

War Zone Stress Without Direct Combat: The Australian Naval Experience of the Gulf War

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This study examines psychological stressors reported by Australian Navy Gulf War veterans in relation to the 1991 Gulf War and other military service. Using a 44-item questionnaire, veterans reported few direct-combat encounters during the Gulf War; however, they reported many other stressful experiences, including fear of death and perceived threat of attack, more frequently in relation to the Gulf War than other military service. Reporting of stressful experiences was associated with younger age, lower rank, and deployment at the height of the conflict. These experiences may partly explain increased rates of psychological disorders previously demonstrated in this Navy veteran population. Findings highlight the importance of documenting war experiences in close proximity to deployment, and developing war exposure instruments which include naval activities and which reflect stressors other than those related to direct combat.

Combat-related psychological stressors have been established as causes of persisting psychological morbidity in military personnel. More than 50 years after returning from World War II and Korea, for example, veterans continue to demonstrate marked associations between psychological ill health and severity of combat exposure (Hunt & Robbins, 2001; Schnurr & Spiro, 1999), including number of casualties (Kidson, Douglas, & Holwill, 1993) and responsibility for the death of others

(Fontana & Rosenheck, 1994). Since these conflicts, the nature of warfare has changed. For example, the 1991 Gulf War involved a relatively brief combat period, with only 40 days of air warfare and 5 days of ground warfare, little close confrontation, with missile and rocket strikes often launched from sites located hundreds of miles from their targets, and relatively few Coalition casualties (Odgers, 2003); however, as with veterans of earlier wars with more direct combat and greater casualties, Gulf War veterans are characterized by increased risk of psychological morbidity (Stimpson, Thomas, Weightman, Dunstan, & Lewis, 2003).

A recent study of Australia's Gulf War veterans (GWVs) showed that they had increased rates of several psychological disorders in the post-Gulf War period, including posttraumatic stress disorder (PTSD), depression, and substance-use disorders, compared to an age-, sex-, and service branch-matched Australian military comparison group who were in operational units at the time of the Gulf War, but who did not deploy to that conflict (Ikin et al., 2004). The increased risk of psychological disorders

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was strongly associated with the number of self-reported Gulf War-related psychological stressors. The Australian contingent, however, encountered little direct combat during their deployment (Odgers, 2003). There were no Australian deaths, and few injuries were reported. The majority were Royal Australian Navy (RAN) personnel whose tasks included participation in a blockade of the Gulf of Oman, and providing transport, supplies, or medical support. One quarter had departed the Gulf region prior to the first Coalition air strikes in January 1991. Although Iraqi Air Force jets made feints towards the Coalition naval forces within weapons-release range, the Australians were not subject to military attack (Odgers, 2003). The question arises as to what were the main psychological stressors encountered by RAN GWVs which characterize this deployment and that may explain the later development of psychological disorders.

To investigate this question, we explored psychological stressors reported by RAN GWVs using the Military Service Experience Questionnaire (MSEQ). The MSEQ was developed specifically for this study as existing war-stress questionnaires seemed inadequate in exploring the experiences of navy groups and of deployed military groups with little direct-combat exposure. We explored the types of stressors reported by RAN GWVs in relation to the Gulf War, and then compared these with the stressors reported in relation to other military service. We also investigated whether the stressors reported in relation to the Gulf War were associated with rank, age, or time of deployment in relation to the period of the air and ground warfare.

Our review of the existing literature in relation to the 1991 Gulf War revealed no comprehensive investigations of psychological stressors experienced by Coalition Navy personnel. A study of Canadian Navy GWVs (Goss Gilroy Inc., 1998) explored exposure to a small number of emotionally stressful events including false alarms of chemical agent use, and direct-combat stressors such as seeing friends killed or wounded. Other brief measures of war zone stressors have been presented for Coalition groups of mixed service types (e.g., McCarroll, Ursano, Fullerton, Liu, & Lundy, 2001; Sutker, Davis, Uddo, & Ditta, 1995) or groups consisting primarily of army veterans (e.g., Wessely et al., 2003).

Method

The methods presented in this article are part of a larger study investigating a wide range of health outcomes and exposures; these are more fully described elsewhere

(Ikin et al., 2004; Kelsall et al., 2004; McKenzie et al., 2004).

Recruitment

The study population was the entire cohort of 1,579 (99% male) RAN veterans who deployed to the 1991 Gulf War. Subjects were recruited via mailed invitation, with two further mailings and intensive follow-up phone contact for nonresponders. Recruitment was carried out during July 2000 to April 2002.

Measures

Full participation in the study included completing a postal questionnaire and undergoing a comprehensive medical examination. For the purpose of this article, data were drawn from the postal questionnaire which included demographic details, military-service history, and military-related psychological stressors measured using the MSEQ. The MSEQ comprised 44 items, each representing a potentially stressful experience considered relevant to military service including, but not exclusive to, the Gulf War deployment. The items refer to actual military events as well as personal appraisals of fear, threat, or discomfort. The MSEQ was initially developed by compiling items derived from individual Gulf War veterans' presentations to Veterans Affairs seminars and from examination of existing military exposure scales. Potentially relevant items were drawn from questionnaires such as the Laufer Combat Scale modified for studies of United States GWVs (Erickson, Wolfe, King, & King, 2001; Gallops, Laufer, & Yager, 1981), the Combat Exposure Scale (Keane et al., 1989), the Operation Desert Storm Exposure Scale (Sutker et al., 1995; Wolfe, Brown, & Kelley, 1993), and exposure questionnaires used by British (Unwin et al., 1999) and Canadian (Goss Gilroy Inc., 1998) GWV studies. In some cases, individual MSEQ items represented a blend of similar items drawn from several questionnaires. A list of items was then presented to a focus group of Australian GWVs facilitated by three of the authors (J.I., M.C., & K.H.). Items that were deemed by the group to be inappropriate or irrelevant for Australian veterans were culled and a number of additional items were created, at the suggestion of those veterans, to generate the final list of 44 questions. Study participants were asked whether they had experienced individual items during the Gulf War, during their other military service, or both. The instrument demonstrated good internal consistency (Cronbach, 1951) both in relation to Gulf War service ($\alpha = .83$) and other military service ($\alpha = .85$).

