Long Term Stability of Recall of Combat Exposure in Australian Vietnam Veterans

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Abstract

Accurate recall of exposure to traumatic events is essential for diagnosis, treatment and compensation. However, in the context of military combat, reports of trauma exposure may not be stable over time. Increased reporting over repeated assessments has been associated with PTSD and its re-experiencing (B) symptoms. Other competing explanations emphasise poorer health. This study reports on 388 Australian Vietnam veterans who were interviewed 21 and 36 years after repatriation. Combat exposure was assessed using a 21-item American scale. PTSD and the symptom clusters were assessed with standardised psychiatric diagnostic interviews, and self-administered measures of health were included. Although total combat scores were highly correlated across the two assessments (r =.865), stability of individual items differed widely.

Sixty-eight per cent of responses were stable, 17.5% were unstable increased reports, and 14.5% were unstable decreased reports. In hierarchical regression analyses, combat was the strongest predictor of stable reports but a weaker predictor of increased and decreased reports. Having a history of PTSD, particularly intrusion symptoms, significantly predicted stable reports. A history of PTSD was a significant but weaker predictor of increased reports of combat exposure. Suggestions of intrusive symptoms and poorer health as explanations of increased reports of exposure were not supported.

Introduction

Exposure to traumatic events is central to the diagnosis of post-traumatic stress disorder (PTSD). Unless objective evidence of trauma exposure is available, accurate subjective recall of exposure is essential for scientific, diagnostic, legal and compensatory purposes. However, recall accuracy of exposure to traumatic events has come into question from studies of US veterans. In a military context, an early report by Janes et al. (1991)[1] that evaluated reliability and validity of a combat stress scale over two assessments two years apart using members of the Vietnam Twin Registry, showed that reports tend to be reliable and, when compared with combat medal status, also tend to be valid. However, the accuracy of reporting combat events was questioned when articles began to appear that indicated the recall of combat exposure in US military veterans was potentially affected by PTSD itself.[2, 3] In particular, it was reported that PTSD in veterans increased the reporting of exposure to events when veterans were assessed on a second occasion. For example, Southwick et al.[2] reported findings from a small study of 59 returnees from a four-month tour of duty in Operation Desert Storm. Subjects completed questionnaires one month and 24 months after return, showing that 52 changed responses on at least one item, 36 changed at least two, and 41 recalled an event at 24 months that they did not report at one month. There were positive correlations between changes in recall and scores on the Mississippi Scale for PTSD[4] that they proposed were due to the effect of intrusive symptoms.

Roemer et al.[3] reported results of a larger study of 460 returnees from Somalia who completed questionnaires within 12 months of return and who were interviewed by telephone one to three years later. Using a 7-item scale, they found that there were significant increases in reports of war-zone exposures from time 1 to time 2, which, in a hierarchical regression, were related to a composite PTSD measure. Subsequent analysis found that of the syndromal subscales assessed using the Posttraumatic Checklist (PCL),[5] the intrusion subscale was significantly related to changes in reports. These reports preceded a much larger study by Koenen et al. in 2007,[6] of Vietnam veterans who were first assessed in 1984, nine years after the end of the war, and re-assessed in 1998—an average of 14 years later. Using an eight-item checklist of Likert scale combat exposures, they computed scores based on the total number of changes of exposures from 'ever' exposed to 'never' exposed, and from 'never' to 'ever', as well as scores of the total number of changes. Assessed against a 17-item self-report PTSD symptom scale, they found that increases in intrusion symptoms, but not avoidance or arousal, were positively and significantly associated with changes from non-endorsement to endorsement (i.e. 'never' to 'ever' responses), and concluded that changes in reporting of exposures were positively associated with PTSD symptoms, with intrusive memories driving veterans' increased later reports. More recently, Garvey Wilson et al.[7] followed returnees from Iraq, surveying them three, six and 12 months after return. They found 80–90% agreement in combat exposure reporting; however, PTSD was only 'slightly' (sic) associated with increased reporting.

However, findings of the effect of PTSD on reporting have not been consistent. King et al.[8] reported a questionnaire assessment of 2 942 Gulf War veterans who completed self-administered questionnaires within five days of return and 18–24 months later. The questionnaires contained a 31-item war-zone stressor scale (with binary Yes/No questions) and the Mississippi PTSD scale. They found that the majority of changed responses were of non-endorsement to endorsement ('never' to 'ever'). Using a cross-lagged panel analysis, they reported that combat reports at time 2 were primarily accounted for by combat reports at time 1, but less so by PTSD symptoms at time 1. In another study of 137 Dutch peacekeepers[9] who deployed for an average of 5.6 months in Cambodia, and who were surveyed twice—three and four years after return—changes in self-reports of exposure were not associated with PTSD measures. A study of UK veterans[10] who had served in the Persian Gulf War (n = 907) and in Bosnia (n = 638) surveyed veterans six years after the close of the first Gulf War and then three years later, reported that remembering more exposures over time was associated with worse perception of health but not with measures of mental health or PTSD symptoms.

