorder rates (past-year): Substance use disorder= 17.7%; Alcohol use disorder= 15.3%; Any illicit drug use disorder= 4.9%; Marijuana use disorder= 2.8%; Any illicit drug (except marijuana) use disorder= 2.4%; Pain killer use disorder= 1.1%; Psychotherapeutic use disorder= 1.6% **Past month use:** Binge drinking= 43.8%; Heavy drinking= 14.2%; Marijuana= 11%; Cocaine= 1.6%; Hallucinogens= 0.9%; Pain killers= 3.5%									
Otherwise healthy	Tan, Westermeyer, Thompson, Thuras & Canive, 2008	Cross-sectional, primary data source; clinical interview	US	American Indian veterans* from north central US states	- Substance use disorders (current; lifetime) (Quick-Diagnostic Interview Schedule DSM-III-R) - Alcohol use disorder (Quick-Diagnostic Interview Schedule DSM-III-R) - Cannabis use disorder (Quick-Diagnostic Interview Schedule DSM-III-R) - Cocaine use disorder (Quick-Diagnostic Interview Schedule DSM-III-R) - Other stimulant use disorder (Quick-Diagnostic Interview Schedule DSM-III-R) - Hallucinogen use disorder (Quick-Diagnostic Interview Schedule DSM-III-R) - Sedative use disorder (Quick-Diagnostic Interview Schedule DSM-III-R) - Opioid use disorder (Quick-Diagnostic Interview	Anxiety, depression, pathological gambling	Stratified to include females and rural veterans with an estimated 93% completion rate	N= 558	47.4 F= 14% M= 86%

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
					Schedule DSM-III-R) - Inhalant use disorder (Quick-Diagnostic Interview Schedule DSM-III-R)				
Substance use disorder rates: Remitted substance use disorder= 15%; Active substance use disorder= 21% **Of those with an active substance use disorder:** Alcohol= 89%; Cannabis= 28%; Cocaine= 18%; Other stimulants= 11%; Hallucinogens= 12%; Sedatives= 5%; Opioids= 6%; Inhalants= 5%									
Otherwise healthy	Westermeyer, Canive, Garrad, Thuras & Thompson, 2005	Cross-sectional, primary data source; clinical interview	US	American Indian and Hispanic veterans* from the Southwest and North central US states	- Substance use disorders (DSM-IV-TR; MAST/AD) - Alcohol use disorders (DSM-IV-TR; MAST/AD)	Depression, anxiety, PTSD, anti-social personality disorder, panic disorder, pathological gambling	Targeted sampling, identification and invitation with an estimated 93% completion rate	N= 1,228	**Gambler**s 48.5(10.3) **Non-gamblers:** 47.2(14.2) F= 10% M= 90%
Lifetime rates: **Substance use disorders:** Gamblers= 58%; Non-gamblers= 32.9% **Alcohol use disorders:** American Indian= 35.2%; Hispanic American= 22.9%									
Accessing VA services									
Seeking mental health services from VA	Edens & Rosenheck, 2012	Cross-sectional secondary data source; method of assessment	US	All veterans* who used VA mental health specialty services in FY 2009	- Alcohol use disorder - Drug use disorder (ICD-9-CM)	Anxiety, depression, dementia, PTSD, schizo-phrenia	Reviewed administrative data	N = 1,102,846	<40 - >85 F= 8.5% M= 91.5%

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
		not specified		7.7% were OEF/OIF					
Overall rates: Alcohol use disorders= 18.3%; Drug use disorder = 14.8% **Pathological gamblers:** Alcohol use disorders= 44.5%; Drug use disorder = 30.0%									
Seeking care from the VA	Frueh et al., 2007	Cross-sectional, primary data source; clinical interview	US	Veterans* who visited VA medical centres in south eastern US states during the FY 1999 19.1%of the 18-44 year olds; 48.4% of 45-64 year olds had combat exposure	- Substance use disorders (MINI)	Anxiety, depression, PTSD	N= 1,198 randomly identified and approached 74%completion rate	N= 745	61.2(11.8) F= 7% M= 93%
Substance use disorder rates by age: 18-44= 4.3%; 45-64= 5.3%									
Seeking care from the VA	Hawkins, Lapham, Kivlahan & Bradley, 2010	Cross-sectional secondary data source; self-report and not	US	OEF/OIF^ and other theatre veterans enrolled in the VA health care system and	- Substance use disorders (ICD-9-CM) - Alcohol use disorders (ICD-9-CM) - Cocaine use disorders (ICD-9-CM)	Depression, anxiety, PTSD, schizo-phrenia	Data was obtained from the VA office of Quality and Performance. Randomly	N= 12,092	**OEF/OIF:** M= 34.7 F= 32.9 **Non-OEF/OIF:**