Study participants also reported any active deployments, other than the Gulf War, in which they had participated during their service. Active deployments include war operations, peacekeeping missions, service-protected evacuations, and humanitarian aid operations.

Participants were divided into age groups according to their age in years upon commencement of the Gulf War. They also were allocated to one of three rank categories according to their highest rank at the time of the Gulf War: officer, other rank–supervisory, and other rank–nonsupervisory (Ikin et al., 2004). Age (Brewin, Andrews, & Valentine, 2000) and rank (Ismail et al., 2000; McKenzie et al., 2004) have been demonstrated to be associated with psychological health in veterans. Further, participants were categorized according to the time of their Gulf War deployment in relation to the air and ground warfare; these categories were pre-air war (those veterans who had departed the Gulf region prior to the start of the air warfare on January 17, 1991), during warfare (those who were in the Gulf region at some time during the air or ground warfare between January 17 and February 28, 1991), and after cease-fire (those who first arrived after the cease-fire on February 28, 1991). These different phases of the war may have exposed veterans to different types of stressors.

Overview of Analyses

Statistical analyses were performed using SPSS for Windows Release 11.5 (SPSS Inc., 2002) and Stata 8.0 (StataCorp, 2002). Exact conditional logistic regression (CYTEL Software Corporation, 2002; Hosmer & Lemeshow, 2000) was used to generate odds ratios (OR), and their 95% confidence intervals (CI), comparing MSEQ items experienced during the Gulf War with those experienced during other service. These ORs, which involve comparisons within each Gulf War participant, obtain information only from participants where MSEQ items were present during Gulf War service and not present during other service, or vice versa. These items appear as discordant pairs in the two-by-two tables. Using Chinn's (2000) method for converting an OR to an effect size by taking the natural logarithm of the OR and dividing by 1.8, MSEQ items were presented in the tables if they achieved a minimum OR value of 1.75 (or ≤ 0.57 for ORs < 1), as this represents at least a medium effect size (Cohen, 1988).

The effects of age (<25, 25–34, 35–44, 45+ years), rank, and time of deployment on each of the Gulf War MSEQ responses were investigated using logistic regression. Rank and time of deployment were entered as cat-

egorical variables, and results for these variables were retained in the figures if the ORs represented at least a medium effect size, as described earlier. Age category was entered as a linear variable, for which the OR refers to the increase in odds associated with each consecutive increase in age category.

Results

Participants

Of the original 1,579 RAN Gulf War veterans, 49 were removed from the sample because they were reported either to be deceased ($n = 17$) or living or based overseas for the duration of the study ($n = 32$) and thus not able to complete the medical examination. From the remaining 1,530 Gulf War veterans, 1,249 (81.6%) participated, of which 1,232 (98.6%) were men. Nonparticipants included 4% who declined full participation but answered a short telephone survey, 6.3% who declined all participation, 3.5% who did not respond to our contact attempts, and 4.6% for whom no current address could be located. The final analysis and results for this article were restricted to the 1,232 male participants, as there were only a small number of female participants. The participating men averaged 37.4 years of age ($SD = 6.1$, range = 27.6–61.5) at the time of assessment. At the time of the Gulf War, the group averaged 26.7 years of age; 15.2% served as officers, 48.6% were categorized as other rank–supervisory, and 36.2% were categorized as other rank–nonsupervisory.

Gulf War Service Compared With Other Service

MSEQ items reported by participants in relation to their Gulf War service, and in relation to their other service, for those whose other service included other active deployments ($n = 506$) and for those whose other service did not include any active deployments ($n = 726$), are shown in Table 1. The MSEQ items are presented in order of decreasing frequency as reported for Gulf War service. Individual MSEQ items in Table 1 are shown with their corresponding question number and full text as they appeared in the postal questionnaire. In later tables, only the question numbers and abbreviated text are shown.

Table 1 shows that the MSEQ item reported most frequently for Gulf War service was being on board a ship or aircraft passing through hostile waters or airspace. Four of the next five MSEQ items, reported most frequently for Gulf War service, involved personal fear

Table 1. MSEQ Items Reported by Navy GWVs in Relation to Their Gulf War Deployment and in Relation to Their Other Service