In the face of these conflicting findings, doubts remain as to whether subsequent reports of combat trauma exposure are inflated and, if so, the extent to which PTSD and its component symptom clusters are responsible. The difficulty with interpretation of these varying results arises because (i) there were variations in the methods of assessment (mostly self-administered questionnaires) and symptoms of PTSD were assessed in the past month (i.e. the focus was on current PTSD); (ii) there were profound differences in exposures associated with the theatres of deployment and thus the potential for experiencing extremely traumatic events; (iii) there were differences in the period between exposure and assessment, from five days after return from a combat zone to nine years; (iv) there were large differences in the periods between assessments, from 12–24 months through 14 years; (v) there were significant differences between the types of service personnel (including Military Police and medical staff in the Southwick et al. study and combatants in the Koenen et al. study), and there were differences in the assessments of PTSD symptomatology. Any or all of these could potentially impact the observed variability of the findings. For example, if traumatic memory consolidation occurs over time, and is subject to intrusive phenomena, this might predict more stable reports of exposure as the memory is rehearsed. So, measures taken years after exposure, rather than sooner, may show smaller variability at a second subsequent assessment and thus more stable trajectories over time for people with PTSD. It is also possible that people with PTSD are reticent to disclose and may be less willing to endorse questionnaires at the first enquiry, so if under-reporting occurred at time 1 this itself might be an epiphenomenon of PTSD.

A number of factors associated with PTSD may impact the stability of recall of exposure to traumatic events. For example, risk factors for PTSD include intensity of combat exposure, education level and IQ, rank, military trade or job (such as infantryman, field engineer, artillery, medic) and becoming a battle casualty.[11] The role of these in the PTSD-recall relationship has not been addressed in the literature. It might be expected that recall may be more accurate for combatants with higher education or intelligence levels, or for events that lead to combat injuries, and these may confound the PTSD-recall relationship. The course of PTSD over time has not been considered in previous studies, so that if PTSD is associated with increased recall but has resolved over time, then the effect of PTSD should also have waned by the time of a second assessment. However, the question of the stability of recall of combat exposure has not been assessed together with changes in PTSD over time.

Uncertainty also remains as to whether stability and change are associated with other factors unmeasured and uncontrolled for in previous studies, such as intelligence, the actual level of combat, or poor health as suggested by the UK results.

While research has been focused on increases in recall over time, it is often overlooked that many reports remain stable over time; claims of an event occurring or not occurring are often recalled precisely, sometimes many years later in all of these studies. It is obvious that not having combat-related PTSD may be associated with stable reports of non-exposure. However, having PTSD may reinforce memories through the intrusion symptoms that act as reminders (Roemer et al., 1998), with a PTSD diagnosis, therefore, possibly associated with more stable reports of exposure.

This article presents data from a longitudinal cohort study of Australian Vietnam veterans who were assessed at similar time intervals to the Koenen et al. study[6], and which incorporates the longitudinal course of PTSD and its symptom clusters, a measure of health status, and statistical control of potential confounding. To overcome potential misclassification weaknesses of self-administered questionnaires, the study used in-person interviews and standardised diagnostic assessments to assess PTSD and examine its relationship with the recall of combat experiences.

The aims of the study were:

- to assess the levels of stable and unstable reports of combat exposure over a 14-year interval in Australian Vietnam veterans
- to establish whether the level of combat, changes in PTSD and symptoms, and perception of health are associated with stable and unstable reporting
- to test whether the course of PTSD and its symptom clusters, and perception of health, is significantly associated with stable or unstable reports of combat exposure after accounting for level of combat and potential confounders.

Method

A simple random sample[12,13] of 1000 male Australian Army Vietnam veterans was selected from personnel files held by the Army and interviewed in-person between July 1990 and February 1993 (n = 641) an average of 21.96 years (SD = 1.91) after repatriation, and again between April 2005 and November 2006 (n = 450), an average of 36.10 years (SD = 1.92) after return, with an average inter-interview interval of 14.18 years (SD = 1.92). Three-hundred and ninety-one veterans were interviewed on both occasions, but due to missing data in some items, the cohort sample size was reduced to 388.