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
		specified		screened between 2003 – 2004	- Cannabis use disorders (ICD-9-CM) - Alcohol misuse (AUDIT-C)		selected medical records were reviewed		M= 47.5 F= 43.5 F= 17% M= 83%
Overall rates: Substance use disorder= 18.9%; Alcohol use disorder= 17.5%; Cocaine use disorder= 3.3%; Cannabis use disorder= 3.9% **OEF/OIF females:** Substance use disorder= 9.5%; Alcohol use disorders= 8.7%; Cocaine use disorder= 0.8%; Cannabis use disorder**=** 3.9% **Non OEF/OIF males:** Substance use disorder= 26.8%; Alcohol use disorders= 21.8%; Cocaine use disorder= 10.0%; Cannabis use disorder**=** 5.8% **Non OEF/OIF females:** Substance use disorder= 10.5%; Alcohol use disorders= 7.9%; Cocaine use disorder= 3.6%; Cannabis use disorder= 2.4% **Alcohol misuse after adjustment for age, marital status, VA pension, recognized substance use disorder and mental health disorder diagnoses in the year prior:** OEF/OIF males= 21.8%; OEF/OIF females= 4.7%; Non OEF/OIF males= 10.5%; Non OEF/OIF females= 2.9%									
Seeking care from the VA and tested for HIV and/or HCV	Huckans, Blackwel, Harms, Indest, & Hauser, 2005	Cross-sectional secondary data source; not specified	US	Veterans^ seen at northwest VA clinics between 1998 – 2003 12.4% were OEF/OIF	- Alcohol use disorders - Opioid use disorders - Cocaine use disorders - Amphetamine use disorders - Other drug use disorders - Polysubstance use disorders (DSM-IV)	None	Reviewed administrative data	N= 293,445	**HIV tested:** 52.6(11.6) F= 8.1% M=91.9% **HIV+:** 50.0(9.6) F= 2.3% M= 97.7% **Hep C tested:** 60.9(16.9)

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
									F= 6.1% M= 93.9% **Hep C+:** 53.7(7.9) F= 3% M= 97%
Alcohol use disorders: HIV tested= 47.7%; HIV+= 30.0%; Hep C tested= 24.8%; Hep C+= 57.7% **Opioid use disorders:** HIV tested= 9.6%; HIV+= 5.7%; Hep C tested= 3.1%; Hep C+= 15.6% **Cocaine use disorders** HIV tested= 14.2%; HIV+= 11.3%; Hep C tested= 4.6%; Hep C+ = 17.7% **Amphetamine use disorders** HIV tested= 9.2%; HIV+= 6.6%; Hep C tested= 2.7%; Hep C+= 10.4% **Other drug use disorders:** HIV tested= 31.4%; HIV+= 21.4%; Hep C tested= 12.5%; Hep C+= 40.0% **Polysubstance use disorders:** HIV tested= 34.6%; HIV+= 22.1%; Hep C tested= 13.3%; Hep C+= 43.9%									
Seeking care from the VA	Kimerling et al., 2010	Cross-sectional secondary data source; not specified	US	OEF/OIF veterans^ who used the VA services between 2001 – 2007, who were screened for military sexual trauma (MST), and had separated	- Substance use disorders (ICD-9-CM)	Depression, anxiety, PTSD, adjustment disorders, any mental health disorder	Reviewed administrative data	N= 125,729	18 - >45 F= 14% M= 86%