MSEQ Item	Gulf War Service		Other Service			
	All GWVs (<i>N</i> = 1, 232)		GWVs with Other Deployments (<i>n</i> = 506)		GWVs with no Other Deployments (<i>n</i> = 726)	
	<i>n</i>	(%) ^a	<i>n</i>	(%) ^a	<i>n</i>	(%) ^a
34. You were on a ship or aircraft (including a helicopter) passing through hostile waters or air space.	986	(81.2)	246	(50.1)	162	(23.9)
36. You were in fear of artillery, missile, SCUD rocket or bomb attack.	872	(71.3)	103	(21.0)	30	(4.4)
31. You were on formal alert for, or felt in threat of nuclear, biological or chemical agent attack.	864	(70.9)	62	(12.6)	34	(4.9)
33. You felt cut off or separated from family or significant others.	814	(66.6)	296	(59.7)	333	(48.3)
41. On board a ship you feared death, injury or entrapment below the waterline as a result of missile attack or hitting a sea-mine.	657	(53.6)	97	(19.6)	66	(9.5)
26. You were in fear for your life.	574	(46.9)	108	(21.9)	110	(16.1)
18. You were responsible for detecting incoming attacks or for spotting land or sea-mines, where a mistake could place the lives of others at risk.	541	(44.1)	130	(26.3)	84	(12.2)
12. You encountered undetonated mines, including sea mines, or booby traps while on patrol or at your duty station.	492	(40.3)	54	(11.0)	45	(6.5)
20. You experienced a 'near miss' or 'very close call' incident where you were in imminent danger of being injured or killed.	434	(35.6)	160	(32.4)	228	(33.1)
2. Artillery, rockets, missiles, mines or something similar, exploded in the air, in the water or on the ground close to you.	376	(31.0)	116	(23.5)	150	(22.0)
14. Your supplies or equipment were inadequate, insufficient or faulty.	351	(28.7)	149	(30.0)	193	(27.9)
5. You have suffered ill-effects of extreme heat or extreme cold.	337	(27.6)	158	(32.1)	209	(30.4)
37. You had difficulty breathing as a result of exposure to oil, smoke, fumes, dust or other contaminants in the air.	325	(26.6)	73	(14.7)	119	(17.2)
21. You were required to detonate, deactivate or otherwise handle live missiles, mines, bombs or other explosive devices.	310	(25.4)	136	(27.4)	209	(30.3)
9. You experienced lack of leadership in your team, crew or unit.	252	(20.7)	140	(28.1)	194	(28.1)
44. You sustained an injury that required medical treatment.	245	(20.3)	154	(31.5)	285	(41.3)
28. You felt lack of togetherness or cohesion in your team or unit.	239	(19.5)	134	(27.0)	192	(27.7)
40. You felt overwhelmed by the level of destruction or devastation or disease around you.	235	(19.3)	83	(16.8)	49	(7.1)
7. You had to work, dive or bathe in water contaminated with smoke, oil, sewerage or other chemical or biological agents.	225	(18.5)	107	(21.6)	167	(24.1)
27. You felt not sufficiently trained or prepared for military activities.	226	(18.4)	82	(16.5)	105	(15.2)
25. You felt an overwhelming inability to protect yourself or others from harm.	189	(15.4)	45	(9.1)	46	(6.6)
43. You feared attack from bandits, rebels or other local militia groups.	182	(14.9)	107	(21.6)	65	(9.4)
23. You had to board hostile vessels at sea.	165	(13.5)	78	(15.8)	70	(10.1)
3. You saw Defence personnel or civilians who were killed, dead, dying or maimed.	159	(13.2)	138	(28.0)	177	(25.7)
29. You suffered burns or rashes on your skin as a result of exposure to oil or other chemicals in the air.	145	(12.0)	64	(13.0)	75	(10.9)
38. You carried out your duties wearing NBC suits (not including training exercises).	142	(11.6)	16	(3.2)	17	(2.5)
1. You were on a ship which suffered a collision or was otherwise damaged or sunk during deployment.	128	(10.6)	149	(30.0)	193	(27.9)
6. You had to eat food or drink water contaminated with smoke, oil, sewerage or other chemical or biological agents.	112	(9.2)	52	(10.5)	66	(9.6)
39. You felt alienated from other military personnel around you.	107	(8.8)	35	(7.1)	53	(7.7)
32. You were exposed to nuclear, biological or chemical warfare.	102	(8.7)	9	(1.8)	8	(1.2)
10. You came under small arms fire.	73	(6.0)	42	(8.5)	12	(1.7)
22. You handled or came into contact with POWs or displaced refugees.	59	(4.8)	76	(15.3)	52	(7.5)
8. Operational rules of engagement prevented you from taking action which could protect you or others from harm.	46	(3.8)	22	(4.5)	12	(1.7)
16. You were attacked by civilians, bandits or other local militia groups.	38	(3.1)	41	(8.2)	38	(5.5)
42. You were required to live in squalid, unsanitary or disease-ridden conditions.	38	(3.1)	30	(6.1)	29	(4.2)
30. You witnessed violent attacks on civilians including rape or other assaults.	32	(2.6)	41	(8.2)	34	(4.9)
11. You handled, buried or exhumed human bodies.	29	(2.4)	58	(11.7)	76	(11.0)
19. You were required to administer medical for which you were not adequately trained or equipped, eg., geriatrics, paediatrics, palliative care. (Answer NO if not applicable)	28	(2.3)	6	(1.2)	14	(2.0)
15. You were deployed to a combat situation against your will.	22	(1.8)	6	(1.2)	4	(0.6)
35. You sat with or cared for someone who was dying.	20	(1.7)	41	(8.3)	33	(4.8)
17. You were sexually harassed.	14	(1.1)	9	(1.8)	17	(2.4)
4. You made a leadership decision which you think resulted in the death or injury of someone.	12	(1.0)	13	(2.6)	15	(2.2)
13. You killed someone or think you might have killed someone.	11	(0.9)	8	(1.6)	3	(0.4)
24. You had to decide who would receive life-saving medical care.	11	(0.9)	13	(2.6)	13	(1.9)

^aThe value of *n* from which each percentage is derived varies by up to 5% fewer respondents depending on the numbers of participants who answered each item.

or threat. These included fear or threat of entrapment, injury, or death associated with nuclear, chemical, or biological (NBC) agent or other military attack. Some of these stressful experiences had been relatively rarely encountered by participants during their other military life. More than 70% of participants, for example, reported threat of an NBC agent attack during the Gulf War whereas only 12.6% of those who had been on other active deployments and 4.9% of those who had not been on other active deployments reported this experience during other service. Almost half of the participants reported being in fear for their life during the Gulf War. At least half of these veterans were reporting this experience for the only time in their service career, with only 21.9% who had been on other active deployments and 16.1% who had not been on other active deployments reporting being in fear for their life during other service. Other frequently reported items for Gulf War service included feelings of separation from family and significant others, responsibility for detecting incoming attack, and encountering undetonated mines while on duty. These were more frequently reported in relation to Gulf War service than to other service.

Participants were relatively unlikely to report items that involved direct experience of combat-related attack or violence during the Gulf War, including coming under arms fire or attack by militia, witnessing violent attacks on others, killing someone, making a decision which resulted in death or injury of someone, or actual exposure to NBC warfare. Participants also were unlikely to report having to handle dead bodies or decide who would receive lifesaving care during the Gulf War. Some of these experiences were more frequently reported in relation to other service.

Logistic regression was undertaken to determine which MSEQ items demonstrated the greatest difference when Gulf War service and other service were compared. The results for participants whose other service included no active deployments are shown in Table 2, and results for participants whose other service included other active deployments are shown in Table 3. MSEQ items shown are those for which the OR reached a minimum of 1.75 (or ≤ 0.57 for ORs < 1), representing an effect size of at least 0.31 as described earlier.