Interviews were conducted in wave 1 by the first author and other members of the research team, by volunteer clinician counsellors recruited from the Vietnam Veterans Counselling Service (VVCS) and by volunteer officers from the Australian Army Psychology Corps. Interviews in wave 2 were conducted by the first author and by clinician counsellors recruited via their affiliation with the VVCS or the (then) Australian Centre for Military and Veteran Health. Interviews lasted between four and six hours and took place across Australia in veteran-nominated locations (usually their own homes).

Ethics approvals were obtained in the first wave from the Human Research Ethics Committees (HRECs) of the University of Sydney and the University of Queensland, and in the second wave from HRECs at Sydney University, the Concord Repatriation General Hospital in Sydney, the Australian Department of Veterans Affairs and the Australian Institute of Health and Welfare. Interviewers were trained in residential sessions in Sydney (wave 1) or interviewers' home cities (wave 2).

Measures

In-person assessments comprised a general health interview, completion of self-administered questionnaires during the interview, and assessment of combat and PTSD. The content of the interviews included (i) a 21-item Vietnam combat index developed in the USA[14] that was not used in the formulation of the diagnosis of PTSD but served to set the scene for the description of DSM Criterion A Vietnam events; (ii) assessment of combat-related PTSD using the Structured Clinical Interview for DSM-III (SCID)[15] in wave one and the Clinician-assessed PTSD Scale for DSM-IV (CAPS-4)[16] in wave two. The CAPS used the standard F1/I2 symptom criteria (Frequency > 1, Intensity > 2)[17]. These diagnoses were used to chart the course of PTSD into three groups: (1) veterans who had never qualified for a diagnosis of PTSD; (2) veterans who had a history of PTSD that was not current at wave two and thus could be considered to be in remission; and (3) veterans who had qualified for a diagnosis of PTSD that was current (one month) PTSD at the time of wave 2 interviews (for details see reference 11).

The Vietnam combat index asked the frequency of experiencing each of 21 events, with response categories of never, once, 2–5 times, 6–10 times and more often. Frequency scores were computed as 0–4 for each item, with a possible total ranging between 0 and 84 (the items are shown in Table 1). The study extracted data from Army records, including rank, enlistment and deployment details, and the Army General Classification Test (AGC), a 100-item test of intelligence comprising mixed spatial, numerical and verbal items shown in this cohort to be related to risk of PTSD.[11]

The Medical Outcomes Study 36-Item Short Form Health Survey(SF-36)[18] was administered during the interview. This questionnaire comprised 36 items that assess eight health concepts: (1) limitations in physical activities because of health problems; (2) limitations in social activities because of physical or emotional problems; (3) limitations in usual role activities because of physical health problems; (4) bodily pain; (5) general mental health; (6) limitations in usual role activities because of emotional problems; (7) vitality; and (8) general health perceptions. These scales are combined to produce summary scores, a Physical Component Summary (PCS) of 21 items and a Mental Component Summary (MCS) of 14 items[19]. (Note that item 2 is not included in the summary scores). Low scores on each scale indicate poor health status. The SF-36 summary scales demonstrated high internal consistency; Chronbach alpha scores for the PCS and MCS were.951 and.930, respectively.

Data analysis

Initial analysis was directed to assessing potential response bias by comparing Army record data of veterans who participated in both waves of interview with all known alive veterans and with veterans who dropped out after wave one. Wave one diagnoses also were compared for veterans who participated twice with those who dropped out after wave one. Over the two waves of assessments veterans were classified into those with no PTSD diagnosis, those with a history of PTSD that was not current at the second assessment, and those who had current PTSD at wave 2.11 Using a similar algorithm, the course of intrusion (B) symptoms, numbing/avoidance (C) symptoms, and arousal (D) symptoms were classified according to whether the veteran had ever met the criterion, and whether the criterion was met currently at the second assessment (no criterion, history of meeting criterion, currently met criterion). This enabled a more refined analysis of the course of component symptoms in addition to the overall PTSD diagnosis.

Changes in combat index items were assessed from crosstabulation of wave 1 with wave 2 item responses. Kappa statistics were computed to assess agreement across waves for each item. Difference scores were computed for each of the 21 combat scale items by subtracting the second score from the first and then summing to produce an overall wave 1 minus wave 2 difference score (W1 – W2 difference score). All items were then recoded into binary (‘ever’ and ‘never’) scores, indicating endorsement or non-endorsement of each item. The following scores were then computed that mirrored those of Koenen et al.:[6]

- stability scores: the number of items unchanged (both ‘never’ and ‘ever’ responses)
- change scores: the number of items changed from ‘never’ to ‘ever’ and ‘ever’ to ‘never’.

