Centre for Military and Veterans' Health Volume I The Middle East Area of Operations (MEAO) Health Study: Census Study Report

14 December 2012











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Abbreviations

ADHREC Australian Defence Human Res	search Ethics Committee
AUDIT Alcohol Use Disorder Identifica	ation Test
CBRN Chemical Biological Radiologic	al and Nuclear
CDC Centre for Disease Control	
CFTS Continuous full-time service	
CMI Chronic multi-symptom illness	;
CI Confidence Interval	
CIDI Composite International Diagr	nostic Interview
CMVH Centre for Military and Vetera	ns' Health
DAR Dimensions of Anger Reaction	S
DHSP Deployment Health Surveillan	ce Program
DMAC Data Management & Analysis	Centre
DRRI Deployment Risk and Resilience	ce Inventory
DSM-IV Diagnostic and Statistical Man	ual Version 4
DVA Department of Veterans' Affai	rs
DVA HREC Department of Veterans Affair	rs' Human Research Ethics Committee
ECRHS European Community Respirat	tory Health Survey
EOD Explosive Ordnance Disposal	
ESO Ex-Service Organisation	
HREC Human Research Ethics Comm	littee
HSCL Health symptom checklist	
IED Improvised explosive device	
IRR Incidence Relative Risk	
IV Intravenous	
K10+ Kessler Psychological Distress	Scale
MEC Medical Employment Classific	ation
mTBI Mild traumatic brain injury	
MEAO Middle East Area of Operation	s
MilHOP Military Health Outcomes Prov	gram
NBC Nuclear Biological Chemical (suit)
NCO Non-commissioned Officer	Surg
NNAI Near North Area of Influence	
OFF Operation Enduring Freedom	
OIE Operation Iragi Freedom	
OP Odds Patio	
PCL C Post Traumatic Stross Disordo	r Chack List Civilian
PMP Program Management Roard	
PHO Program Management Board	
PTC Patient Health Questionnaire	r
POSt Haumatic Stress Disorder	
RAAF ROyal Australian Air Force	
RAN ROyal Australian Navy	of Australia
RSL Returned and Services League	of Australia
SAC Scientific Advisory Committee	nevel bealth assertion 1
SF1 Short Form health Survey – ge	neral nearth question 1
SF12 Short Form Health Survey	
Standardised Mortality Ratio	In Devised
ISES-K Iraumatic Stress Exposure Sca	ile kevised
UA University of Adelaide	
UQ University of Queensland	
UQ BSSERC University of Queensland Beha	avioural & Social Sciences Ethical Review Committee
Unexploded ordnance	

Interpreting the results of the MEAO Census Study

- Respondents to this study in 2010-2011recalled aspects of their deployment to the Middle East Area of Operations (MEAO) in 2001-2009. Recall of their experience may have been affected by their mental health when they completed the survey. Therefore, it is not possible to be sure whether adverse deployment experiences led to poorer mental health or mental health problems caused people to recall their deployment experiences more negatively.
- People with mental or other health problems during or after deployment may have been more inclined to separate from the ADF, so poorer health could be expected to be reported, on average, by active or inactive reserves and ex-serving members.

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The purpose of this chapter is to describe the background to the MEAO Health Study and explain the rationale for the MEAO Census Study design.

1.1 What is the MEAO Health Study?

The Middle East Area of Operations (MEAO) Health Study was designed to investigate the health of Australian Defence Force (ADF) members who have deployed to the MEAO, with a view to identifying factors associated with poorer or better health. The overall study was contracted by the Department of Defence to the Centre for Military and Veterans' Health (CMVH) and was conducted by CMVH nodes at The University of Queensland and The University of Adelaide.

The MEAO Health Study consists of four components:

- The *MEAO Preliminary Study* was conducted in 2009. The purpose was to gain stakeholder input into the development of the instruments and modes of data collection for the Census and Prospective Studies. Defence Force Units, ex-service organisations and other veterans' groups were involved in meetings and focus groups. Further details of the MEAO Preliminary Study are available in Chapter 3; a full copy of the report is included in Volume III.
- The **MEAO Census Study**, which is the subject of this report, was conducted by The University of Queensland node of CMVH. This study was a retrospective, self-report survey of ADF members who deployed to the MEAO between 2001 and 2009.
- The *MEAO Mortality and Cancer Incidence Study* is based on record linkage to national databases. Death and cancer incidence data from the Australian Institute of Health and Welfare (AIHW) were linked with the MEAO nominal roll and cancer and mortality rates are compared.
- The *MEAO Prospective Study* is a follow up study collecting pre- and post-deployment data on members deploying in 2010-11, conducted by CMVH's University of Adelaide node. Along with the self-report survey, selected members also participated in physical and neuro-cognitive testing. The final report is due in late 2012.

The MEAO Health Study was the fourth in a series of post-deployment health studies funded by the Department of Defence under the Deployment Health Surveillance Program (DHSP). The DHSP is shown in Figure 1.1. A Detailed Research Plan, covering the Census, Prospective, and Mortality and Cancer Incidence components of the MEAO Health Study, was developed and modified through rounds of consultations and review between May 2007 and 2010. During all phases of the study's development and conduct, there was consultation with the Department of Defence and the Department of Veterans' Affairs (DVA).

1.1.1 Specific objectives of the MEAO Health Study

The specific objectives of the MEAO Health Study included identifying:

- links between specific chemical, physical, biological and psychological exposures potentially encountered during the MEAO deployment and physical and psychological health outcomes;
- short-term and long-term physical and psychological health effects associated with MEAO deployment;
- means of increasing the utility of ADF health records for monitoring of the physical and psychological health of serving members;

- protective (resilience) factors for psychological health outcomes; trajectory and pattern of psychological morbidity and its somatic manifestations and antecedents;
- potential emergence of any post-deployment syndrome(s); patterns of health care utilisation by personnel deployed to the MEAO;
- health indicators that are predictive of disability and where early intervention or program change may minimise disability in ADF members and veterans



Figure 1.1 The Deployment Health Surveillance Program

1.2 Background to the study

1.2.1 The Australian Defence Force (ADF) operational environment

Australia's operational commitments overseas have increased substantially in the two decades since 1990. Between 1980 and 1989, there were 16 Australian Defence Force (ADF) operational deployments involving just over 1,000 personnel, while from 1990 to 1999 there were 82 operational deployments involving nearly 17,000 personnel [57]. When the Deployment Health Surveillance Program (DHSP) started in July 2005, the ADF had approximately 1,700 members deployed around the world on operations including border protection, United Nations operations, coalition operations and third country deployments. In comparison, on 12 October 2011, approximately 3,300 ADF personnel were approved for deployment to 11 operations overseas and within Australia [58] with a substantial commitment to humanitarian assistance operations.

1.2.2 Summary of Australia's involvement in the Middle East Area of Operations

Following the September 11 attacks on the United States in 2001, Australia announced an ADF contribution to coalition operations against terrorism. The ADF has deployed members of the Royal Australian Navy, Australian Army and Royal Australian Air Force (RAAF) to the MEAO since October 2001 on various operations in Afghanistan, the "coalition of the willing" in Iraq, and other classified locations.

Operations in Iraq included BASTILLE, FALCONER, CATALYST, and KRUGER. More than 20,000 ADF personnel served in Iraq as part of Operation CATALYST between 2003 and 2009, with Australia formally concluding its military commitment to the rehabilitation of Iraq on 31 July 2009 [58]. The ADF's Security Detachment (SECDET), which provided personal protection and physical security in Iraq, remained in Baghdad until complete transfer of security capabilities from the ADF to a civilian contractor in late July 2011.

Under Operation SLIPPER in Afghanistan, which commenced in October 2001, Australian forces contribute to the International Security Assistance Force (ISAF) operations in Afghanistan led by the North Atlantic Treaty Organization (NATO), to maritime security in the MEAO and counter piracy operations in the Gulf of Aden [59]. Details of ADF deployments to the MEAO are provided in Volume III.

1.2.3 Rationale for the MEAO Health Study

The Australian Department of Defence commissioned an investigation of whether exposures associated with deployments to Iraq and Afghanistan since 2001 would result in patterns of illness similar to those in Gulf War veterans. It was intended that this research should commence without undue delay, in line with international studies such as the one conducted by the King's Centre for Military Health Research (KCMHR) which commenced shortly after OP Telic 1 (the 2003 Iraq war) [110]. This was in contrast to the time delay of more than 10 years before health effects of deployments to the 1990-1991 Gulf War were investigated [192]. Results of the Australian Gulf War Study conducted by Monash University were published in 2003 [127-130].

1.2.4 Findings from Gulf War 1990-1991 deployment

In the US, the Institute of Medicine (IOM) has rigorously reviewed evidence on health subsequent to Gulf War deployments [98]. It found *sufficient evidence of a causal relationship* between Gulf War deployment and PTSD and *sufficient evidence of an association* with other psychiatric disorders (including generalised anxiety disorder and substance abuse, particularly alcohol) that persisted for at least 10 years after deployment, with gastrointestinal symptoms consistent with disorders such as irritable bowel syndrome, and with multisymptom illness [98].

The King's Centre for Military Health Research (KCMHR) concluded that there was no unique "Gulf War Syndrome" in UK military personnel [109]. Likewise, a main finding of Australian research was that, although Gulf War veterans were at increased risk of several psychological disorders and reported more symptoms,

there was no new "Gulf War Syndrome" [162] (p.21). Nevertheless, controversy on the health effects of the Gulf War continues [24, 76, 77, 148]. The strength of the evidence may change over time, which demonstrates the importance of long-term follow-up and detailed clinical and scientific investigations using adequately powered studies.

There are several important differences between the MEAO deployments and those to the Gulf War. ADF deployments to the Gulf War were primarily naval [128], whereas MEAO deployments involved all three Services. The nature of many of the exposures is different. Additionally, there were different programs of medical counter-measures. Therefore, although the present study aimed to investigate whether any pattern of symptoms or multi-symptom illness was apparent in relation to MEAO deployments, as had been for the 1990-1991 Gulf War, the deployment situations and some key exposures were expected to differ, although some concerns may have overlapped.

1.3 What is the MEAO Census Study?

The MEAO Census Study was one component of the MEAO Health Study. It was a cross-sectional, surveybased study of ADF members who deployed to the MEAO (primarily Iraq and Afghanistan) between October 2001 and December 31 2009. It was named "census" because, instead of a random sample, all those on the nominal roll – almost 27,000 serving regular, reserve and ex-serving ADF members were invited to participate. (Details of eligibility criteria and nominal roll compilation are provided in Chapter 2: Methods).

The MEAO Census Study has the important feature of including members who were reserves (active or inactive) and ex-serving at the time of the study as well as regular full-time ADF members.

Data for the MEAO Census Study were collected in 2010-2011.

1.3.1 Research Questions of the MEAO Census Study

- 1. Are there links between specific chemical, physical, biological and psychological exposures encountered during the MEAO deployment and physical and psychological health outcomes?
- 2. What exposures are associated with increased risk of morbidity for the group as a whole and for specific MEAO subgroups with identified health disorders?
- 3. Are there gender differences in any health impacts of MEAO deployment?
- 4. What are the protective (resilience) factors for psychological health outcomes?
- 5. Are there relationships between deployment exposures, and non-specific symptoms, and specific health problems?
- 6. What is the pattern of psychological morbidity and its somatic manifestations?
- 7. Is there a post-deployment syndrome(s) common to the MEAO deployments?
- 8. What are the patterns of health care utilisation in personnel deployed to the MEAO and do these differ between groups?
- 9. What is the value of measures utilised in the study as screening tools and tests which may enable the early detection of disorders so as to instigate treatment earlier and minimise disability in veterans?
- 10. How can the utility of ADF health records for monitoring of the physical and psychological health of serving members be increased?

Research questions for the MEAO Census Study were developed by the Investigators Committee to meet the MEAO Health Study objectives, in the context of findings from other studies of the health of veterans deployed to the Middle East (including studies of the 1990-1991 Gulf War). The research questions were used to guide data analysis and as a framework for presenting the results in this report.

The final agreed scope of the MEAO Census Study did not include accessing Defence medical and psychological screening records. Thus, the MEAO Census Study was not able to achieve objectives relating to Defence

screening tools and service utilisation information from these records, and research questions 8, 9 and 10 could not be fully answered from the data collected.

1.3.2 Authorisation of the study

The MEAO Health Study was sponsored by the Surgeon-General, Defence Health Services Division, subsequently the Commander, Joint Health Command. The study was part of the Defence Deployment Health Surveillance Program (DHSP).

- The DHSP Program Management Board gave conditional approval to the study (subject to minor amendments) on 20 November 2007.
- The Chiefs of Services Committee (COSC) agreed in principle to support and promote the project on 25 March 2008.
- Funding for the study was considered by the Workforce Management Committee on 16 May 2008, budgets were revised and funding for year one of the proposed four-year project was agreed in late 2008.

1.3.3 Governance of the MEAO Health Study

The Director General, Strategic Health Policy and Plans is the Senior Responsible Owner for the DHSP. The Sponsoring Group for the DHSP is the Deployment Health Surveillance Program Management Board (PMB). The Department of Defence, in particular Joint Health Command, has played a major role in managing and facilitating the study. The Department of Veterans' Affairs (DVA) has been represented on the PMB and has had scientific input into the study. There was no Program-level Stakeholder Group, but the needs and views of current and former ADF members were represented on the PMB by the single Service representatives and the DVA representatives.

1.3.4 Scientific Advisory Committee

The PMB is supported by a Scientific Advisory Committee (SAC). The SAC reviewed all study proposals and reports to ensure that studies were designed and carried out according to accepted scientific standards, that research plans were consistent with the project aims and outputs, and that the results were valid. The Chair of the SAC attended the PMB meetings to give general scientific and/or research advice to the PMB. The SAC has included the following distinguished members over its course: Professor Michael Moore (current Chair), Professor A. J. (Tony) McMichael (past Chair), Professor A. Scott Henderson (current), Associate Professor Tim Driscoll (current), Professor Helen Berry (current), Professor Neil Pearce (past), Associate Professor Emily Banks (past), and Professor Louisa Jorm (past).

1.3.5 The Investigators' Committee

Membership of the Investigators' Committee changed over the course of the study.

- Professor Annette Dobson, University of Queensland (First Chief Investigator from March 2011, Chief Investigator to March 2011)
- Professor Alexander McFarlane, CMVH University of Adelaide (First Chief Investigator to March 2011)
- Professor Malcolm Sim, Monash University (Chief Investigator, resigned April 2011)
- Associate Professor Susan Treloar, CMVH University of Queensland (Chief Investigator)
- Dr Keith Horsley (Chief Investigator)
- COL Stephanie Hodson, Director of Mental Health, Department of Defence (Chief Investigator)
- Professor Philip Ryan, University of Adelaide (Associate Investigator, then Chief Investigator from March 2011)
- Professor Harvey Whiteford, University of Queensland (Chief Investigator from March 2011 to March 2012)

- Dr. Ian Gardner (Defence Centre for Occupational Health, Chief Investigator from March 2011)
- Dr. Carol Davy, CMVH, University of Adelaide (Chief Investigator from March 2011)
- Professor Beverley Raphael (Chief Investigator from March 2012)

1.4 MEAO deployment and health

An extensive body of literature has been published from the UK (King's Centre for Military Health Research), the US (especially Millennium Cohort), Canada (Institute for Military and Veterans' Health Research) and the Netherlands on health subsequent to deployment to the MEAO since 2001.

1.4.1 Combat exposures

In addition to overstretch of personnel, studies of UK defence force members deployed to Iraq and Afghanistan have shown location of deployment [68] and combat exposure [190] to be associated with adverse mental health [190]. US studies have shown that in addition to injury on deployment, combat experiences [91, 188], combat exposure [27, 147], killing in war [27, 121], witnessing dead bodies [90, 137], discharging a weapon and deployment-related stressors [27] were related to adverse health conditions such as PTSD and alcohol problems. In addition to combat exposures, the fear of injury or death while on deployment has also been identified as an important risk factor for both PTSD symptoms and alcohol misuse [95, 137, 188].

We present our findings on combat exposures for ADF members in the MEAO in Chapter 4.

1.4.2 Patterns of deployment

Studies from several countries focusing on a variety of operational deployments have suggested that prolonged duration and high frequency of military deployments to hostile environments can have detrimental effects on the mental and physical health of military personnel [2, 25, 35, 68, 146, 149, 159, 172]. Associations have been demonstrated between deployment length and alcohol misuse [149, 172], symptoms of posttraumatic stress [2, 149, 159], poor general health [149], depression [2], and self-reports of multiple physical symptoms [149]. The role of frequency of deployment is less clear.

Australian operational tempo has increased with MEAO deployments since 2001. We present our findings on patterns of deployment and subsequent health in Chapter 5.

1.4.3 Environmental exposures

Exposure to chemical, biological and other environmental factors continues to be a major non-combat concern in some military members deployed to the Middle East [137, 165, 171], although in some studies [86] the level of concern was low. It is important to note that ADF members may have been located in different areas in the MEAO and performed different tasks from US and UK defence forces, so findings about particular health conditions may not be applicable to Australian serving personnel. Additionally, accurate assessment of all hazards pertaining to the ADF was not possible because of the lack of relevant information from several regions and establishments, lack of access to higher level security information, for example, secret deployments and limited availability of "one-off" ADF hazard reports with no information on changes in exposures over time. The hazard review conducted prior to the MEAO Health Study is included in Volume III and key findings are summarized in Chapter 6. Critical deficiencies in the data include lack of ADF information on hazards and incidents on patrols, limited formal hazard assessments of areas used for forward deployments and small outlying detachments, limited assessment of industrial or other specific waste hazards in the known areas, and no specific assessments of agricultural risks, chemical usage or endemic microbiological infestations [62].

We present our findings on self-reported exposures to physical and other environmental hazards and health (including respiratory health) in Chapter 6.

1.4.4 Military, family and community support

International research has generally focused on estimating prevalence rates of health problems within the deployed military population and identifying risk factors associated with negative health [35, 37, 68, 97, 120, 137, 143, 149, 151]. However, identifying factors that may buffer against negative health or enhance good health can inform development of preventive health strategies. Unit cohesion has been identified as a possible buffer against negative psychological health, such as symptoms of PTSD, depression and common mental disorders [64, 167]. Social and military support have been associated with reductions in health problems including depression, post-traumatic stress symptoms, alcohol dependence and suicidal ideation [134, 139, 141, 167].

We present our findings on these factors in Chapter 7.

1.4.5 Gender

A review of studies focusing on female US veterans of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) [20] identified female veterans as having specific health care needs differing from those of men. Pre-deployment gender differences in risk factors for poor mental health have also been noted [40]. Women's needs, including continuity of care, for psychiatric and gynaecological problems occurring in the field have been highlighted [20]. US and Canadian research found women were at increased risk of PTSD symptoms [68, 103, 120], depression [132, 186], panic disorder, and any mood or anxiety disorder [132], and less likely to have alcohol dependence [132]. In contrast, UK research reported no gender difference for post-traumatic stress reaction or PTSD [150].

As women constitute increasing percentages of the Australian and US defence forces [20, 53], they will form an increasingly higher proportion of the ex-serving and veteran populations in years to come. Therefore, obtaining valid information on occupational risk factors among women has become increasingly important [169]. Findings from other countries may not generalise to Australian populations, and to date, little information has been published on the needs of women in the ADF. We present our findings on gender in Chapter 8.

1.4.6 Patterns of psychological and somatic symptoms

UK research has found no evidence for an Iraq War Syndrome [109] (p. 29), and that it was unlikely that factors common to both the Gulf War and Iraq conflicts (such as depleted uranium, anthrax vaccine, pesticides, pyridostigmine bromide tablets or general stress) were a main cause of the Gulf War illnesses [109]. There has been no published research since then to suggest the development of a pattern of multi-symptom illness, either similar or different, in veterans of Iraq or Afghanistan.

We present our findings on patterns of psychological and somatic symptoms in Chapter 9.

1.5 Summary

The MEAO Census Study is the first large scale Australian study that investigates the association between deployment exposures and health of ADF members, including reserves and ex-serving members, who deployed to Iraq, Afghanistan and supporting locations. The study aimed to investigate the health of ADF personnel who have deployed to the MEAO, and to identify any potential health concerns in relation to self-report data on exposures.

Structure of this report

The introduction, background, study aims and research questions are presented in this chapter (Chapter 1). Chapter 2 describes the methods, participants, response rates and measures of the MEAO Census Study. Chapter 3 provides an overview of the health of study participants. Subsequent chapters address the research questions of the MEAO Census Study:

- **Chapter 4**: Combat exposures and health (Research questions: 2)
- **Chapter 5**: Deployment patterns and health (Research questions: 2)
- **Chapter 6**: Environmental exposures and health (Research questions: 1, 2)
- Chapter 7: Military, family and community support and health (Research questions: 4)
- **Chapter 8**: Gender and health (Research question: 3)
- **Chapter 9**: Patterns of somatic symptoms and conditions (Research questions: 5, 6, 7)

Chapter 10 summarises the findings in relation to the study objectives. It considers the study strengths and limitations, and outlines the implications of the study.

This chapter presents a summary of the methods used for the MEAO Census Study (full details of the materials and methods are included in Volume III). Response rates for the MEAO Census Study are presented and compared with similar studies. The measures used in the report are then listed, and the analytical methods explained. Finally, the design and objectives of the MEAO Census Study are discussed in the context of the Military Health Outcomes Program (MilHOP).

Key Points

- The MEAO Census Study was a self-reported survey among the population of 26,915 regular and reserve, serving and ex-serving ADF members who deployed to the MEAO in the period 2001 to 2009.
- Study methodology was developed during previous CMVH Deployment Health Surveillance Program studies and the MEAO Preliminary Study (2009).
- The Census Study, conducted in 2010-11, was available online and in hard copy. It included a brief deployment history, sections on experiences during the most recent deployment to Iraq and/or Afghanistan, and on current health.
- Study invitations were issued by email or mail. Promotional efforts included Defence-related print media and visits to a number of the larger Defence bases. Non-respondents were followed up by telephone.
- There were 14,032 respondents, which was 53% of eligible participants. This compares favourably with similar studies. Most (92%) respondents used the online survey.
- Ex-serving members, active and inactive reserve members, and lower ranks were underrepresented among respondents. RAAF had the highest response rate (60%) of the three Services. Statistical weightings and adjustments were therefore applied to certain analyses to improve the representativeness of findings.
- Among respondents, 39% had deployed to both Iraq and Afghanistan, 37% deployed to Iraq only and 24% to Afghanistan only.
- There was overlap of participants and measures between the MEAO Census Study and the 2010 ADF Mental Health Prevalence and Wellbeing Study (MHPWS) but there were also differences in the data collected.

2.1 Study population and sample

The study population was the nominal roll of all 26,915 current and ex-serving Australian Defence Force members who had deployed to the Middle East between 1 October 2001 and 31 December 2009, specifically:

- members deployed to Iraq or areas supporting operations in Iraq (including ships in the Persian Gulf) between 2001 and 2009 (including Operations BASTILLE, FALCONER, CATALYST, KRUGER and RIVERBANK);
- members deployed to Afghanistan or areas supporting operations in Afghanistan between 2001 and 2009 (including Operations SLIPPER, PALATE II and HERRICK);
- members attached to foreign militaries or the United Nations in the above areas.

Visitors and persons seconded to the ADF from other military and civilian organisations were excluded.

The study design was a cross-sectional survey. Participation was voluntary.

2.2 Development of methodology

The *MEAO Preliminary Study* was conducted in 2009 to obtain broad stakeholder and consumer input into the development of the MEAO Health Study instruments and mode of data collection. ADF units, ex-service organisations, the National Younger Veterans' Consultative Forum, and other veterans' groups were involved in consultations. Stakeholder meetings and focus groups were used to obtain qualitative data on MEAO veterans' experiences and health concerns. This information and advice was used to develop the health and deployment exposure survey. Subsequently, the draft survey was refined based on the input of focus group participants and pilot tested as a check of face validity and to identify potential content, structural or flow problems in the survey instruments. CMVH conducted 28 focus groups involving 143 ADF members who had deployed to Iraq and/or Afghanistan. Serving and ex-serving, regular and reserve members across all Services participated voluntarily in the focus groups.

The stakeholder meetings and focus groups largely confirmed the initial selection of health issues for inclusion and the priority attached to these issues. In particular, focus group participants reported concerns about long term mental health issues (especially depression, PTSD and alcohol abuse), medically unexplained symptoms (especially irritable bowel-like symptoms), and the long term respiratory effects of dust. The focus groups were also able to clarify the relative priority that should be placed on the assessment of various exposures.

Health concerns identified in the focus groups were mostly consistent with the literature and with exposures identified in ADF Hazard Assessment Team reports. These included viral conditions associated with living in dense accommodation (e.g. diarrhoea and respiratory infections), as well as combat and non-combat related injuries, in particular musculoskeletal injuries. The latter were often attributed to the weight of issued body armour and some individuals reported either not wearing assigned armour as directed, or alternatively, purchasing their own lighter weight armour from local (non-ADF) sources.

Stress associated with separation and re-integration with family and re-establishing relationships on return from deployment was a more significant area of concern than initially envisaged by the research team. Similarly, the impacts of organisational factors were of higher priority to MEAO veterans than originally anticipated and consequently more emphasis was given to these factors in the survey.

The draft questionnaire was pilot tested by volunteers among members who had participated in the focus groups. Process testing of the email invitation and online survey version was also conducted prior to the launch of the study in April 2010.

This preliminary work has been fully described in the MEAO Preliminary Study Report and the Detailed Research Plan (Volume III).

2.3 Data collection

2.3.1 Survey components

The MEAO Census Study survey (see Volume III) had three main components:

- <u>Brief Deployment History</u>: Participants were asked about their deployments country deployed to, Operation name, year deployment started, number of times deployed in that year, and the total time deployed (in months). The questions and format were based on experience with the Near North Area of Influence (NNAI) health studies conducted by CMVH.
- <u>Health questionnaire</u>: Topics were identified by the review of literature, consultation with stakeholders and focus groups with serving and ex-serving personnel. Items and scales, obtained from a number of different sources, elicited information about major mental health, physical health, social function, and health risk factors. The questions were grouped into sections according to theme. Most of the health questions referred to the respondent's health at the time when they completed the questionnaire.

• <u>Deployment experiences questionnaire</u>: Questions focused on health hazards and threats both real and perceived, in relation to the most recent deployment to Iraq and/or Afghanistan. Iraq based operations comprised Part I, and Afghanistan based operations, Part II, although most questions were identical. Participants who had deployed to both countries were asked to complete both parts. Questionnaire items were identified by the review of literature and review of Hazard Assessment Team reports (more detail on these activities is provided in Chapter 1). In addition, hazards reported by serving and ex-serving personnel during the preliminary study focus groups were incorporated. Data obtained from this questionnaire are based on respondents recall or perceptions of their deployment when they completed the questionnaire, which could have been up to 10 years after the deployment described.

A list of the measures used is given in Section 2.3.6. The survey took approximately thirty to ninety minutes to complete, depending on the number of deployments and other personal characteristics and experiences.

2.3.2 Survey protocol

The survey was available in both online and in hard copy format. The online survey was initially provided by an existing Defence IT contractor. To enhance data integrity and timely tracking of respondents, CMVH UQ took over the hosting of the survey web site in early 2011 using DatStat[©] online survey and participant management software. Completed hard copy questionnaires were logged by CMVH before being batched and sent to an external contractor (Speedscan[©]) for electronic data capture and document scanning. The Data Management and Analysis Centre (DMAC) at The University of Adelaide amalgamated and stored the data from these two sources in a single dataset.

2.3.3 Approach to potential participants

In all participant materials the study was referred to as the "MEAO Health Study", rather than using the term "census" which The University of Queensland Behavioural and Social Sciences Ethical Review Committee felt might imply that the survey was compulsory.

At the commencement of the study, contact details for members on the nominal roll were obtained from the Defence Personnel Management Key Solution (PMKeyS) database. These data were updated at three-monthly intervals throughout the Study.

In April 2010 a warm-up letter was sent to the Defence address for currently serving regular ADF members, who comprised approximately two thirds of the study population. This letter advised members that the study was commencing and that they would shortly receive an emailed invitation to participate. One week later, the invitations were sent to Defence email addresses. Invitees could access the online survey through a hyperlink, or if they preferred, they could request a hard copy. For a small proportion of members where a Defence email address was unavailable, a hard copy invitation and questionnaire were mailed to the Defence mailing address.

From March to May 2011, ex-serving and reserve personnel were mailed hard copy invitation materials. The invitation pack included their personal login details (Study ID and password) for the online questionnaire, and a hard copy consent form. It was mailed to their home address (if available). Invitees could either complete the consent form and questionnaire online, or return the hard copy consent form and receive a hard copy questionnaire by mail to their nominated address. Persons with no available mailing addresses were sent an email invitation if a private email address was available. Persons residing overseas were only excluded from the study population if they had left the ADF and email contact was not possible. Invitations were not posted to available overseas addresses unless requested by the respondent, as reply paid envelopes could not be provided.

Invitations included the following materials (or links to these materials, in the case of email invitations):

- Study Information Sheet
- Invitation from the Chief Investigator
- Letter of Support from the Chief of the Defence Force and the Repatriation Commissioner
- List of Study Investigators
- ADHREC Guidelines for Volunteers
- List of Support Contacts
- CMVH website and Frequently Asked Questions (URL)
- Reply paid envelope (hard copy invitations only).

These materials are included in Volume III.

Invitees had the option of declining the invitation, either online or by email, telephone (free call) or mail. They were also advised to use the free call number or dedicated study email address, if they wanted clarification about any aspect of the study.

Approximately three weeks after the invitations, reminders were sent to non-respondents using the same format (email or postal) as the invitation. Reminders were also issued where persons had commenced, but not completed, the online questionnaire, or had requested, but not returned, hard copy questionnaires.

Telephone follow up was attempted for all individuals where a response was not received within three weeks of the reminder (including where invitations or reminders were returned undeliverable). Up to ten telephone calls were made at a variety of times during the day. Calls were made by appropriately trained interviewers at CMVH.

Call recipients were offered the option of having the hyperlink to the online survey, or a hard copy invitation and questionnaire pack, sent immediately to a nominated address. For email re-sends, this task was automated through the DatStat© software system. Upon logging of the telephone call, a personalised email invitation, with a hyperlink to the survey, were issued from the system. Mail re-sends were batched and issued on a weekly basis.

Contacting ex-serving and inactive reserve members had proved difficult in previous DHSP studies, as contact details supplied by Defence could be out of date. CMVH therefore obtained ethical approval for ComSuper, the Commonwealth Government agency responsible for the administration of military and other public sector superannuation schemes, to provide an additional source of contact information. This source was used for exserving or inactive reserve members who could not be contacted directly by CMVH. CMVH supplied a list of members which was electronically matched to ComSuper's client databases. ComSuper then forwarded the MEAO Census Study invitation pack with a covering letter. The mail-out pack included both the hard copy questionnaire and login details for the online survey. A mailed reminder was also issued by ComSuper, as the final attempt in the contact schedule. ComSuper mailed packs and reminders to 1793 members in November 2011. This activity was approved by all Ethics Committees. ComSuper passed no contact information to CMVH and destroyed the list of names at the conclusion of the activity.

The study recruitment processes are presented diagrammatically in Volume III.

2.3.4 Communications strategy

A communication and media strategy was designed with the assistance of Defence Public Affairs. The study was one of three concurrent studies conducted as part of the Military Health Outcomes Program (MilHOP). More detail about the MilHOP is provided in Section 2.7. Publicity activities were scheduled at the launch of the MilHOP and at various times during the recruitment and data collection process. The aims were to alert members about the studies and encourage participation. The MilHOP studies were also promoted by base visits conducted by senior Defence Officers, CMVH Defence Liaison Officers and study staff. During these visits ADF members had the opportunity to complete a hard copy survey during working hours.

The MEAO Census Study communications strategy also involved Defence media releases, advertisements and editorials. Defence and ex-service publications included Service newspapers, Australian Peacekeepers and Peacemakers Veterans' Association magazine, Defence Family Matters magazine, Defence Today magazine and each state's RSL magazine. Non-defence media included local community newspapers (the Canberra Chronicle, Ipswich City West News, Fremantle Gazette, Melbourne Leader Newspaper Group publications and Penrith Press). Online media were also used, including Defence social media pages such as Facebook, DVA's Touchbase, and the Young Diggers website. Radio interviews were conducted in some locations and the Reserve Directorates for each of the three Services emailed their members about the study.

2.3.5 Ethics committee approvals

The Study was approved by the Australian Defence Human Research Ethics Committee (ADHREC) (Protocol no. 488/07), the Department of Veterans' Affairs Human Research Ethics Committee (DVA HREC) (Protocol no. E008/026), The University of Queensland Behavioural and Social Sciences Ethical Review Committee (UQ BSSERC) (Protocol no. 2009001441) and The University of Adelaide Human Research Ethics Committee (UA HREC) (Protocol no. H-065-2008).

2.3.6 Survey measures

The survey items and instruments are listed below, in the order in which they appeared in the survey. More detail is provided in the relevant results chapters. (A detailed list of the survey items and scales, including sources and scoring is included in Volume III).

Part I: Brief Deployment History

- For each deployment to Afghanistan and Iraq: Operation; year deployment started; number of times deployed in that year; total time deployed (months). Three additional questions asked about pressure to deploy and whether they were deployed with their parent unit.
- For each deployment to Solomon Islands, Bougainville, and East Timor; Operation, year deployment started; number of times deployed in that year; total time deployed (months).
- For every other ADF operational deployment, by country: Operation; year deployment started; number of times deployed in that year; total time deployed (months).
- For other work in the Middle East in a role outside the ADF, country; company worked for; year started; number of times worked in that location in that year; total time worked in location (months).

Part II: Health Questionnaire

Background details

- Date when the survey was filled out.
- Gender; date of birth.
- Relationship characteristics: relationship status, current and one year ago; satisfaction with current relationship; impact of military commitments on relationship and children.
- Career characteristics: educational qualifications; hours per week in paid employment; ADF service: length, type, rank, current/discharged; total months spent on operational deployment in past three years.
- Questions for ex-serving members: year of discharge; whether discharged to reserves; current employment status and type; any experience of unemployment and whether this was due to health.

Recent health symptoms

- Symptom Checklist (based on the Hopkins Symptom Check List) [60]: symptoms suffered in the last month, and, if suffered, the severity (mild/ moderate/ severe).
- Mild Traumatic Brain Injury Screening Instrument (mTBI) [140]: lifetime incidence of TBI events and subsequent symptoms. There are four sections: concussion events in lifetime; symptoms immediately post event; problems commencing or worsening post event; symptoms in last week.

Current health

- Short Form 12 (SF-12) [182]: a generic measure of health status and quality of life, giving scores for general health, physical health, and mental function. The General Health item (SF-1) was used as a stand-alone measure of self-rated health.
- Self-rated health [19]: asks participants to rate, in general, their overall health, quality of life, eyesight (with glasses or contact lenses), hearing, memory, and teeth and gums on a five-point Likert scale.
- Kessler 10 Plus (K10+)[108]: general measure of psychological distress.
- Coping ability (resilience) [56]: measures the extent to which participants can adapt to change and 'bounce back' from illness or hardship.
- Medically Diagnosed Conditions [107, 179]: a 23-item instrument listing medical problems or conditions that had been diagnosed or treated by a doctor. The list was shortened to include only the most common medical conditions identified in Australian Gulf War Veterans' Health Study [161] and Solomon Islands Health Study [44].

Lifestyle behaviours

- Cigarette smoking and tobacco use [164]: current smoking; ever smoked; age started smoking; level of smoking; and attempts at quitting. Changes to level of smoking while on deployment are also recorded.
- Alcohol Use Disorders Identification Test (AUDIT) [161]: quantifies current alcohol use and screens for alcohol use disorders.

Life experiences

- PTSD Check List Civilian (PCL-C): 17 items used to assess symptoms of PTSD [185].
- Anger: Dimensions of Anger Reactions (DAR) [135] measures the frequency of feelings of anger experienced in the last four weeks; two additional items record frequency of actual or threatened physical violence over the last month.
- Patient Health Questionnaire (PHQ9) Depression module [115]: items evaluate nine DSM-IV criteria for major depression syndrome in the last two weeks; a final item records the level of difficulty in daily functioning on a five point scale.
- Patient Health Questionnaire (PHQ15) Anxiety Module [173]: 15 items relate to panic syndrome and seven to other anxiety syndromes suffered in the last four weeks. Please note that PHQ syndromes do not equate to DSM-IV disorders, as a disorder can only be diagnosed when biological causes have been ruled out.
- Suicidality: four items on suicidal feelings, thoughts, planning and attempts in the previous 12 months. Only the last three are commonly reported in similar studies and available population data.

Respiratory health

• European Community Respiratory Health Survey (ECRHS) [36]: symptoms experienced in the past 12 months. A single question was included on allergy and hay fever.

Reproductive history

• Participants were asked if they have ever had problems with fertility and if they have ever been pregnant or fathered a pregnancy. Details of each pregnancy included the outcome, gestation, baby's sex and birth weight, and the occurrence of birth defects or cancer.

Recreation and social activities

• Current frequency of recreational and social activities, including veteran-related activities.

Open-ended questions

• Participants were asked if they had any other important health concerns not addressed in the questionnaire, or if they would like to add any other comments.

Part III: Deployment to Iraq / Part IV: Deployment to Afghanistan

Deployment details

• Characteristics of most recent deployment [107, 179]: geographic location and main duties; duty cycles; hours on duty; rank; service type (regular or reserve).

Chemical and environmental exposures

 Hazard Checklist: frequency of exposure to hazards including airborne, exhaust emissions/ fumes/ toxic industrial chemicals, noise, vector borne and communicable disease, animals, ionising and nonionising radiation, combat, and perceived threats. The Afghanistan list had an extra question on clearing/ searching caves.

Work on deployment

• Experience of and satisfaction with characteristics of the working environment (e.g. match between work requirements and trade experience, work with local community, equipment, organisational support and communication).

Health on deployment

- Sick parade attendance on deployment: number of times attended; reasons for attendance; number of days out of role in each case.
- Diarrhoea or vomiting suffered on deployment: if the condition prevented conduct of duties; if IV fluids were required; and if the condition resolved on leaving the MEAO.
- Sleep issues: five items measured self-rated quality of sleep; satisfaction with sleep; and use of sleep medications.
- Caffeine and supplements: daily level of caffeine consumption and frequency of consumption of body building/ energy/ weight loss supplements while deployed, using a five point scale.
- Military injury compensation: details of any previous, current or planned claims arising from deployment.
- Health impacts of deployment: self-rated comparison between pre- and post-deployment health, also whether any change was due to deployment.

Other deployment experiences

• Problems at home during deployment: whether there were family, financial or work problems; whether the spouse/ partner received sufficient support from the military.

Post deployment experiences

- Characteristics of return to Australia (reason for exit from the theatre of operations; whether psychological screening was received; whether any period of leave was taken away from the operational area before returning home) and the participant's satisfaction with these processes.
- Re-adjustment issues: length of time taken to relax vigilance; support for deployment from public, military, family and friends; other issues, such as financial problems and impact on career.
- Relationship impacts: relationship satisfaction in the weeks after return from deployment.
- Reserve questions: whether the member was in civilian employment at the time of call-up, returned to the same job, or had problems upon return, such as loss of income or career opportunity, or resentment from co-workers.

Open-ended questions

• Participants were asked if they had any other important concerns not addressed in the questionnaire, or if they would like to add any other comments.

2.4 MEAO Census Study response

2.4.1 Response rate

Figure 2.1 shows the response for the Census Study. There were 117 persons who were excluded from the study population (92 persons were known to have died, 22 had left the ADF and permanently emigrated, and three were known to be incapable of completing surveys due to health or other reasons). Members who were scheduled to redeploy to the MEAO before completing a Census survey were transferred to the Prospective Study. Eighty-eight percent of all remaining eligible members were contacted by the Study team. The proportion of persons who could be contacted differed according to service type and employment status (measured at the commencement of the study). Ninety-four percent of currently serving regular members could be contacted, compared with 80% of active reserve members, 72% of inactive reserve members and 62% of ex-serving members.

Among MEAO Census participants, 92% submitted a completed survey or advised that they had completed the survey to their satisfaction, with the remaining 8% providing partial responses in the online system.

In total, 5897 persons (or 42% of respondents) responded to the mailed or emailed invitation (including the routine reminder) without requiring telephone follow up. Telephone follow up was responsible for 53% of responses. Visits to bases yielded 536 surveys and the ComSuper mail-out, 103. Although they did not produce large numbers of completed surveys, these strategies were important in increasing participation among lower ranked members, ex-serving members and inactive reserve members. Members who declined by telephone were not asked why they did not wish to take part, however, 954 persons volunteered a reason for declining. Of these, by far the most common single reason (34%) was that they did not have time to participate.

Survey data were obtained from 53% of all eligible members. This response rate compares favourably with other similar studies (see Table 2.1), including the consolidated CMVH NNAI studies [44-46], the 2010 ADF Mental Health Prevalence and Wellbeing Study (MHPWS) [125], and the first waves of data collection for the King's Cohort in the UK [144] and the US Millennium Cohort [144]. For these two cohorts, the proportion of the sample who were no longer serving was not stated. Data on ex-serving status is available for the CMVH NNAI studies, and more detailed response rates for these studies are compared in Table 2.2.

The Millennium Cohort study commenced before the September 11 terrorist attacks and the ensuing operational activity in the Middle East. The sample was representative of the entire US Defense Force at that time, 70% of whom had never deployed. The survey was provided in both hard copy and online. Invitations and reminders were issued by mail and email. A small incentive (a T-shirt or phone card) was offered to online respondents [144, 154].

The King's Cohort was based on a random stratified sample of personnel who had either deployed on Operation Telic I in 2003 or had served at the same time but did not deploy on the operation. The survey was provided in hard copy only. The invitation strategy included a program of defence base visits conducted between March 2004 and late 2005. Nearly half of all the study participants were visited on base. Other strategies included mailed invitations and reminders, telephone follow up, and defence and civilian tracing [97].



Table 2.1:	Comparison o	f response	rates in MEAO	Census Study	and similar studies

Study	Deployment of interest	Deployment period	Data collection period	Eligible (N)	Response rate
CMVH NNAI studies	NNAI	1997 - 2007	2007 - 2008	13 631	43%
Millennium Cohort	n/a	-	2001 - 2003	256 400 ^a	37%
King's Cohort	OP TELIC	2003	2004 - 2006	17 598	56%
MHWPS ^b	n/a	-	2010	50 049	49%
MEAO Census	MEAO	2001 - 2009	2010 - 2011	26 239	53%

^a Persons who were unable to be contacted about the study were excluded from the denominator in calculation of the response rate ^b ex-serving and reserve members were not eligible for the MHPWS; however, some members may have left the ADF or transferred to reserves during the data collection period

In all CMVH DHSP studies, response rates have been lower among ex-serving and inactive reserve members than for regular serving members (Table 2.2). Response rates were higher for the MEAO Census Study than for the NNAI studies among currently serving regular members, and ex-serving members. Active reserve members were the only group with a lower response rate for the MEAO Census Study than for the NNAI studies. This may be due to the fact that almost all regular members leaving the ADF now discharge into the reserves, so reserve groups now contain proportionately fewer members who have not previously served full-time with the ADF. Another difference is that the NNAI studies each included a comparison group of members who had not deployed to the location in question (Solomon Islands, Bougainville or East Timor). In the NNAI studies, response rates were lower among the comparison groups than among the veteran groups.

Table 2.2:Comparison of response rates in MEAO Census and CMVH NNAI studies by service
characteristics at study commencement or at discharge

Study	All	Current Regulars	Active Reserve	Inactive Reserve	Ex-serving
NNAI	43.5%	51.6%	54.2%	41.8%	22.6%
MEAO Census	53.5%	58.1%	48.4%	42.9%	32.3%

2.4.2 Survey completion

The majority of respondents (92%) completed their surveys online. As it was lengthy, the survey was not necessarily completed in one sitting. Not all respondents progressed to the end of the online survey. For analysis purposes, only persons who completed at least 15% of the online survey were counted as "respondents". The first 14% of the online survey comprised the Brief Deployment History as well as the consent and contact sections; the Health Questionnaire took respondents to just over half way; and the remainder of the survey was made up of the Iraq, then the Afghanistan, deployment sections. Not all questions were answered by all respondents. Respondents could omit items they did not wish to answer, except for a few mandatory questions to enable appropriate branching of the online survey. The mandatory questions were to establish which location/s (Iraq or Afghanistan) participants had deployed to, whether they were reserve or ex-serving, and whether they were current smokers.

Table 2.3 shows the numbers of respondents who submitted survey data, by their location of deployment. For respondents who did not progress to the end of the survey, the last section they commenced is indicated. (Please note that, as discussed in the previous paragraph, progress through a section does not necessarily mean that all relevant questions in that section were answered.) Overall, 88% of respondents progressed to the last applicable section of the survey. The proportion completing was still very high among respondents who had deployed to both locations and therefore had to answer two sets of deployment questions, firstly for lraq, then for Afghanistan. Persons who submitted hard copy surveys were more likely to complete all the relevant sections (94%) than persons who did the survey online (88%). Please note that, in tables throughout this report, percentages may not total 100% as a result of rounding.

Survey progress measured by last section	All		lraq only ^a		Afghanistan only ^b		Both locations		Neit locat	Neither location	
commenced	n۲	% ^c	n°	% ^c	n۲	% ^c	n۲	%	n۲	% ^c	
Health Questionnaire	1179	8.4	391	7.5	351	10.5	393	7.3	44	100.0	
Iraq Questionnaire	379	2.7	175	3.3			204	3.8			
Afghanistan Questionnaire	111	0.8			50	1.5	61	1.1			
All sections	12363	88.1	4677	89.2	2941	88.0	4745	87.8			
Total surveys	14032	100.0	5243	100.0	3342	100.0	5403	100.0	44	100.0	

Table 2.3: Survey progress by self-reported geographic location

^a Iraq or areas supporting operations in Iraq

^b Afghanistan or areas supporting operations in Afghanistan

 $^{\rm c}$ Unweighted totals and column percentages

2.4.3 Comparison of respondents and non-respondents

A note about service characteristics

Some characteristics, including age, rank, Service (Navy, Army, RAAF), service type (regular / reserve) and employment status (serving / ex-serving) are subject to change from the time of the respondent's deployment to the MEAO to the date they completed the survey.

These characteristics could be reported at several time points, namely, the commencement of the study, the date the respondent completed their survey (although this may have been over several sessions, sometimes over several months), and the date of the most recent deployment to a) Iraq and/or b) Afghanistan.

In the interest of consistency and completeness, three time points have generally been used in the analysis of service and employment characteristics:

- Characteristics at the commencement of the study (from PMKeyS in March 2010). These data were available for the entire sample, so were used when comparing respondents and non-respondents. These data were also used in the overview of health presented in Chapter 3, in order to consistently describe the study population, and to make comparisons with other study populations. Note that for ex-serving members, Service and rank at the time of their discharge from the ADF was used.
- Characteristics at the time of the respondent's most recent deployment (2001 to 2009). These characteristics are relevant to the respondent's exposures and experiences while on their most recent deployment to a) Iraq and/or b) Afghanistan.
- A further time point was used in weighting the data for non-response. Data were weighted for sex, Service, rank and employment (regular, active reserve, inactive reserve/ex-serving) from the most recent PMKeyS download before the close of data collection (August 2011).

"ADF employment category", as used in this report, is a mutually exclusive combination of two fields from PMKeyS, namely employment status (active/terminated) and service type (regular/active reserve/inactive reserve). Therefore, in this report, the terms "regular", "active reserve" and "inactive reserve" refer only to members who had not terminated from the ADF when the study commenced in March 2010. "Ex-serving" includes all the members who had terminated or discharged from the ADF at March 2010, regardless of their service type.

Figure 2.2 shows ADF employment category at the commencement of the study, and at the time of respondents' most recent deployment to the MEAO. As a substantial number of survey respondents did not complete this question (N=2445 or 17%), historical PMKeyS data were obtained for a subset of participants (those who were in the reserve or ex-serving at the time of the study, N=4580). This enabled an additional 763 respondents (another 5%) to be classified as either regular members, or reserves on continuous full time service (CFTS), at the time of their most recent deployment to the MEAO. It seems likely that the majority of those who could not be classified (N=1682) would also have deployed as regular members, as most (94.5%) were regular members at the start of the study.

The health of members by ADF employment category is reported in Chapter 3, Section 3.11. First, those who deployed to the MEAO as regular members are compared with those deployed as reserves on CFTS. Second, the main health measures are examined across ADF employment categories at the commencement of the study.

Service characteristics and survey response

Tables 2.4 and 2.4a-d compare the characteristics of respondents and non-respondents at study commencement. Under 35 year olds were under-represented among respondents, especially among exserving and active and inactive reserve members. Army and Navy personnel were also less well-represented than RAAF across all employment categories except for the inactive reserve. Response rates were lower among reserves, especially inactive reserves, and even lower among ex-serving members. Higher rank and being female were also associated with higher response in all ADF employment categories.

Figure 2.2 ADF employment category at the time of most recent deployment to the MEAO and at the commencement of the MEAO Census Study



Table 2.4:Characteristics of survey respondents and non-respondents at study commencement: All
eligible members (N=26239)

	Respond	Respondents		ondents	
Characteristic	nª	% ª	nª	% ª	<i>p</i> -value ^a
All eligible members	14032	53.5	12207	46.5	
Sex					
Female	1730	58.7	1217	41.3	
Male	12302	52.8	10990	47.2	<0.001
Age group					
18 - 24	586	38.8	924	61.2	
25 - 34	5561	47.4	6180	52.6	
35 - 44	5089	57.6	3745	42.4	
45+	2796	67.3	1358	32.7	< 0.001
Service					
Navy	3150	50.3	3109	49.7	
Army	6600	51.2	6287	48.8	
RAAF	4282	60.4	2811	39.6	< 0.001
ADF employment category					
Regular	10819	58.1	7806	41.9	
Active Reserve	1498	48.4	1600	51.6	
Inactive Reserve	1036	42.9	1381	57.1	
Ex-serving	679	32.3	1420	67.7	< 0.001
Rank					
Officer	4129	62.5	2480	37.5	
Non-Commissioned Officer	8083	56.0	6363	44.0	
Other Ranks	1820	35.1	3364	64.9	<0.001

^a Unweighted totals, row percentages and Chi-square test for association

	Respondents		Non-respondents		
Characteristic	n ^a	% ^a	n ^a	% ^a	<i>p</i> -value ^a
All regular members	10819	58.1	7806	41.9	
Sex					
Female	1327	63.0	778	37.0	
Male	9492	57.5	7028	42.5	< 0.001
Age group					
18 - 24	568	40.9	822	59.1	
25 - 34	4405	52.6	3966	47.4	
35 - 44	3956	63.6	2269	36.4	
45+	1890	71.6	749	28.4	< 0.001
Service					
Navy	2165	57.3	1614	42.7	
Army	5151	54.8	4251	45.2	
RAAF	3503	64.3	1941	35.7	< 0.001
Rank					
Officer	3227	65.5	1698	34.5	
Non-Commissioned Officer	6380	60.5	4172	39.5	
Other Ranks	1212	38.5	1936	61.5	<0.001

Table 2.4a:Characteristics of survey respondents and non-respondents at study commencement:
Regular members (N=18625)

^a Unweighted totals, row percentages and Chi-square test for association

Table 2.4b:	Characteristics of survey respondents and non-respondents at study commencement:
	Active reserve members (N=3098)

	Respondents		Non-respondents		
Characteristic	n ^a	% ^a	nª	% ^a	<i>p</i> -value ^a
All active reserve members	1498	48.4	1600	51.6	
Sex					
Female	203	52.6	183	47.4	
Male	1295	47.8	1417	52.2	0.08
Age group					
18 - 24	3	9.7	28	90.3	
25 - 34	446	38.9	701	61.1	
35 - 44	529	48.8	554	51.2	
45+	520	62.1	317	37.9	< 0.001
Service					
Navy	508	50.7	494	49.3	
Army	655	44.0	832	56.0	
RAAF	335	55.0	274	45.0	< 0.001
Rank					
Officer	561	58.4	399	41.6	
Non-Commissioned Officer	758	46.8	860	53.2	
Other Ranks	179	34.4	341	65.6	<0.001

^a Unweighted totals, row percentages and Chi-square test for association
	Respond	dents	Non-respo	ondents	
Characteristic	nª	% ^a	nª	% a	<i>p</i> -value ^ª
All inactive reserve members	1036	42.9	1381	57.1	
Sex					
Female	101	48.3	108	51.7	
Male	935	42.3	1273	57.7	0.10
Age group					
18 - 24	6	16.2	31	83.8	
25 - 34	408	37.1	691	62.9	
35 - 44	367	42.8	490	57.2	
45+	255	60.1	169	39.9	< 0.001
Service					
Navy	191	42.5	258	57.5	
Army	531	43.8	680	56.2	
RAAF	314	41.5	443	58.5	0.58
Rank					
Officer	269	50.9	260	49.1	
Non-Commissioned Officer	567	45.0	693	55.0	
Other Ranks	200	31.8	428	68.2	<0.001

Table 2.4c:	Characteristics of survey respondents and non-respondents at study commencement:
	Inactive reserve members (N=2417)

^a Unweighted totals, row percentages and Chi-square test for association

Table 2.4d: Characteristics of survey respondents and non-respondents at study commencement: Ex-serving members (N=2099)

	Respondents (N=679)		Non-respondents (N=1420)		
Characteristic	nª	, % ^a	nª	% ^a	<i>p</i> -value ^a
All ex-serving members	679	32.3	1420	67.7	
Sex					
Female	99	40.1	148	59.9	
Male	580	31.3	1272	68.7	0.006
Age group					
18 - 24	9	17.3	43	82.7	
25 - 34	302	26.9	822	73.1	
35 - 44	237	35.4	432	64.6	
45+	131	51.6	123	48.4	< 0.001
Service ^b					
Navy	286	27.8	743	72.2	
Army	263	33.4	524	66.6	
RAAF	130	45.9	153	54.1	< 0.001
Rank ^b					
Officer	72	36.9	123	63.1	
Non-Commissioned Officer	378	37.2	638	62.8	
Other Ranks	229	25.8	659	74.2	< 0.001

^a Unweighted totals, row percentages and Chi-square test for association ^b At discharge

2.4.4 Deployment location and time since deployment

Describing deployment location

Self-reported information on deployment location was obtained from a number of different questions. The first part of the census survey was the brief deployment history section which asked about country, operation and year for all past deployments, including those to the MEAO. Later in the survey, there were sections about specific deployment experiences to be completed with reference to the respondent's most recent deployment to each of Iraq and Afghanistan.

For each operation selected in the brief deployment history, respondents were asked to nominate the year they commenced that deployment. The latest reported deployment year was taken to indicate the most recent deployment to Iraq and/or Afghanistan.

