TECHNICAL COMMENTARY

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Prevalence in soldiers and veterans

Introduction

Prevalence represents the overall proportion of individuals in a population who have the disorder of interest. It is different from incidence, which represents only the new cases that have developed over a particular time period. Point prevalence is the proportion of individuals in a population who have the disorder at a given point in time (e.g., at one-month post-trauma), while period prevalence is the proportion of individuals in a population who have the disorder over specific time periods (e.g., one to two months post-trauma). Lifetime prevalence is the proportion of individuals in a population who have ever had the disorder and lifetime morbid risk also includes those who had the disorder but were deceased at the time of the survey.

Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2010 that report results separately for people with PTSD. Reviews were identified by searching the databases MEDLINE, EMBASE, and PsycINFO. When multiple copies of reviews were found, only the most recent version was included. We prioritised reviews with pooled data for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis[1]. Reviews with less than 50% of items checked have been excluded from the library. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from randomised controlled trials (RCTs) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large or if there is a dose dependent response. We have also taken into account sample size and whether results are consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[2]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

Results

We found nine systematic reviews that met our inclusion criteria[3-11].

- After military deployment to Iraq or Afghanistan, moderate quality evidence found the overall prevalence of PTSD was around 23%. Rates were higher in Iraq-deployed personnel (12.9%) than in Afghanistan-deployed personnel (7.1%), higher in combat deployed personnel (12.4%) than support personnel (4.9%), higher in army (13.2%) and marine (10.4%) personnel than in navy (7.3%) and air force (2.6%) personnel, and higher in reserve or National Guard personnel (14.5%) than in active-duty personnel (11.4%).
- Moderate quality evidence found the overall prevalence of PTSD in US army reserve members was 9.8%, and in US active service members, prevalence was 8.9%.
- Moderate to high quality evidence found the prevalence of PTSD in UK service personnel ranges from 2.5% mid-deployment to 4.3% by over 2 years post-deployment.

Margarete Ainsworth Building, Barker Street, Randwick NSW 2031. Phone: 02 9399 1000. Email: info@neura.edu.au

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- Moderate quality evidence found the prevalence of PTSD was higher in military samples with a traumatic brain injury than in military samples without a traumatic brain injury (36.8% vs. 10.8%).
- Moderate to high quality evidence found the prevalence of PTSD in peacekeepers between one month before and 6.6 years after deployment is around 5.3%.
- Moderate quality evidence found the prevalence of PTSD in older US veterans (>65 years) is around 8.4%.
- Moderate quality evidence found the prevalence of PTSD in US veterans involved in the justice system is between 4% and 39%.
- Moderate quality evidence found the prevalence of PTSD in ex-military personnel with a physical impairment is between 2% and 59%.

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Blodgett JC, Avoundjian T, Finlay AK, Rosenthal J, Asch SM, Maisel NC, Midboe AM

Prevalence of mental health disorders among justice-involved veterans

Epidemiologic Reviews 2015; 37: 163-76

View review abstract online

Comparison	**Prevalence of PTSD in US veterans involved in the justice system.**
Summary of evidence	**Moderate quality evidence (large sample, appears inconsistent and imprecise, direct) found the prevalence of PTSD in veterans involved in the justice system is between 4% and 39%.**
Prevalence of PTSD in US veterans involved in the justice system	
15 studies, N >60,00, prevalence range = 4% to 39%	
Consistency in results	Appears inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Cohen GH, Fink DS, Sampson L, Galea S

Mental health among reserve component military service members and veterans

Epidemiologic Reviews 2015; 37: 7-22

View review abstract online

Comparison	**Prevalence of PTSD in US reserve vs. active service members.**
Summary of evidence	**Moderate quality evidence (large samples, inconsistent, imprecise, direct) found the prevalence of PTSD in army reserve members is 9.8%, and in active service members prevalence is 8.9%.**
Prevalence of PTSD in US reserve vs. active service members	
9 studies, N = 166,310, prevalence in reserve members = 9.8%, 95%CI 5.9% to 13.7%	
9 studies, N = 251,675, prevalence in active service members = 8.9%, 95%CI 5.7% to 12.1%	