In the first step of the analysis, each of these four change scores was tested for a significant relationship with potentially confounding variables known to be related to PTSD.11,[20] These were Military Corps (job or ‘trade’, such as Infantry, Armour, Artillery, Medical, etc.), intelligence (Army AGC test), age at (first) deployment, rank in Vietnam, conscript or volunteer enlistment, duration of Vietnam service and whether the veteran had been injured in combat.

The course of PTSD over the 14 years between waves (no PTSD, history of resolved PTSD, current and chronic PTSD at wave 2) was tested for bivariate relationships with stability and change scores using analysis of variance with tests for linear and quadratic trend. The course of each of the B, C and D symptom clusters’ diagnostic criteria were similarly classified into three: (1) never meeting the criterion symptoms; (2) a history of meeting the criterion symptoms; and (3) meeting current criterion symptoms. Analysis of variance was used to assess each for stability and change in recall as a function of symptom course, again testing for linear and quadratic trends. Pearson correlation coefficients were computed between change scores and the summary scales of the SF-36 to test for a relationship between health status at the second assessment and stability and change in recall. Finally, a series of sequential hierarchical linear regression models were computed for each change endpoint. Because the PTSD diagnosis and symptom course variables were categorical, dummy variables were computed for entry into the multivariate analyses with the category of no PTSD serving as the reference. The first model entered potential confounders, the second model entered wave 1 combat, the third model entered the PTSD course or the B, C and D symptom courses together, and in the final model the two summary SF-36 scales were entered together. In this way, the effects of each variable set could be assessed after controlling for the previous ones. PTSD diagnosis and the symptom clusters were not entered together in the same model, to avoid issues of collinearity, but were analysed in separate modelling. Model R^2 change was examined to determine relative importance to each change score of each successive model.

Results

The age of veterans at wave 2 ranged from 46 to 87 years (M = 60.50 years, SD = 5.34); veterans were mostly married (prevalence = 87.9%) with only few (3.4%) never married; 83.5% were in possession of a treatment entitlement card issued by the Australian Department of Veterans Affairs (DVA) that indicated acceptance of a war-caused disability; and 60.9% reported that their main source of income was a DVA pension. The prevalences of lifetime and current (one month) PTSD were 22.9% and 13.7% respectively in wave one, and 31.2% and 20.4% in wave 2.[11]

Multivariate analysis of Army record data comparing respondents who were interviewed twice with all known alive non-respondents, and with wave 1 interviewees who did not participate in the second interview, revealed only two significant items: the AGC for respondents was significantly higher than that for alive non-respondents, and non-respondents had more charges of AWOL after return to Australia. This suggests that cohort respondents were generally more intelligent and more engaged, and is consistent with non-response analysis at wave 1[20] and wave 2.[21] There were no significant differences between wave 1 veterans who dropped out and those who participated twice, either in terms of Army-derived data or wave 1 psychiatric diagnoses including PTSD.

Means for the combat scale totals for waves 1 and 2 were 20.80 (SD = 4.07) and 21.16 (SD = 4.14) respectively, and ranges and medians were 0–82 and 18.0 for wave 1 and 0–75 and 19.0 for wave 2. The two combat scales had high individual internal consistencies (Chronbach α =.930 and .935 at Time 1 and 2 respectively) and they were highly correlated (r =.865, p <.001). A two-tailed t-test of whether the (W1 – W2) mean difference score between wave 1 and wave 2 varied significantly from zero was (t_{387} = -3.530, p <.001) indicating significant tendency overall to an increase in combat item response categories from wave 1 to wave 2.

Table 1. Prevalence of endorsement for each item of the combat index in both waves, item changes between waves 1 and 2 and kappa statistics assessing correspondence between the waves.