The first question in each deployment section recorded the geographic regions in which the respondent was mainly based. The options were:

- "Baghdad", "Talil", "Balad", "Persian Gulf (ships)", "Attachment to Foreign militaries or UN", "Other Areas in Iraq" or "Other supporting areas NOT in Iraq (e.g. .2, .4)";
- "Tarin Kowt", "Kandahar", "Other areas in Afghanistan", "Attachment to Foreign militaries or UN" or "Other supporting areas NOT in Afghanistan".

Respondents were asked to select all locations which applied. Where a combination of "inside" and "outside" regions was selected, the deployment was classified as "inside".

Reporting of the country deployed to (Iraq / Afghanistan) was more complete than the reporting of the more detailed information of region and year of deployment which was asked later in the survey. Questions were also more likely to be completed in the Iraq deployment section, than the Afghanistan section, as Iraq questions preceded those on Afghanistan. In particular, respondents who had deployed to both locations may have found answering the same, or very similar questions again tedious.

Many of the subsequent analyses in this report used the region data, as respondents based "inside" a country were considered more likely to be exposed to combat and other hazards. Only those who reported a region within each country could be included in analyses of "inside" and "outside" location.

Table 2.5 and Figure 2.3a-b show the classification of "inside" and "outside" deployments for all respondents, by each country, and also where respondents deployed to both countries. The total number who deployed to Iraq was 10646 (76%) and Afghanistan 8745 (62%) with 5403 (39%) having deployed to both. These are the maximum numbers used in subsequent analyses (with lower numbers due to missing data on other variables).

Tuble 2101 Country of deployment by molde and outside base location						
Location in which the		Afghanistan				
respondent was mainly		Not			Base location	
based		deployed	Inside ^c	Outside ^d	not reported	IN
Iraq	Not deployed	44	2387	539	416	3386
	Inside ^a	3579	1031	762	673	6045
	Outside ^b	1142	384	1088	459	3073
	Base location					
	not reported	522	385	162	459	1528
Total N ^e		5287	4187	2551	2007	14032

Table 2.5: Country of deployment by "inside" and "outside" base location

"Baghdad", "Talil"," Balad", "Persian Gulf (ships)", "Attachment to Foreign militaries or UN", "Other Areas in Iraq"
 "Other supporting areas NOT in Iraq (e.g. .2, .4)"

^c "Tarin Kowt", "Kandahar", "Other areas in Afghanistan", "Attachment to Foreign militaries or UN"

^d "Other supporting areas NOT in Afghanistan"

^e Unweighted totals



Figure 2.3b Base location reported by respondents who deployed to both Iraq and Afghanistan (N=5403)



Time since most recent deployment

Time since the most recent deployment to the MEAO was used in some analyses. Respondents who did not report the year/s of relevant operations could not be included in any analyses involving time since most recent deployment. The totals deployed to each country vary slightly from the previous table and figures, due to the different variables used.

The single most recent deployment was also used for some analyses. Where respondents reported deploying to both Iraq and Afghanistan in the same and most recent year, the Iraq responses were used. The Iraq deployment was chosen because Iraq questions preceded Afghanistan questions in the survey so responses tended to be more complete. Therefore, the single most recent deployment for the purposes of analysis in the report was Iraq for 7646 respondents and Afghanistan for 6026 respondents.

Table 2.6 shows the numbers of respondents who reported deploying to Iraq and/or Afghanistan, and, where they reported the year/s of relevant operations, which deployments were the most recent. There were 1877 respondents who reported deploying to both Iraq and Afghanistan in the same and most recent year. Patterns of deployment are discussed in detail in Chapter 5. Table 2.7 shows the years in which respondents' most recent MEAO operations occurred.

Table 2.6: Most recent deployment location in the MEAO

Most r	ecent deployment		Most	Not most		Total
locatio	n	Not	recent	recent	Year not	N ^a
		deployed	deployment	deployment	reported	
	Not deployed	67	3338	-	90	3495
	Most recent					
Iraa	deployment	5037	1877	507	225	7646
Iraq	Not most recent					
	deployment	-	1849	-	-	1849
	Year not reported	120	839	-	83	1042
Total N	la	5224	7903	507	398	14032

^a Unweighted totals

Table 2.7: Most recent deployment lo	ocation by years
--------------------------------------	------------------

Year of most recent	Irac	a ^a	Afghan	istan ^b
deployment	۳c	% ^c	n°	% ^c
2001-5	3463	45.3	847	14.1
2006-7	2525	33.0	912	15.1
2008-9	1580	20.7	3019	50.1
2010	78	1.0	1248	20.7
Total	7646	100	6026	100
Not deployed / year not reported N=360				

^a Iraq or areas supporting operations in Iraq

^b Afghanistan or areas supporting operations in Afghanistan

^b Unweighted totals and column percentages

2.5 Methods of statistical analysis used in this report

2.5.1 Main health measures used in analyses

Table 2.8 shows the main health measures from the survey, and how they are used in the analyses which appear in subsequent chapters.

2.5.2 Overview of analysis

Statistical analyses were performed using SAS version 9.3 [156] and STATA version 10.1 [174]. Data were weighted to account for the differential response rates between groups, based on sex, Service, rank and employment (regular, active reserve, inactive reserve/ex-serving) from the most recent PMKeyS download before the close of data collection (August 2011). An explanation of the statistical weighting procedure is included in Volume II.

For scales with defined cut-off scores that indicate pathology (e.g. symptoms of PTSD screened for in the PCL-C), chi-squared tests were used to compare groups. For normally distributed data, the means and standard deviations are presented and comparisons are made using multiple least squared regressions that are adjusted for demographic variables. Likewise logistic regression models were used for categorical outcomes. All regression models have been adjusted for age at the time of completing the survey (18-24, 25-34, 35-44, 45 or more years), and for Service (Navy, Army and RAAF), rank (Commissioned Officer, Non-commissioned Officer and other ranks) and gender, at study commencement.

	Table 2.0. Main health measures used in this report						
Measure	Name of scale (if applicable)	Score range or categories	Score or category indicative of pathology				
Post-Traumatic Stress Disorder (PTSD)	PTSD Check List – Civilian version (PCL-C) [185]	17 - 85	50+ ^a				
General psychological distress	Kessler 10 (K10) [108]	10 - 50	30+ ^a				
Major depressive syndrome	Patient Health Questionnaire (PHQ9 – Depression module) [116]	Symptoms either meet or do not meet diagnostic criteria	Criteria met ^b				
 Anxiety Panic syndrome Other anxiety syndrome 	Patient Health Questionnaire (PHQ15 – Anxiety module) [173]	u	Criteria met ^b				
Suicidality (in last 12 months): • Thoughts • Attempts • Plans	Each item was analysed separately	Yes / No	Yes				
Alcohol misuse	Alcohol Use Disorder Identification Test (AUDIT) [157]	0 - 40	20+ ^a				
Smoking	n/a	Smoker / Ex-smoker / Never smoker	Smoker				
General health	Short Form 1 (SF1) [182]	Excellent / Very good / Good / Fair / Poor	Fair or poor				

Table 2.8: Main health measures used in this report

^a The epidemiological cut-offs recommended in the relevant literature were used

^b The PHQ uses DSM-IV [70] criteria, however, PHQ syndromes do not equate to DSM-IV disorders, as biological causes cannot be ruled out.

For specific analyses, other variables may have been included in models. In such cases, these extra adjustments are detailed in the relevant chapters.

Unless specified otherwise, missing responses were excluded from the analyses, with the actual number of responses available for any given analysis shown in the tables ('N'). However, scoring algorithms were used to generate total scores for scales (such as PCL-C, K10) even in the absence of some component items. Details can be found in Volume II of this report.

2.5.3 Interpreting the analysis

An odds ratio indicates the odds or likelihood that an event or outcome will occur. In the example below, the interpretation of the odds ratio for major depressive syndrome (OR = 3.50) would read, "Members who deployed to the MEAO twice were three and a half times more likely to report symptoms of major depressive syndrome than members who only deployed once." Confidence intervals indicate the natural variation that occurs in measurements, and define the range within which the true value lies. The confidence interval for this odds ratio (CI = 0.77, 16.02) includes the reference (which in this case is 1), which means the result is not statistically significant. The true value could be anywhere between 0.77 (or 23% less likely) and 16.02 (around 16 times more likely).

In contrast, the odds of members who deployed to the MEAO three or more times reporting symptoms of major depressive syndrome is 5.21. The confidence interval (CI = 1.21, 22.42) excludes the reference point of 1, which indicates that the difference between the groups was statistically significant. We can be confident that these members are more likely than those who deployed only once to report major depressive syndrome. However, the confidence interval is wide, so the true odds of these members having symptoms of the condition, lies somewhere between 21% more likely and over 22 times more likely.

The other statistic shown in the example is the p-value. The p-value is calculated to show whether the difference occurred simply through chance. The p-value is the probability that effects as big as those seen in the study would be observed if there was really no difference between the groups. A p-value of less than 0.05

is conventionally taken to indicate that the results are statistically significant. However, for very large samples and numerous comparisons such as in the Census Study, it is often prudent to require much smaller p-values, for example, p less than 0.001.

Number of times		Major depressive	syndrome		
deployed to the		No	Yes		
MEAO	N	%	%	OR (95%CI)	<i>p</i> -value
Once	200	95.4	1.5	1 (Reference)	-
Twice	79	94.9	5.1	3.50(0.77,16.02)	0.106
≥ 3 times	68	92.7	7.4	5.21(1.21,22.42)	0.027

Example only

2.6 The 2010 ADF Mental Health Prevalence and Wellbeing Study and the Military Health Outcomes Program (MilHOP)

In response to the Dunt report on mental health in the ADF [65], the Department of Defence decided in 2009 to conduct a survey to measure mental health among all regular ADF members. The MEAO Health Study was already in an advanced planning stage but the timelines for the MEAO Census Study were changed to facilitate this goal. Regular ADF members who had deployed to the MEAO in 2001-09 were surveyed in 2010. At the same time, those members who had not deployed to the MEAO were invited to participate in a "Health and Wellbeing Survey". This survey enabled the ADF Directorate of Strategic Operational Mental Health to:

- use the same survey methods developed for the MEAO Census Study,
- launch a single marketing program to promote the studies within the ADF under the MilHOP banner, and,
- in conjunction with the MEAO Census Study, collect mental health data across the entire currently serving regular ADF population, including data from an additional telephone interview administered to a subset of respondents. These findings have been reported as the 2010 ADF MHPWS [89, 125].

2.6.1 Relationship between MilHOP components

The studies which commenced under the MilHOP banner in 2010 involved three distinct groups: MEAO veterans (or retrospective group), a MEAO prospective group, and a non-MEAO group (Table 2.9). The nominal rolls of members for the MEAO retrospective group and the non-MEAO group were prepared early in 2010. Members who deployed to the MEAO after that time were transferred to the prospective group. While every effort was made to ensure members participated in only one study, due to the serial identification of deploying personnel, some members had already responded to another survey before becoming eligible for the Prospective Study. In addition, 382 new members who were not on the nominal roll at the commencement of the MilHOP and deployed to the MEAO in 2010-11 also joined the prospective group.

MilHOP group	Population ^a	Years deployed to MEAO	Survey conducted by
MEAO retrospective	 a) Regular, N=19184 b) Active reserve, N=2568 c) Inactive reserve, N=2987 d) Ex-serving, N=2176 	2001-2009	CMVH, 2010-2011
MEAO prospective	Subset of regular and reserve members, N=3422	2010-2011	CMVH, 2010-2012 (pre- and post-deployment)
Non-MEAO	Regular, currently serving members, N=30848	Not deployed before 2010	University of Adelaide, 2010

Table	2.9:	Milhop	groups

^a ADF employment category at Program commencement, may differ from status at time of response

To facilitate recruitment, the MEAO Census Study concentrated on collecting data from regular serving members in 2010. In 2011, reserve and ex-serving members were invited to take part in the MEAO Census Study. Follow up of regular serving members who had not taken part in 2010 also continued in 2011. Therefore, not all MEAO Census Study respondents are included in the 2010 MHPWS report (Figure 2.4).

Figure 2.4 Overlap between participants in the MEAO Census Study and the ADF Mental Health Prevalence and Wellbeing Study (MHPWS)



^a Number of respondents who had provided sufficient data at 4/02/2011 to be included in the MHPWS; the total number of MHPWS respondents was 24,481.

^b A subset of MHPWS participants completed a telephone Composite International Diagnostic Interview (CIDI).

2.6.2 Differences between the MEAO Census Study and the MHPWS

The three MilHOP studies were intended to be complementary, rather than directly comparable. Key differences between the MilHOP studies are shown in Table 2.10. In summary, the main reasons for the lack of comparability between the MEAO Census Study and the MHPWS are:

- Different, but complementary, objectives.
- Different populations, specifically, the inclusion of ex-serving and reserve members in the MEAO Census Study.
- Different instruments:
 - The MEAO Census Study collected extensive information on experiences during and after deployment. The prevalence of a wide range of self-reported exposures, and mental and physical health symptoms was measured.
 - A selected subset of 1798 MHPWS respondents completed a telephone Composite International Diagnostic Interview (CIDI) [191], a standardised psychiatric interview, as well as the symptom scales, in a two phase design which allowed estimates to be made of case rates by DSM-IV diagnosis. The prevalence of mental health disorders was reported.
- Statistical weighting. Response rates in the studies were not uniform with certain (sex/Service/rank) groups being under- or over-represented. Different statistical weightings were therefore applicable to the analyses for each study to improve the representativeness of results with regard to the particular population of interest. MHWPS data were also weighted for Medical Employment Classification (MEC).
- Different cut-off dates for inclusion of data from regular ADF members.

Table 2.10: MilHOP study characteristics

Characteristic	MEAO Census Study	2010 ADF Mealth Health Prevalence and Wellbeing Study ^a	MEAO Prospective Study
Objectives	 To ascertain the health status of members who deployed to the MEAO between 2001 and 2009 To investigate associations between deployment experiences and health. 	 To establish the baseline prevalence of mental disorder in the ADF To refine current ADF mental health screening instruments To investigate occupational stressors that influence mental health. 	• To investigate changes in health between pre- and post-deployment in a subgroup of members scheduled to deploy to the MEAO during 2010- 11.
Key points of difference	 A survey of members deployed to MEAO 2001- 09, including current and ex-serving, regular and reserve members Explores mental and physical health with regard to specific hazards and exposures encountered in the MEAO. 	• Describes the mental health status of currently serving regular ADF members, compared with the Australian population.	 Prospective design enables detection of within-person changes in mental and physical health associated with deployment. Includes physical and neuro-cognitive testing as well as self-report survey data.
Eligibility criteria	Deployed to the MEAO between 2001 and 2009	Regular members of ADF 2010	Deployed to the MEAO in 2010/11
Data collection period	2010: Regular members invited 2011: Reserve and ex-serving members invited	2010	2010-2011: Pre- deployment 2011-2012: Post- deployment
Health survey	\checkmark	\checkmark	\checkmark
Deployment survey	✓	×	✓
Psychiatric interview (CIDI)	✓ (subset of participants)	✓ (subset of participants)	×
Physical and neurocognitive tests	×	×	✓ (subset of participants)

^a The MHPWS reported mental health data among currently-serving regular members, MEAO-deployed and non-MEAO deployed, who provided survey data before 4/02/11.

2.7 Discussion

There were 14,032 respondents to the MEAO Census Study, which was 53% of eligible participants. This compares favourably with similar studies. Ex-serving members, active and inactive reserve members, and lower ranks were under-represented among respondents. RAAF had the highest response rate (60%) of the three Services. Statistical weightings and adjustments were therefore applied to the analyses reported in subsequent chapters to improve the representativeness of findings.

High response rates are desirable for two reasons. Firstly, if a high proportion of the study population provide data, it is likely that the results are generalisable to the whole study population (in this case, the 26,915 members of the ADF who deployed to the MEAO in 2001 to 2009). Secondly, large numbers are needed to ensure that reliable comparisons can be made between sub-groups or that associations can be identified between aspects of deployment and subsequent health.

Several factors are likely to affect participation levels in studies of military health. Secular trends in epidemiological research show declining participation rates over recent years. Three of the reasons proposed

for such trends are the proliferation of research studies; a general decrease in volunteerism [73]; and an increased difficulty in locating potential participants [131]. In the Australian Longitudinal Study of Women's Health, which commenced in 1996, an estimated 42% of the younger women (n = 14 247), 55% of the mid-age women (n = 13 716), and 40% of the older women (n = 12 432) agreed to participate [119]. In contrast, the "45 and Up Study" (N = 36,645), launched 10 years later, reported a response rate of just 18% (to mailed invitations) [19]. Further, women may be more likely than men to volunteer as study participants, as are mid-aged adults compared with younger adults [178]. ADF personnel also differ from the general Australian population with regard to their high geographical mobility.

The salience of the issue [73], and the time elapsed since the event in question, are also important motivators of participation. The MEAO Census Study covered the deployments during 2001 to 2009, and unlike Gulf War and Vietnam veteran studies, no particular health concerns have been widely expressed in recent times. "Hot" topics generate widespread publicity which assists greatly in bringing research to the attention of potential participants. The time factor impacts on both motivation to participate and the proportion of persons who are no longer serving and thus more difficult to locate.

"Survey fatigue" is also an issue for heavily researched military populations. While available technologies enable efficiencies such as electronic invitations and surveys, it is increasingly difficult to gain the attention of potential respondents who are frequently overwhelmed by unsolicited information from a variety of official and unofficial sources.

Despite declining levels of participation, it has been shown that lower response rates (even in the order of 20%) do not necessarily compromise the validity of epidemiological studies. In order to judge scientific merit, it is considered more important to provide explicit detail about the characteristics of both participants and non-participants, the attempts made to improve participation, and the denominators used to calculate response rates [131].

Telephone contact, immediately followed by an automated email containing a link to the online survey, was the most successful recruitment strategy used in the MEAO Census Study. Commentators have noted that strategies designed to improve response rates usually come at considerable cost, which needs to be weighed alongside potential benefits to study validity [131].

The ComSuper mail-out conducted during the Census Study added about two percent to the respective response rates for the ex-serving and inactive reserve groups. However, the utility of this strategy may have been greatly enhanced if persons who did not respond to the ComSuper mail-out were able to be followed up by telephone. Telephone follow up was not possible as, under the level of data access agreed with ComSuper, and endorsed by the relevant ethics committees, contact details held by ComSuper could not be passed on to CMVH. The process was explained in a cover letter to mail-out recipients, and no privacy concerns or negative feedback were reported to CMVH from members approached in this way. Both ComSuper and the relevant ethics committees may be more amenable to the release of client contact details to CMVH in future studies, now that a relationship and protocol has been established. An alternative would have been for ComSuper to make the follow up calls, however, this would have required significant staffing and training to ensure adherence to study protocols and this was not seen as practical by either party.

The King's Cohort achieved a large response from base visits and other internal defence tracing activities [97]. The MilHOP was the first time that base visits had been conducted for CMVH studies. CMVH had considerable support from the Defence Program Management Office, Joint Health Command, the Directorate of Mental Health, Defence Publicity and its own Defence Liaison Officers in bringing the study to the attention of serving members. However, responses to base visits were somewhat patchy as access to individual units was ultimately at the discretion of each Commanding Officer. It was difficult to find dates and times when all required units were available at a given base. Competing surveys were frequently mentioned by potential respondents. CMVH staff also noted a level of cynicism about whether such studies ever produce concrete, measurable outcomes for ADF members. It is important for CMVH and Defence to address this concern by ensuring that findings from the MilHOP are effectively communicated to members and that the implications are reflected in real changes to policy and procedures.

Chapter 3 Overview of the health of ADF members deployed to the MEAO 2001-2009

This chapter summarises the self-reported health of MEAO veterans defined by their main service and demographic characteristics. More specific research questions will be addressed in each of the chapters that follow. Mental and general health data are presented here according to ADF employment status when they deployed (regular or reserve on CFTS) and at the commencement of the study (regular, active reserve, inactive reserve or ex-serving).

Key Findings

- Mental health was better, and the prevalence of smoking and alcohol misuse was lower in the RAAF than the other Services. Around 3% of RAAF members reported symptoms of PTSD, compared with almost 6% in the Army.
- On most measures, officers reported fewest health problems and other ranks reported more.
 PTSD symptoms were reported by 2.9% of officers and 6.1% of other ranks.
- The prevalence of poorer health increased with age. Eight percent of 18-24 year olds had "fair" or "poor" general health, compared with 19% of those aged over 45.
- Women comprised 11% of the study population, and 12.3% of respondents. They differed from the men in age, Service and rank. The general health of women and men was similar, however, men were less likely to report psychological distress, major depression or panic syndromes.
- There were 597 respondents who deployed to the MEAO as reserves on CFTS and their reported health in the survey was similar to that of regular members.
- Members who were ex-serving at the start of the study reported poorer health than those still serving. For example, they were almost seven times more likely to report symptoms of PTSD. Twenty-three percent of ex-serving members had the lowest MEC classification (MEC 4) at their last record before the study commenced. The prevalence of symptoms of PSTD was highest (29.4%) among ex-serving members 2-3 years after their most recent MEAO deployment.
- Among current ADF members, active and inactive reserve members had poorer health than regulars, for example, being around 2.5 times more likely to report symptoms of PTSD.
- Members who were based inside Iraq on their most recent deployment to that location had poorer health than those based outside Iraq. For example, 6% based inside reported symptoms of PTSD, compared with 2.5% based outside. A similar pattern was evident for Afghanistan, but it was less marked (4.4% of those based inside had PTSD symptoms, as opposed to 3.2% of those based outside).
- Where comparisons were possible, the mental health of regular serving MEAO veterans was poorer than that of MHPWS members (all of whom were regular members) except for the prevalence of PTSD symptoms (2.7% in the Census Study and 3.0% in the MHWPS). MEAO veterans had better mental and general health than participants in CMVH's NNAI Studies. The prevalence of PTSD symptoms was 4.6% in the MEAO Census Study, 7.2% in the East Timor Study, and 5.9% in the Bougainville Study.
- In 2007-08, 3.5% of the Australian population scored above 30 on the K10+ psychological distress scale, compared with 4.2% of MEAO veterans. Smoking was more prevalent among 18-24 year old men (34%) and 18-24 year old women (29%) than among the same sex/age groups in the Australian population (24% and 22%, respectively).

3.1 Overall mental and general health

This section provides an overview of the main health measures by key characteristics of participants. Subsequent chapters are devoted to specific exposures, including combat (Chapter 4), deployment patterns (Chapter 5) and the physical environment (Chapter 6). Military, family and community factors (Chapter 7) and gender (Chapter 8) are also examined. Chapter 9 looks at patterns of physical symptoms reported after deployment.

Table 3.1 shows the unadjusted prevalence of the main mental and general health measures in the population of ADF members deployed to the MEAO in 2001-2009. Data were weighted for non-response as explained in Chapter 2, Section 2.5.2.

PTSD symptoms were reported by 4.6% of veterans and general psychological distress by 4.2%. The proportions who met the screening criteria for major depressive syndrome (3.6%), panic syndrome (3.3%), and other anxiety syndrome (2.2%) were lower than for general psychological distress. Fifty-four respondents (0.4% weighted prevalence) reported attempting suicide in the last 12 months, while 5.5% had suicidal thoughts in this period. Evidence of alcohol misuse was found in 2.5% of members. Almost one third of members who deployed to the MEAO were current smokers. An estimated 14.5% rated their general health as "fair" or "poor" (rather than "excellent", "very good" or "good").

Women comprised 11% of the eligible study population, and 12.3% of respondents. They differed from the men in age, Service and rank. Analyses adjusted for these factors show that men had significantly lower prevalences of most mental health symptoms. A higher proportion of men were smokers. However, self-rated general health (SF-1) did not differ between the sexes. More detailed analyses of gender differences are presented in Chapter 8.

3.1.1 ADF employment category on most recent deployment and at study commencement

Participants were classified by ADF employment category at the time of the study commencement and status on most recent deployment to the MEAO using data from PMKeyS. Table 3.2 compares serving status at these two time points, regardless of their employment status at study commencement, the majority of members deployed as regular full time members.

Reserve members deployed to the MEAO on CFTS

Table 3.3 compares health (reported at the time of the survey) of members who served as regulars and reserves on CFTS, during deployment to the MEAO.

There were very few statistically significant differences between the health of those who deployed as reserves on CFTS and those deployed as regular full-time ADF members. Although the number of reserve members known to have deployed as reserves on CFTS was small, so the confidence intervals for the odds ratios were wide, the estimated prevalences for the two groups were generally similar. There were, however, two exceptions. Reserve members on CFTS were more likely to report suicidal thoughts compared with regular members. Reserve members on CFTS were less likely to be current smokers than regular members.

Table 5.1. Wental and general field		Mamon	Man	
Measure	All (N=14022)	(N=1720)	(NI-12202)	n valua ^b
n ^a in group	(11-14052)	1636	(N-12502)	p-value
PTSD symptoms (PCL-C>50) % ^b	15216	1050	11382	0.67
	4.0	4.4 1 (Poforonco)		0.07
UR(55% CI)		I (Reference)	0.80(0.85,0.99)	
n ª in group	13490	1660	11830	
Psychological Distress (K10≥30) % ^D	4.2	5.8	4.0	< 0.001
OR(95% CI) ^c		1 (Reference)	0.55(0.46, 0.67)	
РНО.				
n ^a in group	12685	1574	11111	
Major depressive syndrome % ^b	3.6	4 7	3.4	0 004
OR(95% CI) ^c	5.0	1 (Reference)	0 59(0 48 0 74)	0.001
n ^a in group	12010	1602	11216	
n ingroup Denie syndrome M ^b	12910	1002	11510	<0.001
	5.5	4.9 1 (Poforonco)	5.2 0.40(0.40, 0.61)	<0.001
		I (Reference)	0.49(0.40, 0.01)	
n in group	12086	1464	10622	
Other anxiety syndrome %	2.2	2.8	2.1	0.09
OR(95% CI) [°]		1 (Reference)	0.63(0.46, 0.85)	
n ^ª in group	12928	1599	11329	
Suicidal thoughts % ^b	5.5	6.4	5.4	0.052
OR(95% CI) ^c		1 (Reference)	0.76(0.64,0.90)	
n ^a in group	12921	1597	11324	
Suicide plan % ^b	1.4	1.4	1.5	0.67
OR(95% CI) ^c		1 (Reference)	0.88(0.64, 1.23)	0107
n ^a in group	12024	1509	11226	
fi ili gioup	12924	1596	11520	0.57
	0.4	U.S 1 (Poforonco)	0.4	0.57
08(55% CI)		I (Reference)	0.82(0.48, 1.41)	
n ^ª in group	13327	1646	11681	
Alcohol misuse (AUDIT≥20) % [®]	2.5	1.8	2.6	0.005
OR(95% CI) ^c		1 (Reference)	1.27(0.91, 1.76)	
n ^a in group	13138	1624	11514	
Current smoker % ^b	28.2	21.6	29.0	< 0.001
OR(95% CI) ^c		1 (Reference)	1.40(1.27. 1.54)	
a.	42602	4.004	11001	
n'in group	13682	1691	11991	0.00
General health (SF-1=Fair/poor) %	14.5	13.5	14./	0.08
OR(95% CI)°		1 (Reference)	0.94(0.84, 1.05)	

Table 3.1.	Montal	and	general	health	of		veterans
Table 5.1.	IVIEIIIai	anu	general	nearth	011	VIEAU	veterans

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for employment, age, Service and rank

Table 3.2: ADF Employment status at study commencement and serving status on most recent deployment to the MEAO

	ADF employment category at study commencement						
Serving status on most recent deployment to MEAO	All	Regular (N=10819)	Active Reserve (N=1498)	Inactive Reserve (1036)	Ex- serving (N=679)		
	N ^a	% ^a	% ^a	% ^a	% ^a	<i>p</i> -value ^a	
Reserve on CFTS	597	0.5	31.4	5.4	2.1		
Full time Member Unable to classify ^b	11753 1682	84.8 14.7	65.7 2.9	91.1 3.5	96.0 1.9	<0.001	

^a Unweighted totals and column percentages ^b See Section 2.4.3 and Figure 2.2 for further explanation (Chapter 2)

	Pogular	Bacanya an CETS	
Measure	(N=11753)	(N=597)	<i>n</i> -value ^b
n ^ª in group	11505	580	0.43
PTSD symptoms (PCL-C≥50) % ^b	4.7	5.3	
OR(95% CI) ^c	1 (Reference)	0.94(0.68, 1.31)	
n ^ª in group	11593	587	0. 65
Psychological Distress (K10≥30) % ^b	4.3	4.0	
OR(95% CI) ^c	1 (Reference)	0.87(0.61, 1.25)	
PHQ: n ^ª in group Major depressive syndrome %^b OR(95% CI)^c	11139 3.6 1 (Reference)	559 3.7 0.90(0.62, 1.30)	0.91
n ^a in group	11364	566	0.10
Panic syndrome % ^b	3.4	4.5	
OR(95% CI) ^c	1 (Reference)	1.12(0.81, 1.56)	
n ^a in group	10638	523	0.98
Other anxiety syndrome % ^b	2.2	2.3	
OR(95% CI) ^c	1 (Reference)	0.85(0.48, 1.49)	
n ^ª in group	11395	569	0.001
Suicidal thoughts % ^b	5.6	8.6	
OR(95% CI) ^c	1 (Reference)	1.38(1.07, 1.79)	
n ^ª in group	11392	567	0.84
Suicide plan % ^b	1.5	1.4	
OR(95% CI) ^c	1 (Reference)	0.81(0.42, 1.53)	
n ^ª in group	11393	566	0.68 ^d
Suicide attempt % ^b	0.4	0.2	
OR(95% CI) ^c	1 (Reference)	0.46(0.11, 1.84)	
n ^ª in group	11541	582	0.28
Alcohol misuse (AUDIT≥20) % ^b	2.5	3.3	
OR(95% CI) ^c	1 (Reference)	1.56(0.98, 2.48)	
n ^a in group	11365	577	<0.001
Current smoker % ^b	28.3	19.0	
OR(95% CI) ^c	1 (Reference)	0.78(0.66, 0.93)	
n ^a in group	11660	588	0.45
General health (SF-1=Fair/poor) % ^b	14.7	15.6	
OR(95% CI) ^c	1 (Reference)	0.99(0.82, 1.20)	
- also adjusted for PCL-C	1 (Reference)	0.98(0.81, 1.19)	

 Table 3.3:
 Comparison of main health measures between members who deployed to the MEAO regulars and reserves on CFTS

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for employment, age, Service and rank

^d Fisher's exact test was used, as fewer than five reserves on CFTS reported attempting suicide

ADF employment category at study commencement

While health differed little between those who served as regulars or reserves on CFTS on their most recent MEAO deployment, ADF employment category at the start of the study was associated with significant differences for all measures of mental and general health. Poorer health was more prevalent among exserving members than among currently serving personnel (Table 3.4). Active and inactive reserve members had poorer health than regular members. The only exception was smoking, where reserve members had lower rates than regulars. The mean ages of members in the four groups did not differ markedly: 36.2 years for currently serving regular members, 41.2 years for the active reserve, 38.5 for inactive reserve, and 37.1 years for ex-serving members (unweighted means).

Ex-serving members were around five to seven times more likely to report symptoms on each of the mental health measures, such as PTSD, than regular currently-serving members, and nearly 10 times more likely to report an alcohol problem. They were also two and a half times more likely to rate their general health as only "Fair" or "Poor" when compared with regular members.

The odds of active reserve members reporting each of the mental health symptoms was generally around twice that of regular members.

MeasureRegularActive ReserveReserveEx-serving(N=10819)(N=1498)(N=1036)(N=679)p-value	D.A.S. S.			mattive		
(N=10819) (N=1498) (N=1036) (N=679) <i>p</i> -value	weasure	Regular	Active Reserve	Reserve	Ex-serving	. h
a	a.	(N=10819)	(N=1498)	(N=1036)	(N=679)	<i>p</i> -value"
n [°] in group 10203 1415 964 636	n [°] in group	10203	1415	964	636	
PTSD symptoms (PCL-C \ge 50) % 2.7 6.7 7.2 16.5 <0.00	PTSD symptoms (PCL-C \ge 50) %	2.7	6.7	7.2	16.5	<0.001
OR(95% CI) ^C 1 (Reference) 2.39(1.96, 2.91) 2.59(2.07, 3.24) 6.91(5.58, 8.56)	OR(95% CI) ^c	1 (Reference)	2.39(1.96, 2.91)	2.59(2.07, 3.24)	6.91(5.58, 8.56)	
n ^a in group 10410 1445 990 645	n ^a in group	10410	1445	990	645	
Psychological Distress (K10 ≥30) % ^b 2.7 5.7 5.3 15.0 <0.00	Psychological Distress (K10 \geq 30) % ^b	2.7	5.7	5.3	15.0	< 0.001
OR(95% CI) ^c 1 (Reference) 2.13(1.72, 2.63) 1.92(1.50, 2.46) 6.01(4.83, 7.48)	OR(95% CI) ^c	1 (Reference)	2.13(1.72, 2.63)	1.92(1.50, 2.46)	6.01(4.83, 7.48)	
		= ((,,,,			
PHQ:	PHQ:					
n [°] in group 9796 1365 919 605	n [°] in group	9796	1365	919	605	0.004
Major depressive syndrome % 2.4 4.3 4.9 12.7 <0.00	Major depressive syndrome %	2.4	4.3	4.9	12.7	<0.001
OR(95% CI) 1 (Reference) 1.74(1.38, 2.19) 2.00(1.52, 2.62) 5.56(4.34, 7.13)	OR(95% CI)°	1 (Reference)	1.74(1.38, 2.19)	2.00(1.52, 2.62)	5.56(4.34, 7.13)	
n ª in group 9997 1378 994 609	n ª in group	9997	1378	994	609	
Panic syndrome %^b 2.0 5.1 4.5 12.3 <0.00	Panic syndrome % ^b	2.0	5.1	4.5	12.3	< 0.001
OR(95% Cl) ^c 1 (Reference) 2.47(1.97, 3.09) 2.24(1.71, 2.94) 7.00(5.51, 8.81)	OR(95% CI) ^c	1 (Reference)	2.47(1.97, 3.09)	2.24(1.71, 2.94)	7.00(5.51, 8.81)	
n ^a in group 9548 1243 815 480	n ^a in group	9548	1243	815	480	
Other anxiety syndrome % ^b 1.4 3.2 3.5 7.6 < 0.00	Other anxiety syndrome % ^b	1.4	3.2	3.5	7.6	< 0.001
OR(95% CI) ^c 1 (Reference) 1.85(1.36, 2.51) 2.22(1.56, 3.17) 4.48(3.21, 6.27)	OR(95% CI) ^c	1 (Reference)	1.85(1.36, 2.51)	2.22(1.56, 3.17)	4.48(3.21, 6.27)	
a.	a.	_ (,		(,,		
n in group 10004 1380 935 609	n in group	10004	1380	935	609	-0.001
Suicidal thoughts %" 3.7 8.5 8.4 16.2 <0.00	Suicidal thoughts %"	3.7	8.5	8.4	16.2	<0.001
OR(95% CI) 1 (Reference) 2.17(1.82, 2.59) 2.30(1.87, 2.82) 4.77(3.88, 5.86)	OR(95% CI) ²	1 (Reference)	2.17(1.82, 2.59)	2.30(1.87, 2.82)	4.77(3.88, 5.86)	
n ^a in group 10000 1377 933 611	n ª in group	10000	1377	933	611	
Suicide plan %^b 1.0 1.2 1.7 5.9 <0.00	Suicide plan % ^Ď	1.0	1.2	1.7	5.9	<0.001
OR(95% Cl) ^c 1 (Reference) 1.04(0.70, 1.53) 1.55(1.00, 2.39) 5.68(4.13, 7.83)	OR(95% CI) ^c	1 (Reference)	1.04(0.70, 1.53)	1.55(1.00, 2.39)	5.68(4.13, 7.83)	
n ^a in group 10000 1379 935 610	n ^a in group	10000	1379	935	610	
Suicide attempt % ^b 0.4 0.2 0.3 0.9 0.04	Suicide attempt % ^b	0.4	0.2	0.3	0.9	0.040
OR(95% CI) ^c 1 (Reference) 0.51(0.21, 1.24) 0.76(0.30, 1.94) 2.27(1.05, 4.90)	OR(95% CI) ^c	1 (Reference)	0.51(0.21, 1.24)	0.76(0.30, 1.94)	2.27(1.05, 4.90)	
n ^a in mour 10205 11425 000 020	a	10205	1425	0.00	c20	
n in group 10295 1425 968 639	n in group	10295	1425	968	639	-0.001
Aiconol misuse (AUDI1220) % 1.3 3.2 4.3 11.4 <0.00	Alconol misuse (AUDIT220) %	1.3 1 (Deference)	3.2	4.3		<0.001
UR(95% CI) I (Reference) 2.62(1.96, 3.49) 3.33(2.47, 4.49) 9.51(7.32, 12.35)	UR(95% CI)	I (Reference)	2.62(1.96, 3.49)	3.33(2.47, 4.49)	9.51(7.32, 12.35)	
n ^a in group 10084 1431 981 642	n ª in group	10084	1431	981	642	
Current smoker %^b 29.6 21.8 23.5 31.6 <0.00	Current smoker % ^b	29.6	21.8	23.5	31.6	< 0.001
OR(95% Cl) ^c 1 (Reference) 0.66(0.59, 0.74) 0.69(0.60, 0.78) 0.91(0.78, 1.05)	OR(95% CI) ^c	1 (Reference)	0.66(0.59, 0.74)	0.69(0.60, 0.78)	0.91(0.78, 1.05)	
n ^a in group 10549 1467 1005 661	n ^a in group	10540	1/67	1005	661	
General health (SE-1-Eair/poor) $\%^{b}$ 12.6 16.4 15.6 20.9 <0.00	General health (SE-1-Eair/noor) % ^b	10545	16 /	1003	100 0 0 c	<0.001
$OR/95\% (I)^{c} 1 (Reference) 1 23(1.09 1.39) 1 20(1.04 1.38) 2.61(2.25.3 0.04)$		1 (Reference)	1 23/1 00 1 20)	1 20/1 0/ 1 22	25.0	

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for employment, age, Service and rank

Table 3.5 more directly compares the health of inactive reserve members with that of the active reserve, and the ex-serving group. There was no significant difference between the health of inactive and active reserve members. However, inactive reserve members had statistically significantly better health than ex-serving members.

 Table 3.5:
 Comparison of main health measures at study commencement between inactive reserve and i) active reserve; and ii) ex-serving members

					Comparison
	Active	Inactive	Comparison		between inactive
Measure	Reserve	Reserve	between active and	Ex-serving	reserve and ex-
	(N=1498)	(N=1036)	inactive reserve	(N=679)	serving
	% ^a	% ^a	<i>p</i> -value	% ^a	<i>p</i> -value
PTSD symptoms	6.7	7.2	0.64	16.5	< 0.001
Psychological distress	5.7	5.3	0.64	15.0	< 0.001
Major depressive syndrome	4.3	4.9	0.49	12.7	< 0.001
Panic syndrome	5.1	4.5	0.47	12.3	< 0.001
Other anxiety syndrome	3.2	3.5	0.78	7.6	0.0011
Suicidal thoughts	8.5	8.4	0.93	16.2	< 0.001
Suicide plan	1.2	1.7	0.30	5.9	< 0.001
Suicide attempt	0.2	0.3	0.55	0.9	0.11
Alcohol misuse	3.2	4.3	0.15	11.4	< 0.001
Smoking	21.8	23.5	0.59	31.6	< 0.001
Fair/poor general health	16.4	15.6	0.28	29.8	< 0.001

^a Estimated prevalences, weighted for non-response

Medical Employment Classification (MEC) and the health of ex-serving and reserve members

An additional analysis was conducted to investigate whether the high prevalence of poor mental health in exserving ADF members could be explained by medical discharge. In November 2012, historical MEC data were obtained from PMKeyS for all study respondents who were ex-serving or active/inactive reserves at the commencement of the study. MEC data were obtained for almost everyone on the list (98.1% of active reserves, 99.4% of inactive reserves and 99.0% of ex-serving members).

The MEC status of each member as close as possible to the start of the MEAO Census Study was determined from the PMKeyS data. Note that for ex-serving and inactive reserve members, this classification may have been recorded up to 10 years before study commencement. The MEC classifications used in the analysis were condensed from a list of 44 codes (full details can be found Volume II of this report).

Among the ex-serving, 22.6% were classified as "not deployable at all", compared with around 1% of active/inactive reserves (Table 3.6). Table 3.7 shows the association between MEC status and symptoms of PTSD among ex-serving and active/inactive reserve members. Forty percent of those classified as "not deployable at all" met screening criteria for PTSD.

available IVIEC IIIay IIave	beenrecord	eu up to 10 ye	ears previously)
MEC	Active Reserve (N=1470) % ^a	Inactive Reserve (N=1030) % ^a	Ex-serving (N=672) % ^a	Total (N=3172) % ^a
Fit for deployment (MEC 1 or 2)	80.1	94.2	66.5	81.8
Temporarily not deployable (MEC 3)	2.5	3.9	9.4	4.4
Not deployable at all (MEC 4)	1.2	0.7	22.6	5.5
Other	16.3	1.3	1.5	8.3

Table 3.6:Reserve and ex-serving members by MEC (at study commencement, although the most recent
available MEC may have been recorded up to 10 years previously)

^a Unweighted totals and column percentages

Table 3.7:PTSD symptoms of active and inactive reserve and ex-serving members by MEC (at study
commencement, although the most recent available MEC may have been recorded up to 10
years previously)

	PTSD Symptoms			
MEC	PCL-C <50	PCL-C ≥50		
	(N=2713)	(N=264)		
	% ^a	% ^a		
Fit for deployment (MEC 1 or 2)	93.1	6.9		
Temporarily not deployable (MEC 3)	83.2	16.8		
Not deployable at all (MEC 4)	60.0	40.0		
Other	95.7	4.2		

^a Unweighted totals and row percentages; total N differs from previous table due to missing data for PCL-C

3.1.2 Service branch

Army members were approximately one and a half times more likely to report mental health symptoms than Navy members (Table 3.8). The RAAF had the lowest prevalence of smoking and alcohol misuse of the three Services.

Table 3.8:	Main health	measures by	Service at study	/ commencement	or at discharge
	in and include	incusures b	bei fice at staa	connencencenterie	or at aborninge

Measure	Navy (N=3150)	Army (N=6600)	RAAF (N=4282)	<i>p</i> -value ^b
n ^a in group	2963	6175	4080	<0.001
PTSD symptoms (PCL-C≥50) % ^b	4.4	5.7	2.9	
OR(95% CI) ^c	1 (Reference)	1.88(1.55,2.28)	0.86(0.69,1.07)	
n ^ª in group	3022	6316	4152	<0.001
Psychological Distress (K10≥30) % ^b	4.1	4.8	3.1	
OR(95% Cl) ^c	1 (Reference)	1.73(1.41, 2.13)	1.07(0.86,1.34)	
PHQ: n ^a in group Major depressive syndrome % ^b OR(95% CI) ^c n ^a in group	2838 3.8 1 (Reference) 2896	5897 3.8 1.45(1.15, 1.81) 5994	3950 2.9 1.00(0.79, 1.27) 4028	0.003
Panic syndrome % ^b	2.7	3.1	2.1	<0.001
OR(95% CI) ^c	1 (Reference)	1.77(1.42, 2.21)	1.03(0.81, 1.31)	
n ^a in group	2709	5578	3799	
Other anxiety syndrome % ^b	3.1	2.2	1.3	<0.001
OR(95% CI) ^c	1 (Reference)	0.97(0.75, 1.26)	0.50(0.37, 0.67)	
n ^a in group	2905	5998	4025	0.0002
Suicidal thoughts % ^b	6.8	5.3	4.9	
OR(95% CI) ^c	1 (Reference)	1.00(0.85, 1.19)	0.85(0.72, 1.01)	
n in group	2903	5996	4022	0.047
Suicide plan % ^b	1.7	1.5	1.2	
OR(95% CI) ^c	1 (Reference)	1.18(0.85, 1.66)	0.83(0.59, 1.17)	
n ^a in group	2904	5997	4023	
Suicide attempt % ^b	0.4	0.4	0.5	0.18
OR(95% CI) ^c	1 (Reference)	1.11(0.57, 2.16)	1.45(0.78, 2.73)	
n ^a in group	2995	6223	4109	<0.001
Alcohol misuse (AUDIT≥20) % ^b	2.7	3.1	1.2	
OR(95% CI) ^c	1 (Reference)	1.72(1.33, 2.22)	0.70(0.50, 0.97)	
n ^ª in group	2965	6133	4040	<0.001
Current smoker % ^b	29.2	31.5	21.2	
OR(95% CI) ^c	1 (Reference)	1.08(1.00,1.17)	0.68(0.62, 0.74)	
n ^a in group	3069	6413	4200	<0.001
General health (SF-1=Fair/poor) % ^b	15.8	15.3	12.0	
OR(95% CI) ^c	1 (Reference)	1.13(1.02, 1.24)	0.80(0.72, 0.89)	

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for employment, age, Service and rank

3.1.3 Rank

Among members deployed to the MEAO in 2001-2009, the lower the rank, the greater the prevalence of PTSD symptoms, general psychological distress, major depressive syndrome, suicidality, alcohol misuse and smoking (Table 3.9). Adjustment for other key demographic and service characteristics did not affect this finding.

		Non-		
Measure	Officers	Officers	Other ranks	b
	(N=4129)	(N=8083)	(N=1820)	<i>p</i> -value
n ^ª in group	3950	7592	1676	
PTSD symptoms (PCL-C≥50) % [®]	2.9	4.9	6.1	< 0.001
OR(95% CI) ^c	1 (Reference)	1.80(1.53,2.13)	2.03(1.56,2.64)	
n ^b in group	4009	7763	1718	
Psychological Distress (K10≥30) % ^b	2.4	4.4	6.0	< 0.001
OR(95% CI) ^c	1 (Reference)	1.93(1.62, 2.29)	2.22(1.70, 2.90)	
PHQ:				
n ^a in group	3812	7274	1599	
Major depressive syndrome % ^b	2.1	3.9	4.6	< 0.001
OR(95% CI) ^c	1 (Reference)	1.93(1.60, 2.34)	2.20(1.61, 3.01)	
n ª in group	3887	7407	1624	
Panic syndrome % ^b	2.2	3.7	3.8	< 0.001
OR(95% CI) ^c	1 (Reference)	1.87(1.55, 2.25)	1.75(1.28, 2.38)	
n ^b in group	3685	6898	1503	
Other anxiety syndrome % ^b	1.6	2.3	2.7	<0.001
OR(95% CI) ^c	1 (Reference)	1.56(1.23, 1.96)	1.88(1.28, 2.76)	
n ª in group	3889	7412	1627	
Suicidal thoughts % ^b	4.8	5.8	5.9	0.004
OR(95% CI) ^c	1 (Reference)	1.25(1.09, 1.43)	1.28(0.99, 1.64)	
n ª in group	3887	7410	1624	
Suicide plan % ^b	1.0	1.6	1.7	<0.001
OR(95% CI) ^c	1 (Reference)	1.53(1.16, 2.02)	1.63(1.01, 2.62)	
n ³ in group	3889	7409	1626	
Suicide attempt % ^b	0.3	0.5	0.3	0.009
OR(95% CI) ^c	1 (Reference)	1.71(1.06, 2.78)	1.20(0.49, 2.96)	
n ^a in group	3971	7661	1695	
Alcohol misuse (AUDIT≥20) % ^b	0.9	2.7	3.9	< 0.001
OR(95% CI) ^c	1 (Reference)	2.68(2.04, 3.51)	2.38(1.62, 3.50)	
n ^a in group	3916	7540	1682	
Current smoker % ^b	15.2%	32.2%	34.0%	< 0.001
OR(95% CI) ^c	1 (Reference)	2.56(2.39, 2.74)	2.66(2.37, 2.98)	
n ^a in group	4047	7886	1749	
General health (SF-1=Fair/poor) % ^b	9.7	16.4	15.4	< 0.001
OR(95% CI) ^c	1 (Reference)	1.94(1.79, 2.11)	2.05(1.76, 2.38)	

Table 3.9:Main health measures by rank at study commencement or at discharge

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for employment, age, Service and rank

3.1.4 Age

Respondents' ages ranged from 18 to 67, with a mean of 37 years (unadjusted). Prevalence of mental health risk was highest among the older age groups (Table 3.10). The proportion who rated their general health as "Fair" or "Poor" also increased with age. The prevalence of smoking was highest in the youngest group, but the odds were not statistically significant after adjustment for other service and demographic characteristics.

	by age group at	study commence	ment. weighteu m	equencies	
Measure	18 – 24 (N=584)	25 – 34 (N=5554)	35 – 44 (N=5091)	45+ (N=2803)	<i>p</i> -value ^b
n ^a in group	541	5141	4828	2708	<0.001
PTSD symptoms (PCL-C≥50) % ^b	2.7	3.7	4.9	6.5	
OR(95% CI) ^c	1 (Reference)	1.07(0.65, 1.77)	1.74(1.04, 2.89)	2.57(1.54, 4.31)	
n ^ª in group	558	5271	4925	2736	0.03
Psychological Distress (K10≥30) % ^b	3.4	3.8	4.3	4.9	
OR(95% Cl) ^c	1 (Reference)	0.92(0.59, 1.46)	1.26(0.79,2.01)	1.59(0.99 <i>,</i> 2.55)	
PHQ: n ^ª in group Major depressive syndrome %^b OR(95% CI)^c	525 2.1 1 (Reference)	4917 2.9 1.13(0.62, 2.06)	4644 3.9 1.85(1.00, 3.44)	2599 4.8 2.57(1.38, 4.79)	<0.001
n ^a in group	530	5011	4728	2649	<0.001
Panic syndrome % ^b	1.8	2.5	3.8	4.8	
OR(95% CI) ^c	1 (Reference)	1.03(0.55, 1.93)	1.84(0.98, 3.47)	2.54(1.34, 4.81)	
n ^ª in group	518	4721	4397	2450	<0.001
Other anxiety syndrome % ^b	0.6	1.8	2.3	3.2	
OR(95% CI) ^c	1 (Reference)	2.36(0.87, 6.41)	3.72(1.35, 10.25)	5.96(2.15, 16.53)	
n ^ª in group	529	5008	4734	2657	<0.001
Suicidal thoughts % ^b	2.3	4.3	6.3	7.6	
OR(95% CI) ^c	1 (Reference)	1.42(0.85, 2.37)	2.31(1.37, 3.90)	2.85(1.68, 4.83)	
n ^ª in group	529	5003	4733	2656	<0.001
Suicide plan % ^b	0.9	0.9	1.8	2.0	
OR(95% CI) ^c	1 (Reference)	0.86(0.35, 2.12)	1.98(0.78, 5.01)	2.37(0.93, 6.07)	
n ^a in group	529	5003	4736	2656	<0.001 ^d
Suicide attempt % ^a	0.0	0.3	0.7	0.3	
OR(95% CI) ^c	1 (Reference)	–	–	–	
n ^ª in group	548	5199	4870	2710	0.04
Alcohol misuse (AUDIT≥20) %ª	1.6	2.8	2.3	2.5	
OR(95% CI) ^c	1 (Reference)	1.21(0.68, 2.18)	1.12(0.61, 2.07)	1.38(0.74,2.58)	
n ^ª in group	547	5136	4785	2670	<0.001
Current smoker % ^b	33.7	30.9	27.0	23.2	
OR(95% CI) ^c	1 (Reference)	1.10(0.93, 1.30)	1.01(0.85, 1.20)	0.98(0.82,1.17)	
n ^ª in group	566	5385	4972	2759	<0.001
General health (SF-1=Fair/poor) % ^b	8.1	11.9	16.3	18.7	
OR(95% CI) ^c	1 (Reference)	1.51(1.14, 2.00)	2.45(1.85, 3.26)	3.25(2.44, 4.34)	

 Table 3.10:
 Main health measures by age group at study commencement: weighted frequencies

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for employment, age, Service and rank

3.1.5 Deployment location

Members who were mainly based in "Other supporting areas NOT in [Iraq/Afghanistan]" on their most recent deployment generally reported better health than those who were based *inside* the country (Table 3.11). (Note that the Iraq and Afghanistan columns are not mutually exclusive, as 39 percent of members deployed to both locations, see Chapter 2, Section 2.4.4 for more details about how deployment location was classified).

Members based inside Iraq reported poorer health than those based outside on all the main health measures (except suicide attempt, which was a rare event in all the groups studied). For Afghanistan, differences were only apparent for PTSD symptoms, general psychological distress, panic syndrome and smoking, and the size of these differences was smaller than for Iraq deployments. For example, for Iraq, PTSD symptoms among veterans based in inside locations was 6.0%, compared with 2.5% among veterans based outside Iraq. For Afghanistan, the same comparison was 4.4% inside and 3.2% outside. The proportions reporting poorer health were fairly similar across outside locations regardless of the country of deployment.

		i) Iraq		ii)	Afghanista	an
Measure	Inside ^ª	Outside ^b		Inside	Outside ^a	
	(N=6045)	(N=3073)	p-value [*]	(N=4187)	(N=2551)	<i>p</i> -value [']
n ^e in group	6021	3062		4167	2548	
PTSD symptoms (PCL-C≥50) % ^f	6.0	2.5	<0.001	4.4	3.2	0.002
n^ein group	6025	3063		4166	2547	
Psychological Distress (K10≥30) % ^f	5.1	2.6	<0.001	3.9	2.9	0.007
PHQ:						
n ^e in group	5847	2992		4051	2480	
Major depressive syndrome % ^f	4.6	2.6	<0.001	2.9	3.3	0.29
n ^e in group	5974	3052		4139	2535	
Panic syndrome % ^f	4.4	2.3	<0.001	3.0	2.2	0.01
n ^e in group	5523	2884		3906	2398	
Other anxiety syndrome %e ^f	2.9	1.4	<0.001	1.8	1.7	0.58
n ^e in group	5994	3059		4155	2540	
Suicidal thoughts % ^f	6.7	4.8	<0.001	4.7	5.6	0.054
n ^e in group	5993	3056		4156	2537	
Suicide plan % ^f	1.7	0.9	<0.001	1.5	1.4	0.86
n ^e in group	5990	3059		4153	2542	
Suicide attempt % ^f	0.4	0.5	0.76	0.5	0.6	0.57
n ^e in group	6016	3065		4165	2547	
Alcohol misuse (AUDIT≥20) % ^e	3.0	1.6	<0.001	2.2	2.0	0.56
n ^e in group	5914	3011		4082	2508	
Current smoker % ^f	28.5	22.5	<0.001	30.7	25.0	<0.001
n^e in group	6025	3067		4171	2549	
General health (SF-1=Fair/poor) %	16.6	12.3	<0.001	13.0	12.7	0.65

 Table 3.11:
 Main health measures by base location during deployment to i) Iraq and ii) Afghanistan

^a "Baghdad", "Talil"," Balad", "Persian Gulf (ships)", "Attachment to Foreign militaries or UN", "Other Areas in Iraq".