The eight MSEQ items reported most frequently for Gulf War service (first eight items in Table 1) were all found to be more frequent during Gulf War service compared with other service, both when other service did not include active deployments (Table 2) and when other service included active deployments (Table 3). These included items involving fear and threat of attack, death, or injury, isolation from family, responsibility for detecting attack, and encountering undetonated explosives while on duty. Several other Gulf War service items were elevated

when compared with other service both with and without active deployments; these included feeling an overwhelming inability to protect self or others, carrying out duties wearing NBC suits, difficulty breathing as a result of contaminants in the air, and being exposed to NBC warfare.

For participants who had not experienced other active deployments (Table 2), additional MSEQ items which were more common to the Gulf War included feeling insufficiently trained or prepared, being overwhelmed by the surrounding destruction or disease, fear of attack from bandits or militia, having artillery or similar exploding nearby, and coming under small-arms fire.

The four MSEQ items reported least frequently for the Gulf War (last four items in Table 1), including sexual harassment, killing someone, deciding who would receive lifesaving medical care, and leadership decisions resulting in death or injury of others, also were rarely reported during other service. Since there were only small differences between Gulf War and other service, these data are not shown in Tables 2 or 3. Several MSEQ items which might typically be associated with direct-combat exposure were less frequent during Gulf War service compared with other service both with (Table 3) and without (Table 2) active deployments. These included handling dead bodies, caring for someone dying, witnessing violent attacks, seeing injured or dying defense personnel, handling live explosive devices, and sustaining an injury.

Gulf War Service Experience by Time of Deployment, Rank, and Age

For MSEQ items reported in relation to the Gulf War only, Fig. 1 shows those items where regression ORs, after adjustment for rank and age, represented at least a medium effect size of 0.31 (OR = 1.75, or 0.57 if < 1) when veterans present during warfare were compared with those present pre-air war or with those present after cease-fire. Several items involving fear or threat of attack, death, or injury were significantly lower for both pre-air war and after cease-fire veterans compared with those present during warfare. Difficulty breathing from contaminants in the air was reported more commonly by after-cess-fire veterans compared with during-warfare veterans, and less commonly by pre-air war veterans. Also less common to the pre-air war group, compared with during-warfare veterans, were near-miss incidents, exposure to NBC warfare, encountering undetonated mines, and suffering from rashes or burns.

Fig. 2 shows the 12 Gulf War-related MSEQ items for which regression ORs, after adjustment for time of deployment and age, represented at least a medium effect

Table 2. MSEQ Items More Frequently or Less Frequently Reported During the Gulf War Compared With Other Service for Navy GWVs With No Other Active Deployments

MSEQ Item ^b	Item Reported in Relation to:				OR ^c	95% CI
	Gulf War Only	GW and Other Service	Other Service Only	Not Reported		
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)		
GWVs Whose Other Service Does Not Include Active Deployments (<i>n</i> = 726 ^a)						
Items more frequently reported during the Gulf War						
36. Fear of artillery/SCUD/bomb attack.	460 (68)	26 (4)	3 (<1)	192 (28)	153.33	52.14–746.26
34. On ship/aircraft passing through hostile waters/air space.	379 (56)	158 (24)	3 (<1)	131 (20)	126.33	42.90–615.33
31. Formal alert/threat of NBC attack.	446 (65)	30 (4)	4 (1)	202 (30)	111.5	43.24–411.02
41. Feared death/injury/entrapment below the ship's waterline.	319 (46)	61 (9)	5 (1)	306 (44)	63.80	27.06–197.84
18. Responsible for detecting attacks/mines where a mistake could put others at risk.	202 (30)	80 (12)	4 (1)	398 (58)	50.50	19.42–187.13
38. Carried out duties wearing NBC suits	70 (10)	14 (7)	2 (<1)	604 (88)	35.00	9.33–294.69
32. Exposed to NBC warfare.	60 (9)	5 (1)	3 (<1)	587 (90)	20.00	6.52–99.71
26. In fear for your life.	246 (36)	90 (13)	18 (3)	325 (48)	13.67	8.47–23.44
12. Undetonated mines/booby traps.	239 (35)	27 (4)	18 (3)	400 (58)	13.28	8.22–22.79
15. Deployed against your will.	9 (1)	3 (<1)	1 (<1)	679 (98)	9.00	1.25–394.48
25. Overwhelming inability to protect self/others from harm.	68 (10)	36 (5)	10 (1)	577 (84)	6.80	3.48–14.82
33. Cut off/separated from family/significant others.	132 (19)	310 (45)	21 (3)	224 (33)	6.29	3.95–10.49
40. Overwhelmed by destruction/devastation/disease.	88 (13)	34 (5)	15 (2)	549 (80)	5.87	3.37–10.92
10. Under small arms fire.	37 (5)	3 (<1)	8 (1)	638 (93)	4.63	2.12–11.50
8. Prevented from taking action to protect self/others.	17 (2)	7 (1)	5 (<1)	660 (96)	3.40	1.20–11.79
43. Feared attack from bandits/rebels/local militia.	65 (9)	36 (5)	27 (4)	561 (81)	2.41	1.52–3.92
2. Artillery/rockets. . . exploded close to you.	110 (16)	98 (15)	47 (7)	417 (62)	2.34	1.65–3.37
27. Not sufficiently prepared for military activities.	52 (8)	80 (12)	25 (4)	533 (77)	2.08	1.27–3.50
37. Difficulty breathing from contaminants in the air.	99 (14)	71 (10)	47 (7)	470 (68)	2.11	1.47–3.05
Items less frequently reported during the Gulf War						
11. Handled/buried/exhumed human bodies.	7 (1)	9 (1)	64 (9)	604 (88)	0.11	0.04–0.24
1. Ship collision/damaged/sunk.	17 (3)	35 (5)	151 (22)	475 (70)	0.11	0.06–0.18
44. Injury that required medical treatment.	29 (4)	107 (16)	172 (25)	375 (55)	0.17	0.11–0.25
3. Saw Defence personnel/civilians killed/maimed.	29 (4)	50 (7)	119 (18)	480 (71)	0.24	0.16–0.37
4. Decision resulting in death/injury.	3 (<1)	2 (<1)	13 (2)	669 (97)	0.23	0.04–0.84
17. Sexually harassed.	2 (<1)	5 (1)	12 (2)	673 (97)	0.17	0.02–0.75
35. Sat with/cared for someone dying.	7 (1)	3 (<1)	29 (4)	644 (94)	0.24	0.09–0.56
30. Witnessed violent attacks on civilians.	9 (1)	8 (1)	26 (4)	641 (94)	0.35	0.14–0.76
9. Lack of leadership.	32 (5)	110 (16)	80 (12)	464 (68)	0.40	0.26–0.61
21. Detonate/deactivate/handle live explosive devices.	31 (5)	147 (21)	60 (9)	448 (65)	0.52	0.32–0.81
28. Lack of togetherness/cohesion.	45 (7)	102 (15)	90 (13)	455 (66)	0.50	0.34–0.72