	Per cent Ever		Per cent Unchanged	Per cent Changed		$\varkappa$*
	Wave 1	Wave 2		Never-Ever	Ever-Never	
1. Make contact with the enemy	69.0	72.9	92.5	1.8	5.7	0.82
2. Fire weapon at the enemy	58.7	73.6	77.7	18.6	3.6	0.52
3. See Vietnamese killed	45.5	62.0	70.1	23.3	6.7	0.41
4. See our men killed	31.0	56.1	64.1	30.5	5.4	0.31
5. See enemy wounded	61.0	35.4	58.9	7.8	33.3	0.23
6. See our men wounded	66.4	61.5	72.3	11.4	16.3	0.40
7. See dead enemy	72.4	69.5	72.9	12.1	15.0	0.34
8. Kill the enemy	26.9	72.6	53.7	46.0	0.3	0.24
9. See dead civilians	49.9	30.2	60.3	10.1	29.7	0.20
10. See our own dead	56.8	49.9	63.1	15.0	22.0	0.26
11. Felt may never survive combat	45.5	51.7	62.3	22.0	15.8	0.25
12. Participate in body count	29.2	50.1	62.0	29.5	8.5	0.24
13. Directly hurt Vietnamese	24.3	26.9	76.2	13.2	10.6	0.38
14. Burn, destroy villages	17.1	15.8	78.0	10.3	11.6	0.20
15. Observe killing Vietnamese	27.6	15.8	73.2	7.5	19.4	0.23
16. Risk of being killed, wounded	87.6	25.1	35.9	0.8	63.3	0.07
17. See our men wounded by antipersonnel devices	39.8	52.5	84.2	14.2	1.6	0.69
18. Directly kill Vietnamese	36.4	36.4	66.9	16.5	16.5	0.29
19. Observe Vietnamese being hurt	25.8	32.0	70.5	17.8	11.6	0.29
20. Direct involvement in mutilation	3.6	15.8	83.8	14.2	2.1	0.11
21. Observe mutilation	12.7	8.8	87.3	4.4	8.3	0.34

* All $\varkappa$ values are statistically significant (p <.005)

There were many changes in individual item responses between the waves. Table 1 shows the items in the scale, the percentage of veterans who reported that the event occurred at least once, the per cent that was unchanged, that were changed from 'ever' to 'never' and 'never' to 'ever', and the kappa statistics comparing each item scored as binary ('never' vs 'ever').

Several features stand out in the table: Firstly, the percentage of responses that remained unchanged between waves 1 and 2 varied markedly across items. Veterans were highly likely to be consistent in reports of enemy contact and either (not) witnessing or (not) being directly involved in acts of mutilation, and seeing men injured by antipersonnel devices, but other items varied widely. Item 8 (kill the enemy) saw a large increase in positive reports from wave 1 to wave 2, as did item 4 (see our men killed) and item 12 (participate in a body count), item 3 (see Vietnamese killed) and item 11 (never survive combat). In 11 of the 21 items, there was an increase in the number of veterans who claimed to have experienced it. However, many initially positive reports remained positive, and many initially negative reports remained negative. There were also large numbers of initially positive reports that were changed to negative ones: item 16 (subjective risk of being killed or injured), item 5 (see enemy wounded), item 9 (see dead civilians) and item 10 (see our own dead) were all changed negatively in more than 20% of reports at wave 2. Thus, while there was a high correlation between total scores from wave 1 to wave 2, examination of the behaviour of individual items revealed marked differences in their stability.

The 21-item combat index presented the opportunity for up to 21 stable or unstable responses. Overall, 40.1% were stable 'never'-'never' responses, 28.0% were stable 'ever'-'ever' responses, 17.5% were unstable 'never'-'ever' responses, and 14.5% were unstable 'ever'-'never' responses. Therefore, more than two-thirds of responses were stable over time, while unstable increases and decreases were at similar levels.

Table 2. Means and standard deviations of combat index change scores for the 14-year course of PTSD diagnosis and each diagnostic symptom cluster (intrusion, numbing/avoidance and arousal).

	Unchanged Never-Never		Unchanged Ever-Ever		Changed Never-Ever		Changes Ever-Never	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PTSD Diagnosis								
No PTSD	10.24**	5.72	4.12 **	4.62	3.42*	2.12	3.11	2.06
History only	6.63	4.84	6.91	5.15	4.26	2.32	2.94	1.90
Current PTSD	4.58	3.78	9.81	5.55	3.75	2.55	2.85	2.2
Intrusion (B) criterion met								
No symptoms	12.33***	5.45	2.65***	3.48	2.94**	1.97	2.87	1.98
History only	8.38	5.08	5.16	4.72	3.93	2.14	3.23	1.93
Current symptoms	6.23	4.97	7.61	5.69	3.86	2.41	2.99	2.17
Numbing/Avoidance (C) criterion met								
No symptoms	10.46***	5.76	4.06***	4.67	3.25**	2.02	3.12	2.05
History only	6.95	4.84	7.05	4.84	4.16	2.32	2.84	1.89
Current symptoms	5.34	4.45	8.10	5.86	4.00	2.56	2.88	2.19
Hyperarousal (D) criterion met								
No symptoms	11.73***	5.38	3.03***	3.65	3.16**	2.06	2.90	1.98
History only	7.32	4.99	5.53	4.50	4.32	2.28	3.29	1.94
Current symptoms	6.31	5.04	7.59	5.77	3.80	2.38	3.01	2.15