^b "Other supporting areas NOT in Iraq (e.g. .2, .4)".

^c "Tarin Kowt", "Kandahar", "Other areas in Afghanistan", "Attachment to Foreign militaries or UN".

^d "Other supporting areas NOT in Afghanistan".

^e Unweighted totals

^f Estimated prevalences, weighted for non-response

3.1.6 Time since most recent MEAO deployment

Time since the most recent deployment to the MEAO was also examined in relation to Service and ADF employment category at study commencement (Table 3.12). Note that time since most recent deployment was measured in whole years, and that members may have deployed to other non-MEAO locations since their most recent MEAO deployment.

Ex-serving veterans had the highest rates of PTSD symptoms in all Services and across all time periods since their most recent deployment. The prevalence of symptoms was greatest at two to three years post-deployment (29.4%) and lowest at 6-10 years post-deployment (13.8%) among these members.

For regular members, prevalence of PTSD symptoms was lowest (1.7%) among veterans whose most recent deployment to the MEAO was in the same year as the survey, or in the year before the survey (0-1 year group). For regular Army members, the highest rates of PTSD symptoms (5.4%) were reported at 6-10 years post-deployment. Among the active Army reserve, the pattern was similar to that of regular members, but rates were higher, rising from 6.6% (2-3 years post-deployment) to 10.9% (6-10 years post-deployment). Among inactive Army reserve members, the pattern differed across time: the prevalence of PTSD fell from 13.8% at 2-3 years post-deployment.

Table 3.12:PTSD symptoms by years since most recent deployment to the MEAO^a, Service^b, and
employment category^b (N=12896; data missing for PCL-C or time since most recent deployment
for N=1136)

		Total	0-1 vear	2-3 years	4-5 years	6-10 years	
Service	e group	n ^c in	n ^c in group				
	- 0 P	group	PTSD % ^d	PTSD % ^d	PTSD % ^d	PTSD % ^d	<i>p</i> -value ^d
Navy	Regulars	1972	325	507	368	772	
,			0.2	2.0	3.2	2.9	<0.001
	Active Reserves	465	6	39	75	345	
			0.0	2.2	2.5	8.2	0.002 ^e
	Inactive Reserves	175	0	4	11	160	
			-	0.0	0.0	5.2	-
	Ex-serving	255	0	3	22	230	
	-		-	38.9	13.5	10.0	0.52 ^e
Army	Regulars	4722	1563	1910	957	292	
			2.3	4.2	3.7	5.4	<0.001
	Active Reserves	599	35	159	232	173	
			0.0	6.6	8.3	10.9	0.20 ^e
	Inactive Reserves	485	2	54	183	246	
			0.0	13.8	6.6	7.2	0.26 ^e
	Ex-serving	234	1	15	90	128	
			0.0	26.4	29.7	21.4	0.24 ^e
RAAF	Regulars	3274	991	996	575	712	
			1.2	1.7	1.6	2.0	0.16
	Active Reserves	313	16	66	70	161	0
			6.2	7.6	0.0	2.5	0.08
	Inactive Reserves	280	1	18	53	208	
			0.0	0.0	1.8	7.3	-
	Ex-serving	122	0	6	17	99	٩
			-	33.6	18.2	14.5	0.45
All	Regulars	9968	2879	3413	1900	1776	
			1.7	3.2	3.0	3.0	<0.001
	Active Reserves	1377	57	264	377	679	
			1.5	6.2	5.8	7.7	<0.001
	Inactive Reserves	940	3	76	247	614	o o o e
		64.6	0.0	10.0	5.3	6.7	0.32*
	Ex-serving	611	1	24	129	457	0.001
1			0.0	29.4	25.4	13.8	0.001

^a Whole years from year of deployment to year of survey response

^b Measured at study commencement or at discharge for ex-serving members

^c Unweighted totals

^d Estimated prevalences, weighted for non-response

^e Estimated prevalences, weighted for non-response, calculated for three categories.

3.2 Comparison of findings with the MHPWS

The main mental health findings reported in the MHPWS were from the CIDI data, obtained using a two-phase design, and are not directly comparable to the Census Study. Methodological differences between the studies are detailed in Chapter 2, Section 2.6 and include weighting of the MHPWS data for MEC. There was a considerable overlap between the participant groups.

Prevalence data for the PCL-C (PTSD symptoms), K10 (symptoms of general psychological distress) and AUDIT (risk of alcohol misuse) were tabulated in an annexe to the MHPWS report [125]. Table 3.13a compares these measures for sub groups of the two studies. Suicidality items were also common to both studies (Table 3.13b).

	PTSD symptoms (PCL-C≥50)		Psychologi (K10	cal distress ≥30)	Alcohol misuse (AUDIT≥20)	
Group	MHPWS % ^ª	Census % ^b	MHPWS % ^ª	Census % ^b	MHPWS % ^ª	Census % ^b
Women	3.0	4.4	5.1	5.8	0.3	1.8
Men	2.9	4.6	3.3	4.0	1.5	2.6
Navy	3.0	4.4	4.4	4.1	1.6	2.7
Army	3.4	5.7	3.6	4.8	1.8	3.1
RAAF	2.2	2.9	2.8	3.1	0.4	1.2
Officers	2.2	2.9	2.1	2.4	0.5	0.9
NCOs	3.3	4.9	3.3	4.4	1.2	2.7
Other ranks	3.0	6.1	5.0	6.0	2.3	3.9
Never deployed	2.8	n/a	4.3	n/a	1.5	n/a
Ever deployed	3.0	4.6	3.1	4.2	1.3	2.5

Table 3.13a:Comparison between the MHPWS (N=24,481) and Census Study (N=14,032) for PCL-C, K10 and
AUDIT

^a Currently serving regular members 2010; estimated prevalences, weighted for sex, Service, rank and MEC.

^b Regular, reserve and ex-serving members deployed to the MEAO 2001-09; estimated prevalences, weighted for sex, Service, rank and employment (regular, active reserve, inactive reserve/ex-serving) at study commencement.

	Suicidal thoughts		Suicide	e plans	Suicide attempts	
Group	MHPWS	Census	MHPWS	Census	MHPWS	Census
	% ^a	% ^b	% ^a	% ^b	% ^a	% ^b
Women	5.1	6.4	1.2	1.4	0.5	0.5
Men	3.7	5.4	1.1	1.5	0.4	0.4

^a Currently serving regular members 2010; estimated prevalences, weighted for sex, Service, rank and MEC.

^b Regular, reserve and ex-serving members deployed to the MEAO 2001-09; estimated prevalences, weighted for sex, Service, rank and employment (regular, active reserve, inactive reserve/ex-serving) at study commencement.

Table 3.14 shows the results for all MEAO veterans, regular serving MEAO veterans, and the MHPWS (which only included regular serving members). Regular MEAO veterans had a lower prevalence of PTSD symptoms (2.7%) and psychological distress (2.7%) than currently serving members generally (MHPWS, 3.0% and 3.6%, respectively).

regular service at stu	dy commencement,	for PCL-C, K10, AUDIT	and suicidality
Health measure	Census – all (N=14,032) % ^a	Census – regulars (N=10,819) % ^b	MHPWS (N=24,481) % ^c
PTSD symptoms (PCL-C ≥ 50)	4.6	2.7	3.0
Psychological Distress (K10 ≥ 30)	4.2	2.7	3.6
Alcohol misuse (AUDIT ≥ 20)	2.5	1.3	1.4
Suicidal thoughts	5.5	3.7	3.9
Suicide plans	1.4	1.0	1.1
Suicide attemnts	0.4	0.4	0.4

Table 3.14: Comparison between the MHPWS, all Census Study members, and Census Study members in

^a Regular, reserve and ex-serving members deployed to the MEAO 2001-09; estimated prevalences, weighted for sex, Service, rank and

employment (regular, active reserve, inactive reserve/ex-serving) at study commencement. ^b Currently serving regular members deployed to the MEAO 2001-09; estimated prevalences, weighted for sex, Service and rank at study commencement.

^c Currently serving regular members 2010; estimated prevalences, weighted for sex, Service, rank and MEC.

3.3 **Comparison of findings with NNAI studies**

In 2007 and 2008, CMVH conducted similar studies of deployment to the Solomon Islands, East Timor and Bougainville. Comparative results for key measures are shown in Table 3.15. The NNAI studies included comparison groups of ADF members who had served at the same time but did not deploy to the location in question. The results shown are for NNAI veterans only.

A higher proportion of East Timor veterans, and to a lesser extent, Bougainville veterans, met mental and general health screening criteria than MEAO veterans. However, a higher proportion of members in these two cohorts were ex-serving (around 25% compared with less than 10% in the MEAO Census Study and 12.5% for the Solomon Islands).

Deployment location	N	PTSD symptoms (PCL-C≥50) %	Psychological distress (K10≥30) %	Alcohol misuse (AUDIT≥20) %	Smoking (Current) %	General health (SF1 = Fair/poor) %
Solomon Islands ^a	227	4.6	3.9	1.5	23.2	15.6
Bougainville ^a	2342	5.9	5.5	0.6	26.9	18.0
East Timor ^a	1833	7.2	7.0	1.8	30.9	20.8
MEAO Census ^b	14032	4.6	4.2	2.5	28.2	14.5

Table 3.15: Comparison between the MEAO Census Study and NNAI studies (veterans only)

^a Unweighted prevalences

^b Estimated prevalences, weighted for non-response

3.4 Comparison of findings with Australian population data

Where common measures were available, MEAO Census Study findings were compared with findings from the Australian Bureau of Statistics (ABS) National Health Survey (NHS) 2007-08. The ABS results were drawn from published reports not from analysis of the microdata.

3.4.1 Psychological distress

Symptoms of psychological distress in the four weeks preceding the survey were measured using the K10. The prevalence of a "very high" level of psychological distress (K10 \geq 30) among Australians in 2007 was 3.5% (Table 3.16) [12]. In contrast, it was estimated that 4.2% of MEAO veterans had "very high" psychological distress. Higher prevalence estimates for the MEAO Census population were evident across most age/sex categories. In both populations, the prevalence increased with age and was greater in women than men. However, the most notable differences were among the youngest men (3.5% versus 1.2%) and the oldest women (8.8% versus 4.9%).

	All (K10≥30)		Wo ı (К10	men ≥30)	Men (K10≥30)	
Age group	ABS % ^a	Census % ^b	ABS % ^a	Census % ^b	ABS % ^a	Census % ^b
18-24	2.7	3.4	4.3	3.1	1.2	3.5
25-34	3.4	3.8	4.2	4.9	2.7	3.6
35-44	3.4	4.3	4.0	6.8	2.7	4.1
45+ ^c	4.3	4.9	4.9	8.8	3.7	4.6
All participants	3.5	4.2	4.1	5.8	2.8	4.0

Table 3.16: Comparison between the Census Study and ABS: Psychological distress (K10≥30) by age and sex

^a Prevalences from ABS National Health Survey (NHS) 2007-08

^b Estimated prevalences, weighted for non-response

^c The 45-64 years age group from the NHS has been used for comparison.

3.4.2 Suicidality

The prevalence of suicide attempts in the 12 months prior to the survey among MEAO veterans was very similar to that in the Australian community (Table 3.17) [9]. However, a greater proportion of MEAO study members had thought about, or planned, suicide.

	All		Wor	men	Men	
Measure	ABS %ª	Census % ^b	ABS % ^a	Census % ^b	ABS %ª	Census % ^b
Suicidal thoughts	2.3	5.5	2.7	6.4	1.8	5.4
Suicide plans	0.6	1.4	0.7	1.4	0.4	1.5
Suicide attempts	0.4	0.4	0.5	0.5	0.3	0.4

 Table 3.17:
 Comparison between the Census Study and ABS: Suicidality by sex

^a Prevalences from ABS National Health Survey (NHS) 2007-08

^b Estimated prevalences, weighted for non-response

3.4.3 Smoking

Nearly 30% of Census Study participants were current smokers (Table 3.18). In Australia in 2007-08, 25-34 year old men had the highest prevalence of smoking (33%) [13]. In the Census Study, the proportion of men aged 25-34 who were smokers was similar (32%). However, 34% of 18-24 year olds were smokers, compared with only 24% of same aged Australian men. There were also more female smokers in the 18-24 years age category (29%), compared with Australian women of the same age (22%) [13].

The findings from self-reported data from the CMVH NNAI studies were that 19% of East Timor veterans [46] and 17% of Bougainville [45] veterans were current smokers. However, these veterans were generally older at the time of survey than the MEAO veterans. For the NNAI studies, there was no difference in smoking between veterans and a comparison group who had not deployed to the same location. In the MEAO Census Study, participants were asked whether their smoking pattern changed while on deployment. Results are presented in Chapter 5.

	All		Wo	men	Men	
	(Current	smoker)	(Current	smoker)	(Current smoker)	
Age group	ABS % ^a	Census % ^b	ABS % ^a	Census % ^b	ABS % ^a	Census % ^b
18-24	23.1	33.7	21.9	28.8	24.2	34.4
25-34	27.6	30.9	22.3	23.2	32.8	32.2
35-44	25.1	27.0	22.2	18.9	28.2	27.9
45+ ^c	20.2	23.2	19.8	17.4	20.6	23.5
All participants	20.8	28.2	18.7	21.6	22.9	29.0

^a Prevalences from ABS National Health Survey (NHS) 2007-08

^b Estimated prevalences, weighted for non-response

 $^{\rm c}$ The 45-64 years age group from the NHS has been used for comparison.

3.4.4 General health

Self-rated general health (SF-1) was also measured in the latest ABS National Health Survey (Table 3.19). The proportion of Australian women who rated their health as "fair" or "poor" was the same as the population estimate for women in the MEAO Census Study (13.5%). For men, the proportions were 15.5% (ABS) and 14.7% (MEAO Census Study) [14]. As the MEAO Census population included a higher proportion of younger persons, a lower prevalence of fair/poor health would be expected in this group than for Australian men and women generally.

Table 3.19:	Comparison	between the	Census	Study a	and ABS	data: ge	eneral h	ealth	(SF1) b	by sex

	All		Woi	men	Men		
	ABS	Census	ABS	Census	ABS	Census	
	% ^a	% ^b	% ^a	% ^b	% ^a	% ^b	
General health (SF-1)							
Fair/Poor	14.5	14.5	13.5	13.5	15.5	14.7	

^a Prevalences from ABS National Health Survey (NHS) 2007-08

^b Estimated prevalences, weighted for non-response

 $^{\circ}$ The 45-64 years age group from the NHS has been used for comparison.

3.5 Discussion

Due to the large sample size, many of the tabulated associations reached statistical significance, however, the magnitude of the differences between groups was frequently quite small. Adjustment for demographic factors showed some important differences between the main groups. Other sub-groups and specific exposures will be addressed in subsequent chapters.

The overall health of men and women who deployed to the MEAO did not differ, however, men were less likely to report mental health symptoms. Rank was an important factor, with other ranks being around twice as likely to experience poor health on any given measure than officers. Rank was also more important than age in predicting smoking. Being over 35 years of age was an important risk factor for most other health symptoms.

There was little evidence of poorer health outcomes among reserve members who had deployed to the MEAO on CFTS, compared with those who deployed as regulars. This contrasts with a number of recent studies in other military populations [32, 104, 180]. Although prevalence estimates were similar to those for ADF members who deployed as regulars, the results reported here are based on small numbers deploying as reserves on CFTS. There may be other important differences between ADF reserve members on CFTS compared with deployed reserves from other countries. This finding merits further investigation.

Analyses by ADF employment category at the commencement of the study suggest that much poorer health was reported by ex-serving members, and, to a lesser extent, active and inactive reserve members, than by currently serving regular personnel. This finding was expected, as poor health is a common reason for discharge from the ADF. Twenty-three percent of ex-serving members were classified as MEC 4 (unable to deploy at all) on their most recent record before the survey. Also, response rates were lower among exserving and reserves than among regular serving personnel. It is possible that ex-serving members who were experiencing poor health were more likely to respond to a health survey than those without current health problems (although the opposite is also possible). Overall response rates were highest among the RAAF who also reported the best health. Furthermore, despite assurances of confidentiality, currently serving regular members may have under-reported health issues that could impact on their service career and future ability to deploy.

The influence of ex-serving status is likely to account for the poorer mental and general health reported by veterans of East Timor and Bougainville in CMVH's NNAI studies, than was evident for MEAO veterans.

As expected, persons mainly based inside Iraq (including ships in the Persian Gulf) on their most recent deployment, reported poorer health than persons based outside the country. This inside/outside distinction was less evident for Afghanistan deployments. The health of members based outside Iraq was similar to the health of those based outside Afghanistan. The association between deployment location and deployment exposures is reported in Chapters 4 and 6. Inside/outside location has been accounted for in these analyses.

A higher prevalence of psychological distress was evident among MEAO veterans than in the Australian community. Changes in community perceptions of mental illness over time can impact on the prevalence found in self-reported surveys [10]. This may be partly responsible for the higher prevalence of distress seen in the 2010-2011 MEAO data, compared with 2007 ABS data.

Compared with the Australian population, there were more young smokers among MEAO veterans. Despite overall prevalence rates similar to Australian men and women, poorer self-rated health was also more likely among MEAO veterans, due to differences in age composition from the national population.

This chapter is about traumatic combat-related exposures on deployment to Iraq and Afghanistan and reported health outcomes, in particular mental health issues.

Research question 2

What exposures are associated with increased risk of morbidity for the group as a whole and for specific MEAO subgroups with identified health disorders?

Key points:

- Strong and consistent associations exist between more traumatic exposures and poorer mental health. This effect was especially pronounced for symptoms of PTSD and multiple traumatic exposures during deployment to Iraq.
- The number of times exposed to traumatic situations was more strongly associated with poorer mental health than the number of different types of traumatic exposures.
- Combat injuries and head injuries were not common among this group but were associated with poorer mental health, especially PTSD symptoms

4.1 Introduction

Exposure to combat on deployments to Iraq and Afghanistan has been linked with subsequent symptoms of PTSD [27, 90, 121, 137]. Combat roles involve exposure to a variety of hazards with the potential to traumatise. In particular, witnessing dead bodies [90, 137], discharging a weapon in combat [90] and direct or indirect killing [121], have been shown to be strong predictors of PTSD in studies involving US personnel. Studies have also found that combat exposure is associated with alcohol misuse [95, 104, 121, 188]. Both direct or indirect killing [121] and hostility from civilians during deployment [95] have been identified as risk factors for alcohol problems in UK and US military personnel. In addition, the fear of injury or death while on deployment has also been identified as a risk factor for both PTSD symptoms and alcohol misuse [95, 137, 188].

Personnel who undertake combat roles may be more likely to experience injuries on deployment which in turn may increase the possibility of developing PTSD symptoms [87]. Studies involving US personnel found head and neck injuries occurred in a quarter of members evacuated from the MEAO. To date, research on the effect of combat exposures, injuries on deployment, and mild traumatic brain injury (mTBI) in relation to subsequent health outcomes has primarily focused on UK and US armed forces in recent deployments to Afghanistan and Iraq.

mTBI is defined as feeling dazed, confused, loss of consciousness (less than 30 minutes, although loss of consciousness does not occur in every case) or post-traumatic amnesia (less than 24 hours) following an injury to the head. Symptoms that may follow a mTBI include problems with memory, balance, and concentration, as well as headaches, tinnitus, light sensitivity, fatigue, and irritability. The terms 'mTBI' and 'concussion' are used interchangeably in most military settings to describe a head injury from which full recovery is expected in a short period of time.

Multiple deployments and increased use of improvised explosive devices (IED) in Iraq and Afghanistan have resulted in higher rates of exposures to blasts, and have possibly contributed to elevated rates of mTBI and stress-related health problems such as PTSD [26, 136]. Substantially different mTBI prevalence rates have been

reported for the US, UK, and Canada [26, 152, 193]. This may be due to differing research methodology, the different types of risks/exposures faced by the sample, or differing lengths of deployment [153]. Currently, there are no prevalence rates for Australian service men and women returning from Iraq or Afghanistan.

A history of multiple mTBI/concussions has been found to lead to worse cognitive outcomes, particularly in the domains of executive control (i.e. attention) and memory [21]. Within the military, personnel may experience multiple mTBI events during war-like deployments and are frequently exposed to multiple blasts, including sub-threshold (e.g. blast wave) exposures. The effects of these blasts may interfere with neuropsychological recovery [79] and increase risk for persistent neuropsychological impairment [194] and subsequent dementia syndromes [74, 80].

There is emerging evidence that a history of mTBI increases the risk for PTSD in both civilian [34] and military populations [94, 152]. The highest rate of PTSD (33% to 39%) has been reported among US Operation Enduring Freedom (Afghanistan) and Operation Iraqi Freedom (Iraq) soldiers with a history of mTBI [39]. Having a mTBI is also associated with alcohol misuse and multiple physical symptoms, however, when PTSD is controlled for, the effects are reduced [152] or become non-significant [93].

This chapter describes the reported levels of different traumatic combat-related exposures on deployment and how the level of traumatic exposure varies between different groups within the ADF. Further, we assess whether traumatic and combat exposures are associated with measures of mental health in this group and identify the specific categories of trauma and combat exposures most strongly associated with poor health in ADF members deployed to the MEAO.

In this chapter, we also report associations between trauma and combat exposure and reported physical injuries on deployment. Self-reported prevalence of mTBI and head injuries on deployment are also discussed. The association between mTBI on deployment and perceived physical and mental health on return to Australia are also reported.

With Australian deployments to Afghanistan still ongoing, these findings on types of trauma and combat exposure most likely to be associated with poor health may assist the ADF to better prepare members for deployment and their return to Australia.

4.2 Methods

The participants were 14,032 currently serving, reserve, and ex-serving members who had deployed to the MEAO between 1 October 2001 and 31 December 2009 and responded to the MEAO Census Study. Participants answered a series of questions relating to their deployment history, deployment experience, and health. All items were self-reported by participants on their perceived traumatic and combat exposures. For more details of data collection and participants, please refer to *Chapter 2: Methods*.

4.2.1 Measures

Participants who deployed to Iraq and Afghanistan completed questionnaires about their deployment experiences in each location. The questionnaires contained 26 questions about specific combat and traumatic exposures which were drawn or adapted from the Deployment Risk and Resilience Inventory (DRRI)[112], the King's College Health and Wellbeing Survey (Phase II)[179] and the Traumatic Stressors Exposure Scale (TSER)[176].

In order to assess the association between specific traumatic and combat experiences and health measures, the 26 items were grouped into nine broader categories (Table 4.1) of traumatic experiences considered to be similar in nature. The decision regarding how to group traumatic experiences was made before analyses were undertaken to ensure the integrity of the research approach. The decision was also based on previous research on combat exposures by Wilk and colleagues [188]. The nine groups of traumatic experiences were then used in statistical modelling to determine which specific types of traumatic experiences were most strongly associated with specific mental and physical health measures. If participants reported at least one item in each category of traumatic exposures they were coded as having experienced that exposure.

Participants were also asked about specific injuries and illnesses on deployment which resulted in attendance at sick parade. Those who attended sick parade were then asked how many days the injury or illnesses kept them out of their role on deployment. These items were collected separately for the Afghanistan and Iraq deployments and included questions about musculoskeletal injuries due to combat and head injury/concussion.

A screening tool for mTBI was included in the health questionnaire. These questions were not limited to those events and injuries that occurred on deployment to the MEAO, so results for this condition were not separated by Iraq and Afghanistan deployments. This tool comprises four sections which asked about the nature of the event (e.g. blast or explosion, fall), what happened immediately after the event (e.g. concussion, loss of consciousness), symptoms that subsequently developed or increased (e.g. memory problems or balance problems), and whether those symptoms are currently ongoing. A positive response in each of the four sections indicates a positive screen for mTBI [94].

The following health measures were analysed in this chapter. For a detailed description of measurement scales and cut-offs used in the analyses, please refer to Volume II.

Mental and general health:

- Posttraumatic Stress Disorder (PTSD): PTSD Check List Civilian version (PCL-C)
- Psychological distress: Kessler 10 (K10)
- Major depressive syndrome: Patient Health Questionnaire (PHQ)
- Panic syndrome (PHQ)
- Other anxiety syndrome (PHQ)
- Alcohol misuse: Alcohol Use Disorder Identification Test (AUDIT)
- General health: Short Form 1 (SF1)

Potential for exposure	Seriously fear you would encounter an IED
	Go on combat patrols or missions
	Participate in support convoys (e.g. re-supply, VIP escort)
	Concerned about yourself or others (including allies) having an
	unauthorised discharge of a weapon
	Clear / search buildings
	Clear / search caves*
Coming under fire	Come under small arms or anti-aircraft fire
	Come under guided or directed mortar / artillery fire
	Experience in-direct fire (e.g. rocket attack)
	Experience an IED/EOD that detonated
	Experience a suicide bombing
	Experience a landmine strike
	Encounter small arms fire from an unknown enemy combatant
In danger of being injured or	In danger of being killed
killed	In danger of being injured
Casualties among people close to	Heard of a close friend or co-worker who had been injured or killed
you	Were present when a close friend was injured or killed
	Heard of a loved one who was injured or killed
	Were present when a loved one was injured or killed
Handling/seeing dead bodies	Handled dead bodies
	Saw dead bodies
Threatening situation, unable to	Experience a threatening situation where you were unable to
respond	respond due to the rules of engagement
Witness to human degradation	Witness to human degradation and misery on a large scale
and misery	
Discharging own weapon	Discharge your own weapon in direct combat
Own action/inaction result in	Believe your action or inaction resulted in someone being seriously
injury or death	injured
	Believe your action or inaction resulted in someone being killed

*Afghanistan only: This item was not included in the combat scale score

4.2.2 Data analysis

Logistic regression modelling was used to examine the association between traumatic experiences on deployment and mental and physical health. Composite measures of the traumatic experiences items were also used to assess 'dose-response' associations between the level of traumatic experiences on deployment and subsequent health. This was done in two ways:

- a) By calculating a total score based on the traumatic experience items, where 'Never'=0, 'Once'=1, '2-4 times'=2, '5-9 times'=3 and '10+'=4. The scores assigned to these frequencies were the same as those used in the TSES-R2-A[176]. This total score between 0 and 100 was divided into quartiles to categorise people by the frequency of traumatic exposures.
- b) By calculating a total score based on the nine broad types of traumatic exposures. This score between 0 and 9 was divided into quartiles to categorise participants by the number of different types of traumatic exposure they experienced.

Logistic regression models were also used to assess the association between injuries experienced by the participant and their mental and physical health. For traumatic exposures, data from the Iraq and Afghanistan deployments and supporting areas outside Iraq and Afghanistan were analysed separately, whereas for the analyses which used injuries on deployment or lifetime mTBI as an exposure, a combined dataset of Iraq and Afghanistan veterans was used. The main and supporting areas of Iraq and Afghanistan were analysed separately because of the likelihood that participants' experiences and exposure to traumatic situations were different.

All models were adjusted for age (18-24, 25-34, 35-44, 45+ years), rank (Commissioned Officer, Noncommissioned Officer and Other ranks), Service (Army, Navy and RAAF) and sex. Results presented are weighted based on the characteristics of the MEAO nominal roll. For more details on the weighting procedure and on the tools used in the analyses, please refer to *Volume II*.

4.3 Results

4.3.1 Trauma, combat exposures and mental health

Service by exposure to traumatic experiences

Members from each service who deployed to Iraq and Afghanistan reported more traumatic experiences compared to those deployed to supporting areas outside Iraq and Afghanistan. The Australian Army had the greatest percentage of members reporting a high frequency (i.e. 16-100) of traumatic experiences, compared with the other two Services (Table 4.2).

Table 4.2:Service and the frequency of self-reported traumatic experiences (Afghanistan N=6108, Iraq
N=8319)

		Traumatic Experiences Scale				
		0	1-5	6-15	16-100	
Role		(none)	(low)	(medium)	(high)	
	n°	% ⁰	% ^b	% ^b	% ^b	
Afghanistan						
Royal Australian Navy	129	32.0	24.1	21.8	22.1	
Australian Army	3129	3.9	18.4	25.3	52.5	
Royal Australian Air Force	702	11.9	37.6	37.2	13.3	
Supporting area outside Afghanistan						
Royal Australian Navy	730	52.9	30.8	13.5	2.6	
Australian Army	275	37.1	40.6	15.1	7.2	
Royal Australian Air Force	1143	56.1	29.6	11.9	2.5	
Iraq						
Royal Australian Navy	2098	42.6	33.0	17.5	7.0	
Australian Army	2789	3.4	13.6	25.0	58.0	
Royal Australian Air Force	669	11.8	27.3	35.9	24.9	
Supporting area outside Iraq						
Royal Australian Navy	111	48.3	32.8	16.2	2.7	
Australian Army	407	32.1	37.9	22.5	7.6	
Royal Australian Air Force	2245	48.8	34.0	14.1	3.1	

a Unweighted totals

b Estimated prevalences, weighted for non-response

Exposure to traumatic experiences by roles and Service

Iraq

Roles were examined according to the frequency of traumatic experiences reported whilst on deployment to Iraq (Table 4.3) and supporting areas outside Iraq (Table 4.4). The Combat (e.g. Infantry, Artillery etc.) and EOD (bomb disposal, IED technician) roles reported the greatest frequency of exposure to traumatic experiences. Participants who deployed to supporting areas outside Iraq recorded fewer traumatic experiences compared to those deployed in Iraq.

		Traumatic Experiences Scale					
		0	1-5	6-15	16+		
Role		(none)	(low)	(medium)	(high)		
(Iraq)	nª	% ^b	% ^b	% ^b	% ^b		
EOD (Bomb disposal, IED technician) ^c	58	1.8	6.8	12.7	78.7		
Combat (e.g. infantry, artillery etc.) ^c	1041	1.3	3.8	13.4	81.5		
Other combat – Navy	946	34.7	35.7	22.0	7.6		
Other combat – Army	357	1.2	8.2	31.7	58.9		
Other combat – RAAF	61	2.0	18.1	32.2	47.6		
Combat support – Navy	410	51.0	34.7	10.4	3.8		
Combat support – Army	471	4.6	27.4	34.4	33.6		
Combat support – RAAF	185	7.3	30.7	43.1	18.9		
Aircrew ^c	215	15.4	22.4	32.6	29.6		
Health ^c	247	60.2	28.7	10.6	0.6		
Logistics (Navy)	168	55.6	25.7	12.9	5.8		
Logistics (Army)	445	4.9	20.1	35.2	39.8		
Logistics (RAAF)	129	18.7	34.4	32.1	14.8		
Maritime operations ^c	100	33.8	29.2	23.5	13.4		
Administration + other ^c	189	15.5	26.4	29.7	28.3		

Table 4.3:Role in Iraq deployment and the frequency of traumatic experiences (N=5511)

a Unweighted totals

b Estimated prevalences, weighted for non-response

c All services combined

Table 4.4:	Role in supporting areas	outside Irag and the freq	uency of traumatic expe	riences (N=2715)
	note in supporting areas	outside hug and the heg	active of traditiative expe	

		Traumatic Experiences Scale					
		0	1-5	6-15	16+		
Role		(none)	(low)	(medium)	(high)		
(supporting areas outside Iraq)	n	% ⁰	% ⁰	% ^b	% ^b		
EOD (Bomb disposal, IED technician) ^c	27	11.3	39.3	37.7	11.6		
Combat (e.g. infantry, artillery etc.) ^c	18	14.5	36.1	21.3	28.1		
Other combat – Navy	28	45.2	40.6	14.2	0		
Other combat – Army	8	9.1	23.6	23.6	43.7		
Other combat – RAAF	120	21.1	41.2	28.7	9.0		
Combat support – Navy	11	36.0	30.3	26.5	7.2		
Combat support – Army	66	35.7	42.2	14.6	7.6		
Combat support – RAAF	510	55.9	30.8	11.4	1.9		
Aircrew ^c	112	34.4	38.7	25.2	1.7		
Health ^c	10	83.1	8.0	0	8.9		
Logistics (Navy)	35	39.8	36.5	23.7	0		
Logistics (Army)	192	36.1	36.9	21.5	5.4		
Logistics (RAAF)	728	58.0	33.1	8.8	0.2		
Maritime operations ^c	453	31.2	37.7	22.3	8.8		
Administration + other ^c	397	50.4	34.4	12.7	2.5		

a Unweighted totals

b Estimated prevalences, weighted for non-response

c All services combined

Afghanistan

Roles were examined according to the frequency of traumatic experiences reported whilst on deployment to Afghanistan (Table 4.5) and supporting areas outside Afghanistan (Table 4.6). The Combat (e.g. Infantry, Artillery etc.) and EOD (bomb disposal, IED technician) roles recorded the greatest percentage of members with a high (i.e. 16-100) frequency of self-reported traumatic exposures. Those participants who deployed to supporting areas outside Afghanistan recorded fewer traumatic experiences compared to deployments in Afghanistan.

		Traumatic Experiences Scale					
		0	16+				
Role		(none)	(low)	(medium)	(high)		
(Afghanistan)	nª	% ^b	% ^b	% ^b	% ^b		
EOD (Bomb disposal, IED technician) ^c	96	0	3.7	12.5	83.8		
Combat (e.g. infantry, artillery etc.) ^c	1076	0.2	1.3	7.0	91.4		
Other combat – Navy	27	25.7	35.8	20.3	18.2		
Other combat – Army	153	1.4	17.1	33.4	48.1		
Other combat – RAAF	41	4.4	20.7	52.8	22.2		
Combat support – Navy	30	30.8	11.7	25.5	32.0		
Combat support – Army	627	5.1	30.1	35.4	29.4		
Combat support – RAAF	235	11.3	40.5	36.0	12.2		
Aircrew ^c	172	3.9	19.1	45.0	32.0		
Health ^c	9	54.0	37.6	8.4	0		
Logistics (Navy)	10	66.3	19.5	7.8	6.4		
Logistics (Army)	595	6.7	33.0	40.0	20.2		
Logistics (RAAF)	109	15.3	42.6	33.8	8.3		
Maritime operations ^c	144	9.5	34.2	31.1	25.3		
Administration + other ^c	551	13.3	30.0	36.7	20.1		

 Table 4.5:
 Role service by frequency of exposure to traumatic experiences (Afghanistan) (N=3875)

a Unweighted totals

b Estimated prevalences, weighted for non-response

c All services combined

Table 4.6:	Role service by frequency of exposure to traumatic experiences (supporting areas outside
	Afghanistan) (N=2100)

		Traumatic Experiences Scale				
		0	16+			
Role		(none)	(low)	(medium)	(high)	
(Supporting areas outside Afghanistan)	nª	% ^b	% ^b	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^c	14	12.8	42.6	16.0	28.6	
Combat (e.g. infantry, artillery etc.) ^c	25	32.8	36.9	22.1	8.1	
Other combat – Navy	228	40.3	32.4	22.5	4.8	
Other combat – Army	11	15.0	39.0	25.7	20.2	
Other combat – RAAF	56	29.9	48.1	16.5	5.6	
Combat support – Navy	171	61.3	28.6	8.8	1.3	
Combat support – Army	49	47.7	33.9	14.3	4.2	
Combat support – RAAF	206	62.7	28.3	8.2	0.7	
Aircrew ^c	83	50.3	34.6	8.3	6.8	
Health ^c	147	65.5	27.4	7.1	0	
Logistics (Navy)	74	57.6	30.9	11.4	0	
Logistics (Army)	112	34.8	40.8	18.9	5.4	
Logistics (RAAF)	394	68.1	26.4	4.7	0.7	
Maritime operations ^c	287	39.0	35.3	20.5	5.1	
Administration + other ^c	243	49.8	32.0	14.8	3.4	

a Unweighted totals

b Estimated prevalences, weighted for non-response

c All services combined

Categories of traumatic experiences

The frequency of each category of self-reported traumatic experience was collated for participants who deployed to Iraq and Afghanistan (Table 4.7), and supporting areas outside Iraq and Afghanistan (Table 4.8). The frequency of reported traumatic experiences was considerably higher for participants who deployed to the main areas in Iraq and Afghanistan, compared to participants who deployed to supporting areas outside Iraq and Afghanistan.

When considering deployments that were within Iraq and Afghanistan, traumatic experiences were reported most frequently by participants who deployed to Afghanistan compared with Iraq. In particular, the exposures 'coming under fire', 'discharging ones' own weapon', 'handling or seeing dead bodies' and 'in danger of being injured or killed' were higher among Afghanistan veterans.

Aighanistan						
Traumatic Experiences	(N=5840)*		Iraq %	Afghanistan %	(N=4099)*_	Percentage difference (Iraq-Afghanistan) % Difference (95% CI)
Potential for exposure	3983	69.1	70	73.7	2933	-4.3 (-5.6, -3.1)
Coming under fire	3475	59.9		<mark>85</mark> .4	3482	-25.4 (-26.6, -24.2)
In danger of being injured or killed	2263	40.0		49.9	1940	-9.7 (-11.1, -8.3)
Casualties among people close to you	1770	31.3		52.6	2040	-2.2 (-3.1, -1.3)
Handling/seeing dead bodies	1538	27.4		41.0	1608	-13.8 (-15.112.4)
Threatening situation unable to respond	861	16.2		15.3	565	1.0 (0, 2.1)
Witness to human degradation and misery	618	10.8		13.1	502	-2.2 (-3.1, -1.3)
Discharging own weapon	233	4.3		17.2	631	-12.8 (-13.8, -11.9)
Own actions/inactions resulted in death/injury to others	252	4.4		7.7	304	-3.2 (-3.9, -2.5)

Table 4.7:Frequency of traumatic experiences by category reported one or more times in Iraq and
Afghanistan

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

*combat/trauma items with missing data varied for each question

Table 4.8:Frequency of traumatic experiences by category reported one or more times in supporting
areas outside Iraq and Afghanistan

Traumatic		Iraq	Afghanistan		Percentage difference
Experiences	(N=2964)*	(supporting)	(supporting)	(N=2351)*	(Iraq-Afghanistan)
Experiences	n	%	%	n	% Difference (95% Cl)
Potential for exposure	1065	37.4	30.6	696	7.2 (5.2, 9.1)
Coming under fire	496	17.3	12.5	301	4.8 (3.0, 6.2)
In danger of being injured or killed	542	19.1	15.5	358	3.7 (2.2, 5.3)
Casualties among people close to you	371	13.2	10.2	232	3.1 (1.8, 4.4)
Handling/seeing dead bodies	295	10.4	7.3	175	3.1 (1.9. 4.3)
Threatening situation unable to respond	44	1.5	4.7	93	-3.2 (-3.9, -2.5)
Witness to human degradation and misery	47	1.7	2.4	53	-0.7 (-1.4, 0)
Discharging own weapon	14	0.6	0.2	4	0.4 (0.1, 0.6)
Own actions/inactions resulted in death/injury to others	63	2.1	1.0	24	1.2 (0.7, 1.7)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

*combat/trauma items with missing data varied for each question

Due to large differences in the frequency of reported traumatic experiences in deployment locations within Iraq and Afghanistan compared to supporting areas outside of Iraq and Afghanistan, the results are only presented for participants who deployed to within Iraq and Afghanistan, not in areas outside these countries. Analyses for supporting areas of Iraq and Afghanistan are available in Volume II.

Specific types of traumatic experiences and PTSD

The *types* of traumatic combat-related experiences associated with PTSD symptoms (scores on PLC-C \geq 50) differed between the Iraq and Afghanistan deployments. For the Iraq deployment, six of the nine traumatic exposure categories were associated with higher PTSD scores, while four of the nine traumatic exposure categories were significant (or borderline) in the Afghanistan deployment (Table 4.9). The exposures: *'threatening situation and unable to respond', 'handling/seeing dead bodies'* and *'being witness to human degradation and misery'* were strongly and statistically significantly associated with PTSD symptoms, as measured by the PCL-C, in both Iraq and Afghanistan.

Traumatic	Psychological Distress (K10 ≥ 30)								
Experiences	OR (95% CI) ^c	<i>p-</i> value		Iraq % ^b	Afgha	nistan % ^b	<i>p-</i> value	OR (95% CI) ^c	
Potential for exposure (N=5476) ^a (N=3890) ^a									
No	1 (Reference)		2.3			1.9		1 (Reference)	
Yes	2.05 (1.38, 3.04)	<0.001	6.2			4.6	0.25	1.35 (0.81, 2.24)	
Coming under f	ire								
No	1(Reference)		3.5			2.2		1 (Reference)	
Yes	1.16 (0.75, 1.82)	0.51	6.1			4.2	0.35	1.39 (0.70, 2.76)	
In danger being	injured or killed								
No	1(Reference)		3.1			2.4		1 (Reference)	
Yes	1.54 (1.15, 2.05)	<0.01	7.7			5.2	0.77	0.94 (0.61, 1.44)	
Casualties close	e to you								
No	1 (Reference)		3.7			2.1		1(Reference)	
Yes	1.37 (1.01, 1.84)	0.04	7.9			5.2	0.06	1.48 (0.99, 2.21)	
Handling/seein	g dead bodies								
No	1(Reference)		3.9			2.3		1 (Reference)	
Yes	1.12 (0.83, 1.52)	0.46	8.0			6.1	0.03	1.56 (1.04, 2.33)	
Threatening site	uation unable to re	spond							
No	1(Reference)		3.7			2.9		1 (Reference)	
Yes	2.16 (1.61, 2.89)	< 0.0001	12.0			9.2	<0.01	1.93 (1.23, 3.02)	
Witness human degredation and misery									
No	1 (Reference)		4.2			2.9		1 (Reference)	
Yes	1.74 (1.25, 2.41)	0.001	11.1			9.6	< 0.0001	2.42 (1.64, 3.57)	
Discharging ow	n weapon								
No	1(Reference)		4.8			3.4		1 (Reference)	
Yes	1.14 (0.69, 1.88)	0.6	10.6			6.6	0.45	0.84 (0.53, 1.33)	
Own actions res	sulted in death or in	njury							
No	1 (Reference)		4.9			3.3		1 (Reference)	
Yes	0.96 (0.57, 1.60)	0.87	8.9			9.9	< 0.01	2.02 (1.25, 3.25)	

Table 4.9:Association between traumatic experiences in Iraq and Afghanistan and PTSD symptoms, as
measured by the PCL-C

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender and the other combat exposures in the table

Specific types of traumatic experiences and psychological distress

For participants deployed to the main areas of Iraq and Afghanistan (Tables 4.10), as many as five traumatic experiences were found to be associated with high psychological distress (scores on K10 \geq 30). The type of experiences statistically significantly associated with high psychological distress varied between deployment locations. The two experiences that were associated with highest psychological distress across both locations were 'being in a threatening situation and unable to respond' and 'being witness to human degradation and misery'.

Fewer types of traumatic experiences were associated with psychological distress compared to PTSD across deployment locations.

Traumatic	Psychological Distress (K10 ≥ 30)								
Experiences	OR (95% CI) ^c	<i>p-</i> value	1	raq % ^b	Afghanis	tan % ^b	<i>p-</i> value	OR (95% CI) ^c	
Potential for ex	posure		(N=	5476) ^a	(N=3890)	а			
No	1 (Reference)		2.3			1.9		1 (Reference)	
Yes	2.05 (1.38, 3.04)	<0.001	6.2			4.6	0.25	1.35 (0.81, 2.24)	
Coming under f	ire								
No	1(Reference)		3.5			2.2		1 (Reference)	
Yes	1.16 (0.75, 1.82)	0.51	6.1			4.2	0.35	1.39 (0.70, 2.76)	
In danger being	injured or killed								
No	1 (Reference)		3.1			2.4		1 (Reference)	
Yes	1.54 (1.15, 2.05)	<0.01	7.7			5.2	0.77	0.94 (0.61, 1.44)	
Casualties close	e to you								
No	1 (Reference)		3.7			2.1		1(Reference)	
Yes	1.37 (1.01, 1.84)	0.04	7.9			5.2	0.06	1.48 (0.99, 2.21)	
Handling/seein	g dead bodies								
No	1 (Reference)		3.9			2.3		1 (Reference)	
Yes	1.12 (0.83, 1.52)	0.46	8.0			6.1	0.03	1.56 (1.04, 2.33)	
Threatening sit	uation unable to re	spond							
No	1(Reference)		3.7			2.9		1 (Reference)	
Yes	2.16 (1.61, 2.89)	<0.0001	12.0			9.2	<0.01	1.93 (1.23, 3.02)	
Witness human degredation and misery									
No	1 (Reference)		4.2			2.9		1 (Reference)	
Yes	1.74 (1.25, 2.41)	0.001	11.1			9.6	< 0.0001	2.42 (1.64, 3.57)	
Discharging ow	n weapon								
No	1 (Reference)		4.8			3.4		1 (Reference)	
Yes	1.14 (0.69, 1.88)	0.6	10.6			6.6	0.45	0.84 (0.53, 1.33)	
Own actions resulted in death or injury									
No	1 (Reference)		4.9			3.3		1 (Reference)	
Yes	0.96 (0.57, 1.60)	0.87	8.9			9.9	< 0.01	2.02 (1.25, 3.25)	

Table 4.10:Association between traumatic experiences in Iraq and Afghanistan and psychological distress
(K10)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender and other factor categories in the model

Specific types of traumatic experiences and alcohol misuse

Very few types of traumatic experiences were found to be associated with alcohol misuse (scores on AUDIT \geq 20) across all deployment locations (Table 4.11). The types of traumatic experiences that were statistically significantly associated with alcohol misuse were different between the main areas in Iraq (*'being in a threatening situation and unable to respond'*) and Afghanistan (*'being witness to human degradation and misery'*).

Specific types of traumatic experiences: depression and anxiety

Different types of traumatic experiences were associated with major depressive syndrome, panic syndrome, and other anxiety syndromes for participants deployed to Iraq and Afghanistan, and supporting areas outside those countries. For members deployed to Iraq and Afghanistan, one of the most consistent and highly associated traumatic experiences with depression, panic, and anxiety syndromes was *being in a threatening situation and unable to respond*. Compared to Iraq and Afghanistan, fewer traumatic experiences were

associated with depression or anxiety for supporting areas outside Iraq and Afghanistan. All the tables for depression and anxiety are available in Volume II.

Traumatic	Alcohol misuse (AUDIT ≥ 20)									
Experiences	OR (95% CI) ^c	<i>p-</i> value		Iraq % ^b	Af	ghanistan % ^b	<i>p-</i> value	OR (95% CI) ^c		
Potential for exposure (N=5472) ^a (N=3890) ^a										
No	1 (Reference)		1.4			0.9		1 (Reference)		
Yes	1.64 (0.94, 2.87)	0.08	3.7			2.7	0.64	1.19 (0.57, 2.51)		
Coming under f	ire									
No	1 (Reference)		1.9			1.2		1 (Reference)		
Yes	1.19 (0.66, 2.16)	0.56	3.7			2.4	0.92	0.96 (0.45, 2.08)		
In danger being	injured or killed									
No	1 (Reference)		1.8			1.3		1 (Reference)		
Yes	1.39 (0.94, 2.05)	0.10	4.6			3.2	0.96	0.99 (0.53, 1.83)		
Casualties close	to you									
No	1 (Reference)		2.2			1.0		1(Reference)		
Yes	1.29 (0.86, 1.91)	0.22	4.7			3.3	0.08	1.61 (0.94, 2.74)		
Handling/seein	g dead bodies									
No	1 (Reference)		2.2			1.3		1 (Reference)		
Yes	1.21 (0.82, 1.77)	0.34	5.0			3.6	0.08	1.66 (0.94, 2.92)		
Threatening site	uation unable to re	spond								
No	1 (Reference)		2.0			1.7		1 (Reference)		
Yes	2.39 (1.68, 3.40)	<0.0001	8.0			5.2	0.06	1.67 (0.98, 2.85)		
Witness human	degredation and n	nisery								
No	1 (Reference)		2.5			1.8		1 (Reference)		
Yes	1.24 (0.81, 1.89)	0.32	6.1			4.8	0.03	1.74 (1.06, 2.87)		
Discharging own	n weapon									
No	1 (Reference)		2.7			1.8		1 (Reference)		
Yes	1.21 (0.69, 2.11)	0.51	8.3			4.1	0.75	0.91 (0.51, 1.63)		
Own actions res	ulted in death or in	njury								
No	1 (Reference)		2.7			2.1		1 (Reference)		
Yes	1.66 (0.95, 2.16)	0.07	8.2			4.0	0.54	1.23 (0.63, 2.40)		

Table 4.11:	Association between	traumatic experiences in Iraq	and Afghanistan	and alcohol misuse (AUDIT

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender and other factor categories in the model

4.3.2 Repeated exposures to trauma: mental and general health

Iraq

There were strong 'dose-response' associations between the number of traumatic combat-related experiences reported during deployment to Iraq; and greater PTSD symptoms, psychological distress, and alcohol misuse (Table 4.12). Similar associations were found for major depressive disorder, panic syndrome, and other anxiety syndrome, which was measured by the PHQ. The results for all PHQ analyses are available in Volume II.

Those participants who deployed to Iraq and reported six or more traumatic experiences were three times more likely to report PTSD symptoms (PCL-C \ge 50), high psychological distress (K10 \ge 30), and twice as likely to report alcohol misuse (AUDIT \ge 20). When the number of reported traumatic experiences was 16 or more; participants were 16 times more likely to report PTSD symptoms, eight times more likely to report high psychological distress, and six times more likely to report alcohol misuse. Similarly, participants who deployed to Iraq and reported one or more combat exposures were statistically significantly more likely to meet the PHQ criteria for major depressive syndrome, and panic and anxiety syndromes (Volume II).
The traumatic exposure scale was constructed by calculating a total score based on the traumatic experience items reported by participants. Scores ranged from 1 to 100 and were divided into quartiles (0, 1-5, 6-15, 16-100) to categorise participants by the frequency of reported traumatic experiences.

	No PTSD	PTSD (PCL_C>EQ)		
scale	n ^a (%) ^b	n ^a (%) ^b	OR (95%CI) ^c	<i>p</i> -value
0	1045 (98.3)	16 (1.7)	1 (Reference)	
1-5	1240 (96.6)	40 (3.4)	2.52 (1.50, 4.24)	0.0005
6-15	1285 (96.6)	38 (3.4)	3.40 (1.94, 5.96)	<0.0001
16-100	1680 (88.2)	199 (11.8)	16.3 (9.79, 27.1)	<0.0001
	No psychological	Psychological		
Traumatic exposures	distress (K10<30)	distress (K10≥30)	-	
scale	n" (%)"	n" (%)"	OR (95%CI)	<i>p</i> -value
0	1045 (98.0)	19 (2.0)	1 (Reference)	
1-5	1239 (96.3)	43 (3.7)	2.38 (1.42, 3.98)	0.001
6-15	1274 (95.9)	47 (4.1)	3.39 (1.99, 5.80)	<0.0001
16-100	1741 (91.8)	137 (8.2)	8.39 (4.97, 14.2)	<0.0001
	No alcohol misuse	Alcohol misuse		
Traumatic exposures	(AUDIT<20)	(AUDIT≥20)		
scale	n ^ª (%) ^b	n [°] (%) ^b	OR (95%CI) ^c	<i>p</i> -value
0	1052 (98.7)	11 (1.3)	1 (Reference)	
1-5	1259 (97.9)	20 (2.1)	1.96 (0.98, 3.91)	0.06
6-15	1297 (98.0)	23 (2.0)	2.30 (1.14, 4.63)	0.02
16-100	1793 (94.8)	84 (5.2)	6.34 (3.27, 12.3)	<0.0001

Table 4.12:	Association between repeated exposure to traumatic experiences in Iraq and PTSD (PCL-C),
	psychological distress (K10) and alcohol misuse (AUDIT) (N=5543)

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

For participants who deployed to Iraq, self-reported fair or poor general health was higher for those who reported a greater number of traumatic experiences. However, when symptoms of PTSD were adjusted for, the magnitude of this association was reduced (Table 4.13). This suggests that self-reported fair or poor general health may in part be accounted for by symptoms of PTSD.

Table 4.13:	Association between repeated exposure to traumatic experiences in Iraq and general health
	(N=5542)

Traumatic exposures	Good/very good/ excellent health	Fair or poor general health		
scale	n ^ª (%) ^b	n ^ª (%) ^b	OR (95%CI) ^c	<i>p</i> -value
0	931 (87.4)	133 (12.6)	1 (Reference)	
1-5	1090 (84.2)	190 (15.8)	1.47 (1.18, 1.83)	0.0007
6-15	1132 (84.7)	189 (15.3)	1.63 (1.28, 2.08)	< 0.0001
16-100	1513 (79.3)	364 (20.7)	2.50 (1.96, 3.19)	< 0.0001
	Good/very good/	Fair or poor general		
Traumatic exposures	excellent health	health	OR adjusted for PCL-	
scale	n" (%)"	n" (%)"	C (95%CI)"	<i>p</i> -value
0	931 (87.4)	133 (12.6)	1 (Reference)	
1-5	1090 (84.2)	190 (15.8)	1.32 (1.05, 1.67)	0.02
6-15	1132 (84.7)	189 (15.3)	1.42 (1.11, 1.82)	0.006
16-100	1513 (79.3)	364 (20.7)	1.63 (1.26, 2.11)	0.0002

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

d Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender, and PCL-C

Afghanistan

Participants who deployed to Afghanistan and reported a greater number of traumatic experiences were statistically significantly more likely to have adverse psychological health outcomes, compared to veterans who reported fewer exposures to trauma. However, for participants deployed to Afghanistan, the odds of experiencing poorer mental health were not as high as that observed for Iraq participants.

Participants who deployed to Afghanistan and reported sixteen or more traumatic experiences were statistically significantly more likely to report PTSD symptoms (PCL-C \geq 50) and high psychological distress (K10 \geq 30). Those participants in the highest category of traumatic experiences (i.e. 16 to 100) were also more likely to report alcohol misuse (AUDIT \geq 20) (Table 4.14), although this did not approach statistical significance.