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Consistency in results	Authors report data are inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Fulton JJ, Calhoun PS, Wagner HR, Schry AR, Hair LP, Feeling N, Elbogen E, Beckham JC

The prevalence of posttraumatic stress disorder in Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) Veterans: a meta-analysis

Journal of Anxiety Disorders 2015; 31: 98-107

View review abstract online

Comparison	**Prevalence of PTSD in US veterans following Operation Enduring Freedom and Operation Iraqi Freedom.**
Summary of evidence	**Moderate quality evidence (large sample, inconsistent, appears imprecise, direct) found the prevalence of PTSD in Operation Enduring Freedom/Operation Iraqi Freedom US veterans is around 23%. Rates were highest in more recent studies, in studies with more formerly active-duty participants, and in studies with fewer Caucasian participants.**

Prevalence of PTSD in US veterans following Operation Enduring Freedom and Operation Iraqi Freedom

33 studies, N = 4,945,897, prevalence = 23%, ± 8.4%

Rates were highest in more recent studies, in studies with more formerly active-duty participants, and in studies with fewer Caucasian participants.

Consistency in results	Authors report data are inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Hines LA, Sundin J, Rona RJ, Wessely S, Fear NT

Posttraumatic stress disorder post Iraq and Afghanistan: prevalence among military subgroups

Prevalence in soldiers and veterans

Canadian Journal of Psychiatry 2014; 59: 468-79 View review abstract online	
Comparison	**Prevalence of PTSD in US, Canadian or UK veterans after the Iraq and Afghanistan wars.**
Summary of evidence	**Moderate quality evidence (large sample, inconsistent, appears imprecise, direct) found the prevalence of PTSD was higher in Iraq-deployed personnel (12.9%) than in Afghanistan-deployed personnel (7.1%). The prevalence of PTSD was higher in combat deployed personnel (12.4%) than in support roles (4.9%). The prevalence of PTSD was higher in army (13.2%) and marine (10.4%) samples than in navy (7.3%) and air force (2.6%) samples. Rates were higher in reserve or National Guard samples (14.5%) than in active-duty members (11.4%). There were no differences in PTSD prevalence rates between males and females (both 11.8%).**
Prevalence of PTSD in veterans after the Iraq and Afghanistan wars	
49 studies, N = 1,545,462 30 studies, prevalence of PTSD in Iraq-deployed personnel = 12.9%, 95%CI 11.3% to 14.4%, I^2 >95% 10 studies, prevalence of PTSD in Afghanistan-deployed personnel = 7.1%, 95%CI 4.6% to 9.6%, I^2 >95% 15 studies, prevalence of PTSD in Iraq and Afghanistan-deployed personnel = 10.4%, 95%CI 8.2% to 12.7%, I^2 >95% 21 studies, prevalence of PTSD in combat deployed personnel = 12.4%, 95%CI 10.9% to 13.4%, I^2 >95% 8 studies, prevalence of PTSD in support roles = 4.9%, 95%CI 1.4% to 8.4%, I^2 >95% There were no differences in PTSD prevalence rates between males and females (both 11.8%). Rates were slightly higher in reserve or National Guard samples (14.5%) than in active-duty members (11.4%). Rates were higher in army (13.2%) and marines (10.4%) than in navy (7.3%) and air force (2.6%).	
Consistency in results	Inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Loignon A, Ouellet MC, Belleville G

Margarete Ainsworth Building, Barker Street, Randwick NSW 2031. Phone: 02 9399 1000. Email: info@neura.edu.au

A systematic review and meta-analysis on PTSD following TBI among military/veteran and civilian populations

Journal of Head Trauma Rehabilitation 2020; 35: E21-E35

View review abstract online

Comparison	**Prevalence of PTSD following a traumatic brain injury vs. no traumatic brain injury in military samples.**
Summary of evidence	**Moderate quality evidence (large sample, inconsistent, imprecise, direct) found the prevalence of PTSD was higher in military samples with a TBI than in military samples without a TBI (36.8% vs. 10.8%).**
Prevalence of PTSD after a TBI vs. no TBI	
19 studies, N = 13,861 TBI: prevalence = 36.8%, 95%CI 29.2% to 49.2% No TBI (with another injury or unknown status): prevalence = 10.8%, 95%CI 7.0% to 6.2% *A large, significant difference of increased PTSD prevalence in military personnel with a TBI;* OR = 4.18, 95%CI 2.90 to 6.00, $p < 0.001$, I^2 not reported	
Consistency in results	Appears inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Rona RJ, Burdett H, Bull S, Jones M, Jones N, Greenberg N, Wessely S, Fear NT