* $p<.05$, ** $p<.01$, *** $p<.001$

Table 2 shows the means and standard deviations of change scores for the course of PTSD diagnosis and each criterion B, C and D symptom clusters. All analyses returned significant linear (but not quadratic) trend except for increased 'never-ever' scores. Thus, unchanged stable reporting of 'never-never' and 'ever-ever' exposures were associated with PTSD diagnosis and all symptom clusters, with PTSD diagnosis and clusters associated with fewer stable 'never-never' responses and more stable 'ever-ever' responses. Changed unstable reports from 'never' to 'ever' were associated with PTSD diagnosis and all symptoms clusters but not linearly. The significant quadratic (but not linear) trend indicated higher unstable scores among veterans who had PTSD that was not current at wave two (i.e., had remitted).[11] Unstable changes from 'ever' to 'never' were not associated with any diagnosis or symptom course.

Pearson correlation coefficients between the combat index, each of the SF-36 PCS and MCS scale scores and each of the change scores are shown in Table 3. Note the pattern of positive and negative directions of the significant correlations. Combat was strongly positively correlated with stable 'ever' response scores, and negatively correlated with stable 'never' scores. This suggests that stable responses of no exposure are associated with lower combat, and stable responses of actual exposure are associated with higher combat. Combat was also weakly negatively correlated with unstable 'ever-never' scores, but positively correlated with unstable 'never-ever' response scores. The SF-36 scales were associated with stable reports but in opposite directions. This suggests that poor health may be associated with fewer stable 'never-never' reports and more stable 'ever-ever' reports. SF-36 scales were not significantly correlated with unstable reports.

Potential confounders of predictors of recall

Intelligence test scores were not related to any change scores, nor were years of education, age at first deployment, serving in Infantry in Vietnam, or serving as an officer in Vietnam. Lower rank was associated with fewer stable 'never-never' and more stable 'ever-ever' responses, but not associated with unstable responses. Enlistment via conscription was associated only with more unstable 'never-ever' responses; however, becoming a battle casualty was associated strongly with fewer stable 'never-never' and more stable 'ever-ever' responses, but not with unstable responses. Corps group (representing the military job or trade - Infantry, Engineers, Medical, etc.) was associated with stable but not unstable responses.

Multivariate analysis of stable and unstable reports

To assess the relative contributions of combat, the course of PTSD symptom clusters and poorer health to stable or unstable reporting, sequential hierarchical regression modelling was undertaken with each outcome variable as dependent. Each model was adjusted for potential confounding variables appropriate for each endpoint: rank in Vietnam, sustaining a battle casualty, and corps for stable responses, and enlistment method (conscript versus volunteer) for unstable 'never'-'ever' responses. Since no potential confounding variable was associated with unstable 'ever'-'never' responses, adjustment was unnecessary. (Note the definition of a confounding variable[22] specifies that the variable is associated with the dependent and the independent variable, which warrants adjustment in analysis—if there are no confounders then adjustment is not warranted).

Table 3. Pearson correlation coefficients between the wave 1 combat index, wave 2 SF-36 summary scales and each of the stable or unstable change scores.

	Number unchanged		Number changed	
	Never-Never	Ever-Ever	Never-Ever	Ever-Never
Wave 1 Combat index	-.827**	.914***	-.173**	.106*
SF-36 Summary Scales:				
Physical Health	.273**	-.267**	-.080	-.045
Mental Health	.298**	-.280**	-.098	-.045

* p <.05, ** p <.01, *** p <.001

Table 4. Changes in R^2 for regression models as each item block was added sequentially to models of total unchanged (never-never and ever-ever) and total changed (never-ever and ever-never) response scores, and standardised regression coefficients for the final models.

(1) Model A with PTSD diagnosis	Unchanged Never-Never	Unchanged Ever-Ever	Changes Never-Ever	Changes Ever-Never
Changes in Adjusted R^2				
Confounders	.131***	.165***	.019**	-
+ Combat index	.558***	.676***	.024**	.009*
+ PTSD course	.010**	.005**	.039***	.011
+ Wave SF-36 subscales	.001	.000	.010	.002
Total Adjusted R^2	.701	.842	.077	.022
Final Models: Standardised Regression Coefficients (β)				
Combat	-.761***	.854***	-.241***	.141*
Course of PTSD:				
- History of PTSD	-.084**	.020	.173**	-.072
- Current PTSD	-.067	.075**	.112	-.121
SF-36 summary scales:				
Physical Health	-.033	.003	-.073	-.043
Mental Health	.074	-.002	-.036	-.004
(2) Model B with Symptom Clusters	Unchanged Never- Never	Unchanged Ever-Ever	Changes Never-Ever	Changes Ever-Never
Changes in Adjusted R^2				
Confounders	.131***	.165***	.019**	-
+ Combat index	.558***	.676***	.024**	.009*
+ B, C & D symptom course	.023***	.004	.083***	.027
+ Wave 2 SF-36 subscales	.001	.000	.001	.000
Total Adjusted R^2	.713	.845	.107	.036
Final Models: Standardised Regression Coefficients (β)				
Combat	-.733***	.866***	-.300***	.095
B symptoms course:				
- History of B symptoms	-.091*	-.019	-.118	-.089
- Current B Symptoms	.032	.027	-.045	.076
C Symptom Course:				
- History of C Symptoms	-.041	.033	.089	-.078
- Current C Symptoms	-.087	.041	.165*	-.106
D Symptom Course:				
- History of D Symptoms	.016	.012	-.056	-.048
- Current D symptoms	-.037	-.023	.019	.026
SF-36 summary scales:				
Physical Health	-.047	.012	-.036	-.030
Mental Health	.054	-.016	-.001	.017