(PC	CL-C), psychological distress (K10), and alcohol misus	se (AUDIT) (N=3950)	
	No PTSD	PTSD		
Traumatic	(PCL-C<50)	(PCL-C≥50)		
exposures scale	n ^ª (%) ^b	n ^ª (%) ^b	OR (95% CI) [°]	<i>p</i> -value
0	247 (98.7)	3 (1.3)	1 (Reference)	
1-5	888 (99.0)	8 (1.0)	0.89 (0.26, 3.10)	0.85
6-15	1082 (96.7)	32 (3.3)	3.10 (1.01, 9.49)	0.05
16-100	1578 (92.8)	112 (7.2)	7.62 (2.57, 22.6)	0.0002
	No psychological	Psychological		
Traumatic	distress (K10<30)	distress (K10≥30)	_	
exposures scale	n ^a (%) ^b	n ^a (%) ^b	OR (95% CI) ^c	<i>p</i> -value
0	245 (97.7)	5 (2.3)	1 (Reference)	
1-5	880 (98.2)	15 (1.8)	0.96 (0.31, 2.95)	0.95
6-15	1083 (97.4)	29 (2.6)	1.58 (0.59, 4.20)	0.36
16-100	1598 (93.9)	92 (6.1)	4.11 (1.59, 10.6)	0.004
	No alcohol misuse	Alcohol misuse		
Traumatic	(AUDIT<20)	(AUDIT≥20)		
exposures scale	n ^ª (%) ^b	n ^ª (%) ^b	OR (95% CI) [°]	<i>p</i> -value
0	248 (98.8)	2 (1.2)	1 (Reference)	
1-5	888 (99.1)	7 (0.9)	0.72 (0.19, 2.76)	0.63
6-15	1099 (98.6)	13 (1.4)	1.08 (0.30, 3.86)	0.91
16-100	1635 (96.3)	56 (3.7)	2.49 (0.79, 7.88)	0.12

Table 4.14:Association between the repeated exposure to traumatic experiences in Afghanistan and PTSD
(PCL-C), psychological distress (K10), and alcohol misuse (AUDIT) (N=3950)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

For participants deployed to Afghanistan, self-reported general health was poorer when a greater number of traumatic experiences were reported (Table 4.15). However, when symptoms of PTSD were adjusted for, the magnitude of this association was reduced, which may suggest that self-reported fair or poor general health is at least partially accounted for by symptoms of PTSD.

llealti	1 (12-2921)			
Traumatic	Good, Very Good or Excellent	Fair or Poor general health		
exposures scale	n ^ª (%) ^ɒ	n ^ª (%) ^b	OR (95% CI) ^c	<i>p</i> -value
0	231 (91.3)	19 (8.7)	1 (Reference)	
1-5	808 (89.5)	88 (10.5)	1.39 (0.84, 2.28)	0.20
6-15	968 (86.9)	145 (13.1)	1.82 (1.13, 2.94)	0.01
16-100	1451 (85.3)	241 (14.7)	2.20 (1.36, 3.54)	0.001
	Good, Very Good or	Fair or Poor general		
Traumatic	Excellent	health	OR (95%CI)	
exposures scale	n ^ª (%) ^b	n [°] (%) ^b	(adjust for PCL-C) ^d	<i>p</i> -value
0	231 (91.3)	19 (8.7)	1 (Reference)	
1-5	808 (89.5)	88 (10.5)	1.40 (0.84, 2.34)	0.19
6-15	968 (86.9)	145 (13.1)	1.67 (1.02, 2.72)	0.04
16-100	1451 (85.3)	241 (14.7)	1.70 (1.04, 2.78)	0.03

Table 4.15:Associations between repeated exposure to traumatic experiences in Afghanistan and general
health (N=3951)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

^d Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender, and PCL-C

4.3.3 Different types of traumatic experiences and mental and general health

The previous analyses considered the association between repeated, cumulative, traumatic experiences and physical and mental health measures. Strong associations were found between a *greater number* of reported traumatic experiences and poorer mental health. This section examines whether there was an association between exposure to *different types* of traumatic experiences and mental health. Specifically, we examined whether exposure to multiple types of traumatic experiences were more or less likely to be associated with measures of mental health, rather than just investigating the cumulative total of traumatic experiences and associated health. The tables for the Iraq and Afghanistan analyses are available in Volume II.

Iraq

Participants who deployed to Iraq and reported experiencing more types of traumatic exposures were statistically significantly more likely to report higher PTSD symptoms (PCL-C \ge 50), psychological distress (K10 \ge 30), and alcohol misuse (AUDIT \ge 20). Participants who reported experiencing between five and nine different types of traumatic exposures (as listed in Table 4.1) were 15 times more likely to report high PTSD symptoms, over six times more likely to report high psychological distress, and four times more likely to report alcohol misuse. Similarly, participants who reported experiencing more types of traumatic exposures were statistically significantly more likely to report major depressive, panic, and anxiety syndromes. Participants who deployed to Iraq and reported experiencing more types of traumatic exposures. This association was not as strong when participants' PTSD symptoms were adjusted for; however, it remained statistically significant.

Afghanistan

Participants who deployed to Afghanistan and reported experiencing five or more types of traumatic exposures were statistically significantly more likely to report higher PTSD symptoms (PCL-C \ge 50) and psychological distress (K10 \ge 30). Experiencing multiple types of trauma was not associated with alcohol misuse (AUDIT \ge 20). Participants who deployed to Afghanistan and experienced five or more different types of combat exposures were statistically significantly more likely to report major depressive syndrome and panic syndrome. Participants who experienced three or more different types of traumatic experiences were statistically significantly more likely to report anxiety syndromes. Self-reported fair or poor general health was higher for those who also reported experiencing three or more types of traumatic exposures. When symptoms of PTSD were adjusted for, the association, whilst remaining significant, was not as strong.

4.3.4 Physical Health on deployment

Self-reported reasons for sick parade attendance and days out of role whilst on deployment to Iraq and supporting areas outside Iraq are shown in Table 4.16 and Figure 4.1. The most common reasons for sick parade attendance for participants deployed to Iraq were respiratory illnesses, musculoskeletal injuries sustained in the member's job/role (not combat), and diarrhoea/vomiting. In areas outside Iraq, the most common self-reported reasons were respiratory illness and musculoskeletal injuries sustained in the member's job/role (not combat). Sick parade attendance was reported slightly more by members deployed to Iraq compared with supporting areas outside Iraq.

supporting ar	eas outside frac	1				
	Di	In Iraq (N = 548) ays out of	5) ª role	Si Di	(N = 282) Apporting N = 282) Ays out of	lraq 3) ^ª role
Reason	n ^ª (%) ^b	Mean ^c	Median (IQR) ^c	n ^ª (%) ^b	Mean ^c	Median (IQR) ^c
Injury						
Motor vehicle	64 (1.2)	4.2	0.6 (0, 2.1)	18 (0.7)	4.3	0.3 (0, 0.7)
accident						
Combat	66 (1.4)	4.4	1.2 (0, 4.5)	7 (0.3)	3.4	0 (0, 3.2)
Musculoskeletal injury						
Job/role (not combat)	910 (16.7)	3.8	0.6 (0, 1.9)	325 (11.8)	7.1	0.5 (0, 1.1)
During training	222 (4.4)	6.2	0.4 (0, 1.3)	77 (2.8)	1.3	0.5 (0, 1.0)
Recreation or sport	391 (7.0)	6.3	0.6 (0.03, 1.6)	281 (9.9)	6.8	0.5 (0.02,1.0)
Head injury/ concussion	103 (2.1)	3.4	0.5 (0.004, 1.1)	22 (0.8)	1.2	0.7 (0.3, 1.1)
Heat stress	299 (5.8)	1.7	0.6 (0.1, 1.2)	106 (3.9)	1.1	0.4 (0.001, 0.9)
Cold Exposure	110 (2.0)	1.2	0.5 (0.06, 1.0)	31 (1.1)	1.2	0.6 (0.1, 1.1)
Respiratory illness	1109 (19.6)	1.8	0.7 (0.1, 1.6)	559 (19.6)	1.8	0.8 (0.2, 1.6)
Dental problems	237 (4.4)	1.4	0.4 (0.005, 0.9)	77 (2.8)	1.0	0.4 (0, 0.8)
Skin rashes/irritations	558 (10.2)	1.6	0.3 (0, 0.8)	266 (9.4)	0.8	0.3 (0, 0.7)
Diarrhoea and/or vomiting	822 (15.4)	2.2	0.9 (0.3, 2.1)	297 (10.4)	2.6	0.8 (0.3, 1.7)
Other	571 (11.2)	6.0	0.7 (0.01, 2.2)	355 (13.4)	1.9	0.6 (0.1, 1.1)

Table 4.16:Reasons for sick parade attendance and days out of role during deployment to Iraq and
supporting areas outside Iraq

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimates are weighted for non-response

Figure 4.1 Percentage of sick parade reasons self-reported by participants deployed to Iraq and supporting areas outside Iraq



Note: * Musculoskeletal injuries, ^ injury

The most common reasons for sick parade attendance for participants deployed to Afghanistan was diarrhoea/vomiting, followed by respiratory illness, and musculoskeletal injuries sustained in the members' job/role (not combat) (Figure 4.2, Table 4.17). In areas outside Afghanistan, the most common self-reported reasons were respiratory illness followed by musculoskeletal injuries sustained in the members' job/role (not combat). A greater percentage of sick parade attendance and days out of role were reported for members in Afghanistan, rather than in supporting areas outside Afghanistan.

Figure 4.2 Percentage of sick day reasons self-reported by participants deployed to Afghanistan and supporting areas outside Afghanistan



Note: * Musculoskeletal injuries, ^ injury

			In Afghanistan (N = 3886) ^a		Support	ting Afghanistan (N = 2252) ^a
			Days out of role			Days out of role
Reason	n ^a (%) ^b	Mean ^c	Median(IQR) ^c	n ^a (%) ^b	Mean ^c	Median (IQR) ^c
Injury						
Motor vehicle	46 (1.2)	4.7	0.5 (0, 1.9)	8 (0.4)	1.4	1.1 (0, 1.8)
accident						
Combat	106 (3.1)	17.3	2.0 (0.4, 6.9)	1 (0.04)	N/A	N/A
Musculoskeletal injury						
Job/role (not	633 (16.8)	5.8	0.7 (0.1, 2.7)	229 (10.5)	4.1	0.7 (0.2, 1.6)
combat)						
During training	146 (3.9)	2.7	0.7 (0.1, 1.9)	55 (2.4)	1.3	0.4 (0, 0.9)
Recreation or sport	218 (5.4)	13.2	0.6 (0.03, 1.4)	173 (7.4)	3.6	0.4 (0, 0.9)
Head injury / concussion	62 (1.8)	2.8	0.8 (0.1, 4.2)	18 (0.8)	0.8	0 (0, 0.7)
Heat stress	122 (3.5)	1.5	0.7 (0.2, 1.6)	74 (3.5)	1.1	0.5 (0.1, 0.9)
Cold exposure	80 (2.2)	1.0	0.4 (0, 0.9)	27 (1.3)	0.9	0.4 (0, 1.0)
Respiratory illness	754 (19.2)	5.5	0.8 (0.2, 1.8)	360 (15.6)	1.6	0.7 (0.2, 1.4)
Dental problems	112 (3.0)	1.3	0.4 (0.1, 0.8)	59 (2.6)	1.3	0.3 (0, 0.8)
Skin rashes/irritations	363 (9.4)	8.6	0.4 (0, 0.9)	160 (7.0)	0.8	0.2 (0, 0.7)
Diarrhoea and/or	943 (25.2)	4.9	1.4 (0.5, 2.8)	222 (9.4)	1.9	0.8 (0.2, 1.7)
vomiting						
Other	393 (11.0)	5.8	0.7 (0.1, 2.0)	198 (9.1)	4.5	0.7 (0.1, 1.8)

Table 4.17: Reasons for sick parade attendance and days out of role during deployment to Afghanistan and supporting areas outside Afghanistan

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimates are weighted for non-response

NB: N/A = not applicable because only 1 person reported a combat injury from supporting areas outside Afghanistan

4.3.5 Head injury/concussion and combat injuries: mental and general health

Head injury/concussion

The number of participants reporting head injury/concussion was relatively low for participants deployed to Iraq (2.1%) and Afghanistan (1.8%). The association between head injury/concussion and mental and general health measures was examined (Table 4.18). Due to the low prevalence of self-reported head injuries, participants deployed to Iraq and Afghanistan were grouped together for analysis. Self-reported head injury was strongly associated with PTSD symptoms, high psychological distress, migraines, and poor general health. The association between head injury and poor general health remained significant, although the magnitude of the relationship was reduced, when adjusted for PTSD symptoms.

Table 4.18:Associations between head injury/concussion experienced on deployment to the MEAO and
mental and general health (N=11615)

Head injury/	No PTSD (PCL-C<50)	PTSD (PCL-C >50)		
concussion		<u> </u>	OR (95% CI) ^c	<i>p</i> -value
No	11009 (95.9)	406 (4.1)	1 (Reference)	
Yes	176 (87.0)	24 (13.0)	3.10 (2.10, 4.55)	< 0.0001
	No psychological distress (K10<30)	Psychological distress (K10≥30)		
	n ^a (%) ^b	n ^a (%) ^b	OR (95% CI) ^c	<i>p</i> -value
No	11040 (96.2)	377 (3.8)	1 (Reference)	
Yes	185 (91.9)	16 (8.1)	1.97 (1.25, 3.10)	0.004
	No alcohol misuse (AUDIT<20)	Alcohol misuse (AUDIT≥20)		
	n ^a (%) ^b	n ^a (%) ^b	OR (95% CI) ^c	<i>p</i> -value
No	11195 (97.7)	214 (2.3)	1 (Reference)	
Yes	191 (95.9)	7 (4.1)	1.46 (0.75, 2.86)	0.27
	No Migraines	Migraines	c.	
	n" (%)"	n" (%)"	OR (95% CI)	<i>p</i> -value
No	10763 (94.4)	616 (5.6)	1 (Reference)	
Yes	175 (86.7)	24 (13.3)	2.59 (1.76, 3.80)	<0.0001
	Good, Very Good, or	General health fair or		
	Excellent	poor		n value
No	0028 (86.2)	1 (70) 1 (70)	1 (Reference)	p-value
NO	9928 (80.2) 154 (76.2)	1407 (15.0) (72 71)	1 92 (1 29 2 44)	<0.0001
Tes	LD4 (70.5)	General health fair or	1.05 (1.56, 2.44)	<0.0001
	Excellent	noor		
	n ^a (%) ^b	n ^a (%) ^b	(Adi PCL-C)	<i>p</i> -value
No	9928 (86.2)	1487 (13.8)	1 (Reference)	P
Yes	154 (76.3)	47 (23.7)	1.48 (1.06, 2.06)	0.02

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

d Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender, and PCL-C

Lifetime and current mild traumatic brain injury (mTBI)

Questions relating to *lifetime* and *current* mTBI were not limited to events and injuries that occurred during deployment to the MEAO. In order to have a lifetime mTBI, participants indicated an event (e.g. blast or explosion, fall) had occurred, what happened immediately after the event (e.g. concussion, loss of consciousness), and symptoms that subsequently developed or increased (e.g. memory problems or balance problems). To screen positively for a current mTBI, participants had to meet the above criteria as well as indicate whether those symptoms were currently ongoing.

The number of participants who screened positive for a *lifetime* mTBI (11.0%) was greater than the total number of head injuries self-reported by participants on their MEAO deployments (3.9%) (Table 4.19). The number of participants who reported an ongoing symptom was slightly lower (9.1%).

Table 4.19:Lifetime and current diagnoses of mild traumatic brain injury (mTBI) for participants deployed
to the MEAO (N=13706)

mTBI	n ^a	% ^b
Lifetime	1409	11.0
Current	1153	9.1

a Unweighted totals

b Estimated prevalences, weighted for non-response

Combat injuries

The association between self-reported combat injury, mental and general health measures was examined (Table 4.20). The percentage of participants who self-reported combat injuries was relatively low for Iraq (1.4%) and Afghanistan (3.1%). Due to the low prevalence of self-reported combat injuries, participants deployed to Iraq and Afghanistan were grouped together for analysis to improve power to detect change.

Self-reported combat injury was statistically significantly associated with PTSD symptoms, psychological distress, alcohol misuse, and migraines (Table 4.20). Self-reported combat injury was associated with poor general health, however when PTSD symptoms were adjusted for, the association was no longer significant.

gen				
	No PTSD (PCL-C<50)	PTSD (PCL-C >50)		
Combat Iniury	n ^a (%) ^b	n ^a (%) ^b	OR (95% CI) ^c	<i>p</i> -value
No	11061 (96.0)	399 (4.0)	1 (Reference)	P
Yes	143 (79.3)	36 (20.7)	4.93 (3.53, 6.90)	<0.0001
	No psychological distress (K10<30)	Psychological distress (K10≥30)		
	n ^a (%) ^b	n ^a (%) ^b	OR (95% CI) ^c	<i>p</i> -value
No	11085 (96.2)	374 (3.8)	1 (Reference)	
Yes	157 (87.5)	22 (12.5)	3.07 (2.05, 4.61)	<0.0001
	No alcohol misuse (AUDIT<20)	Alcohol misuse (AUDIT≥20)		
	n ^a (%) ^b	n ^a (%) ^b	OR (95% CI) ^c	<i>p</i> -value
No	11241 (97.7)	210 (2.3)	1 (Reference)	
Yes	168 (93.4)	11 (6.6)	2.17 (1.25, 3.76)	0.006
	No Migraines	Migraines		
	n ^ª (%) ^b	n ^ª (%) ^b	OR (95% CI) ^c	<i>p</i> -value
No	10804 (94.4)	619 (5.6)	1 (Reference)	
Yes	156 (87.9)	21 (12.1)	2.71 (1.83, 4.02)	<0.0001
	Good, Very Good or	General health fair or		
	Excellent	Poor		
	n" (%)"	n° (%)°	OR (95% CI)*	<i>p</i> -value
NO	9969 (86.2)	1489 (13.8)	1 (Reference)	
Yes	132 (73.0)	47 (27.0)	2.06 (1.54, 2.75)	<0.0001
	Good, Very Good, or Excellent	General health fair or poor	OR (95% CI) ^d	
	n ^ª (%) ^b	n ^ª (%) [»]	(Adj for PCL-C)	<i>p</i> -value
No	9969 (86.2)	1489 (13.8)	1 (Reference)	
Yes	132 (73.0)	47 (27.0)	1.33 (0.96, 1.86)	0.09

Table 4.20:	Associations between combat injury experienced on deployment to the MEAO and mental and
	general health (N=11639)

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

d Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, gender, and PCL-C

4.4 Discussion

Traumatic experiences were found to be associated with poorer mental health, such as PTSD and high psychological distress, and to a lesser extent, alcohol misuse. There were particular roles, such as EOD (bomb disposal, IED technician) and combat (e.g. infantry, artillery, etc.), that had the greatest frequency of exposure to traumatic and combat experiences. This finding suggests that personnel from roles with high exposure to potentially traumatic, combat-related events may be most at risk of poorer mental health.

Differences were found in the frequency of combat and traumatic experiences reported by participants deployed to Iraq and Afghanistan. The number of reported traumatic and combat experiences was much higher for personnel deployed to Iraq and Afghanistan compared to supporting areas. This suggests that the blanket grouping of findings for all personnel deployed to the MEAO should be considered with caution, as differences between deployment locations may be overlooked which may result in a dilution of findings. Also, whilst more traumatic experiences were reported in Afghanistan deployments, the psychological and physical effect of trauma was greater for deployments to Iraq.

4.1.1 Traumatic experiences

ADF members reported a greater number of traumatic experiences during deployment to Afghanistan compared to Iraq. For example, participants reported discharging their own weapon four times more often than those who deployed to Iraq. However, there were greater associations between traumatic exposures and poorer mental health for those who deployed to Iraq. The study was not designed to extrapolate *why* certain exposures were more traumatic in Iraq than Afghanistan. It may be that the experience of more combat built resilience in members or that the sharing of common experiences was protective. Participants deployed to supporting areas outside Iraq and Afghanistan reported a similar number of traumatic experiences, such that traumatic experiences did not appear to be greater in one supporting location compared to another.

In both Iraq and Afghanistan, traumatic experiences were most strongly associated with PTSD symptoms and high psychological distress. The association between traumatic experiences and alcohol misuse was not as strong. These results are consistent with previous literature on associations between combat frequency and mental health [27, 90, 121, 137]. An interesting finding was that different types of exposures were associated with poorer mental health, depending on the deployment location being Iraq or Afghanistan. However, there was one traumatic experience, *'being in a threatening situation and being unable to respond'*, which was consistently found to be associated with poorer mental health (i.e. PTSD, psychological distress, alcohol, depression and anxiety) across all deployment locations, including supporting areas outside Iraq and Afghanistan. This traumatic experience was reported to have occurred by 16.2% of participants deployed to Iraq and 15.3% to Afghanistan, compared to 85.4% of participants deployed to Afghanistan reporting the experience of coming under fire, or 69.1% of participants deployed to Iraq reporting the potential for exposure. *Being in a threatening situation and unable to respond* was not the most frequently reported exposure, however it appears to be a potent one.

Evidence was found to suggest that repeated exposure or accumulation of self-reported traumatic experiences is associated with poorer mental health and poor general health. This effect was strongest for participants deployed to Iraq. For example, participants who deployed to Iraq and reported 16 or more traumatic experiences were 16 times more likely to develop PTSD, eight times more likely to report high psychological distress, and six times more likely to misuse alcohol, compared to participants with no exposures. Therefore, being exposed to a greater cumulative number of traumatic experiences increased the likelihood that participants may develop psychological and general health problems. Taken together with evidence that certain roles attract greater exposure to trauma and combat, it may be necessary to keep accurate records of traumatic experiences and for individuals with a high frequency of exposures to be targeted for intervention. Further, knowing that some roles are at a greater risk of exposure, individuals may be targeted for resilience training prior to deployment to protect against adverse effects of exposure to traumatic experiences.

The evidence suggests that:

- a) traumatic experiences whilst on deployment adversely impact upon mental and general health;
- b) there is a *dose-response* effect with traumatic experiences, such that repeated and cumulative exposure to traumatic experiences is strongly associated with poorer mental and general health; and
- c) exposure to more *types* of traumatic experiences is associated with poorer mental health.

These findings may be used to inform Defence about the specific types of support required by returning personnel post-deployment, based on the traumatic experiences reported whilst on deployment.

4.1.2 Physical injuries

Although the level of combat exposure was reported to be high (e.g. 85% in Afghanistan and 60% in Iraq reported 'coming under fire'), the actual number of participants who reported sustaining a combat injury whilst on deployment was low (at 1.4% for Iraq and 3.1% for Afghanistan). The leading reason reported for sick parade attendance in Iraq was respiratory illness and diarrhoea and/or vomiting in Afghanistan. Despite the low frequency, combat injuries were associated with poorer mental health, including PTSD, psychological distress, alcohol misuse, and migraines. Unlike head injuries, combat injuries were associated with alcohol misuse, which suggests that ADF members may use alcohol as a means of managing or coping with physical and psychological pain.

4.1.3 Head injuries: concussion/mild traumatic brain injury

The percentage of participants who self-reported sustaining a head injury or concussion whilst on deployment to Iraq (2.1%) and Afghanistan (1.8%) was low. Given that the frequency of self-reported head injuries sustained on deployment to Iraq was higher than the number of combat injuries reported, it implies that not all head injuries were sustained during combat. Head injuries may have been the result of recreation, sport, training, vehicle accident, or as a result of the participant's role (e.g. EOD). It was not clear if the head injuries reported were mild, moderate, or severe in nature. Despite the low prevalence, head injuries or concussions were found to be strongly associated with PTSD, high psychological distress, migraines, and poor general health, but not alcohol misuse.

Lifetime and current estimates of mild traumatic brain injury (mTBI) were also calculated. The authors were able to screen for mTBI based on symptoms. Based on these criteria, there was a much higher percentage of participants who were screened as having had a mTBI at some time in their life, which may or may not have been during deployment or military service. The prevalence of lifetime mTBI was 11%, whilst 9% of participants reported that they continued to experience some symptoms associated with the mTBI. The large difference between head injuries sustained on deployment and the lifetime prevalence of mTBI may be a product of how the information was elicited. There is literature which suggests that when participants are asked to endorse symptoms of mTBI rather than to indicate the occurrence of a head injury or concussion, the prevalence rates are higher [187]. It is possible that people over-report symptoms, or that they fail to identify or remember the occurrence of an event causing concussion.

In this study, it appears that when members were asked firstly about the occurrence of an event (e.g. did you experience an IED, RPG, landmine, vehicle accident, fall), secondly, if they experienced subsequent symptoms associated with mTBI (e.g. loss of consciousness, dazed, confused, amnesia), and finally, if the problems began or became worse after the event, there was a greater likelihood that the member would have reported a positive screen for mTBI. The concern with simply asking individuals if they have had a head injury is that they may not recognise or remember minor incidents which may have led to the concussion. This may also apply to a sub-concussive event, such as falling during training, sport, or recreation, even if it occurred during military service. The inherent association between mTBI and amnesia or loss of consciousness may produce a problem or bias in recall.

Even if a mTBI was not sustained during military service or deployment, there are implications for the veterans and Defence. Given the current findings that head injury/concussion are associated with poorer mental health, this may impact on a member's wellbeing during or post-deployment and their ability to function at an adequate level when in theatre.

The questionnaire was not designed to measure the prevalence of multiple mTBIs/concussions. It would be imperative to obtain this information given emerging research suggests that mTBIs, and particularly multiple mTBIs, may leave some individuals vulnerable to significant mental health problems, cognitive decline, and/or chronic traumatic encephalopathy. There may be implications for deployability or the ability to return to duty. Further, very little has been reported on the effects of multiple concussions sustained in a short time frame.

It is difficult to conduct a thorough investigation on the effects of deployment related head injury and concussion against a background of relatively high pre-deployment prevalence of such injuries and the possibility of negative reporting bias. This is an area which requires much more targeted research.

This chapter investigates associations between MEAO deployment patterns and health subsequent to these deployments. Aspects of deployment include number of deployments, length of deployments and serving status on deployment (regular or reserves deployed on continuous full-time service (CFTS)). Associations with family relationships are considered in addition to mental and general health.

Research question 2:

What exposures are associated with increased risk of morbidity for the group as a whole and for specific MEAO subgroups with identified health disorders?

Key Points

- Associations between number of deployments to the MEAO and subsequent health were weak and generally did not reach statistical significance.
- Associations between cumulative time deployed to the MEAO and subsequent health were weak and generally did not reach statistical significance.
- Associations between duration of most recent deployment to the MEAO and subsequent health were weak and generally did not reach statistical significance.
- About 60% of respondents reported that military commitments had negative impacts on their marriage and children, and this association increased with number of deployments to the MEAO, cumulative time deployed to the MEAO, and the duration of most recent deployment to the MEAO.
- A large number of respondents commenced, resumed or increased smoking while on deployment to the MEAO.

Implications

- Programs and strategies to reduce the impact of military commitments on marriage and children should be developed and implemented.
- Programs and strategies preventing the increase of smoking behaviour on deployment should be considered.

5.1 Introduction

Number and length of military deployments to hostile environments can have detrimental effects on the mental and general health of military personnel [2, 25, 35, 68, 105, 146, 149, 151, 159, 172]. The optimal number and length of deployments are still open to debate and require further investigation.

5.1.1 Number of deployments

Results are inconsistent on the association between number of deployments and subsequent health. This may be due to differences in study design and selected samples. Numerous studies have found no association between number of deployments and health and attributed this finding to 'the healthy soldier effect' (that is, those who are deployed multiple times may be healthier than their never or less frequently deployed counterparts) or 'combat seasoning' (combat-related experiences on deployment may increase the physical and psychological resilience of veterans compared to their less experienced counterparts) [6, 68, 149]. However, other studies reported associations between total number of deployments and alcohol misuse [172], symptoms of posttraumatic stress [25, 146], and increased self-reports of physical symptoms [25]. Further, a US report suggested that military personnel on their third or fourth deployment were at higher risk for mental health problems and work-related problems than those deploying on their first or second deployment [126].

5.1.2 Length of deployments

There is strong evidence pointing to the association between length of deployments and poor health. Several studies have demonstrated associations between length of deployments and alcohol misuse [149, 172], symptoms of posttraumatic stress [2, 149, 159], poor general health [149], depression [2], and self-reports of multiple physical symptoms [149]. Research suggests that the length of time deployed may be more important than the number of deployments, with UK defence members deployed for more than 12 months in a three-year period at increased risk for a variety of adverse health outcomes [68, 149]. A review of literature on the impact of deployment length on the health and wellbeing of military personnel [35] found that spending more than six months away can have adverse effects, with even greater effects on deployed members' health and wellbeing for deployments lasting longer than one year. Further, a US report suggested that work-related problems due to stress, mental health problems and marital separations increased with each subsequent month of deployment [126].

Military deployments have also been associated with reduced relationship satisfaction [5, 55]. Adverse effects on military families, such as marriage breakdown, increased with higher number of deployments and longer deployments [4, 55, 123].

With previous research suggesting possible associations between the number and length of deployments and poorer health, this chapter sheds some light on whether these associations are applicable for Australian MEAO deployments. Methods

5.2 Methods

5.2.1 Measures of deployment patterns, mental health, general health, lifestyle behaviours and social health

In this chapter, deployment patterns were defined by:

- Number of deployments to the MEAO (categorised as: once, twice, and three or more),
- Cumulative time (in months) deployed to the MEAO between 2001-2009 (categorised as: 6 months or less, 7 to 12 months, and 13 months or more), and
- Months deployed in most recent deployment to the MEAO (*categorised as: 4 months or less, 5 to 7 months, and 8 months or more*).

All three variables were calculated based on participant responses to the section 'deployment to MEAO' in the Brief Deployment History Questionnaire. This section included questions on:

- country of deployment,
- operation name,
- year deployment started,
- number of times deployed in the year, and
- total time deployed in months per year.

Mental health measures included:

- posttraumatic stress PTSD Check List civilian version (PCL-C),
- psychological distress Kessler 10 (K10),
- major depressive syndrome Patient Health Questionnaire (PHQ),
- panic syndrome PHQ,
- other anxiety syndrome PHQ,
- suicide ideation 3 items.

General health was measured using:

• Short Form 1- SF1

Life-style behaviours included:

- Alcohol Use Disorders Identification Test AUDIT, and
- smoking.

Social health measures include:

- relationship satisfaction, and
- impact on marriage and children.

For details of these health measures, please refer to Volume II.

5.2.2 Data Analyses

Logistic regression modelling was used to examine the association between the various deployment patterns measures with mental health. All models were adjusted for age (18-24, 25-34, 35-44, 45+ years), rank (Commissioned Officer, Non-commissioned Officer and Other ranks), Service (Army, Navy and RAAF) and sex. Results presented are weighted based on the characteristics of the MEAO nominal roll. For more details on the weighting procedure and on the tools used in the analyses, please refer to Volume II.

5.3 Results

5.3.1 Deployment patterns by Service and other demographics

More than half of the respondents (*weighted percentage* = 50.4%) had deployed to the MEAO more than once. The number of deployments ranged from one to 26, with an average of two deployments. In total, participants had spent an average of 8.5 months deployed to the MEAO, with a range of one to 63 months.

Approximately half of respondents from the Army (*weighted percentage* = 55%) had deployed only once to the MEAO. Compared to the other Services, more participants from the RAAF reported three or more deployments (*weighted percentage* = 29%).

5.3.2 Number of deployments to the MEAO and mental health

There were no statistically significant associations between the number of times deployed and self-reported PTSD symptoms (Table 5.1).

Table 5.1:	Associations between number of times deployed to the MEAO and self-reported symptoms of
	PTSD (N=12135)

		PTSD sy	ymptoms		
Number of MEAO		No (PCL-C<50)	Yes (PCL-C≥50)		
deployments	nª	% ^b	% [°]	OR (95%CI) ^{c,a}	<i>p</i> -value
1	5933	95.4	4.6	1 (Reference)	-
2	3426	95.3	4.7	1.10 (0.92,1.31)	0.285
≥ 3	2776	96.1	3.9	1.02 (0.82,1.25)	0.886

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between the number of times deployed and self-reported psychological distress (Table 5.2).

Table 5.2:Associations between number of times deployed to the MEAO and self-reported psychological
distress (N=12381)

Number of MEAO		No (K10<30)	Yes (K10≥30)		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	6037	95.4	4.6	1 (Reference)	-
2	3516	96.3	3.7	0.86 (0.71,1.03)	0.106
≥3	2828	96.7	3.3	0.85 (0.69,1.04)	0.109

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between number of times deployed and meeting PHQ criteria for major depressive syndrome (Table 5.3).

Table 5.3:Associations between number of times deployed to the MEAO and meeting PHQ criteria for
major depressive syndrome (N=11647)

		Major depressive	syndrome		
Number of MEAO		No	Yes		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5688	96.4	3.6	1 (Reference)	-
2	3296	96.5	3.5	1.01 (0.82,1.24)	0.937
≥ 3	2663	96.8	3.2	0.99 (0.79,1.24)	0.915

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between the number of times deployed and meeting PHQ criteria for panic syndrome (Table 5.4).

Table 5.4:	Associations between number of times deployed to the MEAO and meeting PHQ criteria for
	panic syndrome (N=11866)

		Panic sync	Irome		
Number of MEAO		No	Yes		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5795	96.6	3.4	1 (Reference)	-
2	3350	96.6	3.4	1.07 (0.87,1.31)	0.546
≥3	2721	97.5	2.5	0.84 (0.66,1.07)	0.158

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

There were no statistically significant associations between the number of times deployed and meeting PHQ criteria for other anxiety syndrome (Table 5.5).

other and					
		Other anxiety synd	rome		
Number of MEAO		No	Yes		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5419	97.4	2.6	1 (Reference)	-
2	3118	98.1	1.9	0.77 (0.58,1.03)	0.077
≥3	2581	98.3	1.7	0.74 (0.55,0.99)	0.054

Table 5.5:Associations between number of times deployed to the MEAO and meeting PHQ criteria for
other anxiety syndrome (N=11118)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between the number of times deployed and self-reported thoughts of suicide (Table 5.6).

Table 5.6: Associations between number of times deployed to the MEAO and suicidal thoughts (N=11879)

		Suicide t	houghts		
Number of MEAO		No	Yes		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5790	94.0	6.0	1 (Reference)	-
2	3358	95.0	5.0	0.85 (0.73,1.00)	0.052
≥3	2731	94.6	5.4	0.94 (0.80,1.12)	0.502

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between number of times deployed and self-reported plans for suicide (Table 5.7).

Table 5.7:Associations between number of times deployed to the MEAO and making suicide plans
(N=11873)

		Suicide	e plans		
Number of MEAO		No	Yes		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5785	98.4	1.6	1 (Reference)	-
2	3360	98.9	1.1	0.73 (0.53,1.01)	0.056
≥3	2728	98.6	1.4	0.99 (0.72,1.35)	0.930

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

Respondents who deployed three or more times were 1.9 times more likely to report attempting suicide than those who deployed only once (Table 5.8).

Table 5.8:	Associations between nu	imber of times deplo	yed to the MEAC	D and suicide attempt	s (N=11875
		Suicide att	empts		
Number of M	IEAO	No	Yes		
deployments	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5786	99.7	0.3	1 (Reference)	-
2	3360	99.7	0.3	0.90 (0.48,1.69)	0.738
≥3	2729	99.3	0.7	1.85 (1.13,3.04)	0.015

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Summary of number of deployments and mental health

Overall, there was little evidence of an association between number of times deployed to the MEAO and subsequent poor self-reported mental health.

Respondents who had deployed for three or more times were more likely to report suicide attempts compared to those deployed only once. However, the prevalence was low.

5.3.3 Number of deployments to the MEAO and general health

There were no statistically significant associations between the number of times deployed and general health (Table 5.9).

		Genera			
Number of MEAO		Good	Fair/Poor		
deployments	nª	% ⁰	% [°]	OR (95%CI) ^{c,e}	<i>p</i> -value
1	6129	85.5	14.5	1 (Reference)	-
2	3552	85.7	14.3	1.03 (0.93,1.13)	0.584
≥3	2867	86.5	13.5	0.97 (0.88,1.08)	0.593
		Genera	- Adjusted for PCL_C		
Number of MEAO		Good	Fair/Poor		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
1	6129	85.5	14.5	1 (Reference)	-
2	3552	85.7	14.3	1.01 (0.91,1.12)	0.851
≥3	2867	86.5	13.5	0.98 (0.88,1.09)	0.703

Table 5.9:Associations between number of times deployed to the MEAO and general health (N=12548)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Adjusted for age, gender, Service, rank and PCL-C.

5.3.4 Number of deployments to the MEAO and alcohol use and smoking

Prevalence of harmful drinking was low and no statistically significant association was found with number of deployments (Table 5.10).

Number of MEAO	-	Alcohol	misuse		
Number of IVIEAU		No (AUDIT<20)	Yes(AUDIT≥20)		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5977	97.3	2.7	1 (Reference)	-
2	3464	97.6	2.4	0.98 (0.76,1.26)	0.869
≥3	2800	98.1	1.9	0.83 (0.62,1.12)	0.220

 Table 5.10:
 Associations between number of times deployed to the MEAO and alcohol misuse (N=12241)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Almost half of respondents (weighted percentage = 45.3%) reported smoking at least 100 cigarettes in their lifetime. More than a third of these respondents (weighted percentage = 37.4%) reported smoking more than usual while on deployment. Approximately one in six (weighted percentage =17.2%) reported taking up or restarting smoking while on deployment (Table 5.11).

Table 5.11: Smoking patterns on MEAO deployments (N=5818)

Smoking pattern on deployment	n	% ^a
Did not smoke on deployment	1491	24.3
Smoked less than usual	260	4.5
Smoked the same amount on deployment as when not deployed	977	16.6
Smoked more than usual	2095	37.4
Began/restarted smoking on deployment	995	17.2

^a percentages, weighted for non-response

Respondents who deployed twice were 1.1 times more likely to be a current smoker compared to those deployed only once (Table 5.12).

Table 5.12:Associations between number of times deployed to the MEAO and current smoking status
(N=12068)

		Current	t smoker	_	
Number of MEAO		No	Yes	_	
deployments	n ^a	% ^D	% ⁰	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5895	71.9	28.1	1 (Reference)	-
2	3414	70.9	29.1	1.10 (1.02,1.19)	0.015
≥3	2759	73.7	26.3	0.99 (0.91,1.08)	0.798

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

5.3.5 Number of deployments to the MEAO and relationship satisfaction

Over all, the majority of respondents were either extremely satisfied (*Weighted percentage* = 57.7%) or satisfied (*weighted percentage* = 32%) with their relationship/marriage. There was no association between number of times deployed to the MEAO and satisfaction with relationship/marriage (Table 5.13).

Table 5.15. Relationship satisfaction by number of deployments to the MEAO (N=10575)								
Relationship Satisfaction								
Extremely satisfied/, Dissatisfied/								
Number of		satisfied/neither	Extremely					
MEAO	_	satisfied nor dissatisfied	dissatisfied					
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value			
1	5110	96.1	3.9	1 (Reference)	-			
2	3009	96.3	3.7	0.95 (0.79,1.15)	0.612			
≥ 3	2460	96.3	3.7	0.96 (0.79,1.17)	0.682			

Table 5.13: Relationship satisfaction by number of deployments to the MEAO (N=10579)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

However, 61% of respondents reported that military commitments impacted negatively on their marriage. Respondents deployed twice to the MEAO were 1.2 times more likely to report negative impact on their marriage compared to those deployed only once. Respondents who deployed for three or more times were 1.3 times more likely to report negative impact on their marriage compared to those deployed only once (Table 5.14).

Table 5.14:Impact of military commitment on marriage by number of deployments to the MEAO
(N=11911)

Number of		Impact on Ma	rriage		
MEAO		Positive or no impact	Negative impact		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	5750	40.9	59.1	1 (Reference)	-
2	3401	37.8	62.2	1.17 (1.09,1.26)	<0.001
≥ 3	2760	35.1	64.9	1.34 (1.25,1.45)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Similarly, 59% of respondents reported that military commitment impacted negatively on their children. Respondents who deployed twice to the MEAO were 1.2 times more likely to report negative impact on their children compared to those deployed only once. Respondents who deployed for three or more times were 1.4 times more likely to report negative impact on their children compared to those deployed only once (Table 5.15).

Table 5.15:	Impact of military	commitment on chil	dren by number	of deplo	yments to the	e MEAO	(N=7735)
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Number of		Impact on Chi			
MEAO		Positive or no impact	Negative impact		
deployments	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
1	3682	43.9	56.1	1 (Reference)	-
2	2240	39.2	60.8	1.23 (1.12,1.25)	< 0.001
≥ 3	1813	36.3	63.7	1.36 (1.23,1.51)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

5.3.6 Number of deployments to the MEAO by Role

Number of times deployed to the MEAO varied significantly between roles ($\chi 2 = 993.0$, df = 28, p<0.0001). Those grouped as 'Other combat – Army' (66.0%) most commonly deployed to the MEAO only once. Highest percentage of respondents (47.7%) in 'Maritime operations' deployed three or more times.

Table 3.10. Number of times deployed to the MERO by sen reported roles (N° 10555)							
		Numbe	r of MEAO deploy	ments			
Role	nĎ	1,	2,	≥3,			
		% ^c of group	% ^c of group	% ^c of group			
EOD (Bomb disposal, IED technician) ^a	150	45.0	35.6	19.5			
Combat (e.g. infantry, artillery, etc.) ^a	1740	53.4	28.3	18.3			
Other combat – Navy	946	48.1	27.1	24.8			
Other combat – Army	437	66.0	20.1	14.0			
Other combat –Air Force	205	45.5	32.2	22.3			
Combat support - Navy	454	52.5	24.0	23.4			
Combat support - Army	955	50.9	30.4	18.7			
Combat support - Air Force	866	39.0	33.5	27.5			
Aircrew ^a	477	58.2	26.4	15.5			
Maritime operations ^a	689	27.8	24.5	47.7			
Health ^a	289	57.1	25.5	17.4			
Logistics - Navy	211	47.0	29.2	23.8			
Logistics - Army	1075	59.1	28.1	12.8			
Logistics - Air Force	1005	41.9	30.2	27.9			
Administration and other roles ^a	1454	51.7	29.0	19.3			

Table 5 16 [.]	Number of times deployed to the MEAO by self-reported roles (N=10953))
Table 5.10.	Inditiber of times deployed to the MEAO by self-reported roles (N=10555)	,

^a all three Services ^b Unweighted totals

^c Estimated prevalences, weighted for non-response

Summary of number of deployments to the MEAO and general health, social health and life-style behaviours

The association between number of deployments to the MEAO and subsequent general health was weak and did not reach statistical significance.

Respondents who deployed twice to the MEAO were more likely to report current smoking compared to those deployed only once. More than a third of respondents reported smoking more than usual while on deployment and approximately one in six respondents commenced or restarted smoking while on deployment.

Approximately 60% of respondents reported negative impacts of military commitments on their marriage and children. Those who deployed twice, or three or more times were more likely to report negative impacts compared to those who deployed only once.

5.3.7 Cumulative time deployed to the MEAO from 2001-2009 and mental health

Respondents who deployed for 7-12 months were 1.3 times more likely to report symptoms of PTSD than those who deployed for six months or less (Table 5.17). No significant differences were found between those who deployed for 13 months or more and those who deployed for six months or less.

Table 5.17:	Associations between cumulative time deployed to the MEAO from 2001-2009 and PTSD
	symptoms (N=12390)

	PTSD symptoms				
Cumulative months		No (PCL-C<50)	Yes (PCL-C<50)		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5998	96.0	4.0	1 (Reference)	-
7 - 12	4350	94.8	5.2	1.29 (1.09,1.53)	0.003
≥ 13	2042	95.8	4.2	1.12 (0.90,1.40)	0.304

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between cumulative time deployed to the MEAO and self-reported psychological distress (Table 5.18).

Table 5.18	Associations between cumulative time deployed to the MEAO from 2001-2009 and
	psychological distress (N=12640)

	_	Psychologi	cal distress		
Cumulative months	_	No (K10<30)	Yes (K10≥30)		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	6114	96.0	4.0	1 (Reference)	-
7 - 12	4444	95.8	4.2	1.05 (0.88,1.25)	0.589
≥ 13	2082	96.4	3.6	0.95 (0.76,1.19)	0.651

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between cumulative time deployed to the MEAO and meeting PHQ criteria for major depressive syndrome (Table 5.19).

Table 5.19:	Associations between cumulative time deployed to the MEAO from 2001-2009 and meeting
	PHQ criteria for major depressive syndrome (N=11896)

Major depressive syndrome					
Cumulative months		No	Yes		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5761	96.6	3.4	1 (Reference)	-
7 - 12	4187	96.2	3.8	1.17 (0.97,1.42)	0.107
≥ 13	1948	97.0	3.0	0.96 (0.75,1.23)	0.740

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

There were no significant associations between cumulative time deployed to the MEAO and meeting PHQ criteria for panic syndrome (Table 5.20).

Table 5.20:	Associations between cumulative time deployed to the MEAO from 2001-2009 and meeting
	PHQ criteria for panic syndrome (N=12115)

		(- /			
		Panic syndrome			
Cumulative months		No	Yes		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5860	96.9	3.1	1 (Reference)	-
7 - 12	4257	96.7	3.3	1.07 (0.88,1.30)	0.488
≥ 13	1998	97.0	3.0	1.02 (0.79,1.32)	0.879

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between cumulative time deployed to the MEAO and meeting PHQ criteria for other anxiety syndrome (Table 5.21).

Table 5.21:Associations between cumulative time deployed to the MEAO from 2001-2009 and meeting
PHQ criteria for other anxiety syndrome (N=11354)

		Other anxiety syndrome			
Cumulative months		No	Yes		
deployed to the MEAO	n	%	%	OR (95%CI) ^ª	<i>p</i> -value
<u><</u> 6	5495	97.7	2.3	1 (Reference)	-
7 - 12	3991	97.8	2.2	1.04 (0.81,1.35)	0.757
<u>></u> 13	1868	98.5	1.5	0.72 (0.51,1.02)	0.064

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between cumulative time deployed to the MEAO and self-reports of suicidal thoughts (Table 5.22).

Table 5.22:Associations between cumulative time deployed to the MEAO from 2001-2009 and suicidal
thoughts (N=12125)

		Suicide	e thoughts		
Cumulative months		No	Yes		
deployed to the MEAO	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5855	94.4	5.6	1 (Reference)	-
7 - 12	4267	94.5	5.5	1.03 (0.89,1.20)	0.673
<u>></u> 13	2003	94.8	5.2	0.98 (0.80,1.20)	0.867

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

There were no statistically significant associations between cumulative time deployed to the MEAO and self-reports of making suicide plans (Table 5.23).

Table 5.23:	Associations between cumulative time deployed to the MEAO from 2001-2009 and making
	suicide plans (N=12119)

		Su	icide plans		
Cumulative months		No	Yes		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5852	98.5	1.5	1 (Reference)	-
7 - 12	4265	98.6	1.4	0.94 (0.70,1.26)	0.678
<u>></u> 13	2002	99.1	0.9	0.67 (0.43,1.04)	0.072

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between cumulative time deployed to the MEAO and self-reports of suicide attempts (Table 5.24).

Table 5.24:Associations between cumulative time deployed to the MEAO from 2001-2009 and suicide
attempts (N=12121)

		Suicide attempts			
Cumulative months		No	Yes		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5856	99.7	0.3	1 (Reference)	-
7 - 12	4262	99.6	0.4	1.33 (0.77,2.28)	0.309
<u>></u> 13	2003	99.5	0.5	1.44 (0.78,2.66)	0.246

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Summary for cumulative time deployed to the MEAO from 2001-2009 and mental health

Overall, there was little evidence of an association between cumulative time deployed to the MEAO and subsequent self-reported poor mental health.

Respondents who deployed for 7-12 months were more likely to report symptoms of PTSD compared to those deployed for six months or less. However, the effect size was small.

5.3.8 Cumulative time deployed to the MEAO from 2001-2009 and general health

There were no statistically significant differences in general health between respondents who had deployed for 7-12 months, or 13 months or more and those deployed for six months or less (Table 5.25).

Table 5.25:Associations between cumulative time deployed to the MEAO between 2001-2009 and general
health (N=12813)

			General health		
Cumulative time		Good	Fair/Poor		
deployed the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
<u><</u> 6	6204	85.7	14.3	1 (Reference)	-
7 - 12	4493	85.2	14.8	1.05 (0.96,1.15)	0.312
<u>></u> 13	2116	86.7	13.3	0.93 (0.83,1.04)	0.219
			General health	Adjusted for	
Cumulative time		Good	Fair/Poor	PCL-C	
deployed the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
<u><</u> 6	6204	85.7	14.3	1 (Reference)	-
7 - 12	4493	85.2	14.8	0.99 (0.90,1.09)	0.835
<u>></u> 13	2116	86.7	13.3	0.91 (0.81,1.03)	0.148

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Adjusted for age, gender, Service, rank and PCL-C.

^e Estimated odds ratios, weighted for non-response

5.3.9 Cumulative time deployed to the MEAO from 2001-2009 and alcohol use and smoking

There were no statistically significant differences in harmful drinking between respondents who had deployed for 7-12 months, or 13 months or more and those deployed for six months or less (Table 5.26).

Associations between cumulative time deployed to the MEAO between 2001-2009 and alcohol

misuse (N=	12493)		,		
			Alcohol misuse		
Cumulative month	No AUDIT<20(Yes (AUDIT≥20)		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	6045	97.7	2.3	1 (Reference)	-
7 - 12	4387	97.2	2.8	1.14 (0.90,1.45)	0.287
>13	2061	97.8	2.2	0.91 (0.67,1.24)	0.558

^a Unweighted totals

Table 5.26:

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Respondents who deployed for 7-12 months or 13 months or more were 1.2 times more likely to report current smoking compared to those deployed for six months or less (Table 5.27).

Table 5.27:Associations between cumulative time deployed to the MEAO between 2001-2009 and current
smoking status (N=12314)

	Current smoker				
Cumulative months		No	Yes		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5957	74.3	25.7	1 (Reference)	-
7 - 12	4316	70.0	30.0	1.17 (1.09,1.26)	<0.001
<u>></u> 13	2041	69.6	30.4	1.19 (1.09,1.30)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

5.3.10 Cumulative time deployed to the MEAO from 2001-2009 and relationship satisfaction

There were no statistically significant associations between cumulative time deployed to the MEAO and relationship/marriage satisfaction (Table 5.28).

Table 5.28:Relationship/marriage satisfaction by cumulative time deployed to the MEAO from 2001-2009
(N=10797)

		Relatio	onship satisfaction		
		Extremely			
		satisfied/	Dissatisfied/		
		satisfied/	extremely		
		Neither satisfied	dissatisfied		
Cumulative months		nor dissatisfied			
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5228	96.5	3.5	1 (Reference)	-
7 - 12	3791	96.0	4.0	1.15 (0.96,1.37)	0.127
<u>></u> 13	1778	96.9	3.9	1.11 (0.90,1.38)	0.337

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Respondents who deployed for 7-12 months were 1.3 times more likely to report negative impacts of military commitments on their relationship or marriage compared to those deployed for six months or less. Respondents who deployed for 13 months or more were 1.5 times more likely to report negative impacts on their marriage/relationship compared to those deployed for six months or less (Table 5.29).

Table 5.29:	Impact of military commitment on marriage by cumulative time deployed to the MEAO from
	2001-2009 (N=12162)

		Impact on relat	tionship/marriage		
		Positive or no	Negative impact		
Cumulative months		impact	Negative impact		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	5836	42.6	57.4	1 (Reference)	-
7 - 12	4289	36.2	63.8	1.28 (1.20,1.37)	<0.001
<u>></u> 13	2037	33.0	67.0	1.45 (1.34,1.58)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Similarly, Respondents who deployed for 7-12 months were 1.4 times more likely to report negative impacts of military commitments on their children compared to those deployed for six months or less. Respondents who deployed for 13 months or more were 1.5 times more likely to report negative impacts on their children compared to those deployed for six months or less (Table 5.30).

Table 5.30:Impact of military commitment on children by cumulative time deployed to the MEAO from
2001-2009 (N=7906)

		l	mpact on children		
		Positive or No	Negative Impact		
Cumulative months		Impact	Negative impact		
deployed to the MEAO	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 6	3812	45.3	54.7	1 (Reference)	-
7 - 12	2792	37.6	62.4	1.37 (1.25,1.50)	< 0.001
<u>></u> 13	1302	34.3	65.7	1.51 (1.35,1.69)	< 0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

5.3.11 Cumulative time deployed to the MEAO from 2001-2009 by role

Cumulative time deployed to the MEAO varied significantly between roles ($\chi 2 = 1025.6$, df = 28, p<0.0001). Almost half of respondents (47.1%) in the 'combat' role deployed for 7-12 cumulative months from 2001-2009. Those who deployed, mainly in 'health' (61.3%) and 'aircrew' (60.8%) reported the highest percentages of deployments of six cumulative months or less (Table 5.31).

		Cumulative m	onths deployed	to the MEAO
Role	nª	<u><</u> 6	7 - 12	≥ 13
		% ^b of group	% ^b of group	% ^b of group
EOD (Bomb disposal, IED technician)*	155	36.4	41.5	22.1
Combat (e.g. infantry, artillery, etc.)*	1807	31.9	47.1	21.0
Other combat – Navy	971	52.6	28.7	18.7
Other combat – Army	446	45.7	42.4	11.9
Other combat –Air Force	213	49.0	36.9	14.1
Combat support - Navy	457	58.6	23.7	17.7
Combat support - Army	977	38.8	42.8	18.4
Combat support - Air Force	876	50.0	32.4	17.6
Aircrew*	475	60.8	32.2	7.0
Maritime operations*	693	45.0	32.4	22.6
Health*	288	61.3	25.9	12.8
Logistics - Navy	218	54.4	26.2	19.4
Logistics - Army	1109	49.6	39.1	11.3
Logistics - Air Force	1009	57.1	30.4	12.5
Administration and other roles*	1496	57.0	30.7	12.3

|--|

*all three Services

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

Summary of cumulative time deployed to the MEAO and general health, social health and life-style behaviours

The association between cumulative time deployed to the MEAO and subsequent general health was weak and did not reach statistical significance.

Respondents who deployed for 7-12 months, or 13 months or more to the MEAO were more likely to report current smoking behaviour compared to those deployed for six months or less. However, the effect sizes were small.

With regards to impact of military commitment on relationship/marriage and children, respondents who deployed for 7-12 months, or 13 months or more were significantly more likely to report negative impacts on both compared to those deployed for six months or less.

5.3.12 Most recent deployment to the MEAO

All Services

Respondents who deployed for five to seven months on their most recent deployment were 1.2 times more likely to report symptoms of PTSD compared to those deployed for four months or less. Respondents who deployed for eight months or more on their most recent deployment were 1.4 times more likely to report symptoms of PTSD compared to those deployed for four months or less (Table 5.32).

Table 5.32:Associations between duration of most recent deployment to the MEAO and PTSD symptoms
(N=12287)

Duration of most recent	_	PTSD syn	nptoms		
MEAO deployment	_	No (PCL-C<50)	Yes (PCL-C<50)		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	5262	96.1	3.9	1 (Reference)	-
5 - 7	6110	95.3	4.7	1.24 (1.05,1.45)	0.012
<u>></u> 8	915	94.9	5.1	1.41 (1.07,1.87)	0.016

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Adjusted for age, gender, Service and rank

d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between duration of most recent deployment and self-reported psychological distress (Table 5.33).