Prevalence of PTSD and other mental disorders in UK service personnel by time since end of deployment: A meta-analysis

BMC Psychiatry 2016; 16: 333

View review abstract online

Comparison	**Prevalence of PTSD in UK service personnel during and post-deployment.**
Summary of evidence	**Moderate to high quality evidence (large sample, mostly consistent, appears imprecise, direct) found the prevalence of PTSD in UK service personnel ranges from 2.5% mid-deployment to 4.3% by over 2 years post-deployment.**

Prevalence of PTSD in UK service personnel during and post-deployment	
Mid-deployment: 2 studies, N = 3,405, prevalence = 2.5%, 95%CI 1.6% to 3.4%, I^2 = 59.2%, *p* = 0.086 Returning from deployment: 2 studies, N = 3,712, prevalence = 2.0%, 95%CI 1.1% to 2.9%, I^2 = 68.3%, *p* = 0.08 <3 months post-deployment: 4 studies, N = 9,398, prevalence = 2.9%, 95%CI 1.5% to 4.4%, I^2 = 58.6%, *p* = 0.065 3-6 months post-deployment: 3 studies, N = 863, prevalence = 2.6%, 95%CI 1.4% to 3.8%, I^2 = 0%, *p* = 0.39 6-11 months post-deployment: 3 studies, N = 1,332, prevalence = 3.2%, 95%CI 2.2% to 4.2%, I^2 = 0%, *p* = 0.86 12–17 months post-deployment: 3 studies, N =2,062, prevalence = 3.1%, 95%CI 2.3% to 3.9%, I^2 = 0%, *p* = 0.55 18–23 months post-deployment: 3 studies, N = 2,228, prevalence = 2.5%, 95%CI 0.2% to 4.8%, *I2* = 92.4%, *p* < 0.001 24+ months post-deployment: 3 studies, N = 2,993, prevalence = 4.3%, 95%CI 2.9% to 5.7%, I^2 = 54.5%, *p* = 0.11	
Consistency in results	Mostly consistent
Precision in results	Appears imprecise
Directness of results	Direct

Souza WF, Figueira I, Mendlowicz MV, Volchan E, Portella CM, Mendonca-de-Souza AC, Coutinho ES

Posttraumatic stress disorder in peacekeepers: a meta-analysis

Journal of Nervous and Mental Disease 2011; 199: 309-12

View review abstract online

Comparison	**Prevalence of PTSD in peacekeepers.**
Summary of evidence	**Moderate to high quality evidence (large samples, consistent, appears imprecise, direct) found the prevalence of PTSD in peacekeepers between one month before and 6.6 years after deployment is around 5.3%.**
Prevalence of PTSD in peacekeepers	
12 studies, N = 14,059, prevalence 1 month before return to 6.6 years after deployment = 5.3%,	

95%CI 0.05% to 25.8%, I^2 = 96.8%	
Consistency in results	Consistent
Precision in results	Appears imprecise
Directness of results	Direct

Stevelink SA, Malcolm EM, Mason C, Jenkins S, Sundin J, Fear NT

The prevalence of mental health disorders in (ex-)military personnel with a physical impairment: a systematic review

Occupational and Environmental Medicine 2015; 72: 243-51

View review abstract online

Comparison	**Prevalence of PTSD in ex-military personnel with a physical impairment.**
Summary of evidence	**Moderate quality evidence (large samples, appears inconsistent and imprecise, direct) found the prevalence of PTSD in ex-military personnel with a physical impairment is between 2% and 59%.**
Prevalence of PTSD in ex-military personnel with a physical impairment	
15 studies, N = 3,683, prevalence ranged from 2% to 59%	
Consistency in results	Appears inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Williamson V, Stevelink SAM, Greenberg K, Greenberg N

Prevalence of Mental Health Disorders in Elderly U.S. Military Veterans: A Meta-Analysis and Systematic Review