* p <.05, ** p <.01, *** p <.001

The analysis strategy first introduced the course of PTSD in the regression modelling without the symptom cluster data (model A) and in the second series of models then introduced the symptom cluster courses without the full diagnosis (model B). This was undertaken to check whether the diagnosis itself was significant and, if so, whether some individual symptoms were more important than others. Entering the diagnosis as well as the symptom clusters would introduce significant multicollinearity, as the symptom clusters were integral to the diagnosis itself. Table 4 shows the change in R^2 at each step of the modelling and the standardised regression coefficients for variables in the final models for each change variable.

Combat was a strong predictor of stability but a weaker predictor of instability. After accounting for combat, the course of PTSD diagnosis added significantly to both of the stable responses and the unstable 'never-ever' responses but not to unstable 'ever-never' responses. The final model's significant variables for stable 'never-never' responses included combat and a history of PTSD but not current PTSD. In contrast, the final model's significant variables for stable 'ever-ever' responses included current PTSD but not a history of PTSD.

A history of B symptoms, but not current B symptoms, were significant in the final model for stable 'never-never' responses, but C and D symptom courses and SF-36 scores were not significant. Thus, lower combat was associated with more stable reports of 'never-never' experiencing traumatic combat events. The significant variables in the final model for stable 'ever-ever' responses included combat and PTSD diagnosis with current PTSD being significant, but not B, C or D symptoms. Thus, higher combat and current PTSD were significant associates of more stable 'ever-ever' reports.

The significant variables in the final model for unstable 'never-ever' reports included combat (with a negative parameter estimate that indicates PTSD is related to fewer increased reports) and current C symptoms. This is inconsistent with previous explanations of increased reporting as a function of intrusive symptoms.[2, 3, 6] This is also inconsistent with the hypothesis that increased reporting of combat exposure is more closely associated with poor health.[10] Finally, unstable 'ever-never' reports had no significant individual variables in the final model except combat. SF-36 summary scales made no significant further contribution to stable or unstable scores after controlling for PTSD or its symptom clusters.

Discussion

This study has confirmed that increased reporting of combat exposure may occur when veterans are asked on several occasions, even three decades after the war ended, and 14 years after they first told their stories. This adds to evidence that increased reporting may occur over the first 12 months after return,[7] may be observable over 2–3 years after return,[2, 3, 8] 6–9 years after return,[10] and be measurable a further 14 years later.[6] In Australian Vietnam veterans assessed more than 20 years after their service in Vietnam and again 14 years later, recall of combat exposure over time was characterised by both stability and change. Stable reporting of non-exposure to traumatic combat events was highest in veterans with lower combat exposure, as may be expected. Stable reporting of exposure to combat events was higher in veterans with high combat exposure and with current chronic PTSD. Veterans with higher combat were less likely to change their responses from 'never' to 'ever' but also more likely to change their responses from 'ever' to 'never'. Therefore, it seems that combat, rather than development of PTSD, may be the driving factor in stable reporting, while increased reporting over time may be associated with lower combat. In using scales of combat or trauma exposure, there is a set of implicit assumptions that the measures are adequate (that veterans are able to recall events), reliable (that veterans give the same answer on subsequent occasions) and valid (that veterans' answers are accurate).

However, these assumptions may be tenuous. In some individual circumstances, it may be difficult to attribute a sufficiently high level of adequacy of responses. For example, questioning an individual about whether they actually killed an enemy combatant in a firefight might present an impossible question—during enemy contact an individual might fire their weapon at the enemy but, in jungle or urban warfare, might not actually see where any of their bullets hit. After the contact is concluded and an enemy body is discovered, it might be impossible to tell which soldier's fire was responsible, making it impossible for an individual combatant's report to be objectively verified later.