^aThe value of *n* upon which each percentage is derived varies by up to 10% fewer respondents depending on the number of participants who answered each item. ^bThe MSEQ item text is abbreviated here. For full text please refer to Table 1. ^cThese ORs are based on within-subject comparisons where MSEQ items were present during Gulf War service and not present during other service, or vice versa; these data are in the "Gulf War only" and "other service only" columns.

size of 0.31 when officers were compared to other ranks—supervisory or with other ranks—nonsupervisory. Several MSEQ items were more common to the lowest rank category, other rank—nonsupervisory, compared with officers.

These included fear or threat of attack, death, or injury, actual injuries, exposure to NBC warfare, inability to protect self or others, effects of extreme temperature, near-miss incidents, and detonating or otherwise handling live

Table 3. MSEQ Items More Frequently or Less Frequently Reported During the Gulf War Compared With Other Service for Navy GWVs With Other Active Deployments

MSEQ Item ^b	Item Reported in Relation to:				OR ^c	95% CI
	Gulf War Only	GW and Other Service	Other Service Only	Not Reported		
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)		
GWVs Whose Other Service Includes Active Deployments (<i>n</i> = 506 ^a)						
Items more frequently reported during the Gulf War						
31. Formal alert/threat of NBC attack.	291 (60)	59 (12)	3 (1)	136 (28)	97.00	32.86–473.09
36. Fear of artillery/SCUD/bomb attack.	248 (51)	97 (20)	5 (1)	139 (28)	49.60	20.97–154.10
41. Feared death/injury/ entrapment below the ship's waterline.	164 (33)	88 (18)	8 (2)	232 (47)	20.50	10.16–48.28
34. On ship/aircraft passing through hostile waters/air space.	173 (35)	232 (47)	13 (3)	71 (15)	13.31	7.58–25.50
32. Exposed to NBC warfare.	23 (5)	7 (1)	2 (<1)	438 (93)	11.50	2.84–100.63
12. Undetonated mines/booby traps.	161 (33)	37 (8)	17 (3)	275 (56)	9.47	5.73–16.66
18. Responsible for detecting attacks/mines where a mistake could put others at risk.	118 (24)	116 (24)	14 (3)	245 (50)	8.43	4.83–15.89
33. Cut off/separated from family/significant others.	56 (11)	288 (58)	8 (2)	142 (29)	7.00	3.32–17.00
26. In fear for your life.	115 (23)	91 (18)	17 (3)	270 (55)	6.76	4.05–12.01
38. Carried out duties wearing NBC suits.	41 (8)	10 (2)	6 (1)	438 (88)	6.83	2.88–19.69
37. Difficulty breathing from contaminants in the air.	88 (18)	50 (10)	21 (4)	333 (68)	4.19	2.58–7.10
25. Overwhelming inability to protect self/others from harm.	39 (8)	33 (7)	12 (2)	411 (83)	3.25	1.67–6.82
Items less frequently reported during the Gulf War						
11. Handled/buried/exhumed human bodies.	4 (1)	5 (1)	50 (10)	433 (88)	0.08	0.02–0.22
35. Sat with/cared for someone dying.	3 (1)	5 (1)	36 (7)	440 (91)	0.08	0.02–0.26
22. Handled/contact with POWs/displaced refugees.	10 (2)	10 (2)	64 (13)	410 (83)	0.16	0.07–0.31
16. Attacked by civilians/bandits/other local militia.	5 (1)	6 (1)	32 (7)	446 (91)	0.16	0.05–0.40
24. Decide who would receive life-saving care.	2 (<1)	3 (1)	10 (2)	479 (97)	0.20	0.02–0.94
30. Witnessed violent attacks on civilians.	5 (1)	7 (1)	33 (7)	448 (91)	0.15	0.05–0.39
1. Ship collision/damaged/sunk.	27 (6)	39 (8)	106 (22)	318 (65)	0.25	0.16–0.39
3. Saw Defence personnel/civilians killed/maimed.	32 (7)	36 (7)	97 (20)	322 (66)	0.33	0.21–0.50
28. Lack of togetherness/cohesion.	24 (5)	61 (12)	69 (14)	337 (69)	0.35	0.21–0.56
42. Live in squalid conditions.	7 (1)	7 (1)	22 (4)	456 (93)	0.32	0.11–0.77
44. Injury that required medical treatment.	23 (5)	73 (15)	76 (16)	310 (64)	0.30	0.18–0.49
43. Feared attack from bandits/rebels/local militia.	30 (6)	45 (9)	59 (12)	356 (73)	0.51	0.32–0.80
7. Work/dive/bathe in contaminated water.	26 (5)	50 (10)	53 (11)	360 (74)	0.49	0.29–0.80
9. Lack of leadership.	27 (5)	77 (16)	60 (12)	329 (67)	0.45	0.27–0.72
21. Detonate/deactivate/handle live explosive devices.	13 (3)	107 (22)	27 (5)	347 (50)	0.48	0.23–0.97

^aThe value of *n* upon which each percentage is derived varies by up to 7% fewer respondents depending on the number of participants who answered each item. ^bThe MSEQ item text is abbreviated here. For full text please refer to Table 1. ^cThese ORs are based on within-subject comparisons where MSEQ items were present during Gulf War service and not present during other service, or vice versa; these data are in the "Gulf War only" and "other service only" columns.

explosives. There were fewer differences between other ranks—supervisory and officers. Compared with both categories of lower ranks, officers were more likely to report feeling cut off from family.