Table 5.33:	Associations between duration of most recent deployment to the MEAO and self-reported
	psychological distress (N=12535)

Duration of most recent		Psychologi	cal distress		
MEAO deployment		No (K10<30)	Yes (K10≥30)		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	5383	96.3	3.7	1 (Reference)	-
5 - 7	6221	96.0	4.0	1.07 (0.90,1.26)	0.441
<u>></u> 8	931	95.6	4.4	1.21 (0.90,1.62)	0.201

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Adjusted for age, gender, Service and rank

d Estimated odds ratios, weighted for non-response

There were no statistically significant associations between duration of most recent deployment and meeting PHQ criteria for major depressive syndrome (Table 5.34).

Table 5.34:	Associations between duration of most recent deployment to the MEAO and meeting PHQ
	criteria for major depressive syndrome (N=11799)

Duration of most recent		Major dep	ressive syndrome		
MEAO deployment		No	Yes		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	5057	96.8	3.2	1 (Reference)	-
5 - 7	5857	96.4	3.6	1.13 (0.94,1.35)	0.211
<u>></u> 8	885	97.0	3.0	0.99 (0.70,1.40)	0.949

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

Australian Army

For Australian Army only, no statistically significant associations were found between total months deployed in the most recent deployment and self-reported symptoms of PTSD (Table 5.35).

(Anny) (N-	-3733)				
Duration of most recent			PTSD symptoms		
MEAO deployment	_	No (PCL-C<50)	Yes (PCL-C<50)		
(months)	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	1748	95.2	4.8	1 (Reference)	-
5 - 7	3210	94.3	5.7	1.19 (0.94,1.50)	0.144
<u>></u> 8	775	94.8	5.2	1.10 (0.79,1.53)	0.582

Table 5.35:Associations between duration of most recent deployment to the MEAO and PTSD symptoms
(Army) (N=5733)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

No statistically significant associations were found between total months deployed in the most recent deployment and self-reported psychological distress for Army respondents (Table 5.36).

Table 5.36:Associations between duration of most recent deployment to the MEAO and psychological
distress (Army) (N=5861)

Duration of most recent	_	Psyc	hological distress		
MEAO deployment		No (K10<30)	Yes (K10≥30)		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,a}	<i>p</i> -value
<u><</u> 4	1801	95.7	4.3	1 (Reference)	-
5 - 7	3272	95.5	4.5	1.04 (0.81,1.33)	0.761
<u>></u> 8	788	95.6	4.4	1.00 (0.71,1.42)	0.995

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

No statistically significant associations were found between total months deployed in the most recent deployment and meeting PHQ criteria for major depressive syndrome for Army respondents (Table 5.37).

Table 5.37:	Associations between duration of most recent deployment to the MEAO and meeting PHQ
	criteria for major depressive syndrome (Army) (N=5479)

Duration of most recent		Major dep	ressive syndrome		
MEAO deployment		No	Yes		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,a}	<i>p</i> -value
<u><</u> 4	1665	96.8	3.2	1 (Reference)	-
5 - 7	3063	96.1	3.9	1.27 (0.95,1.71)	0.106
<u>></u> 8	751	96.8	3.2	1.09 (0.72,1.64)	0.696

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

Royal Australian Navy (RAN)

Navy respondents who had deployed for eight months or more on their most recent deployment were 2.4 times more likely to report symptoms of PTSD than those who had deployed for four months or less (Table 5.38). No statistically significant differences were found between those deployed for five to seven months and those who deployed for four months or less.

symptoms (R					
			PTSD symptoms		
Duration of most recent		No (PCL-C<50)	Yes (PCL-C<50)		
MEAO deployment to the	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	924	94.8	5.2	1 (Reference)	-
5 - 7	1728	96.3	3.7	0.72 (0.50,1.02)	0.066

90.6

9.4

1.71 (0.82,3.56)

0.154

Table 5.38: Associations between duration of most recent deployment to the MEAO and self-reported PTSD

¹Unweighted totals

<u>></u>8

^b Estimated prevalences, weighted for non-response

66

^e Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

No statistically significant associations were found between total months deployed in the most recent deployment and self-reported psychological distress for RAN respondents (Table 5.39).

Table 5.39:	Associations between duration of most recent deployment to the MEAO and self-reported
	psychological distress (RAN) (N=2772)

Duration of most recent	_	Psyc	chological distress		
MEAO deployment		No (K10<30)	Yes (K10≥30)		
(months)	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	945	95.4	4.6	1 (Reference)	-
5 - 7	1758	96.3	3.7	0.80 (0.56,1.16)	0.241
<u>></u> 8	69	92.8	7.2	1.60 (0.73,3.53)	0.242

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

No statistically significant associations were found between total months deployed in the most recent deployment and meeting PHQ criteria for major depressive syndrome for RAN respondents (Table 5.40).

Table 5.40: Associations between duration of most recent deployment to the MEAO and meeting PHQ. criteria for major depressive syndrome (RAN) (N=2607)

Duration of most recent	_	Major dep	ressive syndrome		
MEAO deployment		No	Yes		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	881	95.7	4.3	1 (Reference)	-
5 - 7	1664	96.5	3.5	0.83 (0.55,1.23)	0.350
<u>></u> 8	82	97.0	3.0	0.67 (0.22,2.08)	0.491

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

Royal Australian Air Force (RAAF)

No statistically significant associations were found between total months deployed in the most recent deployment and self-reported symptoms of PTSD for RAAF respondents (Table 5.41).

Table 5.41:Associations between duration of most recent deployment to the MEAO and PTSD symptoms
(RAAF) (N=3836)

	50507				
Duration of most recent			PTSD symptoms		
MEAO deployment		No (PCL-C<50)	Yes (PCL-C<50)		
(months)	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	2590	97.5	2.5	1 (Reference)	-
5 - 7	1172	97.1	2.9	1.08 (0.76,1.53)	0.667
<u>></u> 8	74	100.0	0.0	-	-

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

No statistically significant associations were found between total months deployed in the most recent deployment and self-reported psychological distress for RAAF respondents (Table 5.42).

Table 5.42: Associations between duration of most recent deployment to the MEAO and psychological distress (RAAF) (N=3902)

Duration of most recent		Psych	nological distress		
MEAO deployment		No (K10<30)	Yes (K10≥30)		
(months)	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	2637	97.1	2.9	1 (Reference)	-
5 - 7	1191	97.0	3.0	0.95 (0.70,1.30)	0.747
<u>></u> 8	74	98.8	1.2	0.39 (0.11,1.41)	0.152

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

No statistically significant associations were found between total months deployed in the most recent deployment and meeting PHQ criteria for major depressive syndrome for RAAF respondents (Table 5.43).

Table 5.43:	Associations between duration of most recent deployment to the MEAO and meeting PHQ
	criteria for major depressive syndrome (RAAF) (N=3713)

Duration of most recent	_	Major dep	ressive syndrome		
MEAO deployment		No	Yes		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,a}	<i>p</i> -value
<u><</u> 4	2511	97.1	2.9	1 (Reference)	-
5 - 7	1130	97.2	2.8	0.96 (0.68,1.37)	0.830
<u>></u> 8	72	100.0	0.0	-	-

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

Duration of most recent deployment to the MEAO and family

There were no statistically significant associations between duration of most recent deployment to the MEAO and relationship/marriage satisfaction (Table 5.44)

relationship/marriage satisfaction (N=10703)						
Relationship satisfaction						
		Extremely				
		satisfied/	Dissatisfied/			
		satisfied/	extremely			
Duration of most recent		neither satisfied	dissatisfied			
MEAO deployment	_	nor dissatisfied				
(months)	n ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value	
<u><</u> 4	4678	96.4	3.6	1 (Reference)	-	
5 - 7	5253	96.1	3.9	1.01 (0.85,1.21)	0.904	
<u>></u> 8	772	95.7	4.3	1.29 (0.93,1.79)	0.133	

Table 5.44:Associations between duration of most recent deployment to the MEAO and
relationship/marriage satisfaction (N=10703)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Respondents who deployed for eight months or more on their most recent deployment were 1.3 times more likely to report negative impact of military commitment on their marriage compared to those deployed for four months or less (Table 5.45).

Table 5.45:	Associations between duration of most recent deployment to the MEAO and impact of military
	commitment on marriage (N=12051)

Impact on relationship/marriage					
Duration of most recent MEAO deployment		Positive or no impact	Negative impact		
(months)	nª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
<u><</u> 4	5181	41.3	58.7	1 (Reference)	-
5 - 7	5992	38.1	61.9	1.01 (0.95,1.07)	0.822
<u>></u> 8	878	32.2	67.8	1.30 (1.15,1.48)	0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank

^d Estimated odds ratios, weighted for non-response

Respondents who deployed for eight months or more on their most recent deployment were 1.4 times more likely to report negative impacts of military commitments on their children compared to those deployed for four months or less (Table 5.46).

Table 5.46:Associations between duration of most recent deployment to the MEAO and impact of military
commitment on children (N=7845)

Impact on Children					
Duration of most recent MEAO deployment		Positive or no impact	Negative impact		
(months)	nª	% ⁰	% ^b	OR (95%CI) ^{c,a}	<i>p</i> -value
<u><</u> 4	3451	43.5	56.5	1 (Reference)	-
5 - 7	3837	39.8	60.2	1.09 (1.00,1.19)	0.052
<u>></u> 8	557	34.4	65.6	1.42 (1.20,1.69)	0.001

a Unweighted totals

b Estimated prevalences, weighted for non-response

c Adjusted for age, gender, Service and rank

Duration of most recent deployment to the MEAO by Role

'Maritime operations' (77.0%) and 'Logistics – Air Force' (75.2%) were mostly deployed for four months or less on the most recent deployment. Respondents in the 'Combat' role (18.6%) reported the highest percentage of deployments lasting eight months or more (Table 5.47).

Table 5.47. Duration of most recent deployment to the MEAO by sen reported roles (N=11002)					
		Duration of most recent MEAO deployment			
	a —		(months)		
Role	n	<u><</u> 4	5 - 7	≥8	
		%" of group	% [°] of group	%" of group	
EOD (Bomb disposal, IED technician)*	152	30.7	50.8	18.5	
Combat (e.g. infantry, artillery, etc.)*	1772	23.6	57.7	18.6	
Other combat – Navy	968	30.2	67.4	2.4	
Other combat – Army	441	20.0	70.1	10.0	
Other combat –Air Force	215	51.6	47.6	0.8	
Combat support - Navy	457	34.2	63.8	1.9	
Combat support - Army	961	27.9	57.3	14.9	
Combat support - Air Force	872	57.8	37.9	4.3	
Aircrew*	472	51.9	45.0	3.1	
Maritime operations*	685	77.0	21.4	1.6	
Health*	290	32.6	66.0	1.5	
Logistics - Navy	215	41.2	56.0	2.9	
Logistics - Army	1097	34.1	53.7	12.2	
Logistics - Air Force	1004	75.2	23.7	1.0	
Administration and other roles*	1481	47.3	48.1	4.5	

Table 5.47: Duration of most recent deployment to the MEAO by self-reported roles (N=11082)

*all three Services

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

Summary of most recent deployment to the MEAO

Over all, respondents who deployed for five to seven months or eight months or more were significantly more likely to report symptoms of PTSD compared to those deployed for four months or less on their most recent deployment to the MEAO.

RAN respondents who had deployed for eight months or more on their most recent deployment were significantly more likely to report symptoms of PTSD compared to RAN respondents who deployed for four months or less. However, other results suggest that the duration of most recent deployment to the MEAO was not significantly associated with subsequent mental health.

Duration of most recent deployment to the MEAO was associated with impact of military commitment on marriage and children. Respondents deployed for eight months or more were more likely to report negative impacts on their marriage and children compared to those deployed for four months or less.

5.4 Discussion

There was little evidence of a strong association between deployment patterns to the MEAO and subsequent self-reported poor health of ADF members. Even though associations were found between number of times deployed to the MEAO and self-reported suicide attempts (deployed for three or more times compared to once), and current smoking behaviour (deployed twice compared to once); between cumulative time deployed and symptoms of PTSD (deployed for 7-12 months compared to 6 months or less), and current smoking behaviour (deployed for 5-7 months or less); and between most recent deployment and symptoms of PTSD (deployed for 5-7 months compared to 4 months or less). Effect sizes for these associations were generally small.

Current findings with ADF members are supported by some existing literature which do not suggest a consistent association between higher frequency of deployment and subsequent poor health of Defence force members [6, 68, 149]. However, the lack of reliable associations between longer duration of deployment and subsequent poor health contradicts most literature in the area [2, 35, 149, 159, 172]. Current findings may be attributed to 'the healthy soldier effect' (that is, those who are deployed multiple times may be healthier than their never or less frequently deployed counterparts) or 'combat seasoning' (combat-related experiences on deployment may increase the physical and psychological resilience of veterans compared to their less experienced counterparts) [6, 149]. Also, the association between deployment patterns and subsequent health may be confounded by deployment experiences such as exposures to combat. This requires further examination.

Respondents consistently reported negative impacts of military commitments on their relationship/marriage and children. Number of deployments (deployed twice, or three or more times compared to once); cumulative time deployed (deployed for 7-12 months, or 13 months or more compared to 6 months or less); and duration of most recent deployment (deployed for 8 months or more compared to 4 months or less) were all associated with reports of negative consequences for deployed members' marriage and children. These findings are consistent with existing literature which suggests that higher number of deployments and longer deployments are associated with adverse effects for military families [4, 55, 123]. Thus, it may be worthwhile for the Department of Defence to consider strategies and programs to combat negative consequences of deployment on military families.

Smoking on deployment may be an area which the Department of Defence can target in order to reduce potential long term negative health effects. More than a third of respondents reported smoking more than usual while on deployment and one in six respondents commenced or restarted smoking while on deployment. Programs and strategies preventing the increase of smoking behaviour of ADF members should be considered and implemented.

Over all, deployment patterns to the MEAO are not significantly associated with self-reported poor mental and general health. However, the impact of military commitment on marriage and children, and smoking behaviour while on deployment warrants attention.

This chapter describes self-reported (i.e. perceived) exposures to specific environmental hazards encountered by ADF members who deployed to the MEAO, including: respiratory irritants; chemical and radiational hazards; local food and water; and occupational noise. Associations between these perceived environmental exposures and self-reported physical and psychological health are examined.

Research questions 1 and 2:

- Are there links between exposures to specific chemical, physical, biological and psychological exposures encountered during the MEAO deployment and physical and psychological health outcomes?
- What exposures are associated with increased risk of morbidity for the group as a whole and for specific MEAO subgroups with identified health disorders?

Key Points:

- Respiratory exposures were associated with respiratory illnesses, as expected, but effect sizes were modest.
- Eating local food was associated with both short-term gastrointestinal symptoms and long-term bowel problems.
- Exposure to noise at close range and for extended periods, without protection, was associated with every hearing-related condition investigated, and also with claims for compensation.
- Findings across several exposures were different between Iraq and Afghanistan.

Implications:

- Protection from environmental exposures (especially those that may affect the respiratory tract) is important to reduce the risk of ongoing respiratory problems.
- Future research should be considered to investigate causal pathways between respiratory exposures and respiratory conditions.
- Eating local food should be discouraged as this was associated with higher risk for a variety of gastrointestinal problems and bowel conditions.
- Serving members who experience gastrointestinal symptoms on deployment could be screened for bowel disorder as an early intervention/prevention measure.
- Future research should be considered to investigate links between gastrointestinal symptoms on deployment and long-term bowel conditions.
- The use of hearing protection should be encouraged.
- Dissemination of factual information about potential hazards in the MEAO may reduce anxiety about perceived health threats among deployed members.
- Policies and interventions may need to be tailored to specific deployment locations (i.e. Iraq or Afghanistan) rather than generally to the MEAO.

6.1 Introduction and research aims

A review of hazards in the MEAO [61, 62], conducted prior to survey commencement, identified a number of potential environmental hazards, such as airborne particulates (including soil-based dust, diesel dust, industrial emissions), quality of water supply, food hygiene, vector borne disease (e.g. malaria, leishmaniasis), burnt waste (associated with potential exposure to dioxins), ionising radiation (but no evidence of dust contaminated by depleted uranium), unexploded ordinance (UXO), non-ionising radiation (e.g., communications equipment), noise (high levels associated with aircraft operations and generators) and waste disposal.

A variety of respiratory health problems have been documented in US, UK and Australian service members who deployed to Iraq and/or Afghanistan, including asthma [17, 66, 177], bronchitis [66], bronchiolitis [3], acute eosinophilic pneumonia [160], and other non-specific respiratory symptoms [66, 84, 86, 155]. Additionally, some of the most common environmental concerns identified by MEAO veterans have included smoke from oil fires, pollutants from incinerated waste, and particulate matter from sand and/or dust [3, 86, 160]. Despite these concerns about respiratory health, direct associations between environmental air quality and respiratory ailments have not been well documented in the current literature.

Although less prevalent than concerns about environmental air quality, concerns about chemical, biological, radiological and nuclear (CBRN) exposures have been expressed by some US and UK MEAO veterans [55, 66, 86]. Moreover, reporting an experience related to chemical/biological warfare has been associated with increased reporting of PTSD symptoms and diagnoses [66]. Similarly, it has been suggested that reported exposure to depleted uranium is linked with symptoms of post-concussion syndrome [55], a psychiatric condition that has been related to PTSD [37]. An association between CBRN exposures and respiratory health has also been suggested by the prevalence of constrictive bronchiolitis documented in some US soldiers following deployments to Iraq; this rare respiratory disorder has been related to inhalation of toxic chemicals [145]. In ADF members who deployed to Bougainville and Timor Leste, associations have also been found between chemical exposures and tinnitus [113]. However, to the best of our knowledge, Australian forces in the MEAO have not been exposed to CBRN warfare, biological agents or 'directed energy' weapons.

In the MEAO Hazard report, [61, 62], food hygiene was identified as a potential risk factor for gastrointestinal symptoms and concerns about gastrointestinal problems have been documented in a number of reports on MEAO veterans [18, 31, 86, 155]. Gastrointestinal symptoms and concerns are the most frequently cited health issues encountered during deployments to Iraq and to Afghanistan [31, 86, 155], yet investigations into related exposures and associated health outcomes are lacking in the military health literature.

Exposure to occupational noise is common during military deployments and has been suggested as the major source of hearing impairment among veterans [43]. Studies on MEAO veterans in the US [85] and UK [29] have reported on the occupational noise encountered during deployments to the MEAO and the prevalence of ear injuries and hearing impairment.

Accurate objective assessment of all hazards in the MEAO was not possible because of various deficiencies in documentation (e.g., lack of hazard information from several regions and establishments, availability of "one-off" ADF hazard reports with no information on changes in exposures over time, assessments not collected for research purposes, limited assessment of industrial or other specific waste hazards in the known areas) [62]. As a result, the self-report data in the MEAO Census Study provides additional information on some of the perceived environmental exposures that ADF members may have faced during deployments to Iraq and Afghanistan. It also suggests that even perceived threats to health may escalate anxiety associated with these potential exposures.

Previous research has demonstrated associations between environmental exposures and health. The current chapter adds to this knowledge and provides insight into the experiences of ADF members deployed to the MEAO.

6.2 Methods

6.2.1 Measures

The following measures were analysed in this chapter (for a detailed description of scales and cut-offs used in the analyses, please refer to *Chapter 2: Methods, Measures and Response and Volume II*)

Demographic variables:

• Demographic details: Brief deployment history questionnaire and Health Questionnaire Mental and general health:

- General health: Short Form 1 (SF1)
- Posttraumatic Stress Disorder (PTSD): PTSD Check List Civilian version (PCL-C)

Physical health:

- Respiratory health and asthma-like symptoms: European Community Respiratory Health Survey (ECRHS)
- Medically diagnosed conditions: 23 items
- Recent health symptoms: Health Symptom Checklist (HSCL)
- Health on deployment: Sick parade
- Health on deployment: Diarrhoea or vomiting
- Military injury compensation: 1 item

Exposures:

• Environmental exposures: Hazard checklist

6.2.2 Data Analyses

Respiratory exposures

Nine respiratory exposures were grouped using principal components analysis. Different groupings were obtained from the Iraq and Afghanistan deployments. The three groups obtained from the Iraq data were used for the analyses because the grouping of 'smoke, dusts and fibres', 'exhaust, fuels and fumes' and 'chemicals, solvents and sprays' had *a priori* plausibility. These respiratory exposures were categorised as 'minimal', 'low', 'moderate' and 'high' based on the quartiles of the scale scores in each of these groupings.

Each of the logistic regression models used to estimate associations between respiratory exposures and health included the standard adjustments along with adjustment for current smoking status (smoker, non-smoker) and exposure to others' cigarette smoke in confined areas on deployment (ever, never). Separate analyses were undertaken for the Iraq and Afghanistan deployments.

Hazardous material exposures

Logistic regression models were used to assess associations between reported chemical, biological and radiological exposures and physical and mental health.

When assessing associations between environmental exposures and symptoms of PTSD (PCL-C) or doctor diagnosed PTSD, traumatic exposures were adjusted for using quartiles of the scale which measured frequency of different types of combat exposures (Chapter 4).
Food and water exposures

The prevalence of reported gastrointestinal symptoms from the symptoms checklist was compared between Iraq and Afghanistan deployments. These groups of symptoms were derived from the Rome III Diagnostic Criteria for Functional Gastrointestinal Disorders. The symptoms were grouped as follows:

- Oesophageal symptoms: severe chest pain, lump in throat
- Gastroduodenal symptoms: flatulence or burping, indigestion
- Nausea and vomiting symptoms: nausea, vomiting
- Bowel symptoms: stomach bloating, constipation, diarrhoea, feeling that your bowel movement is not finished, and changeable bowel function (mixture of diarrhoea/constipation)
- Abdominal pain: stomach cramps
- Weight change (not included in Rome III documentation): unintended weight gain greater than 4 kg, unintended weight loss greater than 4 kg.

Drinking from local taps or wells and eating local food were used as exposures in logistic regression models to assess the association with gastrointestinal problems. The logistic regression models were fitted separately for Iraq and Afghanistan deployments and for exposures to food and water.

Noise exposures

Being close to loud noises without hearing protection and exposure to noise for extended periods of time without hearing protection were used as exposures in logistic regression models to assess the association with hearing and balance problems. The two exposures were included in the same model to determine which was most strongly associated with hearing problems. The logistic regression models were fitted separately for Iraq and Afghanistan deployments.

6.3 Results

In this section, tables are presented for the first analysis of association as an example. Tables detailing subsequent analyses can be found in *Volume II*. Prevalences are reported for respondents in Iraq, Afghanistan and in supporting areas, but association analyses were only carried out for respondents who were deployed in country.

Results from logistic regressions in each section are presented in tables that summarise noteworthy associations (odds ratio \geq 1.2 and statistical significance of *p* <0.05).

All logistic regressions were weighted for non-response (refer to *Volume II* for details), and only include respondents who deployed in Iraq and Afghanistan, not those deployed to supporting areas.

Please also note that: The number of participants in each category may not add up to the overall number of participants due to incomplete data.

6.3.1 Respiratory exposures and health

Prevalence of respiratory exposures

The prevalence of respiratory exposures varied between Iraq and Afghanistan, and by whether respondents were deployed in country or to supporting areas (see Figures 6.1 to 6.10). 'Smoke' and 'inhalation of fine dust or fibres' were reported much more frequently by those deployed in Afghanistan. Respondents deployed in Iraq reported slightly higher prevalence of 'exposure to solvents'. The prevalence of other respiratory exposures was generally similar in Iraq and Afghanistan. In both Iraq and Afghanistan, the most frequently-cited respiratory hazard was 'dust storms', closely followed by 'diesel exhaust'.

It should be noted that while respondents deployed to supporting areas generally reported lower prevalence of respiratory exposures, there was still a moderate level of exposure on several variables, such as 'dust storms', and higher exposure to 'aircraft fumes'.





Comparing between Services, those in the Army generally reported the most respiratory exposures, whereas those in the Navy were least likely to report these exposures. However, Navy members did report the highest prevalence of 'exposure to solvents', and RAAF members had the highest prevalence of exposures to 'aircraft fumes'. In Afghanistan, those in the army reported the highest prevalence across all respiratory exposures (see Tables 6.1 and 6.2).

in Iraq, by Se	rvice.		
Exposure	Navy (N = 2285)	Army (N = 2921)	RAAF (N = 709)
(In Iraq)	n (%)ª	n (%) ^ª	n (%) [°]
Smoke from fires / smoke fr	om waste incineration / c	oil fire smoke	
Never	1561 (69.2)	562 (19.4)	285 (40.7)
Once	191 (8.7)	155 (5.2)	56 (8.1)
2-4 times	279 (12.2)	626 (21.5)	151 (21.8)
5-9 times	88 (4.0)	355 (12.1)	53 (7.4)
10+	132 (5.9)	1183 (41.8)	155 (22.0)
Dust storms	· · ·	· · ·	· · ·
Never	537 (25.4)	119 (4.1)	46 (6.5)
Once	272 (12.1)	111 (3.8)	45 (6.9)
2-4 times	834 (36.5)	697 (24.1)	218 (31.2)
5-9 times	322 (13.4)	619 (21.1)	158 (21.7)
10+	299 (12.7)	1351 (47.0)	239 (33.6)
Inhalation of fine dust or fib	res (e.g., driving vehicles,	near operating aircraft, dan	naged buildings)
Never	1365 (61.7)	323 (10.8)	118 (16.4)
Once	128 (5.8)	64 (2.3)	23 (3.4)
2-4 times	312 (13.4)	412 (14.0)	137 (20.1)
5-9 times	101 (4 0)	347 (11 7)	67 (9 6)
10+	336 (15.1)	1740 (61.2)	357 (50.5)
Others' cigarette smoke in a	n enclosed recreational o	r work environment	337 (30.3)
Never	1245 (54.2)	900 (30 0)	373 (52 5)
Once	50 (2 2)	54 (1 9)	16 (2.4)
2-4 times	292 (12 3)	389 (13.1)	106 (15 0)
5-9 times	134 (6.0)	265 (9.0)	100 (13.0)
10+	540 (25 3)	1283 (46.1)	162 (23 2)
Diesel exhaust	540 (25.5)	1203 (40.1)	102 (25.2)
Never	575 (25.6)	230 (7 7)	182 (25.2)
Once	59 (2.6)	47 (1.6)	11 (1 8)
2-4 times	359 (2.0)	321 (10 5)	124 (17 5)
5_{-9} times	164 (6.8)	262 (8.6)	74 (10.0)
10x	1104 (0.8)	203 (8.0)	212 (11.5)
Aviation marine or automo		2033 (71.0)	515 (44.5)
Never	780 (33 5)	816 (27 5)	278(28.7)
	85 (2.8)	77 (2.6)	276(36.7)
2-4 times	210 (14 0)	/7 (2.0)	21 (3.1) 111 /16 <i>A</i>)
E 0 timos	140 (5 0)	211 (10.7)	
10x	140 (J.J) 022 (12 8)	1210 (42.1)	238 (33.6)
Aircraft fumos	<u> </u>	1210 (43.1)	238 (33.0)
Novor	780 (25.0)	AA1 (15 A)	100/17/
Onco	760 (55.0) 80 (2.0)	441 (15.4)	125 (17.4)
2.4 times	05 (3.5) 401 (17 3)	95 (3.3)	10 (2.8)
2-4 times	401 (17.3)	655 (50.0) 404 (16.0)	149 (21.0)
5-9 times	188 (7.9)	494 (10.9)	84 (12.4) 227 (46.4)
10+	/99 (55.9)	1013 (34.4)	527 (40.4)
Novor	1560 (68.0)	1721 (60.0)	E12 (74 O)
Oneo	1509 (00.0)	1/21 (00.0)	312 (74.0) 26 (2 7)
2.4 times	74 (3.3)	151 (5.3)	20 (3.7)
2-4 times	199 (8.9)	430 (15.4)	66 (9.7) 20 (4.2)
5-9 times	89 (3.9)	1/6 (6.2)	30 (4.3)
10+	317 (15.9)	374 (13.2)	58 (8.2)
Solvents (e.g., thinners, seal	er, paints)	4540 /54 0)	
Never	911 (37.1)	1519 (51.3)	495 (70.7)
	91 (4.2)	161 (5.7)	30 (4.3)
2-4 times	462 (20.1)	583 (20.6)	86 (12.6)
5-9 times	215 (10.0)	202 (7.2)	34 (4.6)
10+	575 (28.6)	414 (15.1)	53 (7.8)
Live in an area recently spra	yed or togged with chemi	cais	
Never	2057 (91.5)	1376 (48.0)	418 (60.4)
Once	58 (2.5)	172 (6.1)	46 (6.3)
2-4 times	65 (2.7)	499 (17.2)	81 (11.6)
5-9 times	23 (1.0)	220 (7.8)	37 (5.5)
10+	50 (2.4)	609 (20.9)	113 (16.3)

Table 6.1: Frequencies for self-reported exposure to respiratory irritants among ADF personnel deployed

a unweighted totals, weighted percentages; percentages may not add up to 100 due to rounding, and categories may not sum up to the total due to missing information

in Afghanistan, by Service							
Exposure	Navy (N = 144)	Army (N = 3261)	RAAF (N = 755)				
(In Afghanistan)	n (%)	n (%)	n (%)				
Smoke from fires / smoke f	from waste incineration / o	oil fire smoke					
Never	77 (55.4)	554 (16.4)	281 (37.5)				
Once	5 (4.7)	145 (4.3)	62 (8.6)				
2-4 times	22 (15.6)	583 (17.7)	146 (19.7)				
5-9 times	7 (5.2)	321 (10.1)	55 (7.9)				
10+	28 (19.1)	1635 (51.4)	195 (26.3)				
Dust storms							
Never	37 (25.5)	306 (9.4)	72 (9.6)				
Once	15 (11.5)	188 (5.7)	52 (7.1)				
2-4 times	36 (27.1)	887 (27.3)	249 (33.7)				
5-9 times	15 (10.1)	622 (19.2)	125 (17.1)				
10+	37 (25.8)	1242 (38.4)	242 (32.5)				
Inhalation of fine dust or fi	bres (e.g., driving vehicles,	near operating aircraft, dan	naged buildings)				
Never	54 (39.1)	362 (10.7)	136 (18.3)				
Once	7 (5.3)	71 (2.1)	20 (2.9)				
2-4 times	17 (13.4)	413 (12.4)	127 (17.2)				
5-9 times	11 (7.4)	323 (9.7)	52 (7.2)				
10+	49 (34.8)	2069 (65.1)	404 (54.4)				
Others' cigarette smoke in	an enclosed recreational o	r work environment					
Never	69 (47.1)	1129 (33.7)	397 (52.9)				
Once	6 (5.3)	76 (2.4)	28 (4.1)				
2-4 times	24 (16.9)	444 (13.4)	84 (11.3)				
5-9 times	7 (5.3)	238 (7.4)	36 (4.9)				
10+	32 (25.4)	1352 (43.1)	195 (26.7)				
Diesel exhaust							
Never	42 (30.2)	322 (9.5)	159 (21.3)				
Once	6 (4.5)	52 (1.6)	21 (2.8)				
2-4 times	20 (13.9)	392 (11.5)	124 (16.7)				
5-9 times	12 (8 3)	300 (8 9)	65 (8 8)				
10+	58 (43.0)	2175 (68.5)	372 (50.4)				
Aviation, marine, or autom	otive fuels	21/3 (0013)	3,2(30.1)				
Never	66 (45.1)	956 (28.9)	321 (42.9)				
Once	6 (4.7)	94 (2.9)	28 (3.7)				
2-4 times	18 (13.0)	532 (16.4)	102 (14 0)				
5-9 times	15 (10.6)	346 (10.6)	35 (4.7)				
10+	34 (26.6)	1304 (41.2)	254 (34.7)				
Aircraft fumes							
Never	42 (30.4)	522 (16.4)	126 (17.0)				
Once	4 (3.3)	123 (4.0)	26 (3.4)				
2-4 times	24 (17 2)	844 (26.2)	130 (17 3)				
5-9 times	21(15.2)	480 (14.8)	62 (8 4)				
10+	47 (33.6)	1268 (38.7)	396 (53.9)				
Toxic industrial chemicals							
Never	105 (73 8)	2060 (63.0)	605 (81 9)				
Once	2 (1.3)	164 (5.2)	20 (3.0)				
2-4 times	8 (6.8)	442 (14.4)	54 (7.1)				
5-9 times	7 (5.4)	166 (5.3)	15 (2.1)				
10+	16 (12.7)	373 (12.0)	44 (6.0)				
Solvents (e.g., thinners, sea	aler, paints)	0,0(110)					
Never	92 (61 0)	1703 (51 1)	556 (74 8)				
Once	8 (5 6)	156 (4 9)	36 (4 9)				
2-4 times	11 (8 8)	1591(18.9)	77 (10 6)				
5-9 times	9 (8 7)	228 (7 3)	30 (4 3)				
10+	18 (15 9)	546 (17 8)	20 (4.5) 29 (5 <i>A</i>)				
Live in an area recently spr	aved or fogged with chemi	cals	33 (3.4)				
Never	114 (82 6)	1948 (60.2)	580 (78 6)				
Once	9 (7 2)	199 (6 3)	34 (4 7)				
2-4 times	7 (5 1)	495 (15 4)	53 (7 3)				
5-9 times	4 (2 5)	164 (5 2)	28 (3 7)				
10+	3 (2.6)	412 (12 8)	42 (5 7)				
	= (=:•)	(,	.= (0.77				

Table 6.2: Frequencies for self-reported exposure to respiratory irritants among ADF personnel deployed

a unweighted totals, weighted percentages; percentages may not add up to 100 due to rounding, and categories may not sum up to the total due to missing information

Respiratory exposures and asthma

For respondents deployed in Iraq, 11% (n = 619) reported asthma-like symptoms. Those who reported exposure to 'smoke and dust', 'fumes and fuels' or 'chemicals' were significantly (1.5 to 2.4 times) more likely to report symptoms of asthma (Table 6.3, below). For 'smoke and dust', the likelihood of reporting symptoms increased as the level of exposure increased.

Doctor-diagnosed asthma was reported by 3% of members (n = 193). Those reporting exposures to 'smoke and dust' and to high levels of 'chemicals' were significantly (1.6 to 1.9 times) more likely to report doctordiagnosed asthma. No statistically significant association was found between doctor-diagnosed asthma and exposure to 'fumes and fuels' (Table 6.14, in *Volume II*).

For respondents deployed <u>in Afghanistan</u>, 10% (n = 390) reported asthma-like symptoms. High levels of exposure to 'smoke and dust' and to 'fumes and fuels' were associated with significantly higher risk (1.6 to 1.7 times) of asthma-like symptoms; for 'chemicals', the elevated risk (1.6 to 1.8 times) was significant at both moderate and high levels of exposure (Table 6.3).

Doctor-diagnosed asthma was reported by 2% of respondents (n = 69). No statistically significant associations were found between doctor-diagnosed asthma and any of the respiratory exposures (Table 6.14, in *Volume II*).

Smoke & dust		Asthma-like symptoms						
exposure	OR (95% CI) ^c	<i>p-</i> value	Iraq % ^b	Afghanistan % ^b	<i>p</i> -value	OR (95% CI) ^c		
Minimal	1 (Reference)		7.7	6.8		1 (Reference)		
Low	1.52 (1.19, 1.95)	0.001	10.8	8.7	0.286	1.25 (0.83, 1.90)		
Moderate	1.76 (1.35, 2.29)	< 0.001	11.3	6.9	0.758	0.94 (0.62, 1.42)		
High	2.43 (1.87, 3.15)	< 0.001	14.4	12.3	0.013	1.61 (1.10, 2.34)		
Fumes & fuels e	xposure							
Minimal	1 (Reference)		6.6	6.7		1 (Reference)		
Low	1.54 (1.16, 2.04)	0.003	10.3	9.1	0.286	1.23 (0.84, 1.78)		
Moderate	1.49 (1.13, 1.97)	0.005	10.7	8.0	0.884	1.03 (0.71, 1.49)		
High	2.32 (1.77, 3.05)	< 0.001	15.6	13.7	0.003	1.73 (1.20, 2.48)		
Chemical expos	ure							
None	1 (Reference)		7.0	6.4		1 (Reference)		
Minimal	1.59 (1.03, 2.46)	0.036	10.9	11.0	0.057	1.68 (0.99, 2.85)		
Moderate	1.46 (1.15, 1.87)	0.002	10.8	10.8	0.004	1.59 (1.16, 2.17)		
High	1.97 (1.60, 2.41)	<0.001	14.1	12.2	<0.001	1.80 (1.40, 2.31)		

Table 6.3:Association between respiratory exposures and self-reported asthma-like symptoms, as
measured by the ECRHS, for those deployed in Iraq ($N^a = 5677$) and in Afghanistan ($N^a = 3975$)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

 $^{\rm c}$ Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

Respiratory exposures and bronchitis

For deployments in Irag, 4% (*n* = 223) reported being diagnosed with bronchitis by a doctor. Exposure to high levels of 'smoke and dust' and high levels of 'chemicals' was associated with significantly higher risk (1.6 to 1.8 times) of bronchitis (Table 6.15, in *Volume II*). The increased risk associated with exposure to 'fumes and fuels' was not statistically significant.

For deployments in Afghanistan, 2% (n = 88) reported being diagnosed with bronchitis by a doctor. The risk of bronchitis significantly increased (3 to 4 times) even at low levels of exposure to 'fumes and fuels' (Table 6.15, in *Volume II*). No statistically significant associations were found between bronchitis and exposure to 'smoke and dust' or to 'chemicals'.

Respiratory exposures and sinus problems

For deployments in Iraq, 12% (n = 679) reported being diagnosed with sinus problems by a doctor. Respondents reporting exposure to 'smoke and dust', 'fumes and fuels' and 'chemicals' were more likely (1.2 to 1.6 times) to report sinus problems; this association was statistically significant at moderate and high levels of exposure to 'chemicals' and to 'smoke and dust', and at high levels of exposure to 'fumes and fuels' (Table 6.16, in *Volume II*).

For deployments in Afghanistan, 7% (n = 307) reported being diagnosed with sinus problems by a doctor. The risk of sinus problems increased (1.5 to 2.7 times) as the level of exposure to 'fumes and fuels' increased, and was statistically significant at moderate and high levels (Table 6.16, in *Volume II*). No statistically significant associations were found between sinus problems and exposures to 'chemicals' or to 'smoke and dust'.

Respiratory exposures and hay fever

For deployments <u>in Iraq</u>, 12% (n = 736) reported being diagnosed with hay fever by a doctor. Exposure to 'smoke and dust' at any level was associated with significantly greater risk (1.3 to 1.6 times) of hay fever (Table 6.17, in *Volume II*). High levels of exposure to 'fumes and fuels' and to 'chemicals' were associated with significantly greater risk (1.2 to 1.5) of hay fever.

For deployments in <u>in Afghanistan</u>, 7% (*n* = 294) reported being diagnosed with hay fever by a doctor. The risk of hay fever increased (1.6 to 2.2 times) as the level of exposure to 'fumes and fuels' increased, and was statistically significant for moderate and high levels of exposure (Table 6.17, in *Volume II*). Moderate and high exposure to 'chemicals' was associated with significantly greater risk (1.4 to 1.5 times) of hay fever. There was no statistically significant association between hay fever and exposure to 'smoke and dust'.

Summary: respiratory exposures and health

For deployments to Iraq, 91% of respondents reported exposure to 'smoke and dust'; 90% reported exposure to 'fumes and fuels'; and 67% reported exposure to 'chemicals'. For deployments to Afghanistan, 96% of respondents reported exposure to 'smoke and dust'; 93% reported exposure to 'fumes and fuels'; and 60% reported exposure to 'chemicals'. Respiratory illnesses were reported by approximately 4-12% of respondents, with sinus problems and hay fever the most prevalent.

Associations were found between almost all of the respiratory exposures and respiratory health, and the pattern of results varied between Iraq and Afghanistan (Table 6.4). 'Smoke and dust' exposures were associated with every respiratory condition in Iraq, but only asthma symptoms in Afghanistan. Exposure to 'fumes and fuels' was associated with every respiratory condition except asthma in Afghanistan, and everything except asthma and bronchitis in Iraq. 'Chemical' exposures were associated with every respiratory condition in Iraq. 'Chemical' exposures were associated with every respiratory condition in Iraq. 'Chemical' exposures were associated with every respiratory condition in Iraq. 'Chemical' exposures were associated with every respiratory condition in Iraq. And only asthma symptoms and hay fever in Afghanistan.

exp	osules and health				
	Asthma symptoms	Asthma	Bronchitis	Sinus problems	Hay fever
Smoke and dust					
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Afghanistan	\checkmark	x	×	x	×
Fumes and fuels					
Iraq	\checkmark	x	x	\checkmark	\checkmark
Afghanistan	\checkmark	x	\checkmark	\checkmark	\checkmark
Chemicals					
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Afghanistan	\checkmark	×	x	×	\checkmark

Table 6.4: Summary table of noteworthy associations (OR \geq 1.2 and p<0.05) between respiratory exposures and health

 \checkmark = a significant association was found

× = no significant association was found

6.3.2 Exposure to hazardous materials and health

Prevalence of exposures to hazardous materials

The most frequently reported (perceived) exposure to hazardous material was being 'close to non-ionising radiation' (Table 6.5, below). In deployments to Iraq and Afghanistan, more than 35% reported this exposure 10 or more times. Exposures to other hazardous materials were far less common, with at least 90% reporting having never been exposed to these materials.

Table 6.5:Prevalence of self-reported exposure to hazardous materials among ADF personnel deployed in
Iraq and Afghanistan and to supporting areas

	Irag Afghanista			istan
	Out	In	In	Out
	(N=3012)	(N=5915)	(N=4160)	(N=2530)
Hazards	n ^a (%) ^b	n [°] (%) ^b	n² (%) ^b	n ^a (%) ^b
Close to sources of non-ionising radiation	I			
Never	1854 (62.1)	2167 (35.8)	1431 (33.3)	1507 (62.8)
Once	54 (1.9)	136 (2.3)	73 (1.8)	37 (1.7)
2-4 times	264 (9.3)	554 (9.4)	395 (9.6)	156 (6.7)
5-9 times	85 (3.0)	312 (5.3)	228 (5.6)	76 (3.3)
10+	697 (23.7)	2649 (47.1)	1978 (50.0)	575 (25.5)
Contact with chemical or biological weap	ons			
Never	2941 (99.5)	5660 (97.3)	4030 (98.1)	2339 (99.6)
Once	8 (0.3)	60 (1.0)	23 (0.6)	5 (0.2)
2-4 times	3 (0.1)	61 (1.0)	21 (0.6)	3 (0.2)
5-9 times	1 (0.1)	6 (0.1)	7 (0.2)	0 (0.0)
10+	0 (0.0)	27 (0.5)	21 (0.5)	0 (0.0)
Contact with depleted uranium shell casi	ngs			
Never	2911 (98.2)	5320 (91.1)	3957 (96.4)	2327 (98.9)
Once	19 (0.6)	180 (3.3)	34 (0.8)	10 (0.4)
2-4 times	22 (0.8)	201 (3.7)	69 (1.8)	9 (0.5)
5-9 times	6 (0.2)	43 (0.8)	14 (0.4)	2 (0.1)
10+	3 (0.1)	61 (1.1)	22 (0.6)	2 (0.1)
Exposed to ionising radiation or radioacti	ve materials			
Never	2849 (96.7)	5362 (92.6)	3784 (92.5)	2279 (97.1)
Once	24 (0.8)	100 (1.8)	62 (1.7)	11 (0.5)
2-4 times	31 (1.1)	122 (2.2)	76 (1.9)	19 (0.9)
5-9 times	3 (0.1)	30 (0.5)	18 (0.5)	5 (0.2)
10+	33 (1.2)	155 (2.8)	136 (3.5)	28 (1.3)
Use an NBC suit (not for training purpose	s)			
Never	2878 (96.8)	5627 (96.4)	4084 (99.6)	2330 (99.0)
Once	57 (2.2)	100 (1.8)	10 (0.3)	8 (0.4)
2-4 times	24 (0.9)	63 (1.2)	3 (0.1)	7 (0.4)
5-9 times	5 (0.2)	10 (0.2)	0 (0.0)	2 (0.1)
10+	0 (0.0)	29 (0.5)	1 (0.02)	4 (0.2)

^a Unweighted totals

^b Estimated prevalences weighted for non-response

Exposures to hazardous materials and general health

For deployments to <u>Iraq</u>, 17% (n = 919) reported their health as 'fair' or 'poor'. General health was significantly (1.3 to 1.6 times) more likely to be rated as 'fair' or 'poor' by those reporting exposure to hazardous materials, although for 'non-ionising radiation' this was only statistically significant at high levels of exposure (Table 6.6, below, and Table 6.18 in *Volume II*).

For deployments to <u>Afghanistan</u>, 13% (*n* = 515) rated their health as 'fair' or 'poor'. General health was significantly more likely to be rated as 'fair' or 'poor' by those who reported exposure to 'ionising radiation/radioactive materials' and 'use of an NBC suit' (Table 6.4, below, and Table 6.18 in *Volume II*). No statistically significant associations were found between ratings of general health and the other three hazardous materials, possibly due to small numbers.

	measured by the SF-1, for those deployed in Iraq (N = 5915) and in Afghanistan (N = 4160)						
Non-ionising			General he	alth rated fair o	or poor		
radiation	OR (95% CI) ^c	<i>p-</i> value	Iraq % ^b A	fghanistan % ^b	<i>p</i> -value	OR (95% CI) ^c	
Never	1 (Reference)	-	14.2 1	1.7	-	1 (Reference)	
1-9 times	1.14 (0.93, 1.40)	0.209	16.5 1	4.3	0.168	1.21 (0.92, 1.58)	
10 + times	1.25 (1.06, 1.46)	0.007	18.6 1	3.4	0.359	1.11 (0.89, 1.37)	
Contact with che	emical/biological w	eapons					
Never	1 (Reference)	-	16.3 1	2.7	-	1 (Reference)	
At least once	1.52 (1.07, 2.17)	0.020	27.7 2	6.8	0.117	1.75 (0.83, 3.67)	
Contact with de	pleted uranium she	II casings					
Never	1 (Reference)	-	15.5 1	2.9	-	1 (Reference)	
At least once	1.63 (1.30, 2.04)	< 0.001	27.7 1	6.0	0.870	0.97 (0.50, 1.89)	
Exposed to ionis	ing radiation/radio	active ma	terials				
Never	1 (Reference)	-	15.7 1	2.5	-	1 (Reference)	
At least once	1.53 (1.20, 1.94)	< 0.001	25.9 1	8.5	0.039	1.98 (1.40, 2.81)	
Use of an NBC suit (not for training)							
Never	1 (Reference)	-	16.2 1	2.8	-	1 (Reference)	
At least once	1.53 (1.11, 2.11)	0.010	26.2 5	7.0	0.022	1.57 (0.33, 7.37)	

Table 6.6:Association between exposure to hazardous materials and self-rated general health, as
measured by the SF-1, for those deployed in Iraq (N = 5915) and in Afghanistan (N = 4160

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

Exposures to hazardous materials and PTSD

For deployments <u>in Iraq</u>, 6% (*n* = 308) reported symptoms of PTSD. PTSD symptoms were significantly (1.5 to 2 times) more likely to be reported by those who reported exposure to any hazardous materials, except for the 'use of an NBC suit' (Table 6.19, in *Volume II*). For 'non-ionising radiation', the association with PTSD was only statistically significant at high levels of exposure.

Doctor-diagnosed PTSD was reported by 8% (*n* = 417) of members. Doctor-diagnosed PTSD was significantly (1.4 to 2.3 times) more likely to be reported by those who reported 'contact with non-ionising radiation', 'depleted uranium shell casings', 'ionising radiation/ radioactive materials' and 'use of an NBC suit' (Table 6.20, in *Volume II*). No associations were found between doctor-diagnosed PTSD and reported 'contact with chemical/biological weapons'.

For deployments in Afghanistan, 4% (*n* = 159) reported symptoms of PTSD. PTSD symptoms were significantly (2 to 7.5 times) more likely to be reported by those who reported 'contact with chemical or biological weapons', 'uranium shell casings' or 'use of an NBC suit' (Table 6.19, in *Volume II*). No statistically significant associations were found between PTSD and exposure to any of the other hazardous materials.

Doctor-diagnosed PTSD was reported by 6% (n = 203) of members. Those who reported 'contact with depleted uranium shell casings' or 'use of an NBC suit' were significantly (2 to 5.3 times) more likely to report being diagnosed with PTSD by a doctor. No statistically significant associations were found between doctor-diagnosed PTSD and any of the other hazardous materials (Table 6.20, in *Volume II*).

Exposures to hazardous materials and migraines

For deployments <u>in Iraq</u>, 8% (n = 433) reported being diagnosed with migraines by a doctor. Migraines were significantly (1.4 to 2.1 times) more likely for those who reported exposure to any hazardous material, although for 'non-ionising radiation', the association was only statistically significant at the highest level of exposure (Table 6.21, in *Volume II*).

For deployments in Afghanistan, 4% (*n* = 155) reported being diagnosed with migraines by a doctor. Respondents who reported 'use of an NBC suit' were significantly (4.6 times) more likely to report migraines. No statistically significant associations were found between migraines and any of the other hazardous materials (Table 6.21, in *Volume II*).

Exposures to hazardous materials and hearing

For deployments <u>in Iraq</u>, 16% (*n* = 888) reported hearing loss diagnosed by a doctor. Doctor-diagnosed hearing loss was more likely (1.3 to 1.7 times) for those who reported exposure to 'non-ionising radiation', 'ionising radiation/radioactive materials', 'contact with depleted uranium shell casings' and 'use of an NBC suit' (Table 6.22, in *Volume II*). The increased risk found for reported 'contact with chemical/biological weapons' was not statistically significant.

Ringing in the ears was reported by 33% of respondents (n = 1887). Ringing in the ears was significantly more likely (1.3 to 1.6 times) to be reported by those who reported 'exposure to non-ionising radiation', 'ionising radiation/radioactive materials' or 'contact with depleted uranium shell casings' (Table 6.23, in *Volume II*). No statistically significant associations were found between ringing in the ears and exposure to the remaining two hazardous materials.

For deployments <u>in Afghanistan</u>, 12% (*n* = 499) reported hearing loss diagnosed by a doctor. Doctor-diagnosed hearing loss was more likely (1.9 times) for those who reported 'contact with depleted uranium shell casings' and high levels of 'non-ionising radiation' (Table 6.22, in *Volume II*). The increased risk associated with the remaining three hazardous materials was not statistically significant.

Ringing in the ears was reported by 31% of respondents (n = 1229). Ringing in the ears was significantly more likely (1.6 to 2.2 times) for those who reported contact with 'non-ionising radiation' or 'chemical/biological weapons' (Table 6.23, in *Volume II*). The increased risk found for the remaining three hazardous materials was not statistically significant.

Exposures to hazardous materials and asthma

For deployments <u>in Iraq</u>, 11% (n = 619) reported asthma-like symptoms. Asthma-like symptoms were significantly (1.2 to 2.2 times) more likely to be reported by those who reported exposure to any of the hazardous materials, although the association with 'non-ionising radiation' was only statistically significantly at the highest level of exposure (Table 6.24, in *Volume II*).

For deployments <u>in Afghanistan</u>, 10% (*n* = 390) reported asthma-like symptoms. Those who reported exposure to 'non-ionising radiation', 'ionising radiation/radioactive materials' or 'contact with depleted uranium shell casings' were significantly (1.3 to 1.9 times) more likely to report asthma-like symptoms (Table 6.24, in *Volume II*). The increased risk found for the remaining two hazardous materials was not statistically significant.

Summary: exposures to hazardous materials and health

For deployments in Iraq, 64% of respondents reported exposure to 'non-ionising radiation', 3% reported 'contact with chemical/biological weapons', 9% reported 'contact with depleted uranium shell casings', 7% reported 'exposure to ionising radiation/radioactive materials' and 4% reported 'using an NBC suit'. For deployments in Afghanistan, 67% reported exposure to 'non-ionising radiation', 2% reported 'contact with chemical/biological weapons', 4% reported 'contact with depleted uranium shell casings', 8% reported 'exposure to ionising radiation/radioactive materials' and 0.4% reported 'using an NBC suit'.

The prevalence of symptoms and conditions reported by respondents was approximately 4-33%, with ringing in the ears most common.

The pattern of results varied between Iraq and Afghanistan (Table 6.7, below).

In Iraq, contact with 'non-ionising radiation' was significantly associated with every health condition. In Afghanistan, it was significantly associated with hearing loss, ringing in the ears and asthma.

In Iraq, self-reported contact with 'chemical or biological weapons' was significantly associated with general health, PTSD symptoms, migraines and asthma. In Afghanistan, there were significant associations with PTSD symptoms and ringing in the ears.

In Iraq, self-reported 'contact with depleted uranium' was significantly associated with every health condition. In Afghanistan, it was significantly associated with PTSD symptoms, doctor-diagnosed PTSD and asthma.

In Iraq, self-reported 'exposure to ionising radiation/ radioactive materials' was significantly associated with every health condition. In Afghanistan, it was significantly associated with general health, PTSD symptoms and asthma.

In Iraq, 'use of an NBC suit' was significantly associated with general health, doctor-diagnosed PTSD, migraines, hearing loss and asthma. In Afghanistan, it was significantly associated with general health, PTSD symptoms, doctor-diagnosed PTSD and migraines.

110	2211000311101		cultif						
	General	PTSD	PTSD		Hearing	Ringing in			
	health	(PCL-C)	(diagnosis)	Migraines	loss	ears	Asthma		
Non-ionising radiation									
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		
Afghanistan	x	x	×	x	\checkmark	\checkmark	\checkmark		
Contact with che	mical or biol	ogical weap	ons						
Iraq	\checkmark	\checkmark	x	\checkmark	×	×	\checkmark		
Afghanistan	x	\checkmark	×	x	×	\checkmark	x		
Contact with dep	leted uraniu	m shell casi	ngs						
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		
Afghanistan	x	\checkmark	\checkmark	×	\checkmark	×	\checkmark		
Exposed to ionisi	ng radiation	or radioacti	ve materials						
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		
Afghanistan	\checkmark	\checkmark	×	x	×	×	\checkmark		
Use of NBC suit (not for training)									
Iraq	\checkmark	x	\checkmark	\checkmark	\checkmark	x	\checkmark		
Afghanistan	\checkmark	\checkmark	\checkmark	\checkmark	x	x	x		

Table 6.7:Summary table of noteworthy associations (OR \geq 1.2 and p<0.05) between exposures to
hazardous materials and health

 \checkmark = a significant association was found

× = no significant association was found

6.3.3 Food and water intake and health

Prevalence of exposures to local food and water

The prevalence of drinking local water was low, and was similar between Iraq and Afghanistan deployments (Table 6.8, below). Eating local food was more prevalent for respondents in supporting areas than for those deployed in Iraq and Afghanistan. Respondents deployed in Iraq ate local food more frequently, yet more respondents in Afghanistan reported the food available had a negative impact on their deployment.