Without corroborating witnesses, for some briefer combat item scales that ask only general items (e.g. service in a war zone, service in combat) as used in previous US studies, it may be possible to validate some answers using external sources of information[1, 23, 24] such as media reports, which may themselves not be entirely accurate. Validating military records themselves may not be accurate due to missing or incomplete data entries.

Australian field commanders' diaries may be referred to (in official reports such as official war histories) that specify the units present at the time, but it may be uncertain exactly which soldier was present at the time and location, since any individual unit at any time may have had soldiers on leave, sick or assigned temporarily to other duties in different locations. Therefore a field commander's diary might specify precise location and duration of contact but be unable to confirm who was present during a specific instance of combat.

In most studies, test-retest correlations have been moderate to high.[1, 6, 8] In this study, it was high although there was a degree of change among individual items. A high test-retest correlation of total scale scores does not exclude the possibility that a similar scale score may be achieved in the midst of changes in individual items so that the total amount of combat exposure would not be as unstable. Several methodological differences have distinguished the reports discussed above. One is the method of assessment—it is possible that the studies using self-administered questionnaires have merely reflected lower levels of reliability compared with face-to-face methods.[25] PTSD diagnoses in the current study were collected in standardised face-to-face interviews rather than self-administered questionnaires, which would act to enhance data quality.

Explanations of increased reporting in terms of current B (intrusion symptoms) and poorer health were not supported; instead, history of PTSD and having current C symptoms were associated with increased reports. In fact, the B symptoms were significant predictors of stable negative reporting and were not associated with increased reports or with stable positive reports. In contrast, the C (numbing/avoidance) symptoms were more closely related to increased reporting. These symptoms include efforts to avoid thoughts, feelings or conversations associated with trauma, efforts to avoid activities, places or people who arouse recollections of trauma, as well as psychogenic amnesia—the inability to recall significant aspects of the event. It is possible that this avoidance acted to suppress initial memories and thus reporting of combat events at first interview.

Remaining uncertainty surrounds the question of whether the first or the second report is the more valid response. If having PTSD acts to inhibit reporting of events when first questioned, this will result in withholding of exposure reports that, as they become less painful over time, are more willingly admitted on a second occasion rather than denied. In reporting changes from 'never' to 'ever', it is feasible that veterans may have tended not to disclose all aspects of combat-related, potentially traumatic events but may have been less inhibited in doing so many years later. Reluctance to report events initially was also recognised by Roemer et al.[3] as potentially accounting for subsequent increased reports. If this is the case, it is possible that under-reporting at time 1 itself may be an epiphenomenon of PTSD so that, as reports become more accurate over time, it appears that they inflate later exposure reports. In addition, certain items in an exposure inventory (such as the risk of being killed or injured) may, on reflection over the years, appear to have been less severe than initially estimated (after all, the veterans who participated actually did survive!).

The limitations of this study are shared with any epidemiological study of non-treatment-seeking populations and comprise potential participation bias, measurement bias and confounding. Participation bias was assessed by comparing responders and non-responders, finding that the participants were intellectually brighter on average with fewer AWOL charges after return than non-responders, which may have influenced the reportage changes. Measurement used standardised instruments, in an attempt to minimise interviewer bias and to provide continuous measures that confer higher statistical power. Confounding was addressed in statistical analysis that sought potentially disturbing variables to the outcome variables; for example, there was no association between intelligence and changes in reporting. Multivariate analysis was used to assess the relative importance of PTSD, its symptom clusters and general health in stable and unstable reporting while controlling for confounders. However, the findings may be applicable only to war veterans, so that the results are in need of replication in other potentially traumatised groups, including civilians as well as military life.

An unaddressed concern is the role of compensation in reporting of exposure to combat events. In the context of compensation claims, it is possible that reports of combat exposure may be exaggerated.[24] However, the assessments of the veterans for the study were completely independent of the compensation process—the veterans were talking to researcher-clinicians, who had no role and could have no role in any compensation application for the veterans. Rather than a limitation, this would appear to be a strength of the study, in that reports were not made in expectation of compensation.

In conclusion, higher levels of combat were associated with stable reporting of combat exposure. Future research should consider stable as well as unstable reports of traumatic exposure when assessing change in reporting. In a clinical context, it is important to consider whether initial reports of trauma exposure tell the full story. In compensatory claims, it should be important not to dismiss potential overreporting of trauma exposure in subsequent assessments as a function of PTSD symptoms, but consider whether increased reporting itself is a function of the degree of trauma exposure.

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