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
				from service by 2006					
Substance use disorder rates **Females:** Screened positive for MST= 13.9%; Screened negative for MST= 5.2% **Males:** Screened positive for MST= 22.0%; Screened negative for MST= 12.7%									
Seeking care from the VA	Maguen, Ren, Bosch, Marmar & Seal, 2010	Cross-sectional secondary data source; not specified	US	OEF/OIF veterans^ who were first-time users of a VA facility from 2002 – 2008 and separated from military service	- Drug use disorders - Alcohol use disorders (ICD-9-CM; abuse and dependence)	Depression, anxiety, PTSD, adjustment disorders, eating disorders	Reviewed administrative data	N= 329,049	31.2(9.0) F= 12% M= 88%
Drug use disorder rates: Females= 2%; Males= 3% **Alcohol use disorder rates:** Females= 3%; Males= 8%									
Seeking care from the VA	Maguen, Cohen, Cohen, Madden, Bertenthal & Seal, 2012	Cross-sectional secondary data source; not specified	US	OEF/OIF veterans^ who were first-time users of a VA facility from 2001 – 2010 and separated from military	- Drug use disorders - Alcohol use disorders (ICD-9-CM; abuse and dependence)	Depression, anxiety, PTSD, adjustment disorders, eating disorders	Reviewed administrative data	N= 593,739	31(8.9) F= 12% M= 88%

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
				service					
By gender **Drug use disorder rates:** Females= 2.6%; Males= 5.3% **Alcohol use disorder rates:** Females= 5.3%; Males= 11.6%									
Previously sought medical care from the VA	Sayer et al., 2010	Cross-sectional primary/ secondary data source; mixed sources-self-report and not specified	US	OEF/OIF combat veterans^ who visited a VA facility between 2003 – 2007	- Substance use disorders (ICD-9-CM) - Probable substance use disorders (Two-Item Conjoint Screen)	Depression, anxiety, PTSD, psychotic disorder, adjustment disorder, Traumatic Brain Injury (TBI)	Stratified random sampling without replacement, 62% response rate	N= 754	22 - 62 F= 55% M= 45%
Substance use disorder rates: Surveyed= 5%; Weighted proportion= 7% **Probable substance use disorder rates:** Surveyed= 35%; Weighted proportion= 38%									
Seeking care from the VA	Seal et al., 2009	Cross-sectional secondary data source; not specified	US	OEF/OIF veterans^ entering and using VA care from 2002 – 2008 after separating from military service	- (Illicit) drug use disorders - Alcohol use disorders (ICD-9-CM)	Depression, PTSD, any mental health disorders	Reviewed administrative data	N= 289,328	16 - 68

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
Overall sample **In 2002:** Drug use disorder= 0.2%; Alcohol use disorder= 7.1% **In 2008:** Drug use disorder= 3.0%; Alcohol use disorder= 3.0% **Pre-Iraq war** **Active duty:** Drug use disorder= 0.7%; Alcohol use disorder= 1.1% **Pre-Iraq war** **National Guard/Reserve:** Drug use disorder= 0.8%; Alcohol use disorder= 1.7% **Peri-Iraq war** **Active duty:** Drug use disorder= 2.6%; Alcohol use disorder= 5.2% **Peri-Iraq war** **National Guard/Reserve:** Drug use disorder= 1.7%; Alcohol use disorder= 4.7%									
Seeking care from VA	Seal et al., 2011	Cross-sectional secondary data source; not specified	US	OEF/OIF veterans^ who had their first VA visit after military service separation from 2001 – 2009	- Alcohol use disorders - Drug use disorders - Alcohol use and drug use disorders (ICD-9-CM)	Anxiety, depression, PTSD, adjustment disorder	Reviewed administrative data	N= 456,502	28 F= 12% M= 88%
Overall sample Alcohol use disorder= 9.9%; Drug use disorder= 4.5%; Alcohol use disorder or Drug use disorder= 11%; Alcohol use disorder + Drug use disorder= 3.0%; Alcohol abuse= 7.3%; Alcohol dependence= 5.2%; Drug abuse= 3.9%; Drug dependence= 2.7% **Males:** Alcohol use disorder= 10.5%; Drug use disorder= 4.8%									