Finally, Fig. 3 shows the nine Gulf War-related MSEQ items which differed significantly across age categories after adjustment for time of deployment and rank. All nine items were more frequently reported by younger

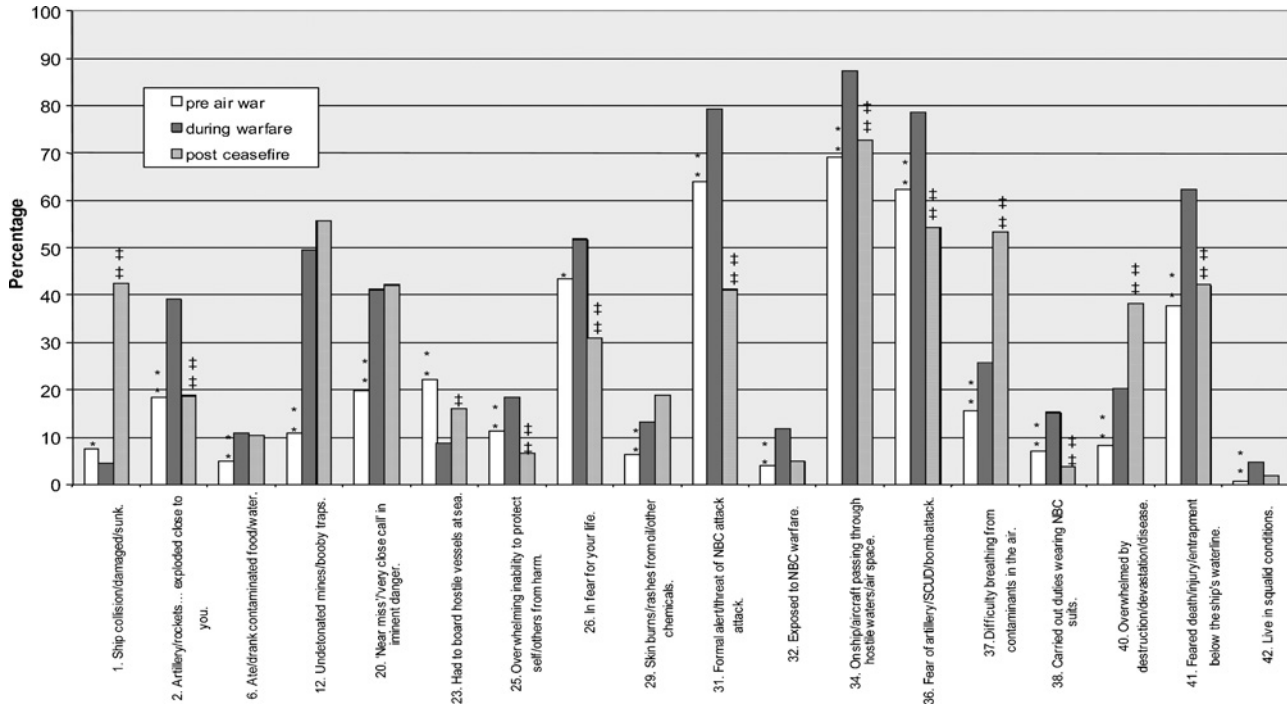


Fig. 1. Gulf War MSEQ responses by time of deployment. Asterisk (*) symbols indicate where differences between during warfare and pre air war are statistically significant at $p < .05^*$ or at $p < .01^{**}$. Double dagger (‡) symbols indicate where differences between during warfare and after the cease-fire are statistically significant at $p < .05^{\ddagger}$ or at $p < .01^{\ddagger\ddagger}$.

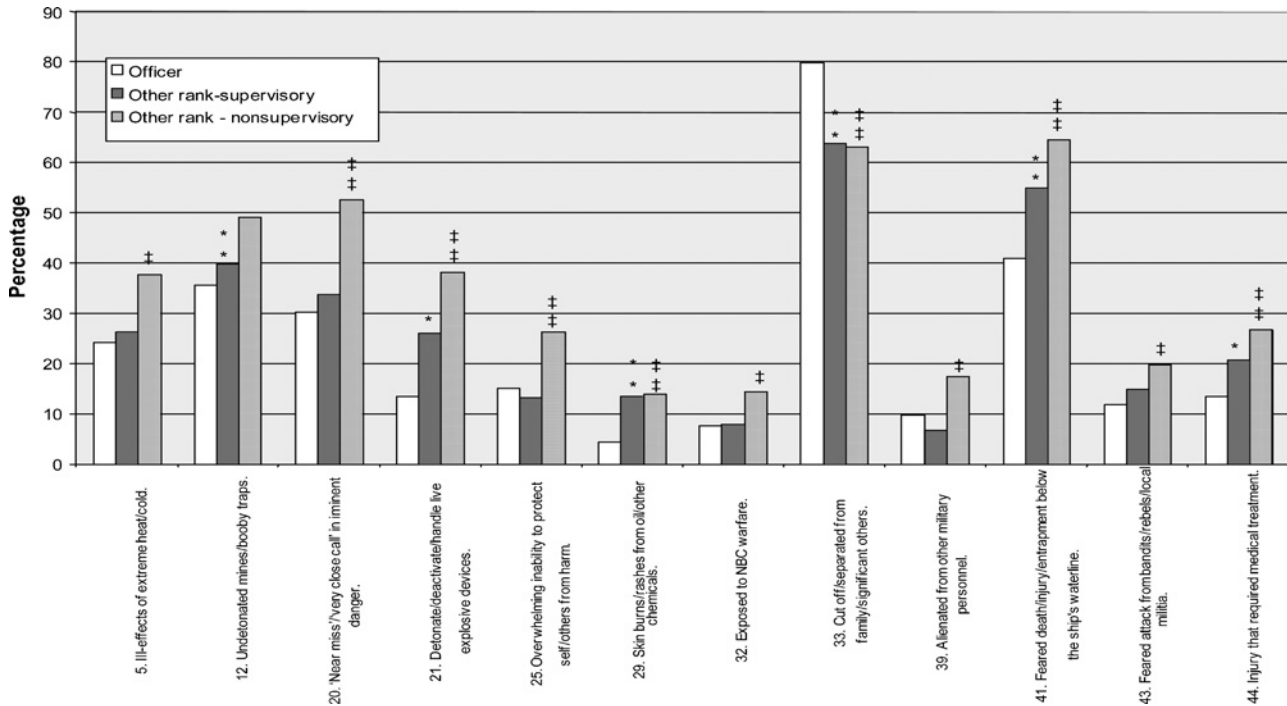


Fig. 2. Gulf War MSEQ responses by rank. Asterisk (*) symbols indicate where differences between officers and other ranks-supervisory are statistically significant at $p < .05^*$ or at $p < .01^{**}$. Double dagger (‡) symbols indicate where differences between officers and other ranks-nonsupervisory are statistically significant at $p < .05^{\ddagger}$ or at $p < .01^{\ddagger\ddagger}$.