Table 6.8:	Frequencies for self-reported exposure to local food and water for ADF personnel deployed in
	Iraq and Afghanistan and to supporting areas

		Afghanistan		
	Out	In	In	Out
	(N=3012)	(N=5915)	(N=4160)	(N=2530)
Exposure	n ^ª (%) ^º	n ^ª (%) [¤]	n ^ª (%) [¤]	n [°] (%) [°]
Drinking from local taps or wells				
Never	2791 (93.7)	5298 (90.4)	3750 (91.0)	2203 (93.3)
Once	29 (1.0)	85 (1.4)	68 (1.7)	27 (1.1)
2-4 times	67 (2.3)	224 (4.0)	128 (3.2)	41 (1.9)
5-9 times	13 (0.4)	61 (1.0)	43 (1.1)	17 (0.7)
10+	78 (2.6)	190 (3.2)	118 (2.9)	75 (3.0)
Eating local food				
Never	753 (25.8)	2330 (39.3)	1918 (45.0)	888 (38.1)
Once	126 (4.3)	325 (5.6)	285 (7.0)	92 (3.7)
2-4 times	586 (19.7)	1175 (20.1)	771 (19.2)	362 (15.3)
5-9 times	445 (14.9)	605 (10.5)	403 (10.4)	285 (11.8)
10+	1072 (35.3)	1417 (24.4)	731 (18.4)	741 (31.1)
Did the food available have a negative	impact on your depl	oyment?		
Never	2593 (86.8)	4762 (81.0)	3119 (75.5)	2139 (90.3)
Once	122 (4.2)	338 (5.8)	264 (6.5)	83 (3.5)
2-4 times	153 (5.3)	421 (7.3)	371 (9.3)	91 (3.7)
5-9 times	32 (1.1)	120 (2.1)	113 (2.9)	16 (0.7)
10+	80 (2.7)	210 (3.8)	232 (5.9)	43 (1.8)

^a Unweighted totals

^b Prevalences weighted for non-response

The prevalence of gastrointestinal symptoms recorded in the last month was higher for respondents deployed in Iraq (5.3 to 38.9%) compared to those deployed in Afghanistan (4.8 to 34.2%) (Table 6.25, in *Volume II*). Regarding supporting areas, the prevalence of symptoms reported by those supporting Iraq was lower than respondents deployed in Iraq. It was the opposite for Afghanistan – respondents in supporting areas reported more symptoms than those deployed in Afghanistan, with the exception of diarrhoea/vomiting and weight change.

The prevalence of diarrhoea which prevented the respondent from carrying out their duties or requiring an IV drip was higher in Afghanistan (45.0% and 13.6% respectively) than in Iraq (32.0% and 8.7% respectively). However, more respondents deployed in Afghanistan reported that their symptoms resolved after exiting MEAO (67.0% compared to 52.9% for Iraq). (Table 6.26, in *Volume II*).

Exposure to local food and water and reported diarrhoea/vomiting on deployment

For deployments <u>in Iraq</u>, 15% (n = 822) reported symptoms of diarrhoea or vomiting. Those who drank from local taps or wells were significantly (2.4 times) more likely to report diarrhoea/vomiting on deployment (Table 6.9, below, and Table 6.27 in *Volume II*). Those who ate local food even once were significantly (1.7 to 2.2 times) more likely to report diarrhoea/vomiting, and the likelihood increased with the number of exposures.

For deployments <u>in Afghanistan</u>, 25% (*n* = 943) reported symptoms of diarrhoea or vomiting. Those who drank from local taps or wells were significantly (1.8 times) more likely to have experienced diarrhoea/vomiting while on deployment (Table 6.7, below, and Table 6.27 in *Volume II*). Those who ate local food more than once were significantly (1.5 to 1.9 times) more likely to report diarrhoea/vomiting, and the likelihood increased with the number of exposures.

Table 6.9:	Association between exposures to local food and water and admission to sick bay for
	diarrhoea/vomiting in Iraq (N = 5915) and in Afghanistan (N = 4160)

Drank from	Sick parade for diarrhoea/vomiting						
local taps/wells	OR (95% CI) ^c	<i>p-</i> value	Iraq % ^b Afghanistan %	^b <i>p-</i> value	OR (95% CI) ^c		
Never	1(Reference)		14.1 24.0		1 (Reference)		
At least once	2.41 (1.99, 2.93)	<0.001	28.1 37.2	<0.001	1.76 (1.40, 2.20)		
Ate local food							
Never	1 (Reference)		10.8 19.3		1 (Reference)		
Once	1.68 (1.24, 2.27)	0.001	18.4 23.4	0.110	1.17 (0.88, 1.55)		
2-4 times	1.69 (1.39, 2.05)	< 0.001	17.3 27.9	< 0.001	1.47 (1.22, 1.78)		
5-9 times	2.07 (1.63, 2.64)	< 0.001	19.3 31.9	< 0.001	1.69 (1.33, 2.13)		
10+ times	2.17 (1.80, 2.62)	< 0.001	19.2 <mark>34.1</mark>	<0.001	1.93 (1.60, 2.33)		

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

 $^{\circ}$ Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

Exposure to local food and water and reported bowel disorder

For deployments in Iraq, 12% (n = 673) reported bowel disorder diagnosed by a doctor. Those who drank from local taps or wells were significantly (two times) more likely to report doctor-diagnosed bowel disorder (Table 6.28, in *Volume II*). Eating local food was associated with significantly higher risk (1.3 to 1.5 times) of bowel disorder even at low levels of exposure.

For deployments in Afghanistan, 8% (n = 335) of respondents reported doctor-diagnosed bowel disorder. Those who drank from local taps or wells were significantly more likely (1.6 times) to be diagnosed with bowel disorder (Table 6.28, in *Volume II*). There was no association between bowel disorder and eating local food.

Sick parade attendance on deployment and diagnosed bowel disorder

The percentage who attended sick parade on deployment for diarrhoea and vomiting was higher in Afghanistan (25.2%) than in Iraq (15.4%), yet the number reporting a doctor diagnosed bowel disorder was slightly higher for those returning from Iraq (11.9% compared to 8.3% for Afghanistan).

The prevalence of subsequently-diagnosed bowel disorder was approximately double for those who attended sick parade for diarrhoea/vomiting (20.3% in Iraq and 12.1% in Afghanistan), compared to those who was diagnosed with bowel disorder but did not attend sick parade on deployment (9.0% for Iraq and 6.9% for Afghanistan) (Table 6.29, in *Volume II*).

Summary: local food and water exposure and health

For deployments in Iraq, 10% reported drinking from local taps or wells, 61% reported eating local food and 19% said the food available had a negative impact on their deployment. For deployments to Afghanistan, 9% reported drinking from local taps or wells, 55% reported eating local food and 25% said the food available had a negative impact on their deployment.

Drinking from local taps or wells was significantly associated with diarrhoea and vomiting on deployment and doctor diagnosed bowel disorders on return to Australian in both Iraq and Afghanistan veterans.

In both Iraq and Afghanistan, those who ate more local food were more likely to attend sick parade for cases of diarrhoea and vomiting. In Afghanistan, there was no association between eating local food and doctordiagnosed bowel disorder on return to Australia. However, for Iraq deployments, those who ate local food even once were more likely to have been diagnosed with bowel disorder on return to Australia.

Those who attended sick parade for diarrhoea/vomiting while on deployment were more likely to be diagnosed with bowel disorder after returning to Australia compared to those who did not attend sick parade for these symptoms.

6.3.4 Noise exposures and health

Prevalence of noise exposures

Exposure to loud noise at close range or exposure to noise over extended periods without hearing protection was more prevalent in Iraq and Afghanistan than in supporting areas (Figures 6.11 and 6.12, below, and Table 6.30 in *Volume II*). Overall, respondents deployed in Afghanistan reported more exposure to noise (78.2% exposed at close range and 66.9% exposed over extended periods) than those deployed in Iraq (65.8% exposed at close range and 59.0% for extended periods). Of those who reported exposure to noise, many (30-42%) reported very high frequency of exposure.



Noise exposures and hearing loss

For those who deployed in Iraq, 16% (*n* = 888) reported hearing loss. Those who reported exposure to loud noises at close range or exposure to noise for extended periods without hearing protection were significantly (1.5 to 2.7 times) more likely to report hearing loss, and the likelihood increased with the number of exposures (Table 6.10, below, and Table 6.31 in *Volume II*).

For those who deployed in Afghanistan, 12% (*n* = 499) reported hearing loss. The odds of reporting hearing loss increased (1.7 to 2.1 times) as exposure to loud noises at close range without hearing protection increased, but the association was only statistically significant for five or more exposures (Table 6.8, below, and Table 6.31 in *Volume II*). Respondents reporting any level of exposure to noise for extended periods of time without hearing protection were significantly (1.6 to 2.3 times) more likely to report hearing loss.

Close to loud						
noises without						
hearing			Не	aring loss		
protection	OR (95% CI) ^c	<i>p-</i> value	Iraq % ^b	Afghanistan	% ^b <i>p-</i> value	OR (95% CI) ^c
Never	1 (Reference)		8.4	6.5		1 (Reference)
Once	1.47 (1.02, 2.11)	0.038	11.5	10.1	0.142	1.42 (0.89, 2.27)
2-4 times	1.63 (1.31, 2.04)	< 0.001	15.3	10.2	0.075	1.38 (0.97, 1.96)
5-9 times	1.64 (1.25, 2.16)	0.001	18.7	12.7	0.009	1.68 (1.14, 2.48)
10+ times	2.06 (1.65, 2.56)	< 0.001	23.9	17.0	< 0.001	2.10 (1.52, 2.90)
Exposed to loud	noise for extended	d periods o	of time withou	it hearing pro	tection	
Never	1 (Reference)		7.6	6.5		1 (Reference)
Once	1.77 (1.27, 2.47)	0.001	16.0	13.4	0.001	2.09 (1.39, 3.16)
2-4 times	1.82 (1.44, 2.29)	< 0.001	16.3	11.8	0.003	1.63 (1.19, 2.24)
5-9 times	2.90 (2.25, 3.74)	< 0.001	25.5	16.0	0.001	2.06 (1.39, 3.06)
10+ times	2.72 (2.22, 3.33)	< 0.001	23.4	17.8	< 0.001	2.26 (1.71, 3.00)

Table 6.10:Association between exposures to noise and hearing loss for those deployed in Iraq (N = 5915)
and in Afghanistan (N = 4160)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Estimated odds ratios, weighted for non-response and adjusted for age, rank, Service, and gender

Noise exposures and increased sensitivity to noise

For those who deployed <u>in Iraq</u>, 20% (n = 1137) reported increased sensitivity to noise. Respondents reporting exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly (1.5 to 2.5 times) more likely to report increased sensitivity to noise, although exposure at close range was only statistically significant for two or more exposures (Table 6.32, in *Volume II*).

For those who deployed in Afghanistan, 20% (n = 772) reported increased sensitivity to noise. Respondents reporting exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly (1.4 to 2.2 times) more likely to report increased sensitivity to noise (Table 6.32, in *Volume II*).

Noise exposures and ringing in ears

For deployments in Iraq, 33% (n = 1887) reported ringing in the ears. Respondents who reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly (1.5 to 2.1 times) more likely to report ringing in the ears, although for noise exposure at close range this association was only significant for two or more exposures (Table 6.33, in *Volume II*).

For deployments <u>in Afghanistan</u>, 31% (n = 1229) reported ringing in the ears. Respondents who reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly (1.3 to 2.4 times) more likely to report ringing in the ears, although exposure for extended periods was only statistically significant for two or more exposures (Table 6.33, in *Volume II*).

Noise exposures and loss of balance

For deployments in Irag, 10% (n = 550) reported loss of balance. Respondents who reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly more likely (1.4 to 2.3 times) to report loss of balance, although this association was only statistically significant for two or more exposures (Table 6.34, in *Volume II*).

For deployments <u>in Afghanistan</u>, 8% (n = 316) reported loss of balance. Respondents who reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly (1.7 to 2.5 times) more likely to report loss of balance, although this association was only significant for two or more exposures (Table 6.32, in *Volume II*).

Noise exposures and compensation claims

For deployments in Iraq, 13% (*n* = 743) reported a previous, current or planned compensation claim related to hearing loss. Respondents who reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly more likely (1.4 to 3.2 times) to report a compensation claim (previous, current or planned) for hearing loss, although for close range exposure, this association was only statistically significant for two or more exposures (Table 6.35, in *Volume II*). For noise for extended periods without hearing protection, the likelihood of a compensation claim increased with the number of exposures.

For deployments in Afghanistan, 13% (*n* = 517) reported a previous, current or planned compensation claim related to hearing loss. Respondents who reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection were significantly (1.9 to 3.6 times) more likely to report a compensation claim (previous, current or planned) for hearing loss (Table 6.35, in *Volume II*). For noise over extended periods without hearing protection, the likelihood of a compensation claim increased with the number of exposures.

Summary: noise exposures and health

For deployments in Irag, 59-66% reported exposure to loud noise at close range without hearing protection or exposure to noise for extended periods without hearing protection. For deployments in Afghanistan, 67-78% reported exposure to loud noise at close range or exposure to noise for extended periods without hearing protection.

Hearing related conditions were reported by approximately 8-33% of respondents, with ringing in the ears most common.

In both Iraq and Afghanistan, reported exposure to loud noise at close range without hearing protection or exposure to noise over extended periods without hearing protection was significantly associated with every

hearing related problem investigated – hearing loss, increased sensitivity to noise, ringing in the ears, loss of balance and compensation claims (Table 6.11, below).

	Hearing loss	Increased sensitivity to noise	Ringing in ears	Loss of balance	Compensation claim	
Close to loud noises without hearing protection						
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Afghanistan	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Exposed to loud noise for extended periods of time without hearing protection						
Iraq	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Afghanistan	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	

Table 6.11: Summary table of noteworthy associations (OR ≥1.2, p<0.05) between noise exposures and health outcomes

 \checkmark = a significant association was found

× = no significant association was found

6.4 Discussion

ADF members deploying to Iraq and Afghanistan reported exposures to various environmental hazards, of which, 'dust storms', 'diesel exhaust', 'non-ionising radiation', 'eating local food' and 'loud noises' (without hearing protection) were the most common. Accurate objective assessment of hazards in the MEAO has not been possible due to methodological issues. The use of self-report data provides a valuable insight into the hazards perceived by deployed members, and their anxieties about the adverse effects of potential/perceived exposures. In some cases, the self-reported prevalence of exposures contradicts reports from other sources. For example, hazard reports show no evidence of CBRN hazards on location, yet this was reported by a small proportion of respondents. Thus, the associations found may be a reflection of anxieties associated with perceived exposures on deployment [66]. For example, Stuart et al. [88] found that Gulf War soldiers who reported higher levels of combat exposures or combat stress were more likely to believe they had been exposed to chemical/biological weapons. It may be useful for the ADF to consider providing serving members with information about potential hazards in the MEAO to dispel any misunderstandings and to enhance through training their capacity to recognise and combat possible hazards while on deployment.

Associations between respiratory exposures and respiratory conditions were common but effect sizes were modest and the findings were somewhat inconsistent between Iraq and Afghanistan. Current literature suggests that the most common respiratory exposure of concern is smoke associated with burning waste and/or oil fires and sand/dust [3, 86, 160, 166]. However, our finding that 'dust storms' and 'diesel exhaust' were the most commonly reported respiratory exposures differs from the literature, and may be a reflection of different defence forces operating in different locations. These findings provide some insight, but the association between respiratory exposures and respiratory conditions could benefit from further research to identify possible causal pathways.

Exposures to hazardous materials were associated with a wide range of mental and physical health conditions for both Iraq and Afghanistan deployments and findings were broadly in line with the available literature.

Eating local food was associated with short-term and long-term gastrointestinal symptoms for deployments to both locations. Further, the association between attendance at sick parade for vomiting or diarrhoea and bowel disorder after deployment suggests it may be useful to screen those members who experience gastrointestinal symptoms on deployment as an early intervention/prevention strategy against possible long-term ill health. Presentations by ADF members to Regimental Aid Post in Tarin Kowt, Afghanistan from February to June 2010 showed a high frequency of gastrointestinal disorders and injuries as well as upper respiratory tract infection and ear, nose and throat disorders [47]. The conclusion was that injury prevention and hygiene maintenance during deployments may need greater attention [47].

Exposure to loud noise at close range and exposure to noise for extended periods without hearing protection were associated with every hearing-related condition investigated, as well as hearing-relating claims for compensation. These findings are consistent with those of other research. It may be useful for Defence to investigate the current availability/use of hearing protection, and explore ways to decrease exposure to loud noise. These findings have potential implications for DVA, given the significant association between noise exposure and hearing-related compensation claims.

Findings across some exposures were inconsistent between Iraq and Afghanistan. This suggests that in some cases the perceptions of either exposures or health may be specific to deployment location rather than to the MEAO generally. If so, policies and interventions may need to be targeted to specific deployment locations. Different prevalences of exposure between those deployed in Iraq and Afghanistan or to supporting areas provide further support for this recommendation.

The findings reported in this chapter are broadly consistent with considerations of biological mechanisms and reports in the literature. Although these associations are plausible the effect sizes are generally modest (with odds ratios less than two) and the possibility of confounding by other factors cannot be ruled out.

This study is cross-sectional, based on retrospective recall of events, and exposures experienced during deployments to the MEAO may have occurred up to ten years before the survey. Therefore, recall bias is possible and reporting of both exposures and health could be distorted by current or ongoing health issues such as PTSD symptoms and depression.

Chapter 7 Military, family and community support and health

This chapter examines associations between military, family and community support and the mental and general health reported by ADF members who had deployed to the MEAO.

Research question 4:

What are the protective (resilience) factors for psychological health outcomes?

Key Points

- Low levels of self-reported unit cohesion during MEAO deployments were associated with poorer mental and general health.
- ADF members who reported that their partner/spouse received no or insufficient support from the military while they were away on deployment, and reported receiving no military support after deployment, also reported poorer mental and general health.
- Perceived low levels of support from the ADF member's family during and after deployment were associated with poorer mental and general health.
- Perceived low levels of community support during and after deployment were associated with poorer mental and general health.
- The majority of Reserve members deployed on CFTS reported adequate community support in the workplace after deployment.
- Perceived inability to adapt to change and to bounce back after illness or hardship were associated with poorer mental and general health.

Implications

- The results need to be interpreted with caution as it is possible that they may be affected by
 negative reporting bias. Nevertheless, the results endorse the value of building and improving
 military social support in terms of leadership, group cohesion, comradeship and an open line of
 communication within the unit.
- The support provided to military families during deployment must be perceived by the ADF member to be sufficient in order for this to be associated with better health.
- Role groups that reported lower unit cohesion, military, family and community support compared to others may require intervention in terms of training and education.
- Based on current results, programs to enhance the resilience of serving members who deploy are recommended.

7.1 Introduction

Recent Australian military operations in Iraq and the continued commitment in Afghanistan may have placed physical and mental strain on deployed members of the ADF. International research has generally focused on estimating prevalence rates of health problems within the deployed military population and identifying risk factors associated with negative health outcomes [35, 37, 68, 97, 120, 137, 143, 149, 151]. However, investigation into potentially modifiable factors which may buffer against negative health outcomes is warranted to inform development of preventive military health care strategies.

Studies of the UK and the US defence forces have identified unit cohesion as a potential factor which can buffer against negative psychological health outcomes after deployment, such as symptoms of posttraumatic stress [28, 63, 64, 102, 139, 163, 167], depression [139, 167], and common mental disorders [64, 82, 133].

Family and community support have also been associated with reductions in health problems including the severity of depression [134, 139, 141, 167], symptoms of posttraumatic stress [41, 71, 111, 134, 139, 141, 167], alcohol dependence [134], and suicidal ideation [118, 134, 142]. Further, in reserve members, a lack of perceived military and non-military support has been associated with increased reporting of symptoms of posttraumatic stress, common mental disorders and alcohol misuse [83].

Resilience, the ability to successfully cope with stress [50], has also been examined in relation to reported mental and general health. Previous research suggests that resilience/hardiness is associated with reduced risk of developing symptoms of PTSD after combat [111, 184].

This chapter examines the question of whether social support and resilience are associated with better health in ADF members deployed to the MEAO.

7.2 Methods

7.2.1 Measures

The following measures were analysed in this chapter. For a detailed description of measurement scales and cut-offs used in the analyses, please refer to *Volume II*.

Mental and general health:

- Posttraumatic Stress Disorder (PTSD): PTSD Check List civilian version (PCL-C)
- Psychological distress: Kessler 10 (K10)
- Major depressive syndrome: Patient Health Questionnaire (PHQ)
- Panic syndrome (PHQ)
- Other anxiety syndrome (PHQ)
- Alcohol misuse: Alcohol Use Disorder Identification Test (AUDIT)
- Suicidality: 3 items
- General health: Short Form 1 (SF1)

Social support:

- Unit cohesion during deployment: 5 items
- Military support during and after deployment: 2 items
- Family support during and after deployment: 3 items
- Community support during and after deployment: 3 items
- Support from workplace for reserves after deployment: 3 items

Resilience

• 2 items from the Connor-Davidson Resilience Scale (CD-RISC)

7.2.2 Analyses

Details of general statistical analyses can be found in Chapter 2. Additional information on weighting for non-response can be found in *Volume II*.

The analysis of unit cohesion is based on work from the King's Centre for Military Health Research using similar items [33, 64, 102](refer to *Volume II*). The analysis of associations between individual unit cohesion items and health measures showed consistent results across all five items and between deployment locations, Iraq and Afghanistan. Therefore, unit cohesion items from each deployment location were collapsed into a single

measure. Summed unit cohesion scores were divided into three categories: high unit cohesion (5-9), moderate unit cohesion (10-15), and low unit cohesion (16-25). In cases where participants had deployed to both Iraq and Afghanistan and provided responses to the unit cohesion items twice, the country of the most recent deployment to the MEAO was used.

Logistic regression models were used to estimate associations between the measures of social support and resilience, and health measures. In addition to standard adjustments, analyses were adjusted for ADF employment category (currently serving, active reservists, ex-serving/inactive reservists), most recent deployment to the MEAO, education level and relationship status. In cases where regression analyses with standard adjustments were not possible, crude odds ratios were presented instead.

For tables presented in this chapter, number of respondents in each health category may not add up to the overall number due to incomplete survey data.

7.3 Results

7.3.1 Unit cohesion

Over all, only 11% (n = 1192) of respondents reported a low level of unit cohesion on their most recent deployment to the MEAO, with the remainder reporting either moderate (n = 5339, 47%) or high (n = 4889, 42%) levels of unit cohesion.

Mental and general health problems were between two to five times more likely for those who reported low levels of unit cohesion, compared to those who reported moderate or high levels (Table 7.2). As the level of unit cohesion decreased, the odds of poorer mental and general health increased.

Suicidal thoughts, plans and attempts were significantly more likely for those who reported low unit cohesion, compared to those who reported high levels (Table 7.3). As reported unit cohesion decreased, the risk of suicide thoughts, plans and attempts increased.

Levels of unit cohesion varied significantly between roles (Table 7.4, $\chi^2 = 207.10$, df = 28, p < 0.0001) (Table 7.3).

Summary of unit cohesion

A small proportion (11%) of respondents reported low levels of unit cohesion. These respondents were significantly more likely to report mental and general health problems, thoughts of suicide, suicide plans or attempts than respondents who reported moderate or high levels of unit cohesion.

10010 712						
	Level of Unit Cohesion					
Service	Number in group ^a	Low % ^b	Moderate % ^b	High % ^b		
Navy	2340	11.6	50.1	38.3		
Army	5487	10.6	45.8	43.6		
RAAF	3593	10.8	47.7	41.5		
Total	11420	10.8	47.3	41.9		

Table 7.1Perceived level of unit cohesion by Service (N = 11420)

^a Unweighted totals

^b Estimated prevalence, weighted for non-response

Table 7.2:	Unit cohesion b	v measures of	mental and	general health ((N=11420)
	offic concoron b	y measures of	incritar ana	Benerarnearth	

			PTSD symptoms		
		No (PCL-C<50)	Yes (PCL-C≥50)		
Level of unit cohesion	n=11392 ^a	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
High	4877	97.1	2.9	1 (Reference)	-
Moderate	5325	96.0	4.0	1.44 (1.17, 1.77)	<0.001
Low	1190	88.3	11.7	4.10 (3.24, 5.20)	<0.001
		Ps	sychological distress		
		No (K10<30)	Yes (K10≥30)		
	n=11391 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
High	4878	98.0	2.0	1 (Reference)	-
Moderate	5325	96.3	3.7	1.71 (1.37, 2.15)	<0.001
Low	1188	89.0	11.0	4.92 (3.83 <i>,</i> 6.32)	<0.001
		Major d	epressive syndrome		
		No	Yes		
	n=11093 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
High	4753	98.0	2.0	1 (Reference)	-
Moderate	5179	96.8	3.2	1.59 (1.25, 2.01)	<0.001
Low	1161	90.0	10.0	4.80 (3.71, 6.22)	<0.001
			Panic syndrome		
		No	Yes		
	n=11329 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
High	4855	98.0	2.0	1 (Reference)	-
Moderate	5294	96.7	3.3	1.71 (1.37, 2.14)	<0.001
Low	1180	92.9	7.1	3.19 (2.42, 4.21)	<0.001
		Othe	er anxiety syndrome		
		No	Yes		
	n=10616 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
High	4647	98.5	1.5	1 (Reference)	-
Moderate	4950	98.1	1.9	1.16 (0.87, 1.55)	0.306
Low	1019	95.0	5.0	2.80 (2.00, 3.91)	<0.001
			Alcohol misuse		
		No (AUDIT<20)	Yes (AUDIT≥20)		
	n=11388 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
High	4873	98.3	1.7	1 (Reference)	-
Moderate	5326	97.7	2.3	1.33 (1.00, 1.77)	0.049
Low	1189	95.2	4.8	2.45 (1.74, 3.46)	<0.001
	-		General health		
		Good – Excellent	Fair/Poor		
	n=11396 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	p-value
High	4879	90.0	10.0	1 (Reference)	-
Moderate	5327	85.3	14.7	1.49 (1.35 <i>,</i> 1.66)	< 0.001
Low	1190	72.1	27.9	2.74 (2.37, 3.17)	<0.001

^a Unweighted totals ^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Table 7.5. Util Colle	SION by meas	ules relating to suicit	Janty (N=11420)		
			Suicide thoughts		
		No	Yes		
Level of unit cohesion	n=11364 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
High	4869	96.2	3.8	1 (Reference)	-
Moderate	5315	94.5	5.5	1.44 (1.22, 1.70)	< 0.001
Low	1180	86.6	13.4	3.51 (2.85, 4.31)	< 0.001
			Suicide plan		
		No	Yes		
	n=11361 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
High	4866	99.1	0.9	1 (Reference)	-
Moderate	5314	98.8	1.2	1.34 (0.94, 1.90)	0.103
Low	1181	96.0	4.0	3.87 (2.61, 5.76)	< 0.001
			Suicide attempt		
		No	Yes		
	n=11359 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
High	4867	99.7	0.3	1 (Reference)	-
Moderate	5312	99.6	0.4	1.64 (0.99, 2.72)	0.054
Low	1180	99.1	0.9	3.22 (1.49, 6.93)	0.003

Table 7.3:	Unit cohesion	by measures relating	to suicidality	(N=11420)
Table 7.5.	Unit conesion	by measures relating	s to suicidanty	(11-11+20)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status. ^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible

Table 7.4:	Level of unit	cohesion by self-re	eported roles	(N=11234)
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		Unit cohesion		
		High	Moderate	Low
Role	nª	% ^b	% ^b	% ^b
EOD (Bomb disposal, IED technician) ^c	155	45.2	46.6	8.2
Combat (e.g. infantry, artillery etc) ^c	1826	46.5	44.6	8.7
Other combat – Navy	969	39.5	49.8	10.7
Other combat – Army	450	43.6	41.9	14.5
Other combat – RAAF	213	26.1	55.2	18.7
Combat support – Navy	465	36.6	52.2	11.2
Combat support – Army	975	43.2	44.4	12.4
Combat support – RAAF	886	40.2	48.3	11.5
Aircrew ^c	479	41.0	47.1	11.9
Health ^c	286	32.5	55.2	12.3
Logistics (Navy)	216	37.6	51.4	11.0
Logistics (Army)	1130	38.6	50.4	11.0
Logistics (RAAF)	1017	40.3	47.9	11.8
Maritime operations ^c	687	47.0	45.6	7.4
Administration + other ^c	1480	44.0	45.5	10.5

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

7.3.2 Military support

Almost one third of respondents (n = 2914, 32.0%) reported that their spouse/partner did not receive military support in the form of reassurance or support while they were deployed. Of the 68.0% (n = 6170) who did, 72% rated it as sufficient.

Deployed members who reported their spouse/partner did not receive military support, or rated support as insufficient, were between two to three times more likely to report mental and general health problems after deployment (Table 7.5).

Military support to			PTSD symptoms		
partner/spouse during		No (PCLC<50)	Yes (PCLC≥50)		
deployment	n=9062 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes, and sufficient	4442	97.7	2.3	1 (Reference)	-
Yes, but not sufficient	1714	93.0	7.0	3.02 (2.30, 3.95)	< 0.001
No	2906	93.2	6.8	2.97 (2.33, 3.80)	< 0.001
		Psy	ychological distress		
		No (K10<30)	Yes (K10≥30)		
	n=9065 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes, and sufficient	4444	97.6	2.4	1 (Reference)	-
Yes, but not sufficient	1713	94.4	5.6	2.35 (1.77, 3.13)	<0.001
No	2908	94.5	5.5	2.29 (1.78, 2.95)	<0.001
	-	Major de	pressive syndrome		
		No	Yes		
	n=8829 [°]	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes, and sufficient	4333	97.7	2.3	1 (Reference)	-
Yes, but not sufficient	1666	95.2	4.8	2.05 (1.52, 2.77)	<0.001
No	2830	95.1	4.9	2.06 (1.59, 2.66)	<0.001
			Panic syndrome		
		No	Yes		
	n=9015 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes, and sufficient	4421	97.7	2.3	1 (Reference)	-
Yes, but not sufficient	1707	95.4	4.6	1.77 (1.31, 2.39)	<0.001
No	2887	95.6	4.4	1.76 (1.36, 2.28)	<0.001
		Other	r anxiety syndrome		
		No	Yes		
	n=8424 ^ª	% [°]	% ^D	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes, and sufficient	4219	98.4	1.6	1 (Reference)	-
Yes, but not sufficient	1577	97.0	3.0	1.76 (1.21, 2.56)	0.003
No	2628	97.2	2.8	1.59 (1.14, 2.20)	0.006
			Alcohol misuse		
		No (AUDIT<20)	Yes (AUDIT≥20)		
	n=9061 ^ª	% [°]	% ^D	OR (95%CI) ^{e,†}	<i>p</i> -value
Yes, and sufficient	4441	98.1	1.9	1 (Reference)	-
Yes, but not sufficient	1715	97.0	3.0	1.50 (1.05, 2.14)	0.025
No	2905	96.9	3.1	1.63 (1.19, 2.23)	0.002
			General health		
		Good-Excellent	Fair/Poor		
	n=9066 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Yes, and sufficient	4442	88.8	11.2	1 (Reference)	-
Yes, but not sufficient	1714	83.3	16.7	1.30 (1.12, 1.52)	< 0.001
No	2910	81.8	18.2	1.52 (1.34, 1.73)	< 0.001

Table 7.5:	Military support during deployment by	measures of mental and general health (N=9084)
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^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

^f Crude odds ratios, due to low prevalence, adjustment was not possible

Respondents who reported their spouse/partner had received no military support, were significantly more likely to have suicidal 'thoughts' and 'plans', compared to those whose spouse/partner received sufficient support (Table 7.6). The association found for suicide attempts was not statistically significant, possibly due to low prevalence.

Support provided by the military to spouses/partners during deployment differed significantly with role (Table 7.7, $\chi^2 = 266.8$, df = 28, p<0.0001).

			Suicide thoughts		
Military support to partner/spou	ise	No	Yes		
during deployment	n=9045 [°]	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Yes, and sufficient	4435	96.1	3.9	1 (Reference)	-
Yes, but not sufficient	1711	92.6	7.4	1.86 (1.48, 2.34)	< 0.001
No	2899	92.1	7.9	1.96 (1.62, 2.37)	< 0.001
			Suicide plan		
		No	Yes		
	n=9043 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Yes, and sufficient	4436	99.0	1.0	1 (Reference)	-
Yes, but not sufficient	1710	98.5	1.5	1.44 (0.88, 2.34)	0.144
No	2897	98.0	2.0	1.91 (1.32, 2.77)	< 0.001
			Suicide attempt		
		No	Yes		
	n=9041 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Yes, and sufficient	4432	99.7	0.3	1 (Reference)	-
Yes, but not sufficient	1709	99.6	0.4	1.04 (0.40, 2.73)	0.935
No	2900	99.4	0.6	1.62 (0.88, 2.98)	0.122

Table 7.6:	Military support	during deployment b	y measures relating	g to suicidality ((N=9084)
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^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible

Table 7.7:Military support during deployment by self-reported roles (N=8934)

		Military support to spouse/partner during deployment			
		Yes, and	Yes, but not		
		sufficient	sufficient	No	
Role	nª	% ^b	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^c	132	46.6	22.8	30.6	
Combat (e.g. infantry, artillery etc) ^c	1406	54.8	22.1	23.1	
Other combat - Navy	730	46.6	19.3	34.1	
Other combat – Army	391	50.1	20.6	29.3	
Other combat – RAAF	175	34.2	23.3	42.5	
Combat support – Navy	340	46.8	19.5	33.7	
Combat support – Army	791	47.4	19.8	32.8	
Combat support – RAAF	726	45.1	19.8	35.1	
Aircrew ^c	388	47.1	16.5	36.4	
Health ^c	214	46.0	19.2	34.8	
Logistics (Navy)	145	48.1	20.3	31.6	
Logistics (Army)	881	48.2	21.9	29.9	
Logistics (RAAF)	814	45.2	20.5	34.3	
Maritime operations ^c	560	52.3	15.6	32.1	
Administration + other ^c	1241	48.3	14.2	37.5	

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

The majority of respondents (n = 9141, 79.9%) reported feeling well supported by the military in the weeks after coming home from deployment. The one fifth (n = 2184, 20.1%) who did not feel well supported by the military were between two and four times more likely to report mental and general health problems (Table 7.8).

		PTSD symptoms				
Military support after		No (PCL-C<50)	Yes (PCL-C≥50)			
deployment to the MEAO	n=11298 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
Agree	9118	97.3	2.7	1 (Reference)	-	
Disagree	2180	88.8	11.2	3.99 (3.33, 4.78)	<0.001	
		Ps	ychological distress			
		No (K10<30)	Yes (K10≥30)			
	n=11299 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
Agree	9118	97.6	2.4	1 (Reference)	-	
Disagree	2181	90.4	9.6	3.71 (3.07, 4.48)	<0.001	
		Major depressive syndrome				
		No	Yes			
	n=11008 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
Agree	8887	97.7	2.3	1 (Reference)	-	
Disagree	2121	92.0	8.0	3.11 (2.54, 3.82)	<0.001	
			Panic Syndrome			
		No	Yes			
	n=11238 ^ª	% ⁰	% ⁰	OR (95%CI) ^{c,e}	<i>p</i> -value	
Agree	9076	97.9	2.1	1 (Reference)	-	
Disagree	2162	92.7	7.3	2.97 (2.42, 3.65)	<0.001	
		Othe				
		No	Yes			
	n=10529 ^ª	% ⁰	% ⁰	OR (95%CI) ^{c,e}	<i>p</i> -value	
Agree	8641	98.7	1.3	1 (Reference)	-	
Disagree	1888	94.7	5.3	3.69 (2.85, 4.77)	<0.001	
			Alcohol misuse			
		No (AUDIT<20)	Yes (AUDIT≥20)			
	n=11293 ^ª	% ⁰	% ⁰	OR (95%CI) ^{c,e}	<i>p</i> -value	
Agree	9116	98.3	1.7	1 (Reference)	-	
Disagree	2177	95.1	4.9	2.49 (1.93, 3.22)	<0.001	
			General health			
		Good - Excellent	Fair/Poor			
	n=11302 ^ª	% ⁰	%0	OR (95%CI) ^{u,e}	p-value	
Agree	9122	88.7	11.3	1 (Reference)	-	
Disagree	2180	74.4	25.6	2.17 (1.94, 2.41)	<0.001	

Table 7.8:Post-deployment military support by measures of mental and general health (N=11325)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Respondents who did not receive military support post deployment were significantly more likely to report suicide thoughts, plans and/or attempts, compared to respondents who did receive support (Table 7.9). Reported military support after deployment differed significantly between roles (χ^2 = 106.6, *df* = 14, *p*<0.0001) (Table 7.10).

Table 7.9:Post-deployment military support by measures relating to suicidality (N=11325)

			Suicide thoughts		
Military support after		No	Yes		
deployment to the MEAO	n=11273 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Agree	9103	96.0	4.0	1 (Reference)	-
Disagree	2170	87.7	12.3	2.96 (2.53, 3.45)	< 0.001
			Suicide plan		
		No	Yes		
	n=11270 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Agree	9101	99.0	1.0	1 (Reference)	-
Disagree	2169	97.0	3.0	2.75 (2.02, 3.74)	< 0.001
			Suicide attempt		
		No	Yes		
	n=11267 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Agree	9100	99.7	0.3	1 (Reference)	-
Disagree	2167	99.2	0.8	2.92 (1.76, 4.85)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible

Table 7.10: Military suppor	t after deplo	yment by self-r	eported roles	(N=11142)
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		Military support	after deployment
		Agree	Disagree
Role	nª	% ^b	% ^b
EOD (Bomb disposal, IED technician) ^c	154	73.0	27.0
Combat (e.g. infantry, artillery etc) ^c	1801	81.0	19.0
Other combat - Navy	961	77.8	22.2
Other combat – Army	446	78.1	21.9
Other combat – RAAF	211	72.4	27.6
Combat support – Navy	465	76.4	23.6
Combat support – Army	967	81.7	18.3
Combat support – RAAF	879	80.2	19.8
Aircrew ^c	474	71.1	28.9
Health ^c	286	79.4	20.6
Logistics (Navy)	211	75.7	24.3
Logistics (Army)	1116	83.3	16.7
Logistics (RAAF)	1008	81.1	18.9
Maritime operations ^c	681	84.0	16.0
Administration + other ^c	1482	80.4	19.6

^a Unweighted totals

^b Estimated percentages, weighted for non-response

c All Services combined

Summary of military support

The majority of ADF members reported receiving military support during and after deployment. Those who reported not receiving sufficient military reassurance/support to their spouse/partner, and perceived a lack of support to themselves after deployment, were more likely to report mental and general health problems, suicide thoughts, plans and attempts. Reported military support differed significantly between roles.

7.3.3 Family support

The majority of respondents (n = 9305, 91.4%) reported receiving sufficient personal support from their family during deployment. Respondents who reported not receiving enough support from their family during deployment (n = 852, 8.6%) were between 1.6 and 3.6 times more likely to report mental and general health problems after deployment (Table 7.11).

Received enough		No (PCL-C<50)	Yes (PCL-C≥50)		
family support	n=10134 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Agree	9283	96.3	3.7	1 (Reference)	-
Disagree	851	87.6	12.4	3.18 (2.50, 4.06)	<0.001
		Ps	ychological distress		
		No (K10<30)	Yes (K10≥30)		
	n=10134 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Agree	9283	96.7	3.3	1 (Reference)	-
Disagree	851	91.1	8.9	2.45 (1.86, 3.23)	<0.001
		Major de	epressive syndrome		
		No	Yes		
	n=9873 [°]	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Agree	9047	97.2	2.8	1 (Reference)	-
Disagree	826	90.7	9.3	2.82 (2.16, 3.67)	<0.001
			Panic syndrome		
		No	Yes		
	n=10083 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Agree	9237	97.3	2.7	1 (Reference)	-
Disagree	846	91.7	8.3	2.67 (2.00, 3.56)	<0.001
		Othe			
		No	Yes		
	n=9451 ^ª	% ⁰	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Agree	8731	98.3	1.7	1 (Reference)	-
Disagree	720	93.9	6.1	3.61 (2.58, 5.06)	<0.001
			Alcohol misuse		
		No (AUDIT<20)	Yes (AUDIT≥20)		
	n=10130 ^ª	% ⁰	% ⁰	OR (95%CI) ^{c,e}	<i>p</i> -value
Agree	9280	98.1	1.9	1 (Reference)	-
Disagree	850	94.6	5.4	2.49 (1.76, 3.52)	<0.001
			General health		
		Good - Excellent	Fair/Poor	4.5	
	n=10136 ^ª	% ⁰	% ⁰	OR (95%CI) ^{a,e}	<i>p</i> -value
Agree	9285	87.0	13.0	1 (Reference)	-
Disagree	851	74.6	25.4	1.63 (1.38, 1.93)	< 0.001

Table 7 11	Family support during	deployment by measures o	f mental and general l	health (N=10157)
	ranning support during	, deployment by measures o	i mentai anu generar	

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Respondents who reported that they did not receive enough family support during deployment were significantly more likely to report suicidal thoughts, compared with those who did receive enough family support (Table 7.12). No significant associations were found for suicide plan and suicide attempt.

Reported family support during deployment differed significantly between roles (χ^2 = 32.4, df = 14, p=0.004) (Table 7.13).

Table 7.12. Failing support during deployment by measures relating to succuality (N=1015	Table 7.12:	Family support	during deploy	ment by measures	relating to	suicidality	(N=10157
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			Suicide thoughts		
Received enough		No	Yes		
family support	n=10112 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Agree	9267	95.0	5.0	1 (Reference)	-
Disagree	845	88.4	11.6	1.94 (1.55, 2.42)	< 0.001
			Suicide plan		
		No	Yes		
	n=10108 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Agree	9263	98.8	1.2	1 (Reference)	-
Disagree	845	97.7	2.3	1.29 (0.78, 2.13)	0.328
			Suicide attempt		
		No	Yes		
	n=10107 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Agree	9261	99.6	0.4	1 (Reference)	-
Disagree	846	99.5	0.5	1.02 (0.28, 3.78)	0.975

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible

Table 7.13:	Family support during deployment by self-reported roles (N=9991)

		Received enough family support		
		Agree	Disagree	
Role	nª	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^a	134	90.3	9.7	
Combat (e.g. infantry, artillery etc) ^a	1603	91.9	8.1	
Other combat - Navy	858	89.1	10.9	
Other combat – Army	411	90.4	9.6	
Other combat – RAAF	189	88.6	11.4	
Combat support – Navy	410	93.2	6.8	
Combat support – Army	870	91.2	8.8	
Combat support – RAAF	798	91.9	8.1	
Aircrew ^a	433	89.2	10.8	
Health ^ª	259	89.8	10.2	
Logistics (Navy)	189	88.4	11.6	
Logistics (Army)	990	92.6	7.4	
Logistics (RAAF)	899	91.5	8.5	
Maritime operations ^a	621	91.9	8.1	
Administration + other ^a	1327	92.3	7.7	

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

On return from deployment, only a minority of respondents (n = 1401, 13.5%) reported feeling let down by someone who they thought would stand by them. These respondents were between two and 7.5 times more likely to report mental and general health problems, compared to those who did not feel let down (n = 9918, 86.5%) (Table 7.14).

Respondents who felt let down by someone who they thought would stand by them were significantly more likely to report suicidal thoughts, plans or attempts (Table 7.15). The proportion of respondents who reported having felt let down by someone close to them after deployment differed significantly between roles (χ^2 = 172.9, *df* = 14, *p*<0.0001) (Table 7.16).

Table 7.14:	Post-deploymer	nt family support l	by measures of	mental and g	general health (N=11319)
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			PTSD symptoms		-
Feeling let down by		No (PCL-C<50)	Yes (PCL-C≥50)		
someone close	n=11295 [°]	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	9901	97.7	2.3	1 (Reference)	-
Agree	1394	82.2	17.8	7.53 (6.27, 9.05)	<0.001
			Psychological distress		
		No (K10<30)	Yes (K10≥30)		
	n=11295 [°]	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	9900	97.9	2.1	1 (Reference)	-
Agree	1395	84.7	15.3	6.72 (5.52, 8.19)	<0.001
		Major	depressive syndrome		
		No	Yes		
	n=11005 ^ª	% [°]	% [°]	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	9643	97.9	2.1	1 (Reference)	-
Agree	1362	87.9	12.1	4.99 (4.05, 6.15)	<0.001
			Panic Syndrome		
		No	Yes		
	n=11233 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	9852	98.2	1.8	1 (Reference)	-
Agree	1381	88.1	11.9	5.70 (4.64, 7.01)	<0.001
		Oth	er Anxiety Syndrome		
		No	Yes		
	n=10529 ^ª	% ⁰	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	9392	98.8	1.2	1 (Reference)	-
Agree	1137	91.8	8.2	6.69 (5.12, 8.74)	<0.001
			Alcohol misuse		
		No (AUDIT<20)	Yes (AUDIT≥20)		
	n=11289 [°]	% ⁰	% ⁰	OR (95%CI) ^{C,e}	<i>p</i> -value
Disagree	9896	98.5	1.5	1 (Reference)	-
Agree	1393	92.5	7.5	3.46 (2.65, 4.51)	<0.001
			General health		
		Good - Excellent	Fair/poor		
	n=11296 ^ª	% ^b	% ^b	OR (95%CI) ^{a,e}	p-value
Disagree	9898	88.4	11.6	1 (Reference)	-
Agree	1398	69.5	30.5	2.25 (1.98, 2.55)	< 0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Table 7.15: Post-deployment family support by measures of suicidality (N=11319)

			Suicide thoughts		
Felt let down by	-	No	Yes		
someone close	n=11269 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Disagree	9881	96.2	3.8	1 (Reference)	-
Agree	1388	82.8	17.2	4.43 (3.77, 5.20)	<0.001
			Suicide plan		
		No	Yes		
	n=11266 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Disagree	9881	99.1	0.9	1 (Reference)	-
Agree	1385	95.4	4.6	4.16 (3.07, 5.66)	<0.001
			Suicide attempt		
		No	Yes		
	n=11263 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Disagree	9877	99.7	0.3	1 (Reference)	-
Agree	1386	98.9	1.1	3.60 (2.03, 6.38)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status. ^d Estimated odds ratios, weighted for non-response

Table 7.16: Post-deployment family support by self-reported roles (N=11135)

		Felt let down by someone close		
		Disagree	Agree	
Role	n	%	%	
EOD (Bomb disposal, IED technician) ^c	155	82.3	17.7	
Combat (e.g. infantry, artillery etc) ^c	1799	81.9	18.1	
Other Combat - Navy	959	83.6	16.4	
Other Combat – Army	447	82.7	17.3	
Other Combat – RAAF	211	84.4	15.6	
Combat support – Navy	465	86.5	13.5	
Combat support – Army	968	87.3	12.7	
Combat support – RAAF	878	90.6	9.4	
Aircrew ^c	472	84.8	15.2	
Health ^c	284	89.1	10.9	
Logistics (Navy)	212	87.0	13.0	
Logistics (Army)	1115	86.8	13.2	
Logistics (RAAF)	1008	89.2	10.8	
Maritime operations ^c	683	90.5	9.5	
Administration + other ^c	1479	90.6	9.4	

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

The majority of respondents were either 'satisfied' or 'extremely satisfied' (n = 10346, 89.7%) with their marriage/relationship. Respondents who reported they were 'neither satisfied or dissatisfied', 'dissatisfied' or 'extremely dissatisfied' (n = 1160, 10.3%) were between 2.6 and 6.4 times more likely to report mental and general health problems than those who were 'satisfied' or 'extremely satisfied' (Table 7.17). As relationship satisfaction decreased, the risk of poorer mental and general health increased.

Respondents who were 'dissatisfied/extremely dissatisfied' or 'neither satisfied/dissatisfied' with their marriage/relationship were significantly more likely to report suicidal thoughts, plans or attempts, compared to those who were 'extremely satisfied' (Table 7.18). Post-deployment levels of relationship/marriage satisfaction were significantly different between roles ($\chi^2 = 114.6$, df = 42, p<0.0001) (Table 7.19).

Summary of family support

The majority of respondents reported receiving enough family support while on deployment, not feeling let down by someone who they thought would stand by them after deployment and feeling satisfied with their relationship/marriage after deployment. Those who had low family support during and after deployment and low relationship/marriage satisfaction were significantly more likely to report poorer mental and general health. The levels of reported family support were significantly different between role groups.

Table 7.17:Post-deployment relationship/marriage satisfaction by measures of mental and general health
(N=11506)

(
			PTSD symptoms		
Relationship/Marriage		No (PCL-C<50)	Yes (PCL-C≥50)		
Satisfaction	n=10921 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Extremely satisfied	6380	97.0	3.0	1 (Reference)	-
Satisfied	3442	95.3	4.7	1.59 (1.29, 1.96)	< 0.001
Neither	681	89.5	10.5	3.61 (2.73, 4.77)	< 0.001
Extremely/Dissatisfied	418	88.0	12.0	3.87 (2.72, 5.51)	<0.001
<i>,,</i>		Psy	chological distress		
		No (K10<30)	Yes (K10>30)		
	n=11131 ^a	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>n</i> -value
Extremely satisfied	6479	97.5	2.5	1 (Reference)	p value
Satisfied	3531	96.1	3.9	1 51 (1 20 1 89)	<0 001
Neither	691	90.5	9.5	4 14 (3 15 5 45)	<0.001
Extremely/Dissatisfied	430	87.2	12.8	5 40 (3 87 7 53)	<0.001
Extremely, Dissuished	450	Major de	pressive syndrome	5.40 (5.07, 7.55)	0.001
		No	Yes		
	$n - 10/187^{a}$	%		OR (95%CI) ^{c,e}	n_value
Extremely satisfied	6130	70 Q& 1	/0	1 (Reference)	<i>p</i> -value
Satisfied	2211	96.7	1.9	1 90 (1 20 2 24)	<0.001
Noithor	651	90.7	5.5 7 /	2 94 (2 77 5 22)	<0.001
Extromoly/Discotisfied	205	92.0	7.4 12 2	5.04 (2.77, 5.55) 6 42 (4 54 0 08)	<0.001
Extremely/Dissatished	393	00.0	Panic syndrome	0.42 (4.54, 5.08)	<0.001
		No			
		INO orb	Yes	an (an (a)00	
	n=10675	%-	%-	OR (95%CI)***	<i>p</i> -value
Extremely satisfied	6248	97.7	2.3	1 (Reference)	-
Satisfied	3363	96.5	3.5	1.56 (1.24, 1.96)	<0.001
Neither	663	94.1	5.9	2.59 (1.82, 3.69)	< 0.001
Extremely/Dissatisfied	401	92.0	8.0	2.78 (1.78, 4.33)	< 0.001
		Other	r anxiety syndrome		
		No	Yes		
	n=10001 ^ª	% ⁰	% ⁰	OR (95%CI) ^{C,e}	<i>p</i> -value
Extremely satisfied	5947	98.4	1.6	1 (Reference)	-
Satisfied	3131	97.4	2.6	1.66 (1.24, 2.23)	<0.001
Neither	590	94.4	5.6	3.74 (2.49, 5.61)	<0.001
Extremely/Dissatisfied	333	92.9	7.1	4.17 (2.58, 6.73)	<0.001
			Alcohol misuse		
		No (AUDIT<20)	Yes (AUDIT≥20)		
	n=11004 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Extremely satisfied	6419	98.8	1.2	1 (Reference)	-
Satisfied	3476	97.2	2.8	2.17 (1.60, 2.94)	<0.001
Neither	688	94.5	5.5	4.20 (2.82, 6.26)	<0.001
Extremely/Dissatisfied	421	93.1	6.9	5.45 (3.49, 8.51)	<0.001
			General health		
		Good-Excellent	Fair/poor		
	n=11276 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	p-value
Extremely satisfied	6563	89.8	10.2	1 (Reference)	-
Satisfied	3578	83.8	16.2	1.65 (1.47, 1.84)	<0.001
Neither	700	71.9	28.1	2.83 (2.38, 3.36)	<0.001
Extremely/Dissatisfied	435	68.4	31.6	3.26 (2.65, 4.02)	< 0.001
a					

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

		5	Suicide thoughts		
Relationship/marriage		No	Yes		
Satisfaction	n=10684 ^ª	% [°]	% [°]	OR (95%CI) ^{c,d}	<i>p</i> -value
Extremely satisfied	6264	97.1	2.9	1 (Reference)	-
Satisfied	3357	93.8	6.2	2.27 (1.88, 2.75)	<0.001
Neither	661	89.2	10.8	4.13 (3.18, 5.37)	<0.001
Extremely/Dissatisfied	402	82.3	17.7	6.46 (4.90 <i>,</i> 8.52)	<0.001
			Suicide plan		
		No	Yes		
	n=10675 [°]	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Extremely satisfied	6261	99.1	0.9	1 (Reference)	-
Satisfied	3352	98.5	1.5	1.74 (1.19, 2.54)	0.004
Neither	661	97.3	2.7	2.96 (1.85, 4.74)	< 0.001
Extremely/Dissatisfied	401	95.7	4.3	3.09 (1.69, 5.64)	<0.001
			Suicide attempt		
		No	Yes		
	n=10678 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Extremely satisfied	6261	99.7	0.3	1 (Reference)	-
Satisfied	3354	99.6	0.4	1.27 (0.66, 2.46)	0.478
Neither	663	99.2	0.8	3.32 (1.59, 6.93)	0.001
Extremely/Dissatisfied	400	98.4	1.6	5.94 (2.84, 12.41)	<0.001

 Table 7.18:
 Post-deployment relationship/marriage satisfaction by measures of suicidality (N=11506)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible.

		Relationship/marriage satisfaction			
		Extremely			Extremely/
		satisfied	Satisfied	Neither	dissatisfied
Role	n°	% ^b	% ^b	% ^b	% ^b
EOD (Bomb disposal, IED technician) °	140	64.4	24.4	5.6	5.6
Combat (e.g. infantry, artillery etc) °	1533	55.8	32.8	7.6	3.8
Other combat - Navy	862	56.0	34.1	6.7	3.2
Other combat – Army	401	60.7	27.1	8.0	4.2
Other combat – RAAF	196	54.6	33.1	7.9	4.4
Combat support – Navy	406	57.5	34.2	3.8	4.5
Combat support – Army	851	55.5	35.4	5.6	3.5
Combat support – RAAF	761	57.1	33.9	5.1	3.9
Aircrew [°]	420	59.3	31.8	5.1	3.8
Health [°]	266	56.0	33.9	6.0	4.1
Logistics (Navy)	171	52.2	32.8	10.4	4.6
Logistics (Army)	972	58.9	30.9	6.4	3.8
Logistics (RAAF)	888	58.2	31.7	6.8	3.3
Maritime operations ^c	639	61.5	30.0	5.4	3.1
Administration + other °	1327	62.4	27.8	5.8	4.0

Table 7.19: Post-deployment relationship/marriage satisfaction by self-reported role (N=9833)

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

7.3.4 Community support

During their most recent deployment, the majority of respondents (n = 9259, 81.4%) felt that the Australian public was supportive of the mission to Iraq/Afghanistan. Those who did not perceive community support during their most recent MEAO deployment (n = 2032, 18.6%) were between 1.6 and 2.8 times more likely to report poorer mental and general health, with the exception of alcohol misuse (Table 7.20).