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
Females: Alcohol use disorder= 4.8%; Drug use disorder= 2.4% **Active Duty males:** Alcohol use disorder= 7.5%; Drug use disorder= 1.9%; Alcohol use disorder + Drug use disorder= 3.7% **Active Duty females:** Alcohol use disorder= 3.3%; Drug use disorder= 1.1%; Alcohol use disorder + Drug use disorder= 1.5% **National Guard/Reserve males:** Alcohol use disorder= 7.2%; Drug use disorder= 1.2%; Alcohol use disorder + Drug use disorder= 2.4% **National Guard/Reserve females:** Alcohol use disorder= 3.6%; Drug use disorder= 0.9%; Alcohol use disorder + Drug use disorder= 1.1% **By age (aged 18-24, 25-29, 30-39, 40-71)** **Active Duty:** Alcohol use disorder= 9.5%, 7.8%, 5.8%, 2.4%; Drug use disorder= 2.4%, 2.2%, 1.4%, 0.3%; Alcohol use disorder + Drug use disorder= 5.2%, 3.9%, 2.7%, 0.6% **National Guard/Reserve:** Alcohol use disorder= 7.8%, 7.2%, 6.7%, 5.8%; Drug use disorder= 1.6%, 1.5%, 1.0%, 0.7%; Alcohol use disorder + Drug use disorder= 3.1%, 2.8%, 1.9%, 1.4% **By rank (enlisted, officer)** **Active Duty:** Alcohol use disorder= 7.3%, 1.7%; Drug use disorder= 7.3%, 1.7%; Alcohol use disorder + Drug use disorder= 3.7%, 0.3% **National Guard/Reserve:** Alcohol use disorder= 7.2%, 2.3%; Drug use disorder= 1.3%. 0.3%; Alcohol use disorder + Drug use disorder= 2.4%, 0.3% **By deployments (1, 2+)** **Active Duty:** Alcohol use disorder= 6.5%, 7.6%; Drug use disorder= 6.5%, 7.6%; Alcohol use disorder + Drug use disorder= 3.7%, 3.1% **National Guard/Reserve:** Alcohol use disorder= 6.9%, 6.7%; Drug use disorder= 1.3%, 1.0%; Alcohol use disorder + Drug use disorder= 2.3%, 2.2% **By branch (Army, Marines, Navy, Air Force)** **Active Duty:** Alcohol use disorder= 7.9%, 10.3%, 4.5%, 2.9%; Drug use disorder= 7.8%, 10.2%, 4.4%, 2.9%; Alcohol use disorder + Drug use disorder= 4.5%, 4.0%, 2.2%, 1.1% **National Guard/Reserve:** Alcohol use disorder= 7.1%, 8.8%, 4.6%, 3.6%; Drug use disorder= 1.3%, 0.9%, 0.6%, 0.5%; Alcohol use disorder + Drug use disorder= 2.4%, 2.5%, 1.0%, 1.0%								

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
Seeking care from VA	Tsai, Edens, & Rosenheck, 2011	Cross-sectional secondary data source; not specified	US	All veterans* who used VA health services during FY 2009 4% were OEF/OIF	- Nicotine use disorder ICD-9-CM (305.1) - Alcohol use disorder (ICD-9-CM) - Drug use disorder (ICD-9-CM)	Depression, anxiety, PTSD, schizo-phrenia, dementia, bipolar disorder, personality disorders, homeless-ness	Reviewed administrative data	N= 5,031,381	<40 - >85 F= 6% M= 94%
Overall sample: Nicotine use disorder= 14.9%; Alcohol use disorder= 6%; Drug use disorder= 3.9% **OEF/OIF veterans:** Nicotine use disorder= 15.1% **Nicotine use disorder by age:** Under 40= 14.1%; 40-49= 21.0%; 50-64= 22.5%									
Seeking care from the VA	Zivin et al., 2011	Cross-sectional secondary data source; not specified	US	Veterans^ who completed the SHEP during FY2005 1% OEF/OIF	- Substance use disorders ICD-9-CM (codes reported elsewhere)	Depression, anxiety, PTSD, schizo-phrenia	The SHEP is randomly stratified	N= 98,867 used to represent the entire VA population	55 F= 8% M= 92%
Overall sample: Substance use disorder rates= 7% **By employment status:**									

Health status	Authors & Year	Design	Country	Population[2] (source)	Primary outcomes (measures & diagnostic criteria)	Secondary outcome(s) (mental health related)	Sampling methodology	Number of participants assessed for substance use disorders[3]	Age[4] & gender (%)
Employed= 4%; Unemployed= 14%; Other employed= 6%; Disabled/unable to work= 10%; Retired= 6%									