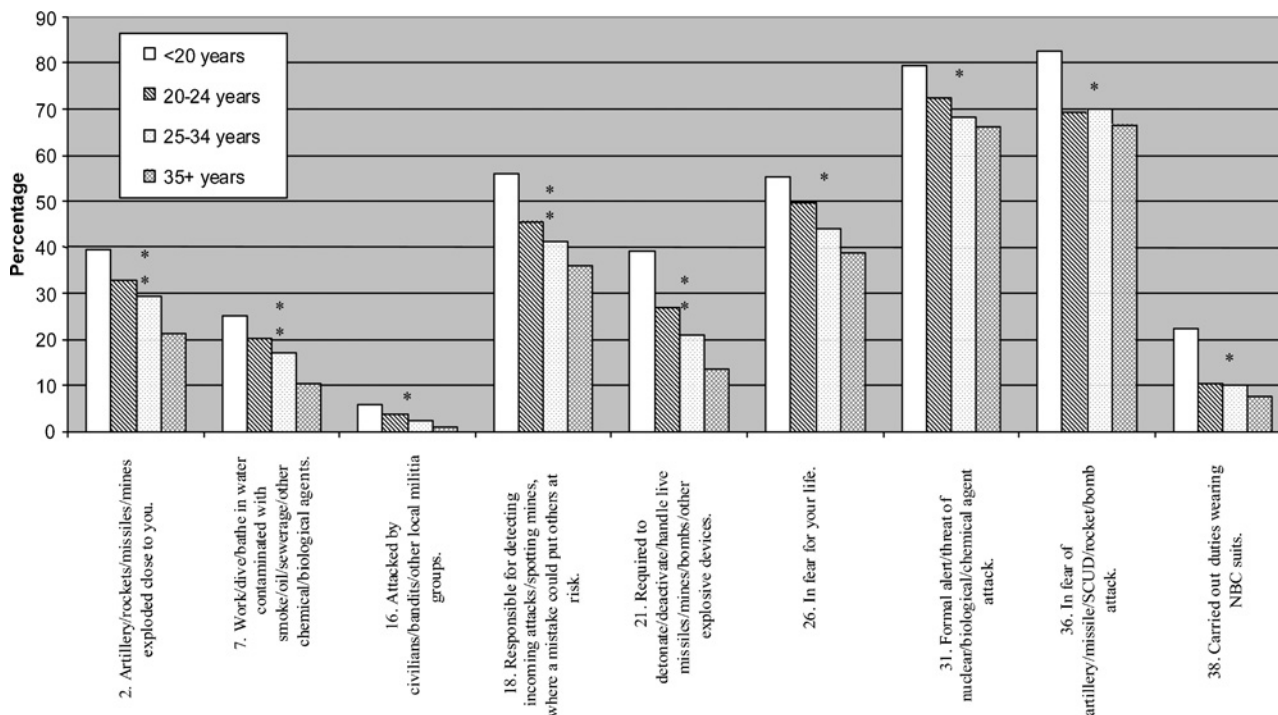


Fig. 3. Gulf War MSEQ responses by age. Asterisk (*) symbols indicate where differences across age category (entered as a linear variable) are statistically significant at $p < .05^*$ or at $p < .01^{**}$.

veterans and less frequently reported by older veterans. They included fear and threat of attack and death, working in contaminated water, having missiles or similar explode nearby, detonating or otherwise handling live explosives, and responsibility for detecting attacks.

Discussion

Royal Australian Navy personnel report many stressful experiences in relation to their deployment to the 1991 Gulf War, the most common being fear and threat of entrapment, attack, death, or injury. Some of these stressful experiences, such as threat of NBC agent attack or fear of death, were reported by large numbers of GWVs who did not report encountering these experiences at any other time in their military life.

Many of these stressful experiences may contribute to the development of psychological disorders in GWVs. Criterion A1 for PTSD in the Diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV; American Psychiatric Association, 1994), for example, requires in part that a person has “experienced, witnessed, or [been] confronted with an event or events that involved actual or threatened death or serious injury, or a threat to

the physical integrity of self or others” (p. 427). MSEQ items involving threat of NBC, artillery, or other attack, fearing entrapment below the waterline, encountering undetonated mines, fearing attack from bandits or militia, rockets or similar exploding close by, and responsibility for detecting incoming attack are all items which were more frequently reported in relation to the Gulf War compared with other service, and all could plausibly fit within these DSM-IV criteria.

DSM-IV Criterion A2 for PTSD goes on to specify a response involving “intense fear, helplessness or horror” (American Psychiatric Association, 1994, p. 428) which may be reflected in MSEQ items such as fear for one’s life, feeling an overwhelming inability to protect self or others, and being overwhelmed by the level of destruction or devastation. These were all reported more frequently in relation to Gulf War service compared with other service.

A study based on data from the National Vietnam Veterans Readjustment Study (Kulka et al., 1990) found that a stressor index reflecting a general milieu of a harsh or malevolent environment was the most potent factor for PTSD compared with alternative stressor indexes reflecting more traditional combat events, atrocities, or violence and subjective or perceived threat (King, King,

Gudanowski, & Vreven, 1995). MSEQ items possibly representing these daily pressures or discomforts and which were more common to Gulf War service include being on a ship or aircraft passing through hostile waters or air space, carrying out duties wearing NBC suits, and difficulty breathing as a result of oil, smoke, or other contaminants in the air. Although these experiences may contribute to the development of psychological disorders including PTSD, it is unlikely that they would meet the PTSD DSM-IV criterion as described earlier.