American Journal of Geriatric Psychiatry 2018; 26: 534-45

View review abstract online

Comparison	**Prevalence of PTSD in elderly US veterans (>65 years).**

Prevalence in soldiers and veterans

Summary of evidence	**Moderate quality evidence (large sample, inconsistent, appears imprecise, direct) found the prevalence of PTSD in older US veterans is around 8.4%.**
Prevalence of PTSD in elderly US veterans	
8 studies, N = 1,296,967, prevalence = 8.4%, 95%CI 2.04% to 17.88%, I^2 = 99%	
Consistency in results	Inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Explanation of acronyms

CI = confidence interval, I^2 = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), N = number of participants

Margarete Ainsworth Building, Barker Street, Randwick NSW 2031. Phone: 02 9399 1000. Email: info@neura.edu.au

Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small[12].

† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. Less than 0.4 represents a small effect, around 0.5 a medium effect, and over 0.8 represents a large effect[12].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, a RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. A RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[13]. lnOR stands for logarithmic OR where a lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients (eg, r) indicate the strength of association or relationship

Margarete Ainsworth Building, Barker Street, Randwick NSW 2031. Phone: 02 9399 1000. Email: info@neura.edu.au

between variables. They can provide an indirect indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the independent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent considerable heterogeneity and over this is considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity with the following formula[12];

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, these criteria should be relaxed[14].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and/or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available and is therefore inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

References

1. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMAGroup (2009): Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *British Medical Journal* 151: 264-9.
2. GRADEWorkingGroup (2004): Grading quality of evidence and strength of recommendations. *British Medical Journal* 328: 1490.
3. Blodgett JC, Avoundjian T, Finlay AK, Rosenthal J, Asch SM, Maisel NC*, et al.* (2015): Prevalence of mental health disorders among justice-involved veterans. *Epidemiologic Reviews* 37: 163-76.
4. Cohen GH, Fink DS, Sampson L, Galea S (2015): Mental health among reserve component military service members and veterans. *Epidemiologic Reviews* 37: 7-22.
5. Fulton JJ, Calhoun PS, Wagner HR, Schry AR, Hair LP, Feeling N*, et al.* (2015): The prevalence of posttraumatic stress disorder in Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) Veterans: a meta-analysis. *Journal of Anxiety Disorders* 31: 98-107.
6. Hines LA, Sundin J, Rona RJ, Wessely S, Fear NT (2014): Posttraumatic stress disorder post Iraq and Afghanistan: prevalence among military subgroups. *Canadian Journal of Psychiatry* 59: 468-79.
7. Loignon A, Ouellet MC, Belleville G (2020): A systematic review and meta-analysis on PTSD following TBI among military/veteran and civilian populations. *Journal of Head Trauma Rehabilitation* 35: E21-E35.
8. Rona RJ, Burdett H, Bull S, Jones M, Jones N, Greenberg N*, et al.* (2016): Prevalence of PTSD and other mental disorders in UK service personnel by time since end of deployment: A meta-analysis. *BMC Psychiatry* 16: 333.
9. Souza WF, Figueira I, Mendlowicz MV, Volchan E, Portella CM, Mendonca-de-Souza AC*, et al.* (2011): Posttraumatic stress disorder in peacekeepers: a meta-analysis. *Journal of Nervous and Mental Disease* 199: 309-12.
10. Stevelink SA, Malcolm EM, Mason C, Jenkins S, Sundin J, Fear NT (2015): The prevalence of mental health disorders in (ex-)military personnel with a physical impairment: a systematic review. *Occupational and Environmental Medicine* 72: 243-51.
11. Williamson V, Stevelink SAM, Greenberg K, Greenberg N (2018): Prevalence of Mental Health Disorders in Elderly U.S. Military Veterans: A Meta-Analysis and Systematic Review. *American Journal of Geriatric Psychiatry* 26: 534-45.
12. CochraneCollaboration (2008): Cochrane Handbook for Systematic Reviews of Interventions. Accessed 24/06/2011.
13. Rosenthal JA (1996): Qualitative Descriptors of Strength of Association and Effect Size. *Journal of Social Service Research* 21: 37-59.
14. GRADEpro (2008): [Computer program]. Jan Brozek, Andrew Oxman, Holger Schünemann. *Version 32 for Windows*