Appendix 5

Quality and bias checklist

Checklist for quality and bias of a prevalence study methodology[17]:

Completed		
Yes	**No**	
		1. Target Population
		• Target population clearly defined, including: age, sex, employment, ethnicity, religion **AND** • relevant data from health questionnaire of sampled persons, *if appropriate*
		• Target population not clearly defined : limited data available on: age, sex, employment, ethnicity, religion **AND** • relevant data from health questionnaire of sampled persons, *if appropriate*
		• Target population poorly defined: little or no information on age, sex, employment, ethnicity, religion **OR** • little or no information from relevant data from health questionnaire of sampled persons, *if appropriate*
		2.Sampling method (Representativeness)
		• Sophisticated probability sampling used:[5] (e.g. stratified sampling; cluster sampling; multistage sampling; multiphase sampling)
		• Simple probability sampling used:[6] (e.g. simple random sampling)
		• No probability sampling used
		3. Measurement (Reliability)

[5] Complex sampling methods (*Boyle, 1998*): **Stratified Sampling**: a population is divided into relatively homogeneous subgroups (strata) and samples selected independently and with known probability from each strata; **Cluster Sampling**: population divided into affiliated units or clusters e.g. neighbourhoods or households and a sample of clusters selected with known probability; **Multistage Sampling:** samples are selected with known probability in hierarchical order e.g. a sample of neighbourhoods, then sample of households, then sample of individuals; **Multiphase Sampling**: sampled individuals are screened and subsets selected with known probability for more intensive assessment

[6] Simple sampling methods (*Boyle, 1998*): Predetermined number of units (individuals, families, households) selected from the sampling frame so each unit has an equal chance of being chosen

		• Standardised data-collection methods (e.g. validated clinical interview or diagnostic instrument/criteria) **OR** • reliable survey instruments (e.g. validated self-report measure / validated screening instrument)
		• Non-standardized data collection **OR** • Non-validated interview or non-validated self-report measure
		4. Information About Non- responders
		• Analysis of differences conducted on non-responders
		• No analysis of differences information provided on non-responders **OR** • only proportion (e.g. per cent) of non-respondents supplied without any other information
		5. Additional Information
		Information that may affect the overall rating (e.g. were special features accounted for? Were there satisfactory/appropriate statistical analyses, confidence intervals, etc.?)

Appendix 6

Evidence Map

Health status	Study n	Primary data source with sophisticated random sampling	Primary data source with simple random sampling	Primary data source with convenience sampling	Secondary data source with sophisticated random sampling	Secondary data source with simple random sampling	Secondary data source with convenience sampling
Otherwise healthy	3			2			1
Accessing VA services	12	1	1	1			9

Appendix 7

Evaluation of the Evidence

Nicotine use disorder

Level of certainty	Included Studies
High	
Moderate	
	• Tsai, Edens & Rosenheck, 2011
Uncertain	

Alcohol use disorder

Level of certainty	Included Studies
High	
Moderate	
	• Seal, Metzler, Gima, Bertenthal, Maguen, & Marmar, 2009 • Seal, Cohen, Waldrop, Cohen, Maguen, & Ren, 2011 • Maguen, Ren, Bosch, Marmar, & Seal, 2010 • Maguen, Cohen, Cohen, Madden, Bertenthal & Seal, 2012
Uncertain	

Drug use disorder

Level of certainty	Included Studies
High	
Moderate	
	• Seal, Metzler, Gima, Bertenthal, Maguen, & Marmar, 2009 • Seal, Cohen, Waldrop, Cohen, Maguen, & Ren, 2011 • Maguen, Ren, Bosch, Marmar, & Seal, 2010 • Maguen, Cohen, Cohen, Madden, Bertenthal & Seal, 2012
Uncertain	

Substance use disorder

Level of certainty	Included Studies
High	
Moderate	
	• Sayer, Noorbaloochi, Frazier, Carlson, Gravely, & Murdoch, 2010 • Seal, Cohen, Waldrop, Cohen, Maguen, & Ren, 2011
Uncertain	