The MSEQ responses confirm the premise that the Australian Naval experience of the Gulf War included little direct-combat exposure, *per se*, which could traditionally explain poorer psychological health in veterans. For example, it was uncommon during the Gulf War, and more common during other service including active deployments, for MSEQ items such as contact with prisoners of war, being attacked by civilians, bandits, or other militia groups, and seeing defense personnel or civilians killed or injured to be reported. Even sustaining an injury that required medical treatment was less common in the Gulf War than during other service.

The extent to which RAN GWVs reported Gulf War-related stressors varied according to their time of deployment, level of rank, and age at the time of the Gulf War. MSEQ items involving fear and threat as well as exposure to NBC warfare were typically more commonly reported by younger veterans, those of lowest rank, and those present in the Gulf region at the height of the conflict. Helplessness associated with an inability to protect self or others from harm was greatest for the lowest ranks and those present during the period of the air and ground warfare. Danger associated with encountering undetonated mines or similar was highest for the lowest ranks and for those present during the air and ground warfare or the post-cease-fire period. The youngest veterans also were most likely to report coming under actual attack. These findings may be relevant to previous military research which has identified younger age at time of deployment as a risk factor for PTSD (Brewin et al., 2000) and lower rank as a risk factor for psychological ill health (Ismail et al., 2000; McKenzie et al., 2004).

Differences in MSEQ reporting between these subgroups of navy veterans could be explained in several ways. While objective war zone experiences should often be similar across large groups of navy personnel who are confined within ships, individual appraisals, perceptions, and interpretations of events may vary (Hendin & Haas, 1984; Solomon, Mikulincer, & Hobfoll, 1987). Older, more experienced, or more highly ranked veterans may have perceived the level of danger associated with the Australian deployment differently from their counter-

parts. Their experience, knowledge, or greater access to information may have resulted in alternative (and possibly more accurate) judgments as to the true risks. Age and experience also might be associated with personal resources such as personality hardiness and social and family support, which Sutker et al. (1995) suggested are related to psychological vulnerability or resistance to negative war outcomes. Alternatively, or in addition, differences in MSEQ reporting across subgroups of veterans may reflect genuine differences in duties and associated dangers. For example, younger or lower ranked veterans report greater fear and perceived threat, but also greater likelihood of having to detonate or handle live explosives. These groups' duties seem to involve the least comfortable environments—being more likely to report suffering from extreme heat or cold, exposure to contaminated water, wearing NBC suits, and suffering burns or rashes on the skin. Veterans whose deployments included the period of actual air and ground warfare were genuinely likely to be in greatest danger of actual attack or an associated combat-related incident. This group's increased reporting of MSEQ items involving fear or threat probably reflect this real change in the status of the war. Other notable Gulf War events included the release of sea mines into the Persian Gulf waters from late December 1990 and the torching of oil wells in January and February 1991. These probably explain increased reporting, by veterans who served in the later time periods, of encounters with undetonated mines or similar, and suffering from difficulty breathing, burns, or rashes from contaminated air.

The MSEQ was newly developed for the Australian Gulf War Veterans Health Study because existing war-exposure questionnaires seemed to focus primarily on land-based and direct-combat experiences. The MSEQ demonstrated good internal consistency; however, its psychometric properties in regard to validity have not yet been formally tested. Previously reported findings (Ikin et al., 2004), that increased numbers of Gulf War-related MSEQ items are strongly associated with psychological disorders in GWVs, may provide some positive indication of the instrument's validity. The increasing levels of MSEQ item reporting by GWVs present during the air and ground warfare, compared with those present before or after the warfare, suggest that the instrument can reflect real changes in the status of that war; however, further investigation of the instrument would be necessary before definitive conclusions on validity can be made. Further investigation of the properties of the MSEQ also may be useful to determine the most important items, with the aim of reducing the instrument's length while also ensuring coverage of key constructs.

Interpretation of the findings is clearly limited by the retrospective nature of the exposure assessment, with study participants reporting perceived experiences and events that occurred at least a decade previously. Since the time of the Gulf War, more than 20% of Australia's veterans have developed a psychological disorder (Ikin et al., 2004). While the conventional interpretation is that the stressful exposures are a central risk factor for the onset of symptoms (Brewin et al., 2000), it also may be the case that the memory of stressful experiences undergoes some modification due to the presence of these symptoms. In a longitudinal study of United Kingdom Gulf War veterans, Wessely et al. (2003) found that recall of military hazards after conflict was not static and was associated with current self-rated perception of health. One possibility is that those individuals who have PTSD, for example, remember the events more accurately than those without the disorder (McFarlane, 1988). Alternatively, recall of threat or fear may become magnified with time in individuals who are symptomatic (Southwick, Morgan, Nicolaou, & Charney, 1997). Wessely et al. (2003) suggested that considerable media attention, given to the Gulf War and its health effects over the specific interval of their study, could help explain the observed changes in exposure reporting. These possibilities highlight the need to document the experiences of veterans in closer proximity to their deployment.

The results of the MSEQ suggest that Australian Navy GWVs experienced many stressful experiences during that conflict, often involving perceptions of fear or threat of attack, death, or injury despite their limited exposure to direct combat. For these veterans, many of the reported stressful experiences were relatively unique to this war compared to their other service activities and deployments. The appropriate appraisal of threat is surely integral to military tactics and self-protection in any military setting, particularly in a war zone where it is certainly inadvisable to underestimate one's risk. The understandable development, and experience, of fear in response to perceived threats could plausibly be associated with the increased risk of psychological disorders previously demonstrated in this group; however, the study results also suggest that perceptions of risk or threat may vary subjectively within veteran groups who are otherwise exposed to the same overt range of conflict-related events. Further research to explore the factors which modify individual perception of events could contribute toward a greater understanding of the association between trauma and subsequent psychopathology in military veterans. Finally, the findings highlight the importance of developing war-exposure instruments which include deployment stressors where there is no direct combat and items for

non-land-based defense services such as the navy as well as those which reflect the changing nature of modern warfare.

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