	_		PTSD symptoms		
Community support during		No (PCL-C<50)	Yes (PCL-C≥50)		
deployment	n=11263 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes	9245	96.6	3.4	1 (Reference)	-
No	2018	91.3	8.7	2.47 (2.05, 2.98)	< 0.001
	_	F	Psychological distress		
		No (K10<30)	Yes (K10≥30)		
	n=11265 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes	9247	97.1	2.9	1 (Reference)	-
No	2018	92.3	7.7	2.50 (2.05, 3.04)	< 0.001
	_	Major o	depressive syndrome		
		No	Yes		
	n=10975 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes	9008	97.2	2.8	1 (Reference)	-
No	1967	93.6	6.4	2.14 (1.74, 2.64)	<0.001
	_		Panic syndrome		
		No	Yes		
	n=11204 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes	9191	97.3	2.7	1 (Reference)	-
No	2013	94.7	5.3	1.77 (1.41, 2.22)	< 0.001
	_	Oth	er anxiety syndrome		
		No	Yes		
	n=10497 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes	8681	98.5	1.5	1 (Reference)	-
No	1816	95.5	4.5	2.79 (2.13, 3.66)	<0.001
	_		Alcohol misuse		
	_	No (AUDIT<20)	Yes (AUDIT≥20)		
	n=11260 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Yes	9240	97.9	2.1	1 (Reference)	-
No	2020	96.9	3.1	1.13 (0.85, 1.52)	0.395
			General health		
		Good - Excellent	Fair/poor		
	n=11268 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Yes	9252	87.4	12.6	1 (Reference)	-
No	2016	78.7	21.3	1.59 (1.41, 1.78)	< 0.001

Table 7.20:Community support during deployment by measures of mental and general health (N=11291)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Those who felt that the Australian public was not supportive of the mission to Iraq/Afghanistan, were significantly more likely to report suicidal thoughts and plans, compared to those who felt the Australian public supported the mission to Iraq/Afghanistan (Table 7.21). No significant statistical association was found for suicide attempts. The reported level of community support during deployment was statistically significantly different between roles ($\chi^2 = 120.2$, df = 14, p<0.0001) (Table 7.22).

Table 7.21: Community support during deployment by measures relating to suicidality (N=11291)

			Suicide thoughts		
Community support		No	Yes		
during deployment	n=11240 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
Yes	9225	95.2	4.8	1 (Reference)	-
No	2015	91.1	8.9	1.77 (1.50, 2.10)	<0.001
			Suicide plan		
		No	Yes		
	n=11237 ^ª	% ^b	% ^b	OR (95%CI) ^{c,a}	<i>p</i> -value
Yes	9222	98.8	1.2	1 (Reference)	-
No	2015	97.8	2.2	1.68 (1.19, 2.37)	0.003
			Suicide attempt		
		No	Yes		
	n=11235 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
Yes	9221	99.6	0.4	1 (Reference)	-
No	2014	99.5	0.5	1.21 (0.60, 2.44)	0.598

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible.

Table 7.22:Community support during deployment by self-reported roles (N=11104)

		Community support during deployment		
		Yes	No	
Role	nª	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^c	154	75.9	24.1	
Combat (e.g. infantry, artillery etc) ^c	1789	78.5	21.5	
Other combat - Navy	954	77.6	22.4	
Other combat – Army	446	81.0	19.0	
Other combat – RAAF	210	74.9	25.1	
Combat support – Navy	463	77.4	22.6	
Combat support – Army	963	83.2	16.7	
Combat support – RAAF	878	84.8	15.2	
Aircrew ^c	473	83.0	17.0	
Health ^c	283	76.9	23.1	
Logistics (Navy)	213	76.5	23.5	
Logistics (Army)	1116	84.4	15.6	
Logistics (RAAF)	1008	82.5	17.5	
Maritime operations ^c	681	84.6	15.4	
Administration + other ^c	1473	84.5	15.5	

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

Almost half (n = 5381, 49.3%) of respondents reported that people did not understand what they had been through after returning from deployment. These respondents were between 1.7 and 5.6 times more likely to report mental and general health problems than those who felt understood by others (n = 5937, 50.7%) (Table 7.23).

Respondents who reported that people did not understand what they had been through were significantly more likely to report suicide thoughts or suicide plans. The association with suicide attempts was not statistically significant, possibly due to low prevalence (Table 7.24).

Table 7.23: Post-deployment community support by measures of mental and general health (N=11318)

People did not			PTSD symptoms		
understand deployment		No (PCL-C<50)	Yes (PCL-C≥50)		
experience	n=11292 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	5931	98.8	1.2	1 (Reference)	-
Agree	5361	92.3	7.7	5.60 (4.46, 7.03)	< 0.001
		Psy	ychological distress		
		No (K10<30)	Yes (K10 ≥30)		
	n=11292 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	5929	98.6	1.4	1 (Reference)	-
Agree	5363	93.7	6.3	3.89 (3.14, 4.81)	<0.001
		Major de	pressive syndrome		
		No	Yes		
	n=11003 ^ª	% ⁰	% ⁰	OR (95%CI) ^{c,e}	<i>p</i> -value
Disagree	5775	98.5	1.5	1 (Reference)	-
Agree	5228	94.5	5.5	3.39 (2.73, 4.22)	<0.001
			Panic syndrome		
		No	Yes	6 0	
	n=11232°	%	%	OR (95%CI) ^{C,e}	<i>p</i> -value
Disagree	5896	98.7	1.3	1 (Reference)	-
Agree	5336	94.9	5.1	3.56 (2.82, 4.49)	<0.001
		Other	r anxiety syndrome		
	· a ·	No	Yes		
	n=10527°	%	%	OR (95%CI)	<i>p</i> -value
Disagree	5686	99.2	0.8	1 (Reference)	-
Agree	4841	96.6	3.4	4.19 (3.10, 5.68)	<0.001
		NO (AUDIT<20)	Yes (AUDIT≥20)		
	n=11287	%*	%*	OR (95%CI)**	<i>p</i> -value
Disagree	5926	99.1	0.9	1 (Reference)	-
Agree	5361	96.3	3./	3.05 (2.27, 4.09)	<0.001
	-	Cood Eventlant			
	-11205ª	GOOD-EXCEILENT	Fair/poor		
Disagras	n=11295	% 00.1	%		<i>p</i> -value
Disagree	5929	90.1	9.9 10 F	1 74 (1 57 1 01)	- 0.001
Agree	5306	81.5	18.5	1.74 (1.57, 1.91)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

|--|

People did not			Suicide thoughts		-
understand deployment		No	Yes		
experience	n=11269 ^ª	% ^b	% [°]	OR (95%CI) ^{c,d}	<i>p</i> -value
Disagree	5919	96.8	3.2	1 (Reference)	-
Agree	5350	91.8	8.2	2.65 (2.27, 3.10)	< 0.001
			Suicide plan		
		No	Yes	-	
	n=11266 ^ª	% ⁰	% [°]	OR (95%CI) ^{c,a}	<i>p</i> -value
Disagree	5916	99.1	0.9	1 (Reference)	-
Agree	5350	98.0	2.0	2.07 (1.54, 2.77)	< 0.001
			Suicide attempt		
		No	Yes		
	n=11263 ^ª	% [°]	% ⁰	OR (95%CI) ^{α,e}	<i>p</i> -value
Disagree	5916	99.7	0.3	1 (Reference)	-
Agree	5347	99.5	0.5	1.40 (0.90, 2.20)	0.140

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment

location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible.

The proportion of respondents who reported people did not understand what they had been through differed significantly between roles ($\chi 2 = 1247.2$, df = 14, p<0.0001) (Table 7.25).
Table 7.25:	Post-deployment	community support by	y self-reported roles	(N=11135)
		/ / /	/ .	

		People did not understand deployment experience		
		Agree	Disagree	
Role	nª	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^c	155	68.6	31.4	
Combat (e.g. infantry, artillery etc) ^c	1794	69.8	30.2	
Other combat - Navy	959	49.5	50.5	
Other combat – Army	448	58.1	41.9	
Other combat – RAAF	211	43.7	56.3	
Combat support – Navy	466	48.9	51.1	
Combat support – Army	967	50.9	49.1	
Combat support – RAAF	879	40.0	60.0	
Aircrew ^c	473	56.2	43.8	
Health ^c	285	40.4	59.6	
Logistics (Navy)	211	40.5	59.5	
Logistics (Army)	1117	45.3	54.7	
Logistics (RAAF)	1009	31.6	68.4	
Maritime operations ^c	681	38.5	61.5	
Administration + other ^c	1480	40.3	59.7	

^b Estimated percentages, weighted for non-response

^c All Services combined

The majority of respondents did not report being given a hard time because of their MEAO deployment (n = 9452, 82.3%). Those who did report that they had been given a hard time (n = 1876, 17.7%) were between 1.6 and 4.2 times more likely to report mental and general health problems (Table 7.26).

Respondents who reported being given a hard time because of their MEAO deployment were significantly more likely to report suicide thoughts, but no significant associations were found for suicide plan and attempts (Table 7.27). The proportion of respondents who reported being given a hard time because of their deployment was significantly different between roles (χ^2 = 462.2, *df* = 14, *p* <0.0001) (Table 7.28).

Summary of community support

Although almost half of respondents reported not feeling understood by people after returning from MEAO deployments, the majority of respondents reported community support during and after deployment. However, those who felt that the general public were not supportive of their mission, those who felt that people did not understand them, and those who were given a hard time after returning from their deployment were significantly more likely to report mental and general health problems. Perceived community support differed significantly between role groups.

Table 7.26:	Post-deployment cor	nmunity support by measures o	of mental and general health	(N=11328)
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		PTSD symptoms				
Given a hard time because of		No (PCL-C<50)	Yes (PCL-C≥50)			
deployment	n=11300 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
No	9432	97.2	2.8	1 (Reference)	-	
Yes	1868	88.2	11.8	4.17 (3.49, 4.99)	<0.001	
			Psychological distress			
		No (K10<30)	Yes (K10≥30)			
	n=11302 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
No	9434	97.3	2.7	1 (Reference)	-	
Yes	1868	90.8	9.2	3.26 (2.69, 3.96)	<0.001	
		Major	depressive syndrome			
		No	Yes			
	n=11010 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
No	9182	97.4	2.6	1 (Reference)	-	
Yes	1828	92.4	7.6	2.84 (2.31, 3.49)	<0.001	
		Panic syndrome				
		No	Yes			
	n=11240 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value	
No	9381	97.9	2.1	1 (Reference)	-	
Yes	1859	92.0	8.0	3.73 (3.04, 4.57)	<0.001	
		Ot	her anxiety syndrome			
		No	Yes			
	n=10529 ^ª	% [°]	% [°]	OR (95%CI) ^{c,e}	<i>p</i> -value	
No	8894	98.6	1.4	1 (Reference)	-	
Yes	1635	94.6	5.4	4.17 (3.22, 5.41)	<0.001	
			Alcohol misuse			
		No (AUDIT<20)	Yes (AUDIT≥20)			
	n=11297 ^ª	%"	% ⁰	OR (95%CI) ^{C,e}	<i>p</i> -value	
No	9428	98.2	1.8	1 (Reference)	-	
Yes	1869	95.1	4.9	2.26 (1.74, 2.93)	<0.001	
			General health			
		Good-Excellent	Fair/poor			
	n=11305 ^ª	% ⁰	% [°]	OR (95%CI) ^{d,e}	p-value	
No	9436	87.6	12.4	1 (Reference)	-	
Yes	1869	77.5	22.5	1.60 (1.42, 1.81)	<0.001	

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Table 7.27:Post-deployment community support by measures of suicidality (N=11328)

			Suicide thoughts		
Given a hard time beca	use	No	Yes		
of deployment	n=11276 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
No	9409	95.3	4.7	1 (Reference)	-
Yes	1867	89.9	10.1	2.17 (1.84, 2.56)	< 0.001
			Suicide plan		
		No	Yes		
	n=11273 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
No	9406	98.7	1.3	1 (Reference)	-
Yes	1867	98.1	1.9	1.28 (0.90, 1.81)	0.166
			Suicide attempt		
		No	Yes		
	n=11271 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
No	9404	99.6	0.4	1 (Reference)	-
Yes	1867	99.6	0.4	1.18 (0.63, 2.20)	0.605

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

 $^{\rm e}$ Crude odds ratios, due to low prevalence, adjustment was not possible.

Table 7.28:	Post-deployment	community support	by self-reported roles	(N=11143)
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		Given a hard time because of deployment	
		No	Yes
Role	nª	% ^b	% ^b
EOD (Bomb disposal, IED technician) ^c	154	76.2	23.8
Combat (e.g. infantry, artillery etc) ^c	1799	71.6	28.4
Other combat - Navy	955	76.4	23.6
Other combat – Army	446	79.7	20.3
Other combat – RAAF	211	81.8	18.2
Combat support – Navy	468	80.4	19.6
Combat support – Army	967	85.2	14.8
Combat support – RAAF	881	88.1	11.9
Aircrew ^c	473	80.5	19.5
Health ^c	285	85.0	15.0
Logistics (Navy)	212	84.0	16.0
Logistics (Army)	1119	87.0	13.0
Logistics (RAAF)	1011	87.3	12.7
Maritime operations ^c	683	88.5	11.5
Administration + other ^c	1479	89.4	10.6

^b Estimated percentages, weighted for non-response

^c All Services combined

7.3.5 Workplace support for reservists after deployment

A minority of respondents who had deployed as reserves reported negative workplace consequences after deployment. Results suggest that approximately 15 to 18 percent of respondents who had deployed to Afghanistan reported loss of seniority, loss of income or resentment from co-workers, with approximately 10 to 13 percent of respondents who deployed to Iraq reporting negative workplace experiences after deployment (Table 7.29).

Table 7.29:	Workplace issue	es for reserves or	CFTS by deplo	ovment location
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a de la construcción de la constru	/ / /	
	Iraq (N = 327)	Afghanistan (N = 271)
Workplace issue	n [″] (% ^b)	n ^a (% ^b)
Loss of seniority, promotion opportunity		
or responsibility in civilian job		
Yes	32 (10%)	41 (15%)
No	228 (70%)	167 (62%)
Not applicable	67 (20%)	63 (23%)
Loss of income during call up		
Yes	41 (13%)	49 (18%)
No	219 (67%)	165 (61%)
Not applicable	67 (20%)	57 (21%)
Resentment from co-workers		
Yes	43 (13%)	43 (16%)
No	221 (68%)	170 (63%)
Not applicable	63 (19%)	58 (21%)

^a Unweighted totals

^b Percentages weighted for non-response

7.3.6 Resilience

Over all, 86.0% of respondents reported the ability to adapt to change either 'often' (n = 4625, 35.0%) or 'nearly all the time' (n = 6976, 51.0%). Due to small numbers, the 'rarely true' and 'not true at all' responses were collapsed into one category.

Those who saw themselves as less able to adapt to change ('sometimes true' or 'rarely true/not true at all') were between four and 43 times more likely to report mental and general health problems (Table 7.30). As self-reported ability to adapt to change decreased, the risk of mental and general health problems increased.

			PTSD symptoms		
		No (PCL-C<50)	Yes (PCL-C≥50)		
Ability to adapt to change	n=13137 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6873	98.9	1.1	1 (Reference)	-
Often true	4546	96.1	3.9	3.60 (2.78, 4.66)	< 0.001
Sometimes true	1156	83.1	16.9	16.11 (12.34, 21.03)	< 0.001
Rarely/ Not true at all	562	75.7	24.3	29.03 (21.88, 38.53)	<0.001
		Psyc	hological distress		
		No (K10<30)	Yes (K10≥30)		
	n=13333ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6969	99.4	0.6	1 (Reference)	-
Often true	4617	96.7	3.3	5.35 (3.87, 7.40)	< 0.001
Sometimes true	1176	82.4	17.6	28.75 (20.84, 39.67)	< 0.001
Rarely/ Not true at all	571	77.2	22.8	43.01 (30.73, 60.21)	< 0.001
		Major dep	ressive syndrome		
		No	Yes		
	n=12609 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6638	99.2	0.8	1 (Reference)	-
Often true	4346	97.0	3.0	4.29 (3.15, 5.84)	< 0.001
Sometimes true	1095	85.2	14.8	21.11 (15.54, 28.68)	< 0.001
Rarely/ Not true at all	530	83.0	17.0	26.19 (18.47, 37.16)	< 0.001
			Panic syndrome		
		No	Yes		
	n=12839 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6756	99.2	0.8	1 (Reference)	-
Often true	4438	97.1	2.9	3.64 (2.68, 4.94)	<0.001
Sometimes true	1107	86.3	13.7	18.09 (13.23, 24.72)	< 0.001
Rarely/ Not true at all	538	84.4	15.6	22.01 (15.41, 31.43)	<0.001
		Other a	anxiety syndrome		
		No	Yes		
	n=12013 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6561	99.3	0.7	1 (Reference)	-
Often true	4142	97.7	2.3	3.00 (2.21, 4.08)	<0.001
Sometimes true	873	90.5	9.5	12.38 (8.99, 17.06)	<0.001
Rarely/ Not true at all	437	93.0	7.0	8.86 (5.81, 13.52)	<0.001
			Alcohol misuse		
		No (AUDIT<20)	Yes (AUDIT≥20)		
	n=13246 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6924	99.4	0.6	1 (Reference)	-
Often true	4590	97.4	2.6	3.55 (2.56, 4.92)	<0.001
Sometimes true	1165	91.4	8.6	10.23 (7.30, 14.34)	<0.001
Rarely/ Not true at all	567	90.1	9.9	14.13 (9.70, 20.58)	<0.001
			General health		
		Good-Excellent	Fair/poor		
	n=13337 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	p-value
True nearly all the time	6968	93.1	6.9	1 (Reference)	-
Often true	4615	83.7	16.3	2.44 (2.20, 2.71)	<0.001
Sometimes true	1182	61.1	38.9	6.26 (5.47, 7.17)	<0.001
Rarely/ Not true at all	572	64.9	35.1	4.28 (3.61, 5.07)	< 0.001

Table 7.30: Ability to adapt to change by measures of mental and general health (N=13356)

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Respondents who reported being less able to adapt to change ('sometimes true' or 'rarely true/not true at all') were significantly more likely to report suicide thoughts, plans or attempts. For suicide attempts, the association was the strongest for those in the 'rarely true/not true at all' category (Table 7.31). The reported ability to adapt to change was significantly different between roles (χ^2 = 266.2, *df* = 42, *p*<0.0001) (Table 7.32).

		se sy measures			
			Suicide thoughts		
		No	Yes		
Ability to adapt to change	n=12847 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
True nearly all the time	6756	97.8	2.2	1 (Reference)	-
Often true	4434	94.5	5.5	2.62 (2.19, 3.14)	< 0.001
Sometimes true	1116	81.9	18.1	9.19 (7.56, 11.18)	< 0.001
Rarely/ Not true at all	541	80.5	19.5	10.50 (8.25, 13.36)	<0.001
		Suicide plan			
		No	Yes		
	n=12840 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value
True nearly all the time	6754	99.4	0.6	1 (Reference)	-
Often true	4429	98.7	1.3	2.06 (1.43, 2.96)	<0.001
Sometimes true	1116	96.3	3.7	5.26 (3.54, 7.80)	<0.001
Rarely/ Not true at all	541	92.6	7.4	11.00 (7.35, 16.45)	<0.001
			Suicide attempts		
		No	Yes	-	
	n=12843 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
True nearly all the time	6756	99.8	0.2	1 (Reference)	-
Often true	4432	99.6	0.4	1.98 (1.21, 3.26)	0.007
Sometimes true	1115	99.4	0.6	1.90 (0.82, 4.39)	0.136
Rarely/ Not true at all	540	97.9	2.1	9.25 (5.11, 16.76)	<0.001

 Table 7.31:
 Ability to adapt to change by measures of suicidality (N=13356)

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible.

Table 7.32:	Ability to adapt to change by self-reported roles (N=11803)	

		Ability to adapt to change				
		True nearly		Sometimes	Rarely / Not	
	_	all the time	Often true	true	true at all	
Role	nª	% ^b	% ^b	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^c	161	57.2	29.4	9.4	4.0	
Combat (e.g. infantry, artillery etc) ^c	1914	51.7	33.8	10.0	4.5	
Other combat - Navy	1042	45.3	39.5	10.6	4.6	
Other combat – Army	471	50.0	34.5	11.7	3.8	
Other combat – RAAF	222	47.7	33.0	13.7	5.6	
Combat support – Navy	504	42.9	42.0	9.7	5.4	
Combat support – Army	1016	48.1	35.5	12.2	4.2	
Combat support – RAAF	903	54.8	35.7	5.6	3.9	
Aircrew ^c	507	54.7	33.6	7.0	4.7	
Health ^c	316	48.9	38.1	9.4	3.6	
Logistics (Navy)	229	42.5	43.3	10.3	3.9	
Logistics (Army)	1167	49.4	35.2	9.6	5.8	
Logistics (RAAF)	1070	53.6	33.4	9.4	3.6	
Maritime operations ^c	728	59.1	31.6	5.7	3.6	
Administration + other ^c	1553	56.5	32.2	7.5	3.8	

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

Overall, 88.8% of respondents reported the ability to bounce back after illness or hardship either 'often' (n = 4596, 34.8%) or 'nearly all the time' (n = 7325, 54.0%). Due to small numbers, the 'rarely true' and 'not true at all' responses were collapsed into one category.

Respondents who reported they were less able to bounce back after illness or hardship ('sometimes true' or 'rarely true/not true at all') were between nine and 71 times more likely to report mental and general health problems than those who responded with 'true nearly all the time' (Table 7.33). As ability to bounce back decreased, the risk of mental and general health problems increased.

í literatura (m. 1997)			PTSD symptoms	-	-
Ability to bounce back after		No (PCLC<50)	Yes (PCLC≥50)		
hardship	n=13096ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	7216	98.9	1.1	1 (Reference)	-
Often true	4513	96.1	3.9	3.68 (2.86, 4.73)	< 0.001
Sometimes true	1081	80.9	19.1	18.76 (14.50, 24.28)	< 0.001
Rarely/ Not true at all	286	59.0	41.0	55.53 (40.98, 75.24)	< 0.001
		Psyc	chological distress		
		No (K10<30)	Yes (K10≥30)		
	n=13291 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	7318	99.3	0.7	1 (Reference)	-
Often true	4585	96.8	3.2	4.15 (3.09, 5.57)	< 0.001
Sometimes true	1096	80.4	19.6	27.54 (20.62, 36.77)	< 0.001
Rarely/ Not true at all	292	59.7	40.3	71.14 (51.18, 98.89)	<0.001
		Major dep	ressive syndrome		
		No	Yes		
	n=12569 ^ª	% ^b	% ^b	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	6962	99.4	0.6	1 (Reference)	-
Often true	4320	96.8	3.2	6.24 (4.60, 8.47)	<0.001
Sometimes true	1024	83.8	16.2	30.16 (22.12, 41.12)	<0.001
Rarely/ Not true at all	263	68.0	32.0	67.53 (46.74, 97.55)	<0.001
			Panic syndrome		
		No	Yes		
	n=12798 ^ª	% [°]	% [°]	OR (95%CI) ^{c,e}	<i>p</i> -value
True nearly all the time	7089	99.3	0.7	1 (Reference)	-
Often true	4404	97.0	3.0	3.74 (2.80, 5.00)	<0.001
Sometimes true	1035	85.1	14.9	18.81 (13.95, 25.37)	< 0.001
Rarely/ Not true at all	270	/3./	26.3	33.63 (23.11, 48.94)	<0.001
		Othera	anxiety syndrome		
		NO	Yes	an (ana(a)).e	
The second set lists a time s	n=11973	% ⁻	%-	OR (95%CI)**	<i>p</i> -value
Often true	6893	99.3	0.7	1 (Reference)	-
Competimos truco	4122	97.7	2.3	3.13 (2.28, 4.30)	<0.001
Barely/Not true at all	780 178	83.0 82.0	10.2	15.72 (9.76, 19.24) 24 87 (15 71 20 20)	<0.001
	178	02.0		24.87 (15.71, 59.59)	<0.001
	$n - 12204^{a}$	% ^b	v ^b	OR (95%CI) ^{c,e}	n-value
True nearly all the time	7274	99.3	0.7	1 (Reference)	p-value
Often true	4554	97.4	2.6	3 33 (2 44 4 56)	<0.001
Sometimes true	1085	90.4	9.6	10.38 (7.48, 14.41)	<0.001
Rarely/Not true at all	291	85.1	14.9	15.62 (10.12, 24.11)	< 0.001
, i i i i i i i i i i i i i i i i i i i			General health		
		Good-Excellent	Fair/poor		
	n=13295 ^a	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value
True nearly all the time	7315	93.7	6.3	1 (Reference)	-
Often true	4588	83.4	16.6	2.76 (2.49, 3.07)	<0.001
Sometimes true	1098	55.7	44.3	8.64 (7.52, 9.93)	< 0.001
Rarely/ Not true at all	294	41.5	58.5	11.11 (8.84, 13.96)	< 0.001

Table 7.33:	Ability to bounce back after illness or hardship by measures of mental and general health
	(N=13314)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level, relationship status and PCL-C.

^e Estimated odds ratios, weighted for non-response

Respondents who reported they were less able to bounce back after illness or hardship ('sometimes true' and 'rarely true/not true at all') were significantly more likely to report suicide thoughts, plans or attempts (Table 7.34). The reported ability to bounce back after illness or hardship differed significantly by role (χ^2 = 199.3, *df* = 42, *p*<0.0001) (Table 7.35).

Table 7.34: Ability to adapt to bounce back after illness or hardship by measures of suicidality (N=13314)						
	Suicide thoughts					
Ability to bounce back after	-	No	Yes			
hardship	n=12806 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value	
True nearly all the time	7098	98.0	2.0	1 (Reference)	-	
Often true	4401	94.5	5.5	2.90 (2.42, 3.47)	< 0.001	
Sometimes true	1036	78.8	21.2	11.92 (9.80, 14.51)	<0.001	
Rarely/ Not true at all	271	68.9	31.1	18.59 (14.18, 24.38)	<0.001	
			Suicide plan			
		No	Yes			
	n=12799 ^ª	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value	
True nearly all the time	7092	99.5	0.5	1 (Reference)	-	
Often true	4398	98.6	1.4	2.87 (2.02, 4.07)	<0.001	
Sometimes true	1036	95.2	4.8	8.99 (6.18, 13.09)	<0.001	
Rarely/ Not true at all	273	88.2	11.8	20.39 (13.02, 31.93)	<0.001	
			Suicide attempt			
	_	No	Yes			
	n=12802 ^ª	% ^b	% ^b	OR (95%CI) ^{d,e}	<i>p</i> -value	
True nearly all the time	7093	99.8	0.2	1 (Reference)	-	
Often true	4401	99.7	0.3	1.69 (1.02, 2.80)	0.043	
Sometimes true	1035	98.9	1.1	5.73 (2.95, 11.11)	<0.001	
Rarely/ Not true at all	273	95.9	4.1	19.26 (9.74, 38.10)	<0.001	

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, rank, Service, ADF employment category (currently serving, reservists or ex-serving), most recent deployment location to the MEAO, education level and relationship status.

^d Estimated odds ratios, weighted for non-response

^e Crude odds ratios, due to low prevalence, adjustment was not possible.

Table 7.35: Ability to bounce back after illness or hardship by role (N=11764)

		Ability to bounce back after hardship				
		True nearly	Often	Sometimes	Rarely/ not	
		all the time	true	true	true at all	
Role	nª	% ^b	% ^b	% ^b	% ^b	
EOD (Bomb disposal, IED technician) ^a	160	60.1	30.6	6.4	2.9	
Combat (e.g. infantry, artillery etc) ^a	1910	55.1	33.4	8.9	2.6	
Other combat - Navy	1037	49.4	39.7	8.4	2.5	
Other combat – Army	470	51.1	34.7	11.5	2.7	
Other combat – RAAF	221	50.1	35.4	11.6	2.9	
Combat support – Navy	504	45.7	39.6	11.9	2.8	
Combat support – Army	1012	52.5	35.7	9.3	2.5	
Combat support – RAAF	902	55.6	35.6	7.4	1.4	
Aircrew ^a	506	58.6	31.3	7.8	2.3	
Health ^a	315	53.3	34.2	10.9	1.6	
Logistics (Navy)	228	45.2	42.6	9.0	3.2	
Logistics (Army)	1160	51.2	37.3	9.2	2.3	
Logistics (RAAF)	1066	57.0	32.9	8.3	1.8	
Maritime operations ^a	723	61.0	31.5	6.2	1.3	
Administration + other ^a	1550	59.2	31.4	7.4	2.0	

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

Summary of resilience

The majority of respondents reported the ability to adapt to change and the ability to bounce back after hardship or illness. Respondents who did not report possessing these traits were significantly more likely to report mental and general health problems.

7.4 Discussion

A high level of perceived unit cohesion during deployment was associated with better mental and general health. This is consistent with existing literature [28, 63, 64, 82, 102, 118, 133, 139, 163, 167]. Further, low levels of cohesion were more strongly associated with poorer health than were moderate or high levels of unit cohesion. These findings suggest the importance of social support in terms of leadership, group cohesion, comradeship and an open line of communication within the military unit. Findings were consistent for both Iraq and Afghanistan deployments. Having a network of social support within the military unit may provide ADF members with emotional consolation post-combat [52]. Thus, it may be important for the Department of Defence to consistently work towards improving unit morale and cohesion.

A lack of perceived military support to partners/spouses during deployment and to ADF members after deployment was also associated with poorer reported mental and general health. These results are consistent with those of Harvey [83] who found that low levels of post-deployment military support were associated with increased reporting of probable posttraumatic disorder and alcohol misuse. Further, results showed very little difference in associated poor health between the perceived situation where no military support was provided to spouses/partners and where support was provided but seen as insufficient. This suggests that military support to spouses/partners during deployment must be perceived as adequate by the ADF member.

Future research might investigate what constitutes sufficient support. However, the possibility of negative reporting bias cannot be excluded here. Findings reinforce the need to ensure deployed members feel adequately supported by the military, not only in terms of building a cohesive working environment during deployment but also providing support for the family while the members are away on deployment and ongoing support for members after deployment.

Low levels of family support and relationship satisfaction were associated with poorer reported mental and general health. The family unit remains an integral part of the support system which provides deployed members with encouragement and reassurance. Results suggest that processes or strategies that can enhance family support and relationship satisfaction, or reduce potentially negative impacts of deployment on family relationships, may be associated with health benefits. Similarly, a lack of community support for the mission was associated with poorer reported health. Negative public perceptions of the deployment may become added psychological burdens which can be detrimental to the wellbeing of deployed members. Current findings suggest the benefits of a smooth readjustment process with supportive and empathic family and community environments.

Reasonably strong community support in the workplace was reported by those who had deployed as reserves. Only a minority reported loss of seniority, loss of income and resentment from co-workers, and one quarter of respondents said this was not applicable. Nevertheless, this may be an area for improvement.

An inability to adapt to change and bounce back after illness or hardship was associated with a much greater risk of poorer mental and general health. Consistent with previous research [50, 51, 54], resilience in terms of the ability to adapt to change and the ability to bounce back after illness or hardship seem to be personal qualities that may reduce risks of negative health after deployment. Resilient people may be more likely to engage in active coping behaviour while under stress and less likely to respond in a passive and helpless manner [184]. It may be beneficial for the Department of Defence to continue with strategies or programs that enhance the resilience of deploying members (e.g. *BattleSMART* (Self-Management and Resilience Training)).

In interpreting these results, it is important to refer to the limitations of the study (see Chapter 10). The health measures used in the study refer to health at the time of completing the survey whereas perceptions of unit cohesion and social support refer to recall of experiences in the past. It is also important to acknowledge the cross-sectional nature of the data, which prevents statements about causality or the direction of associations, which can best be established by longitudinal research. Nevertheless, the results provide evidence that good morale and cohesion within the unit and perceptions of military, family and community support both during and after deployment could buffer or 'protect' against a range of problems including symptoms of PTSD, psychological distress, depression, anxiety, suicidality, alcohol misuse and general health concerns.

In this chapter, we compare women and men who deployed to the MEAO in areas of mental, physical and general health, and health-related behaviours. We also compare women and men on perceived impact of their military commitments, and adequacy of military support during and on return from their MEAO deployment.

Research question 3:

Are there gender differences in health impacts of MEAO deployment?

Key Points

- Men had more combat roles and combat-type traumatic experiences than women, whose duties were more likely to be in administration, aircrew and 'other' roles.
- Men and women had very different deployment experiences, making comparisons difficult.
- Women had statistically significantly more self-reported doctor diagnosed migraines and sinus problems, whilst men had poorer hearing and higher blood pressure.
- Women had significantly higher psychological symptoms compared to men. In general, findings were consistent with general population prevalence for men and women.
- While on deployment, men were more likely to take body building supplements and consume caffeine drinks while women were more likely to take weight loss supplements.
- Women reported less negative impact of their military commitments in general on their partner or children than did men.
- Women were more likely than men to report that their partner did not receive military reassurance or support during their deployment.
- Women were more likely than men to report absence of military support for themselves on their return from MEAO deployment.

Implications

- Women may have traumatic experiences on deployment not captured by the conventional measures of combat-type trauma included in our study. Different questions could be investigated for routine psychological screening.
- Women's needs for additional or different types of support on return from deployment require addressing by the ADF. Longer-term effects may have implications for DVA.
- Our findings are unique to the Australian and ADF contexts. Findings from studies of other defence forces that have deployed to the MEAO, even those of our Allies, cannot be assumed to apply.
- Subtle differences in experience of deployment and in health may be important in personnel management and planning to meet health needs of men and women during and after military service.
- Evaluating gender-appropriate provision of care, personal and family support may be warranted so that the best possible services can be provided to ADF men and women during and on return from deployment.

8.1 Introduction and research aims

The number of women serving in the ADF is relatively small compared with countries such as the U.S. As at 1 October 2011, 8006 women made up 14% of the permanent full-time ADF (19% in the Royal Australian Navy, 10% in the Australian Army, and 17% in the Royal Australian Air Force) [16]. To provide appropriate health services for women and men in the ADF during and after military service, it is necessary to identify any gender differences in health that may be associated with deployment. As women constitute an increasing percentage of the Australian [15, 69] and U.S. Defence Forces [20, 53], they will form increasingly higher proportions of exserving and veteran populations in years to come. Obtaining valid information on occupational risk factors among women has become increasingly important [169] and will continue to do so.

Different exposures and experiences

Types of exposures women and men may face on deployment can vary according to a Defence Force's policy on female occupational roles. The occupational roles that women can perform in the ADF have been subject to some restriction, but policy change removed those restrictions from 27 September 2011 [168]. Nevertheless, 93% of employment categories were available to ADF women before that time.

In the U.S., policy changes in the early 1990s made it possible for women to fill combat-related roles [169] and U.S. women are increasingly exposed to combat [120]. Female U.S. veterans identified combat experiences, military sexual trauma, and separation from family as major stressors, in addition to post-deployment reintegration problems [124]. For U.K. and Canadian forces the types of exposure on deployment may differ for women and men [132, 190]. In a Canadian study, women were less likely to experience deployment-related traumas (e.g. risk to self, trauma to others), accidents and several specific violence-related events, and were more likely to experience sexual trauma, partner abuse and being stalked. Work stress also differed between regular serving women and men [132]. Combat experience is likely to differ qualitatively for men and women. Further, other dimensions in addition to combat exposure may warrant consideration in analyses of gender and health in the deployment context.

Health

Women veterans may have specific health needs that differ from men [20]. Rates of PTSD and other mental disorders are often higher in women compared to men [8]. Hazardous alcohol use may be an exception, where women's rates may be lower than men's in the general [8] and the deployed population [122, 132]. Women with combat exposure may be more likely than men to screen positive for PTSD [132, 163] and depression [75, 120]. However, this association is not shown for some groups [103, 122, 181]. Subsequent physical health and diagnoses may vary according to gender if deployment tasks differ for men and women. Health of men and women may also vary with other factors, including health care and support during and after deployment, which require exploration in the Australian context.

In this chapter, we compare men and women who deployed to the MEAO in areas of mental, physical and general health, and health-related behaviours. Particular attention is paid to health comparisons for women and men in comparable roles during deployment. However, we recognise that the subtleties of roles and experiences may differ for women and men in relation to MEAO deployments.

8.2 Methods

8.2.1 Measures

The following measures were used:

Demographic variables:

- Demographic details (Brief Deployment History Questionnaire and Health Questionnaire)
- Self-reported role on most recent deployment to the MEAO (Deployment Questionnaire)

Traumatic exposures:

• As described in Chapter 4

Physical health:

- General health: Short-Form 1 (SF1)
- Medically diagnosed conditions: 4 items

Mental health:

- Post-traumatic Stress Disorder: PTSD Check List civilian version (PCL-C)
- Psychological distress: Kessler 10 Plus (K10+)
- Panic syndrome and other anxiety syndromes: Patient Health Questionnaire (PHQ)
- Major depressive syndrome: Patient Health Questionnaire (PHQ)

Health related behaviour:

- Cigarette smoking
- Caffeine use
- Dietary supplement use: 3 items
- Alcohol misuse: Alcohol Use Disorders Identification Test (AUDIT)

Impact on marriage/relationship and children:

• Overall impact of military commitments (now or in the past) on marriage/relationship and children

Military support

- Military reassurance/support to spouse /partner during deployment (Deployment Questionnaire)
- Perception of being well supported by the military in the weeks after coming home (Deployment Questionnaire)

8.2.2 Analyses

Initially, women and men were compared in relation to roles on deployment, location of deployment, Service and serving status. As there were important gender differences, we attempted to restrict further analyses to women and men who performed similar roles on deployment, by 'frequency matching' with a 1:2 ratio of women to men. This was accomplished by selecting a sample of men who performed similar roles to the entire sample of women who participated in the MEAO Census Study. Having done this, however, there were still substantial differences between women and men when self-reporting the number of traumatic exposures on their most recent MEAO deployment. We now present comparisons between women and men, adjusting for age, rank and Service.

The participant's most recent MEAO deployment was used in the analyses. In situations where an ADF member had deployed to both Iraq and Afghanistan in the same month and year, the Iraq deployment experience was used for analyses because this was the first deployment participants were asked about and because the Australian mission to Iraq had ceased by the time of this study. Analyses were weighted for non-response where noted in tables.

In general, logistic regression modelling was used to examine the association between gender and Physical, mental and behavioural health. In addition, multinomial logistic regression was used to examine the association between gender, and responders' caffeine consumption and their perceived impact of military commitments on relationship and children. All models were adjusted for age (18-24, 25-34, 35-44, 45+ years), rank (Commissioned Officer, Non-commissioned Officer and Other ranks), and Service (Army, Navy and RAAF) Results presented are weighted based on the characteristics of the MEAO nominal roll. For more details on the weighting procedure and on the tools used in the analyses, please refer to *Volume II*.

8.3 Results

A higher proportion of women (61.4%) than men (54.3%) participated in the MEAO Census Study. RAAF women were likely to consent to participate in the study (65.2%), followed by Army (62.4%), and Navy (56.6%) women.

8.3.1 Locations and role on most recent MEAO deployment

Location

The locations of men and women for Iraq and Afghanistan deployments are shown in Table 8.1. Men and women could deploy to more than one location during their MEAO deployments. Women were more frequently deployed to supporting areas not in Iraq and Afghanistan, compared to men. The frequency of men deployed to Tarin Kowt was almost double that of women.

	Sex					
		Women		Men		
Location of deployment [#]	nª		% ^b % ^b		nª	
In Iraq (N = 5241)						
Baghdad	183	18.1		22.1	1502	
Tallil	63	6.0		12.5	790	
Balad	18	1.7		1.0	72	
Persian Gulf (ships)	242	26.6		20.8	1347	
Attachment to foreign militaries/UN	15	1.4		2.5	177	
Other areas in Iraq	83	8.2		11.7	749	
Supporting areas not in Iraq	395	38.0		29.4	2179	
Total deployment	999				6816	
In Afghanistan (N = 4367)						
Tarin Kowt	136	23.6		42.0	2136	
Kandahar	132	23.3		17.9	1024	
Kabul	25	4.2		5.5	314	
Attachment to foreign militaries/UN	7	1.5		2.0	113	
Other areas in Afghanistan	20	3.8		9.2	460	
Supporting areas not in Afghanistan	229	43.6		23.5	1333	
Total Afghanistan	549				5380	

Table 8.1:Locations on most recent deployment to the MEAO for women and men (Iraq N=7815;
Afghanistan N=5929)

Participants may have deployed to one or more location.

^a Unweighted totals

^b Estimated percetnages, weighted for non-response

Role

The main roles undertaken by women and men whilst on deployment to Iraq and Afghanistan are shown in Table 8.2. For both Iraq and Afghanistan, men were much more likely to report being in combat roles compared to women. Combat support roles, however, had a similar frequency between women and men. The frequency of women in health and administration roles was higher in Iraq and Afghanistan.

	Sex				
		Women	Men		
Role on most recent deployment ^{\$}	nª		% ^b % ^b	nª	
Iraq (N = 6759)					
EOD	2	0.2	1.0	61	
Combat	9	1.1	16.2	829	
Other Combat	121	14.1	21.2	1205	
Combat support	183	21.2	19.2	1139	
Health	98	10.8	3.0	187	
Air Crew	38	4.0	5.9	394	
Maritime Operations	21	2.4	2.9	161	
Logistics	221	24.8	19.7	1194	
Other	112	12.0	9.8	634	
Administration	89	9.3	1.0	61	
Afghanistan (N = 4853)					
EOD	3	0.9	2.1	94	
Combat	4	0.8	26.3	1048	
Other Combat	28	6.4	8.3	352	
Combat Support	107	23.4	21.4	964	
Health	65	13.3	3.1	148	
Air Crew	15	2.9	5.2	263	
Maritime Operations	22	5.5	2.5	100	
Logistics	117	25.2	20.3	891	
Other	73	15.3	9.8	481	
Administration	32	6.4	1.0	46	

Table 8.2:Role on most recent deployment to the MEAO for women and men

Participants could have more than one role on deployment. For the purpose of this analysis the highest risk role was used.

^a Unweighted totals

^b Estimated percentages, weighted for non-response

Role-Service group

The proportions of each Role-Service group performed by women and men are shown in Figure 8.1. The Role-Service groups were statistically significantly different between women and men (p < 0.0001) (Table 8.3).

Figure 8.1 Roles on deployment for women and men (* all services combined)



Female Male

	Women		Men	
	(N°=15	06)	(N°=1094	1)
Role-Service group	nª	% [°]	nª	% [°]
EOD (Bomb disposal, IED technician) ^c	5	0.3	170	1.5
Combat (e.g. infantry, artillery, etc.) ^c	17	1.3	1983	20.2
Other combat – Navy	133	9.5	1064	10.4
Other combat – Army	29	1.9	474	4.4
Other combat – Air Force	19	1.3	231	1.9
Combat support - Navy	109	8.5	437	4.3
Combat support - Army	94	6.0	948	9.0
Combat support - Air Force	117	7.4	842	6.8
Aircrew ^c	173	11.1	360	3.1
Maritime operations ^c	59	3.6	703	5.6
Health ^c	52	3.6	313	3.1
Logistics - Navy	73	5.5	185	1.8
Logistics - Army	145	9.5	1037	10.1
Logistics - Air Force	154	9.7	975	7.8
Administration and other roles ^c	327	20.8	1219	10.1

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c All Services combined

Work pattern

Participants were asked about mixed duty cycles and the hours of duty they worked on their most recent deployment to the MEAO. There were differences between the duty cycles for men and women in relation to Iraq. More men (63%) reported often working mixed duty cycles compared to women (52%). The percentage of women (15%) who reported they never worked these cycles was almost double that of men (8%). Men reported being "on duty" an average of 15.4 hours per day during their Iraq deployment (SD = 4.7). Women reported being "on duty" an average of 14.8 hours per day during their Iraq deployment (SD = 4.7), which was statistically significantly less than male participants (p = 0.0003). Overall, 17% of participants reported being "on duty" 24 hours per day during their Iraq deployment.

There were also differences between the duty cycles for women and men in Afghanistan. A greater percentage of men (58%) reported working mixed duty cycles compared to women (45%). Men reported being "on duty" an average of 15.1 hours per day during their Afghanistan deployment (SD = 4.5). Women reported working an average of 15.9 hours per day during their Afghanistan deployment (SD = 4.7), which was statistically significantly more than their male counterparts (p < 0.0001). Overall, 21% of participants reported being "on duty" 24 hours per day during their Afghanistan deployment.

8.3.2 Demographic characteristics of men and women

Deployment and demographic characteristics of ADF women and men are presented in Table 8.4. There were differences in age (the men were older), rank (the percentage of women in other ranks was higher).

Table 8.4. Deployment and demographic characteristics of men and women.							
(N ^a =14032)	Wo	men	Me	n			
	n°	(%) ^b	n°	(%) ^b	<i>p</i> -value		
Overall	1730	(11.0)	12302	(89.0)	<0.001		
Deployment location							
Iraq	732	(64.0)	5313	(70.0)	0.021		
Supporting not in Iraq	445	(36.0)	2628	(30.0)			
Afghanistan	337	(48.0)	3850	(65.2)	<0.001		
Supporting not in Afghanistan	344	(52.0)	2207	(34.8)			
Service							
Navy	543	(34.5)	2607	(22.2)	<0.001		
Army	531	(29.8)	6069	(52.2)			
RAAF	656	(35.7)	3626	(25.6)			
Age							
18-24	83	(5.4)	501	(5.0)	< 0.001		
25-34	926	(54.6)	4628	(39.8)			
35-44	560	(30.9)	4531	(35.4)			
45 and above	161	(9.1)	2642	(19.8)			
Rank							
Commissioned Officer	542	(28.4)	3587	(24.5)	<0.001		
Non-Commissioned Officer	962	(54.2)	7121	(56.2)			
Other Ranks	226	(17.6)	1594	(19.3)			
Serving status							
Active Regular	1327	(71.7)	9492	(71.7)	<0.001		
Reserve	304	(20.2)	2230	(21.3)			
Ex-serving	99	(8.1)	580	(7.0)			

T-1-1-04 Deployment and demographic characteristics of man and women

^a Unweighted totals

^b Estimated percentages, weighted for non-response

8.3.3 Traumatic experiences on deployment

Participants were asked to report the number of perceived traumatic experiences on deployment to Iraq or Afghanistan, which may have been combat related. In both deployment locations, women were statistically significantly less likely to report experiencing traumatic exposures than men (Tables 8.5 and 8.6). The experience of discharging their own weapon was particularly low for women compared to men, with no women in Afghanistan reporting this experience. The most frequent traumatic experience reported for women in Iraq was 'potential for exposure' and 'coming under fire' for Afghanistan. The differences in reported traumatic experiences between women and men were closely associated with deployment location (e.g. in Iraq or Afghanistan or supporting areas outside Iraq and Afghanistan) and roles on deployment (e.g. more women were in administration roles whilst more men were in combat roles).

	Women		Men		Chi square
Iraq (N ^a = 9007)	nª	% ^b	nª	% ^b	<i>p</i> -value
Coming under fire	343	29.6	3707	49.1	< 0.001
Discharging own weapon	4	0.3	247	3.5	< 0.001
Threatening situation unable to respond	48	4.5	875	12.6	< 0.001
Potential for exposure	472	41.4	4677	61.5	< 0.001
In danger of being killed or injured	216	18.6	2651	35.5	< 0.001
Handling/seeing dead bodies	133	11.6	1736	23.5	< 0.001
Casualties among people close to you	216	18.9	1964	26.6	< 0.001
Witness to human degradation and misery	49	4.2	633	8.6	< 0.001
Own action or inaction resulted in the injury or death of others	17	1.6	301	3.9	< 0.001

Table 8.5: Traumatic experiences on deployment to Iraq reported by women and men.

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

Table 8.6: Traumatic experiences on deployment to Afghanistan reported by women and men.

	Women		Men		Chi square
Afghanistan (N ^a = 6534)	nª	% ^b	nª	% ^b	<i>p</i> -value
Coming under fire	290	43.3	3526	61.5	<0.001
Discharging own weapon	0	0.0	644	12.3	-
Threatening situation unable to respond	24	4.4	646	12.4	< 0.001
Potential for exposure	214	32.8	3456	61.1	<0.001
In danger of being killed or injured	110	16.5	2209	39.7	< 0.001
Handling/seeing dead bodies	98	14.4	1709	30.7	< 0.001
Casualties among people close to you	162	25.2	2139	39.0	<0.001
Witness to human degradation and misery	36	5.4	529	9.8	<0.001
Own action or inaction resulted in the injury or death of others	7	1.0	326	5.8	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

8.3.4 Physical and mental health

Women were statistically significantly more likely than men to report PTSD symptoms (even though women and men reported similar proportions), psychological distress, symptoms of major depressive syndrome, panic syndrome or other anxiety syndromes, or thoughts of suicide (Table 8.7). There were no statistically significant differences between women and men on general health, alcohol misuse, suicide plans, or suicide attempts. Women were statistically significantly more likely than men to report doctor-diagnosed sinus problems and migraines, and statistically significantly less likely to report doctor-diagnosed hearing loss and high blood pressure.

(N ^a =13490)	Women (n ^a =1660)	Men (n ^a =11830)		n voluo
PTSD symptoms	/0	/0	OK (55% CI)	<i>p</i> -value
PCL-C ≥ 50	4.4	4.6	1.28 (1.04,1.57)	0.020
Psychological distress				
K10 ≥ 30	5.8	4.0	1.83 (1.52,2.19)	<0.001
Major depressive syndrome	4.7	3.4	1.71 (1.38,2.11)	< 0.001
Panic syndrome	4.9	3.2	2.06 (1.68,2.53)	<0.001
Other anxiety syndrome	2.8	2.1	1.60 (1.18,2.15)	0.002
Alcohol misuse				
AUDIT ≥ 20	1.8	2.6	0.82 (0.59,1.13)	0.223
Suicidality				
Suicide thoughts	6.4	5.4	1.35 (1.14,1.60)	0.001
Suicide plans	1.4	1.1	1.15 (0.83,1.59)	0.412
Suicide attempts	0.5	0.4	1.22 (0.71,2.08)	0.474
General Health				
Fair/Poor	13.5	14.7	1.08 (0.96,1.21)	0.181
Doctor diagnosed ^d				
Sinus problems	15.2	9.7	1.73 (1.54,1.93)	<0.001
Migraines	11.4	5.2	2.44 (2.14,2.79)	<0.001
Hearing loss	6.9	14.2	0.55 (0.48,0.64)	<0.001
High blood pressure	5.2	12.8	0.43 (0.37,0.52)	<0.001

Table 8.7: Differences in mental and physical health reported by women and men

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Weighted for non-response. Women compared to men, i.e. men were the referent group. Adjusted for age, Service, rank.

^d Diagnosed by a doctor since deployment

8.3.5 Smoking, caffeine drinks and supplement use

Women were statistically significantly less likely than men to smoke cigarettes and to drink three or more caffeine drinks per day (Table 8.8). Women (compared to men) were statistically significantly less likely to use body building and energy supplements, but more likely to use weight loss supplements.

(N ^a = 13305)	Women (n ^a =1645)	Men (n ^a =11660)		
	%	%	OR (95% CI) ⁻	<i>p</i> -value
Cigarette smoking	21.6	29.0	0.72 (0.65,0.79)	< 0.001
Caffeine drinks				
None	14.4	11.4	1 (Reference)	-
1-2 per day	55.4	47.5	0.95 (0.84,1.06)	0.341
3-5 per day	26.3	34.8	0.68 (0.60,0.77)	< 0.001
6 or more per day	3.8	6.4	0.60 (0.48,0.75)	< 0.001
Body building supplements	6.4	19.0	0.25 (0.22,0.29)	< 0.001
Energy supplements	20.6	24.9	0.73 (0.66,0.80)	< 0.001
Weight loss supplements	12.1	7.0	1.84 (1.62,2.09)	< 0.001

 Table 8.8:
 Smoking, caffeine consumption and supplement use by women and men

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Weighted for non-response. Women compared to men, i.e. men were the referent group. Adjusted for age, Service, rank.

8.3.6 Impact of current or past military commitments on marriage/ relationship and children

Given differences in characteristics, experiences and health-related behaviours, gender differences were considered in other aspects of military experience. Over all, the majority of women and men reported the impacts of military commitments on their marriage or relationship, current or past, as negative, rather than positive or of no impact. Women compared to men were statistically significantly more likely to report that military commitments had no impact on their marriage or relationship, compared to a positive impact (Table 8.9). There was no significant difference between women and men on whether they perceived military commitments to have a negative impact on their marriage or relationship, but if the 'positive' and 'no impact' categories were collapsed and used as the referent, women were significantly less likely than men to report a negative effect on their relationship (p < 0.001). Women were 32% less likely than men to report that military commitments had a negative impact on their child or children. This significant difference remained when the 'positive' and 'no impact' categories were collapsed and used as the referent.

	Women	Men		
	% ^b	% ^b	OR (95% CI) ^c	p-value
Impact on marriage/relationship				
(N ^a = 12967)	n ^a = 1544	n ^a = 11423		
Positive	12.5	14.7	1 (Reference)	
No impact	29.9	23.8	1.30 (1.14,1.49)	<0.001
Negative impact	57.6	61.6	0.94 (0.83,1.06)	0.314
Impact on children	n ^a = 676	n ^a = 7719		
(N°=8395)		-		
Positive	15.2	13.9	1 (Reference)	
No impact	33.8	26.4	0.95 (0.75,1.19)	0.632
Negative impact	51.0	59.7	0.68(0.55,0.83)	<0.001

Table 8.9:Self-reported impact of military commitments on marriage/relationship and children.

^a Unweighted totals

^b Estimated percentages, weighted for non-response

^c Weighted for non-response. Women compared to men, i.e. men were the referent group. Adjusted for age, Service, rank.

8.3.7 Military support during and after deployment

Participants were asked "Did the military provide any reassurance/support to your spouse/partner whist you were deployed (e.g. phone calls or visits, arranging 'get togethers' with other service families, newsletters, etc.)?" Women were significantly more likely than men to report absence of such support for their partner while they were deployed (Table 8.10).

Participants were also asked whether they felt well supported by the military in the weeks after they returned home from deployment. Women were significantly more likely than men to report that they did not feel as though they had been well supported by the military in the weeks following their return home (Table 8.10). There were too few ex-serving women respondents to draw reliable comparisons between serving and ex-serving women.

Table 8.10:	Perceived military	support to self and	spouse/partner	during deployment	(N=11325)
					· · · · · · · · · · · · · · · · · · ·

	Women	Men %				
	%	%	OR (95% CI)	p-value		
Military provided reassurance/support to spouse/partner during deployment						
	n ^a = 920	n ^a = 8164				
Yes, sufficient	46.3	48.8	1 (Reference)	-		
Yes, but not sufficient	12.3	20.1	0.66(0.54,0.79)	< 0.001		
No	41.3	31.1	1.40(1.23,1.58)	< 0.001		
Well supported by military in w	eeks after coming h	ome				
	n ^a =1327	n ^a =9998				
Agree	77.1	80.2	1 (Reference)	-		
Disagree	22.8	19.8	1.24(1.11,1.38)	<0.001		

^b Estimated prevalences, weighted for non-response

^c Weighted for non-response. Women compared to men, i.e. men were the referent group. Adjusted for age, Service, rank.

8.4 Discussion

This chapter aimed to compare men and women on behavioural, general, physical, and mental health related to ADF deployment to the MEAO.

There was difficulty in identifying men and women who had similar deployment experiences. Men reported more traumatic/combat type exposures than women. The differences in combat experiences observed between men and women may relate to the types of duties performed. Women were more likely to perform health roles, which may lead them to report similarly to men on items such as witnessing human degradation and misery. However, women have typically been under-represented in the development and testing of combat exposure instruments, which may have led to male gender bias in measurements of combat exposure [175]. Therefore, the combat experiences of women may not have been fully represented in either the literature or in military understanding.

Even when rates of combat experiences are similar, differences may be observed. For U.S. soldiers deployed to Iraq, even with similar overall rates of combat experiences, the nature of these experiences differed for men and women because women were more likely to be in medical specialities [92]. As in our study, King's Centre for Military Health Research U.K. also found that exposures differed for men and women [190]. Women in the U.K. Armed Forces deployed to Iraq or Afghanistan reported less exposure to 'risk to self' events and 'trauma to others' events than men [190].

The Canadian Forces Supplement to the Canadian Community Health Survey has also shown gender differences in types of exposures [132]. Female personnel (both regular and reserve) were less likely than males to experience deployment-related traumas, accidents and several specific violence-related events [132]. Women were more likely to endure other types of trauma such as sexual trauma, partner abuse and being stalked [132]. Work stress also differed between regular serving women and men [132]. In addition to combat experiences, a qualitative study of U.S. women veterans identified military sexual trauma, separation from family and post-deployment reintegration problems as major stressors [124].

Overall, women in our study were significantly more likely to report a number of mental health issues compared to men. Women reported significantly greater psychological distress, symptoms of panic syndrome and major depressive syndrome than men. Recent research, which incorporated data from many serving participants in this MEAO Census Study (see Chapter 3), suggests that the mental health of women in the ADF is not significantly different from women in the Australian community on any affective disorder, any anxiety disorder, or any mental disorder [89].

Significant differences were not found between men and women on suicide plans or attempts, however, women were found to have more suicide thoughts. This is consistent with research which found that for

women, veteran status was associated with ever having suicidal thoughts [189]. There were only marginally higher odds of women reporting PTSD symptoms. Higher rates of PTSD symptoms in women have been reported in some, but not all studies. The current findings regarding PTSD are similar to that of U.S. soldiers deployed to Iraq and Afghanistan [122], but differed from Canadian research, where after adjustments, regular serving women were more likely to report PTSD [132]. U.S. Millennium Cohort studies have found a significantly higher incidence of some mental health outcomes, such as PTSD, in women compared to men [170]. Combat exposure in U.S. soldiers was associated with a higher frequency of PTSD symptoms and depressive symptoms in women and greater severity of depressive symptoms in women compared with men [120]. In contrast, U.K. research reported no gender differences in post-traumatic stress reaction or symptoms of PTSD in their Iraq War Study, and psychological symptoms in women were not positively associated with deployment to the Iraq War [150]. A later U.K. study of gender in relation to deployment to Iraq and Afghanistan concluded that, despite differences in mental health, the impact of deployment was similar in men and women [190]. The number of ex-serving women in our study was too small to enable useful comparisons, but future investigation of their specific needs would be worthwhile.

U.S. Army research has shown combat exposure to be a stronger predictor of post-deployment depression in women than men and there were gender-based differences in depression and PTSD risk [120]. In the US Millennium Cohort Study, although both deployed women and men with combat exposure were at increased risk of depression compared with non-deployed personnel, some categories of women (e.g. married/divorced, active duty, US Navy/Coast Guard) were at increased risk of depression than others [186]. In Mota and colleagues' Canadian study, reservist women were more likely to have depression, panic disorder, and any mood or anxiety disorder [132]. ADF women serving in roles with increased traumatic exposures may require specific assessment because of the potential increase in mental health risk.

The prevalence of alcohol disorders was lower in ADF men and women compared to the community [89]. No evidence of differences between men and women on alcohol misuse was found in our study, which is contrary to recent North American findings of higher reported hazardous alcohol use in men than women [122, 132]. However, US Department of Defense data has shown more harmful drinking patterns in female health care providers compared with males, across both enlisted and officer ranks, in response to deployment [75]. There may be quite specific differences in alcohol consumption patterns between men and women [117] that are not captured in overall hazardous drinking scores. Cultural differences and differences in role and exposures may explain some of the differences from international findings.

The general health of men and women in our study was similar. However, some differences were found on specific aspects of physical health. For example, men were significantly more likely to report hearing loss than women. Women self-reported substantially more medically diagnosed conditions since deployment than men. This may be because women are more likely to seek help, compared to men, but true gender differences in the development of particular conditions in different age groups exist in the general population [7] and are likely to be observed in defence force populations. For example, one US study found that serving women had higher adjusted rate of osteoarthritis than men [38]. Nevertheless our finding may have implications for physical health interventions for the ADF. Men may require targeted physical health interventions to increase help-seeking behaviours and treatment compliance.

Women's perceptions of effects of their military commitments in general on partners and children were more positive than those reported by men in the study. Possible reasons for this might include greater likelihood of having partners with financial independence, or a partner in the ADF. On the other hand, women ADF members who deployed to the MEAO were more likely than men to feel that the military reassurance or support for their partner while they were away was lacking or insufficient. This could be because women's partners were less likely to ask for help or because support was less forthcoming to ADF women's partners. These issues warrant further investigation.

Women were significantly more likely than men to feel that they had not been well supported by the military in the weeks following their return home from MEAO deployment. It may be that women's needs are different. Again further in-depth investigation of this important issue is recommended.

There were several strengths of our analyses, including good statistical power to detect true differences for most items. The small number of Australian women who deployed has been a problem in reaching definitive conclusions in Australian studies, such as the Vietnam War and the Gulf War Study [48, 129]. Even the large US Millennium Cohort Study, in which women constituted 25% of the cohort, oversampled female service members to enable robust analyses by gender [169]. A higher proportion of women than men responded to our survey, but response bias was controlled for by weighting the data before conducting analyses. There was no evidence that differential response was related to health status. Our study focused largely on mental health. Because the Census Study was cross-sectional, we were not able to assess pre-deployment gender differences in risk factors for poor mental health which have been noted in some studies [40]. The number of ex-serving and reserve women was too small for accurate analyses to be conducted.

Our study did not explore work stress, military sexual trauma, partner abuse or stalking, which are important foci of some international studies with a particular interest in women's health. These issues warrant future investigation. Our study did not address women's health care needs in theatre, including continuity of care for health problems which occurred in the field, highlighted by recent literature relevant to OEF and OIF [20]. Health care needs in theatre may differ for men and women. For example, gynaecological and reproductive issues on deployment may include problems associated with contraception, pregnancy, and urinary tract infection [20]. Health care needs in theatre related to combat exposure and military sexual trauma may also differ for men and women [124]. Further, men and women may have different post-deployment experiences and needs for support. For example, needs of women military healthcare providers in response to deployment have been shown to differ from men's, with clinical care implications [75]. Functioning and outcomes may also differ for men and women according to support responsibilities (for example relationships and children) before, during and after deployment. A US study of 1114 Air Force women deployed to OIF showed that women who were parents reported greater interference of physical and emotional problems on their social functioning than did those women who were not parents [138]. The needs of men and women who deployed to the MEAO as partners and parents may warrant further investigation.

Conclusions

The main gender differences in results presented were increased psychological symptoms in women and the greater number of reported conditions diagnosed since deployment. Men and women had very different deployment experiences, making comparisons difficult. Questions selected regarding combat experience to compare men and women may not be appropriate.

Our findings are unique to the Australian and ADF contexts. Institutional and international cultural differences are likely to mean that findings from studies of other defence forces that have deployed to the MEAO, even those of our Allies, cannot be assumed to apply.

Health care, organisational factors and support during and after deployment are likely to have influenced the subsequent health of men and women who deployed. Other differences in experiences between men and women may be important. Even subtle differences may be important in personnel management and planning to meet health needs of men and women during and after military service.

Longer-term follow-up of this cohort is required, as conditions may have a longer lead time. This will also be important for questions of fertility and reproduction, especially as the women in the cohort who deployed to the MEAO tended to be younger than the men. Our study did not focus in any depth on the need for assistance with family issues that may be important for the optimal wellbeing and functioning of mothers and fathers who deployed to the MEAO. This could be a useful area for future research, so that the best possible gender-appropriate support services can be provided to ADF men and women.

Chapter 9 Patterns of somatic symptoms and conditions

This chapter examines the pattern of physical and somatic symptoms and conditions reported by ADF members who deployed to the MEAO, and investigates whether a specific multi-symptom illness or syndrome could be identified. Further, associations between physical symptoms and psychological health were assessed.

Research questions 5, 6 & 7:

- Are there relationships between deployment exposures and non-specific symptoms and specific health problems?
- What is the pattern of psychological morbidity and its somatic manifestations?
- Is there a post deployment syndrome(s) common to the MEAO deployments?

Key points:

- RAAF personnel reported fewer physical health symptoms than Navy and Army members.
- Those with combat roles and those deployed to other areas within Iraq and Afghanistan reported more physical health symptoms.
- There is a strong relationship between physical health symptoms and psychological health among MEAO veterans.
- There was no clear evidence of a post deployment syndrome specific to MEAO deployments.

9.1 Introduction

A definition of chronic multi-symptom illness (CMI) was created by the Centre for Disease Control and Prevention based on persistent symptoms of general fatigue, mood and cognitive abnormalities, and musculoskeletal pain [72]. To date, there has been little research on multi-symptom illness or syndromes in the context of MEAO deployments. The King's Centre for Military Health Research in the UK reported no 'Iraq Syndrome' and found no repetition of the substantial increase in reporting of symptoms after the first Gulf War [110]. The majority of work on self-reported symptoms so far was related to the first Gulf War.

In response to concerns that veterans were suffering from illnesses related to military service in the first Gulf War, researchers investigated evidence for the 'Gulf War Syndrome' [101]. Haley et al. [81] and Kang et al. [106] suggested there was a unique pattern of conditions associated with deployment to the 1990-91 Gulf War. However, the validity and interpretation of these results has been challenged [67, 100, 106, 161], and findings from other studies do not support the existence of a 'Gulf War Syndrome' [22, 67, 100, 114, 158, 161]. Nevertheless, Gulf War veterans were more likely to report multiple symptoms and more likely to report symptoms at greater intensity than non-Gulf War comparison groups [22, 67, 78, 96, 99, 161, 179].

In the US, Blanchard et. al. [23] found that ten years after the first Gulf War, CMI was significantly more prevalent among deployed veterans and was more likely to be severe. However, CMI also affected non-deployed veterans. They found that CMI was strongly associated with chronic fatigue syndrome and fibromyalgia, which have similar symptoms that are unexplained by physical and laboratory examinations [1].

The Australian Gulf War Veterans' Health Study (AGWHS) found that Australian Gulf War veterans (predominantly from the Navy) were significantly more likely to meet criteria for chronic fatigue syndrome than the comparison group, but the number of affected veterans was very small. Gulf War veterans also suffered significantly more from prolonged fatigue [161].

This chapter presents the prevalence of symptoms reported by MEAO veterans and investigates the existence of a unique multi-symptom illness or syndrome related to MEAO deployments. Associations between reported symptoms and psychological health are also assessed.

9.2 Methods

9.2.1 Measures

The following measures were analysed in this chapter (for a detailed description of scales please refer to *Volume III*).

Demographic variables:

• Demographic details: Brief deployment history questionnaire

Health symptoms:

• Recent health symptoms: Health Symptom Checklist (67 items)

Mental health:

- Posttraumatic Stress Disorder (PTSD): PTSD Checklist Civilian version (PCL-C)
- Psychological distress: Kessler 10 Plus (K10+)
- Major depressive syndrome: Patient Health Questionnaire (PHQ)
- Panic and other anxiety syndrome: Patient Health Questionnaire (PHQ)

The health symptom checklist contains 67 items about deployed members' physical and mental health symptoms and the severity of each item (no, mild, moderate or severe). These items were summed to calculate the total number of symptoms reported by participants. The symptom checklist was also used to examine whether MEAO veterans reported any unique cluster of symptoms and if there were any associations between physical and psychological measures.

9.2.2 Data analysis

The analysis presented in this chapter focuses on participants who deployed to Iraq and Afghanistan. Participants who deployed to supporting areas outside these countries were excluded from analyses.

The factor analysis was not weighted for non-response. Other analyses were weighted unless specified. For more details on the weighting procedure and the tools used in the analysis, please refer to *Volume II*. Logistic regression was used to compare dichotomous outcomes (yes/no) between exposure groups, whereas negative binomial regression was used to contrast the mean number of symptoms between groups. All models were adjusted for age (18-24, 25-34, 35-44, 45+ years), rank (Commissioned Officer, Non-commissioned Officer and Other ranks), Service (Army, Navy and RAAF) and sex.

9.2.3 Multi-symptom illness

To investigate whether a multi-symptom illness was present for participants, items from the health symptoms checklist and the PHQ were used to create three cluster of symptoms which reflected similar heath characteristics to a measure created by Blanchard [23] who investigated chronic multi-symptom illness in US veterans of the 1990-91 Gulf War.

The three clusters of this measure were:

- Cluster A Fatigability
 - Fatigue (health symptoms checklist)
- Cluster B Mood and Cognition
 - PHQ Depression Module (0-4=Mild, 5-27=Present, 15-27=Severe)
 - Worried, tense or anxious (PHQ Anxiety 'Not at all'=Absent, 'Several days or more'=Symptom present, 'More than half the days'=Severe symptom present)
 - Loss of concentration, sleeping difficulties, irritability/outbursts of anger (Symptoms checklist)
- Cluster C Musculoskeletal
 - Pain without swelling or redness in several joints, general muscle aches and pains (health symptoms checklist)

A chronic multi-symptom illness was detected if a participant reported one or more symptoms from at least two of the clusters (A, B, or C). Likewise, symptoms of severe chronic multi-symptom illness were detected if a person reported at least one severe symptom in each of clusters A, B, or C.

9.2.4 Chronic fatigue

If participants had four or more of the following symptoms, they were recorded as having symptoms characteristic of chronic fatigue [42]:

- headaches;
- feeling unrefreshed after sleep;
- fatigue;
- sore throat;
- forgetfulness;
- loss of concentration;
- pain without swelling or redness in several joints;
- general muscle aches and pains; and
- tender or painful swelling of lymph glands in neck, armpit or groin.

9.2.5 Self-reported health symptoms

The total number of self-reported health symptoms was compared between broad demographic groups in the ADF (Service and role on deployment). The results are reported as ratios (called incidence rate ratios [IRR]) of average numbers of symptoms for one group relative to a reference group. The total number of self-reported symptoms was also contrasted between deployment locations (those deployed within Iraq and Afghanistan as opposed to those deployed to the supporting locations for Iraq and Afghanistan).

9.2.6 Exploratory factor analysis of self-reported symptoms

An exploratory factor analysis was undertaken using the Heath Symptom Checklist to identify if any cluster of symptoms existed for participants who deployed to Iraq or Afghanistan (conducted separately for both deployment locations). Following this, a common factor analysis was conducted on a combined dataset of those deployed within Iraq and Afghanistan. Both orthogonal and oblique rotations were considered.

Only 66 of the 67 items from the Health Symptoms Checklist were used in the exploratory factor analysis. The item 'seizures and convulsions' was excluded from further analyses because it was reported by less than 0.4% of members in the Iraq and Afghanistan groups. The results of the factor analyses were similar between both deployment locations. In the unrotated solution from a principal components analysis, 40% of the variance was explained by six factors. Scree plots indicated that the majority of variance was explained by the first two to three factors. The initial analyses revealed 13 factors with eigen values greater than one. Therefore all solutions from two and 13 factors were considered.

The orthogonal and oblique rotations were assessed and the results from each were very similar. The oblique rotations were chosen over the orthogonal solutions because the factors were simpler in structure and slightly more concise and interpretable.

The four factor solution was chosen as the most interpretable and parsimonious. This solution contained the following groups of symptoms:

- Psychological factor (14 items)
- Psychosomatic factor (12 items)
- Digestive factor (8 items)
- Muscles and joints factor (7 items)

A five factor solution was not chosen, because respiratory related symptoms (e.g. 'faster breathing than normal') broke off from the psychosomatic factor, and whilst this was interpretable, the simpler four factor solution was chosen as the items relating to respiratory symptoms were deemed to belong with the other items from the psychosomatic factor. The four factor solution is detailed in Table 9.1 and shows which of the Health Symptom Checklist items load onto each of the four factors (refer to *Volume II* for the separate factor analyses tables for participants deployed to Iraq and Afghanistan).

The final factor structure contains those items which were in *both* factor solutions for Afghanistan and Iraq deployment locations. For example, 'feeling unrefreshed after sleep' loaded on the psychological factor for Iraq *and* Afghanistan deployments, whilst 'faster breathing than normal' loaded on the psychosomatic factor for both location analyses. There were some items from the Health Symptom Checklist which did not load significantly on any of the four factors for Iraq or Afghanistan deployments. These items were not used in subsequent analyses.

Table 9.1:	Factors common between Iraq and Afghanistan analyses forming the 4 factor solution (based
	on the items from the Health Symptoms Checklist)

	4 Factors of the oblique rotation			
Items: health symptoms checklist	Psychological	Psychosomatic	Digestive	Muscles and joints
Feeling unrefreshed after sleep	Х			
Irritability / outbursts of anger	Х			
Sleeping difficulties	Х			
Feeling distant or cut off from	х			
others				
Fatigue	Х			
Loss of concentration	Х			
Forgetfulness	Х			
Avoiding doing things or situations	Х			
Feeling jumpy / easily startled	Х			
Difficulty finding the right word	Х			
Distressing dreams	Х			
Loss of interest in sex	Х			
Increased sensitivity to noise	Х			
Headaches	х			
Feeling short of breath at rest		Х		
Faster breathing than normal		Х		
Unable to breathe deeply enough		Х		
Feeling disorientated	х	Х		
Rapid heartbeat		х		
Loss of balance or coordination		Х		
Dizziness, fainting or blackouts		х		
Shaking		х		
Difficulty speaking		х		
Feeling feverish		х		
Wheezing		х		
Double vision		х		
Changeable bowel function			х	
(mixture of diarrhoea /				
constipation)				
Diarrhoea			х	
Stomach cramps			х	
Feeling that your bowel movement			х	
is not finished				
Constipation			х	
Stomach bloating			х	
Flatulence or burping			х	
Indigestion			х	
Joint stiffness				Х
Pain, without swelling or redness,				х
in several joints				
Numbness in fingers / toes				Х
General muscle aches or pains				Х
Tingling in legs and toes				Х
Tingling in fingers and arms				Х
Low back pain				х

Note: X indicates loading of 0.3 or above

9.2.7 Psychological health

Factor scores were created for participants based on the 4 factor solution identified in Table 9.1. These scores were then modelled against psychological measures in a combined analysis of MEAO veterans (Afghanistan and Iraq). As eight of the 14 items in the psychological factor were similar to questions asked on the PCL-C scale that measured PTSD, estimates for this association were not performed due to highly correlated items and as such the outcome would be uninformative.

To determine if an association existed between physical and psychological health symptoms, three total physical symptoms scores were generated by summing the number of items reported by a participant for each of the following three factors: digestive, psychosomatic, and muscles and joints (collectively referred to as physical symptoms).

The factor scores were split into quartiles based on distributions and the relationship was assessed using logistic regression in order to produce odds ratio estimates of probability. Scores for the muscles and joints factor was split into quartiles based on self-reported symptom severity. For the other two physical factors (digestive and psychosomatic), the top quartile (the 25% of participants who reported the most symptoms in that factor) was compared to the bottom three quartiles (75% of participants who reported the lowest number of symptoms). This approach was taken because most participants (approximately 75%) reported a very small number of symptoms (0, 1 or 2) in each of these two factors.

9.3 Results

9.3.1 Fatigue

The prevalence of fatigue-like symptoms was relatively high and was very similar between participants deployed to Iraq and Afghanistan. For participants deployed to Iraq, 43% reported more than 4 fatigue symptoms at any level of severity, and for Afghanistan it was 38%. Moderate or severe fatigue was reported by 10% of Iraq veterans and 8% of Afghanistan veterans; severe fatigue was reported by 1% of Iraq veterans and 0.8% of Afghanistan veterans.

9.3.2 Multi-symptom illness

The prevalence of self-reported multi-symptom illness, based on the criteria used by Blanchard [23], was 64% for participants deployed to Iraq and 59% for participants who deployed to Afghanistan. However, when these symptoms were restricted to participants who reported experiencing the symptoms at a severe level, the prevalence rates fell to 1% for Iraq deployments and 0.7% for Afghanistan deployments.

9.3.3 Total number of health symptoms

The overall mean number of health symptoms reported by participants deployed to Iraq was 13, and 12 for participants who deployed to Afghanistan.

Navy reported the lowest mean number of health symptoms from the Iraq deployment, and RAAF reported the lowest number of health symptoms from the Afghanistan deployment (Table 9.2).

Table 9.2:	Mean number of health symptoms by Service					
	In Iraq (N ^a = 5903)				In Afghanis (N ^a = 414	stan 7)
Service	N ^a	Mean (SD)	IRR (95%CI) ^b	N ^a	Mean (SD)	IRR (95%CI) ^b
Army	2918	13.3 (11.9)	1 (Reference)	3250	11.7 (11.0)	1 (Reference)
Navy	2279	12.0 (10.8)	0.89 (0.84, 0.94)	144	13.1 (12.2)	1.10 (0.92, 1.31)
RAAF	706	12.1 (11.2)	0.86 (0.79, 0.94)	753	9.9 (9.9)	0.82 (0.76, 0.89)

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^b Adjusted for age (18-24, 25-34, 35-44, 45+), rank (Non-commissioned officer, Commissioned Officer, Other ranks) and gender. These estimates have not been weighted for non-response.

Participants in the EOD role during their deployment to Iraq, and in maritime operations during their deployment to Afghanistan, reported the highest mean number of health symptoms (Table 9.3). Participants in a combat (infantry, artillery, etc.) and other combat roles in both Iraq and Afghanistan were statistically significantly more likely to report more health symptoms compared to a participant in a logistics role.

Table 9.3. Mean number of health symptoms by role for frag and Alghanistan							
	In Iraq (N ^a = 5850)				In Afghanistan (N ^a = 4046)		
Role	nª	Mean (SD)	IRR (95%CI) ^D	nª	Mean (SD)	IRR (95%CI) ^D	
EOD	60	17.8 (14.8)	1.44 (1.12, 1.86)	96	12.7 (12.6)	1.19 (0.96, 1.49)	
Combat (infantry,	1072	13.6 (12.3)	1.17 (1.06, 1.28)	1083	12.1 (11.6)	1.22 (1.10, 1.34)	
artillery)							
Other Combat	1476	13.1 (11.6)	1.13 (1.04, 1.24)	237	13.7 (10.7)	1.26 (1.09, 1.47)	
Combat support	1128	12.5 (10.7)	1.05 (0.96, 1.15)	937	11.3 (10.4)	1.07 (0.97, 1.18)	
Health	231	12.0 (11.5)	0.98 (0.85, 1.14)	181	11.5 (11.1)	1.05 (0.89, 1.25)	
Air-crew	105	9.1 (9.4)	0.77 (0.63 <i>,</i> 0.95)	152	8.6 (9.5)	0.90 (0.74, 1.08)	
Maritime	268	11.3 (10.5)	0.98 (0.85, 1.14)	10	15.8 (19.5)	1.18 (0.61, 2.28)	
Operations							
Logistics	788	12.6 (11.3)	1 (Reference)	759	11.1 (10.9)	1 (Reference)	
Other	649	11.3 (10.6)	0.94 (0.84, 1.04)	532	10.6 (10.5)	0.98 (0.87, 1.10)	
Administration	73	11.5 (12.0)	0.89 (0.70, 1.13)	59	9.5 (8.9)	0.87 (0.66, 1.14)	

Table 0.2. Mann number of boolth supertons by role for Irog and Afghanistan

^a Unweighted totals

^b Adjusted for age (18-24, 25-34, 35-44, 45+), rank (Non-commissioned officer, Commissioned Officer, Other ranks) and gender These estimates have not been weighted for non-response.

The prevalence of the most commonly reported health symptoms were very similar between participants who deployed to Iraq and Afghanistan (Table 9.4). In both deployment locations, sleep difficulties and fatigue were the most frequently reported symptoms, with more than 50% of respondents reporting both of these symptoms.

The pattern of symptoms reported by participants was similar between deployment locations (Figure 9.1). The reported health symptom items are ranked by decreasing prevalence.

Table 9.4:Prevalence of the most common symptoms reported by participants who deployed to Iraq and
Afghanistan (Iraq N=5857, Afghanistan N=4125)

Iraq symptoms		Afghanistan symptoms	
(N ^a = 11687)	% ^b	(N ^a = 8039)	% ^b
Fatigue	59.8	Sleeping difficulties	55.7
Sleeping difficulties	58.6	Fatigue	54.6
Feel unrefreshed after sleep	57.1	Feeling unrefreshed after sleep	52.8
Irritability/outbursts of anger	51.6	Irritability/outbursts of anger	49.6
Headaches	49.8	Headaches	45.2
Low back pain	46.1	Low back pain	44.2
General muscle aches and pains	41.0	General muscle aches and pains	37.8
Forgetfulness	40.3	Forgetfulness	37.1
Difficulty finding the right word	38.0	Difficulty finding the right word	35.1
Loss of concentration	36.8	Loss of concentration	33.4
Joint stiffness	35.3	Feel distant/cut-off from others	32.2
Feel distant/cut-off from others	34.7	Joint stiffness	31.8
Ringing in ears	33.5	Ringing in ears	31.3
Flatulence or burping	31.6	Flatulence or burping	27.5
Avoid doing things/situations	31.0	Feeling jumpy/easily startled	26.8

^a Unweighted totals

^bEstimated prevalences, weighted for non-response

Figure 9.1 Prevalence of symptoms reported by Iraq and Afghanistan veterans



Within Iraq, the number of symptoms reported varied slightly by deployment location. Respondents deployed to 'other supporting areas *not* in Iraq' reported the lowest number of symptoms on average, and those deployed to 'other areas in Iraq' reported the highest number of symptoms on average (Table 9.5). Those deployed to 'other areas in Afghanistan' also reported the highest number of symptoms (Table 9.6).

Table 9.5:	wean number of symptoms b	y location for those depi	oyed to Irad (N = 8911)	
Location		n ^a	Mean ^a	SD
Baghdad		2116	13.0	11.5
Talil		1070	12.9	12.0
Balad		111	12.3	11.8
Persian Gulf (s	hips)	2140	11.9	10.8
Attachment to	o foreign militaries or UN	242	13.2	11.5
Other areas in	Iraq	1034	14.7	12.6
Other support	ing areas <i>not</i> in Iraq	3464	10.7	10.6

Table 9.5: Mean number of symptoms by location for those deployed to Iraq (N = 8911)

^a Participants may have deployed to more than one location. These results are not weighted for non-response

Table 9.6:	Mean number of	f symptoms by	location for those	deployed to	Afghanistan (N =	= 6675)
					<u> </u>	

		/ 0 /	/
Location	n ^a	Mean ^a	SD
Tarin Kowt	2552	11.5	10.8
Kandahar	1437	10.9	10.6
Kabul	499	11.7	10.9
Attachment to foreign militaries or UN	162	11.3	11.4
Other areas in Afghanistan	581	13.9	12.8
Other supporting areas not in Afghanistan	2810	11.0	10.6

^a Participants may have deployed to more than one location. These results are not weighted for non-response

9.3.4 Patterns of health symptoms and PTSD

The digestive, psychosomatic, and muscles and joints factor items are referred to collectively as *physical symptoms*. The psychological factor was not compared to psychological measures because of the high correlation between the items.

Participants who reported experiencing more physical symptoms were also more likely to report more symptoms of PTSD, as measured by the PCL-C (scores \geq 50). Participants who reported the highest number of digestive, psychosomatic, and muscular symptoms were two to nine times more likely to report symptoms of PTSD (Table 9.7). The strongest association was between high psychosomatic symptoms and high PTSD symptoms.

Table 9.7: Association between physical symptoms and PTSD for participants deployed to the MEAO (N = 8757)

		PTSD sym	ptoms		
		No	Yes		
	_	(PCL-C<50)	(PCL-C≥50)		
	N ^a	% ^b	% ^b	OR (95%CI) ^{c,d}	<i>p</i> -value ^e
Digestive symptoms					
Quartiles 1-3 (0-2): Low	6957	97.5	2.5	1 (Reference)	
Quartile 4 (3-10): High	1800	84.7	15.3	2.07 (1.67,2.58)	< 0.001
Psychosomatic symptoms					
Quartiles 1-3 (0-1): Low	6735	98.9	1.1	1 (Reference)	
Quartile 4 (2-12): High	1946	82.1	17.9	9.44 (7.16, 12.45)	< 0.001
Muscle and joint symptoms					
Quartile 1 (0): None	3326	98.7	1.3	1 (Reference)	
Quartile 2 (1): Mild	1624	98.6	1.4	0.72 (0.43, 1.18)	
Quartile 3 (2-3): Moderate	2147	95.1	4.9	1.51 (1.02, 2.23)	
Quartile 4 (4-7): Severe	1647	83.9	16.1	2.68 (1.83, 3.91)	< 0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank and other factor categories in the model

^d Estimated odds ratios are weighted for non-response

^e *p*-value for the significance of each factor

9.3.5 Patterns of health symptoms and psychological distress

Participants who reported a higher number physical symptoms were more likely to report high psychological distress, as measured by K10 (scores ≥ 30). Participants who reported the highest number of digestive, psychosomatic, and muscular symptoms were two to nine times more likely to report high psychological distress (Table 9.8). The strongest association was between high psychosomatic symptoms and high psychological distress.

Table 9.8: Association between physical symptoms and psychological distress (N = 8762)

		Psychologica	l distress		
		No (K10<30)	Yes (K10≥30)		
	N ^a	% ^b	% ^b	OR (95%CI) ^{cd}	<i>p</i> -value ^e
Digestive symptoms					
Quartiles 1-3 (0-2): Low	6961	97.7	2.3	1 (Reference)	
Quartile 4 (3-10): High	1801	87.3	12.7	1.99 (1.59, 2.49)	<0.001
Psychosomatic symptoms					
Quartiles 1-3 (0-1): Low	6741	98.9	1.1	1 (Reference)	
Quartile 4 (2-12): High	1945	84.5	15.5	9.06 (6.89, 11.91)	<0.001
Muscle and joint symptoms					
Quartile 1 (0): None	3330	98.5	1.5	1 (Reference)	
Quartile 2 (1): Low	1626	98.4	1.6	0.66 (0.41, 1.06)	
Quartile 3 (2-3): Moderate	2146	96.3	3.7	0.98 (0.67, 1.43)	
Quartile 4 (4-7): Severe	1647	86.4	13.6	1.95 (1.35, 2.81)	<0.001

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

^c Adjusted for age, gender, Service and rank and other factor categories in the model

^d Estimated odds ratios are weighted for non-response

^e *p*-value for the significance of each factor

9.3.6 Patterns of symptoms and depression

Participants who reported a higher number of physical symptoms were also more likely to meet PHQ criteria for major depressive syndrome. Participants who reported the highest number of digestive, psychosomatic, and muscular symptoms were two to seven times more likely to meet PHQ criteria for major depressive syndrome (Table 9.9). The strongest association was between high psychosomatic symptoms and meeting PHQ criteria for major depressive syndrome.

		Major depression syndrome			
		No	Yes		
	N ^a	% ^b	% ^b	OR (95%CI) ^{cd}	<i>p</i> -value ^e
Digestive symptoms					
Quartiles 1-3 (0-2):Low	6752	97.9	2.1	1 (Reference)	
Quartile 4 (3-10):High	1757	89.3	10.7	2.06 (1.61, 2.63)	<0.001
Psychosomatic symptoms					
Quartiles 1-3 (0-1):Low	6547	98.8	1.2	1 (Reference)	
Quartile 4 (2-12):High	1890	87.3	12.7	6.66 (5.00 <i>,</i> 8.86)	<0.001
Muscle and joint symptoms					
Quartile 1 (0):None	3226	98.7	1.3	1 (Reference)	
Quartile 2 (1):Low	1574	98.4	1.6	0.96 (0.57, 1.60)	
Quartile 3 (2-3):Medium	2088	96.2	3.8	1.37 (0.91, 2.05)	
Quartile 4 (4-7):High	1607	89.1	10.9	1.99 (1.34, 2.95)	<0.001

Table 9.9:Association between physical symptoms and meeting PHQ criteria for major depressive
syndrome (N = 8509)

^a Unweighted totals

^b Estimated prevalences, weighted for non-response

 $^{\rm c}$ Adjusted for age, gender, Service and rank and other factor categories in the model

^d Estimated odds ratios are weighted for non-response

^e *p*-value for the significance of each factor

9.4 Discussion

The prevalence of physical and psychological symptoms reported by ADF members deployed to the MEAO is broadly consistent with that reported by Australian and U.K. veterans deployed in the 1990-1991 Gulf War. It

is also consistent with more recent studies of Australian veterans deployed to the Solomon Islands, Bougainville and East Timor [44-46, 161, 179].

Consistent with previous studies, fatigue, feeling unrefreshed, and sleeping problems are some of the most common health symptoms reported in the month prior to survey completion. However, less than 1% reported four or more fatigue symptoms consistent with the Centre for Disease Control criteria for chronic fatigue at the severe level. Likewise, less than 1% reported severe symptoms in all three of the fatigability, mood and cognition, and musculoskeletal clusters which Blanchard used as a marker for severe chronic multisymptom illness [23]. The estimates of severe cases of multisymptom illness were lower than those reported in US personnel deployed to the 1990-91 Gulf war, however, the current study was unable to establish whether reported health symptoms had been present for six months, which was a criteria used in this U.S. study.

Overall, the current MEAO participants reported a slightly lower prevalence of health symptoms than the comparison group used in the Australian 1990-91 Gulf War study and at a similar level to the deployed group used in the analysis of UK First Gulf War veterans [161, 179].

Although the current report has highlighted differences in the exposures experienced by Iraq and Afghanistan veterans, such as differences in the number of reported traumatic or combat experiences (Chapter 4), as well as some differences in environmental factors, such as exposure to dust and smoke whilst deployed (Chapter 6), the prevalence and the pattern of current health symptoms reported was almost identical between participants who deployed to Iraq and those who deployed to Afghanistan.

The four factor solution decided on for participants deployed within Iraq or Afghanistan did not contain an unexpected grouping of symptoms that would have been suggestive of a syndrome specific to the MEAO deployment. Although four factors were obtained, the prevalence of people reporting a high number of items in the psychosomatic and digestive factors was low, with less than 25% reporting over two symptoms in each of these factors. However, the absence of a non-deployed comparison group in this analysis means we were unable to observe whether a group of people who did not deploy to the MEAO would have reported a similar profile of health.

Strong associations were found between the number of physical symptoms (items forming the three factors: digestive, psychosomatic, and muscles and joints) reported and measures of psychological health (measured by PCL-C for PTSD, K10 for psychological distress, and PHQ for major depressive syndrome). Participants with mental health problems such as PTSD, depression or anxiety may be more likely to experience poorer physical health[183]. Alternatively, those who are physically unwell may be more susceptible to psychological problems. Due to the cross-sectional design of this survey, we were unable to establish the direction of this effect, but the association between the physical symptoms and psychological health was strongly significant.

Consistent with previous studies, RAAF members reported fewer health symptoms than the Navy and Army [161]. This finding complements the results in Chapter 3 which show that RAAF personnel were less likely to report psychological health outcomes such as symptoms of PTSD, psychological distress, and panic and anxiety syndromes. Respondents most likely to report a higher number of health symptoms were located in other areas within Iraq and Afghanistan, and if they were involved in combat or other combat roles. It is unknown whether these respondents had a specialist role within Defence which may expose them to more physical and psychological stressors. This may explain the increase in reported symptoms.

No evidence was found for a unique pattern of health related symptoms specific to the MEAO deployments. A strong relationship between physical and psychological health was observed. It may be possible to improve the sensitivity of screening programs for mental health problems within Defence by using physical markers such as increased reporting of health symptoms. Likewise, strategies may be considered to improve the physical health of those people identified as having a mental health condition.

10.1 Study Design and Interpretation

The MEAO Census Study is one of a suite of studies commissioned or conducted by the Department of Defence during 2010-2012. It included all currently serving regular full-time ADF members, reserves and ex-serving personnel who had deployed to the MEAO before 2010 and were not scheduled to be deployed in 2010-11. There were 14,032 respondents, which was 53% of eligible participants; 39% of respondents had deployed to both Iraq and Afghanistan; 37% went to Iraq only and 24% went to Afghanistan only. Ex-serving members, reserve members and lower ranks were under-represented among respondents. Consequently, there is a greater chance of bias in the data from these under-represented groups. In this report, data were weighted for non-response based on Service, sex, rank and employment (regular, active reserve, inactive reserve/ex-serving) at the time of the survey; this is a standard statistical procedure to reduce bias.

There is a partial overlap of participants between this study and the 2010 ADF Mental Health Prevalence and Wellbeing Study (MHPWS) [125], which covered all currently serving ADF members (whether or not they had deployed to the MEAO) but excluded reserves and ex-serving members. There were 9520 MEAO Census Study participants whose data were included in the MHPWS; this was 68% of the MEAO Census Study participants and 39% of MHPWS participants. Thus, the results of the MEAO Census Study were expected to be similar, but not identical to, the results of the MHPWS, for currently serving members. However, the Census Study included considerably more data on the MEAO deployment experience and goes beyond reporting prevalence to examining associations between participants' recall of deployment experiences and their subsequent health.

All of the Census Study data were collected by self-reported surveys completed on the internet or on paper; 92% of respondents did their surveys online. Standard questions that have been used in studies of military populations in Australia and other countries were used wherever possible to ensure the results could be compared.

In interpreting the results, it is important to understand that recall of deployment experience may be affected by the respondent's mood at the time of completing the questionnaire. There is a well-known phenomenon called 'negative reporting bias' [183], or 'effort after meaning' [30] whereby people who are depressed or experiencing other mental health problems may perceive and report their past experiences more negatively than other respondents who had the same experience but are not suffering from mental health problems. The cross-sectional design of the MEAO Census Study means that we cannot be certain whether adverse deployment experiences led to poorer mental health or vice versa.

Also people who experienced mental or other health problems during or after deployment may have been more inclined to leave the ADF. When they participated in the study, they would have been ex-serving members or have transitioned to the reserves; so poorer health could be expected to be reported, on average, by these groups.

10.2 Comparison with other studies

Despite the overlap of participants with the MHPWS, the prevalence of most of the major mental health measures was consistently higher for the MEAO Census Study (Chapter 3). The reason was that prevalence was higher among ex-serving and reserve members who were excluded from the MHPWS. The prevalence of mental health conditions increased two to three years after the most recent deployment, especially for exserving members.

Compared with data from the general population (for example, the Australian National Health Survey [11]), the MEAO Census Study showed that smoking rates, exceeding 30%, were particularly high among younger males

in the Army and Navy (Chapter 3). There was also evidence of increased cigarette smoking while on deployment to the MEAO (Chapter 5).

High smoking rates are likely to have long-term health consequences for physical fitness and future chronic disease. For these reasons, Defence could consider adopting the elimination of smoking as an important health improvement target. There are well-established methods of tobacco control. These include banning smoking in the workplace, limiting ready access to cigarettes, increasing health education about the health damage caused by tobacco, and providing pharmacological and behavioural treatments to help smokers to quit.

10.3 Health of participants who had separated from ADF regular service

On all the measures of mental and general health, currently serving members scored better than ex-serving members. Also, among currently serving ADF personnel, regular members reported better health than reserves. These results were to be expected. Ex-serving members may have separated from the ADF as a result of poorer health. Similarly, members who were reserves at the start of the study may have ceased permanent ADF service due to health problems. Among ex-serving respondents, 23% had a most recent Medical Employment Classification (MEC) of 4 (not deployable at all) compared to 1% for active and inactive reserves (MEC was not obtained for currently serving members).

Poor mental health associated with deployment, and possibly with transition to reserves or separation from the ADF after deployment, could be ameliorated by targeted pre-deployment training through programs like the ADF's BattleSMART initiative [49] and improved post-deployment follow-up (Strategic Objective 5). Reserves and ex-serving members do not have access to Defence health and support services. Defence needs to consider how best to follow up members who transition to reserves or separate from the ADF, and improve their pathways to care. Extending the transition process and period may be called for, particularly if members separate shortly after deployment. Ongoing health surveillance and access to services for those separating from the ADF may improve their long term health.

The implication for DVA of the significantly poorer mental and general health of ex-serving members is that they are likely to require considerable support possibly for many years. Prevalence of PTSD symptoms, suicidal thoughts and alcohol misuse among ex-serving members suggest that there will be on-going need for psychological and psychiatric treatment. Additionally, some mental health consequences of deployment may be delayed, so prevalence is likely to increase further in this group over time. The Department of Veterans' Affairs (DVA) cannot contact these people until they lodge a claim. Therefore, Defence and DVA need to work together to provide continuity of service and opportunities for longer term support for members after separation.

10.4 Effects of traumatic and combat exposures

In Chapter 4, we reported significant increases in mental health problems with increasing combat exposure, with the adjusted risk for some problems increasing up to 15-fold. These findings covered PTSD symptoms, major depressive syndrome, panic and other anxiety syndromes, and alcohol misuse. The findings were consistent for combat in Iraq and Afghanistan, even though the nature and frequency of exposures differed somewhat between locations. The association between mental health and individual types of exposures (e.g. handling or seeing dead bodies), the number of types of exposure reported, and the cumulative number of traumatic exposures (of any type) were assessed. Of these, the association was most pronounced for the cumulative number of exposures. The magnitude and consistency of the effect suggests that it is unlikely to be due only to negative reporting bias and that greater combat exposure does lead to greater risk of subsequent mental health problems, including PTSD.

10.5 Deployment patterns, health and family

The total time spent on deployment to the MEAO, the number of deployments to the MEAO in 2001-09, and the duration of the most recent deployment were not strongly or consistently associated with mental or general health. However, the time since the most recent deployment was strongly associated with poorer mental health, especially among ex-serving members. More detailed analysis of the data are needed to gain further understanding of this phenomenon.

More than 60% of respondents (especially men) reported that their military commitment had a negative impact on their marriage and children. Both greater numbers of deployments and greater total time on deployment were significantly associated with more reporting of negative impacts on marriages and children.

There was little evidence that the patterns of deployment affected reserves on CFTS differently from regular full-time ADF members, but the number who deployed as reserves was small and the results may not be statistically reliable.

10.6 Somatic symptoms

Symptoms of fatigue were reported by about half of the participants, with about 40% reporting four or more fatigue-related symptoms and just under 10% reporting moderate or severe fatigue symptoms (Chapter 9).

Less than 1% of study participants reported severe symptoms consistent with chronic multisymptom illness (defined by symptoms across two or more defined clusters of different types of symptoms).

From a list of more than 60 symptoms, related conditions were grouped into the following categories: psychological, psychosomatic, digestive, and muscles/joints. These groupings were similar for Iraq and Afghanistan and are broadly comparable with U.K. findings. There were strong associations between each group of physical symptoms (i.e., excluding the psychological group) and self-reported mental health. These results may be interpreted as somatic manifestations of psychological morbidity or as shared vulnerabilities to both. A clinical implication of these findings is that when veterans report physical symptoms, the possibility of underlying psychological problems should be investigated.

10.7 Head injury and mental health

Although only about 2% of participants reported head injury or concussion on deployments to Iraq or Afghanistan, these injuries were associated with increased risk of PTSD symptoms and other mental health problems. The study also included screening questions for mild traumatic brain injury (mTBI). These referred to injury over the lifetime and more than 10% of participants screened positive. A positive screen for mTBI was also associated with increased risk of PTSD and other psychological problems. Both head injury on deployment and positive screening for mTBI were associated with reported poorer general health but the association was no longer apparent when symptoms of PTSD were taken into account; this is probably due to a strong association between PTSD and mTBI [93].

These results illustrate the difficulty of understanding the effects of head injury and concussion on deployment against a background of relatively high pre-deployment prevalence of such injuries and the possibility of negative reporting bias. This is an area which requires much more targeted research; it is possible that some of the measurements being made for the MEAO Prospective study of ADF personnel both before and after deployment to Afghanistan may shed light on these issues. Current research by DSTO and allies in the U.S. may also provide guidance about effective ways to reduce the effects of blast exposures on mTBI.
10.8 Environmental exposures and health

Exposures to some respiratory irritants varied between Iraq and Afghanistan, and by whether respondents were deployed in country or to supporting areas (Chapter 6). 'Smoke', and 'inhalation of fine dust or fibres' were reported more frequently by those deployed in Afghanistan. Respondents deployed in Iraq reported slightly higher prevalence of exposure to solvents. Although respondents deployed to supporting areas generally reported lower prevalence of respiratory exposures, there was still moderate levels of exposure on several variables, such as dust storms, and higher exposure to aircraft fumes.

Army personnel were much more likely to be exposed to respiratory irritants, although exposure to aviation fuel was more common for RAAF members. High levels of exposure to any of these hazards were associated with increased risk of respiratory symptoms such as asthma, bronchitis, sinus problems and hay fever. These findings are consistent with the US Millennium Cohort Study which found higher rates of newly reported respiratory symptoms in 'deployers' compared to 'non-deployers' [165]. However, a more recent paper from this group found no association between exposure to burn pits and respiratory outcomes [166].

Among the chemical and other perceived exposures investigated, only perceived exposure to non-ionising radiation was common (reported by more than 50% of respondents, compared with less than 5% for other hazards). Non-ionising radiation (e.g., from communication equipment, radar and counter improvised explosive device (IED) measures) was associated with increased PTSD symptoms, migraines, asthma, hearing loss and ringing in ears, and poorer general health. The risk increased with increasing exposure up to almost a doubling of risk. Perceived exposure to ionising radiation or radioactive materials (reported by about 4% of respondents) was associated with increased risk of PTSD symptoms, migraines, hearing loss, tinnitus, asthma and poorer general health. The wide range of health conditions associated with these exposures made identifying plausible biological mechanisms difficult. The alternative explanation of negative reporting bias is also possible.

Exposure to loud noises, often for extended periods, without hearing protection was reported by more than half of the respondents during deployments to both Iraq and Afghanistan. These exposures were associated with risks of hearing loss, increased sensitivity to noise, ringing in the ears, and loss of balance. They were also associated with previous, current or planned claims of compensation for hearing loss.

The survey also included questions about exposures to extremes of heat or cold as reasons for sick parade attendance. Only about 2% of respondents reported sick parade attendance related to cold exposure. Effects of heat were slightly more common, especially in Iraq (6%), but neither exposure resulted in much time off usual duties.

The extent of environmental exposures reported, especially respiratory irritants, and the association with health conditions has implications for Defence in terms of occupational hygiene. It was not possible within the MEAO Census Study to know if the issue was lack of protective equipment or non-compliance with its use. There may be a case for increasing emphasis on using personal protective devices (such as masks and hearing protection) even under 'usual' working conditions involving diesel exhaust, aviation fuel and noise. However, a more realistic approach is for Defence to engineer out these hazards at source or by design of equipment.

These common environmental exposures (particularly to fuels, fumes and noise) also have implications for DVA. Already, claims for hearing loss are among the most common reasons for compensation and these data suggest that such claims will increase as a result of MEAO deployments. Respiratory problems associated with exposure to diesel exhaust, aviation fuel and passive smoking are likely to lead to claims for respiratory conditions (which would then need to be assessed according to the statements of principles used by the Repatriation Medical Authority). These occupational hazards, common to many industrial occupations, were reported much more frequently than exposures to military chemical, biological and other hazardous materials. Strict implementations of civilian standards of occupational hygiene and safety may be impractical on deployments. However, the US has developed Military Exposure Guidelines based on civilian standards but

modified for a fit, trained and well protected force. If similar standards were to be developed for Australia and implemented, this could reduce future claims to the DVA.

10.9 Food, water, use of supplements and health

Eating local food was commonly reported in Iraq and Afghanistan, while drinking water from local taps and wells was much less common. Risk of gastrointestinal symptoms was associated with such exposures and was responsible for about 12% of sick parade attendances among members serving in Iraq and about 18% in Afghanistan deployments. There were also associations with medically-diagnosed bowel disorder after deployment, suggesting that local food and water may have longer term impacts.

While on deployment, respondents reported high levels of caffeine use (more than two drinks per day), especially among men. About 25% of men and 21% of women reported using energy supplements. Nineteen percent of men reported using body building supplements and around 12% of women reported using weight loss supplements.

These results suggest possible lack of awareness or lack of adequate attention to dietary matters among deploying personnel. Health education and promotion about diet may be beneficial to all ADF personnel and could reduce time lost due to gastrointestinal and other health problems. In the UK and the US, there has been a recent focus on reducing access to and use of supplements.

10.10 Social support during and after deployment

There were strong and consistent associations between all measures of social support and all self-reported mental health. The measures of social support included unit cohesion, sufficient support from the military to ADF members' families during deployment, military support to the ADF member after deployment, support from family to the ADF member during and after deployment, and community support during and after deployment. Participants who reported high levels of such social support had lower prevalence of PTSD symptoms, psychological distress, major depressive symptoms, panic or other anxiety symptoms, alcohol misuse, and suicide ideation, and they had better general health. Similar results were found for those who reported post-deployment satisfaction with their relationship/partner. Resilience, reported as the ability to adapt to change and to bounce back after hardship, was also associated with better mental and general health post-deployment. These results were consistent for deployments to Iraq and Afghanistan.

The strength and consistency of these results suggest that perceptions of positive social and organisational support during and after deployment may act as protective factors against mental health problems (although negative reporting bias is also likely to provide at least part of the explanation).

Defence policies and practices that promote good communication and cohesion within the unit during deployment are likely to have long-term benefits for morale as well as operational value. Results show that social support for families is important. Defence outreach programs to support families have the potential to mitigate adverse effects of deployment.

Eighty to ninety percent of veterans who served as reserves on CFTS reported that workplace issues were relevant to them. Of these, two thirds had experienced good post-deployment workplace support (no loss of income, seniority or opportunity for promotion, or resentment by co-workers). However, around 10% did report problems. These results suggest that stronger reintegration support for reserves may be needed, both for members who deployed as reserves on CFTS and those who left the regular forces and joined the reserves after deployment.

10.11 Gender differences and health

The roles undertaken by men and women on deployment are so different that it is difficult to make valid comparisons. Men were more likely to be in the Army and to have combat roles whereas women were more likely to be in the Navy or RAAF and work in health or administration. Even when we attempted to match for deployment locations, Service and role, men were more likely to be older and to have had combat exposure during the deployment. In the future, this may change with the ADF policy of "Women in Non-traditional Roles" and work on physical employment standards being undertaken at the University of Wollongong and DSTO.

From the data analysed so far, there was little evidence of gender differences in general health measures. There was some evidence that women were more likely to report psychological distress and other mental health problems. Further analysis is required to investigate the extent to which health differences between men and women are consistent with patterns in the general Australian population, or relate to different exposures on deployment.

10.12 Study strengths

This was a large study which documented the deployment experiences of ADF members deployed to both Iraq and Afghanistan. The response rate was high compared to other Australian studies and military epidemiological studies elsewhere, and weighting for non-response was used to control for potential response bias. Standard, validated instruments were used which allows comparison with other military and civilian studies. A preliminary study was conducted to assess its validity at face value for the intended participants and to pilot test the draft questionnaire. At all stages of the design and implementation, there was input from senior Defence health staff and Veterans' Affairs representatives. All these features provide confidence in the validity of the findings.

10.13 Study limitations

The associations between self-reported deployment experiences and health could be affected by 'negative reporting bias' [183]. It is also important to acknowledge that the cross-sectional nature of the data prevents statements about causality, which can best be established by longitudinal research. The length of time between deployment and completion of the survey may have influenced the reporting of symptoms and exposures. For example, a long time between deployment and survey completion may mean that some symptoms dissipated, such as psychological distress, and some symptoms may have become more evident, such as delayed onset of PTSD. Also, the length of time between deployment and survey may have impacted on the type of symptoms reported. All the data were self-reported rather than validated objective measures or records. This study did not involve a non-deployed comparison group from the same era because, due to the operational tempo, it was unlikely that members who did not deploy would be comparable to those who did.

10.14 Need for further analysis of the data

The MEAO Census Study involved the collection of a wealth of data. It was not possible in the time available to analyse the data in sufficient depth to understand adequately the associations between deployment experiences and health.

In particular more detailed analysis is needed to address the following questions:

- 1. Why did respondents who were ex-serving members or reserves at the time of the study report poorer mental health than regulars?
- 2. Do the adverse effects of traumatic and combat exposure accumulate or dissipate over time?
- 3. Why do mental health problems increase with age in this ADF population when they usually decrease in the general population [1]?
- 4. How did the experiences during deployment and on return to Australia differ between those who served as reserves and regulars? How did the deployment experiences of the reserves impact on their subsequent health, family and working lives?
- 5. To what extent did the deployment experience impact differently on women and men? Also, were there any adverse effects on their fertility, pregnancy outcomes or children's health? Were the gender differences for medically diagnosed conditions reflective of the general Australian population? (Note that comparable ABS data have not been published to date).
- 6. Did respondents identify mental health problems in "other reasons" for attending sick parade while on deployment?
- 7. To what extent are exposures to smoke, dust, and fumes associated with respiratory symptoms?
- 8. Which exposures, or combinations of exposures, are associated with hearing loss?
- 9. Is it possible to distinguish between effects of multiple deployments and total time deployed?

Data from the MEAO Health Study are a valuable resource with the potential to provide evidence to inform policy and practice for the Departments of Defence and Veterans' Affairs. With further, more detailed and focused analysis, this goal could be achieved.

CMVH has completed cross-sectional surveys of ADF members who deployed to the MEAO and Australia's Near North Area of Influence and, in the process, has successfully recruited large numbers of serving and exserving members. It would be very valuable to maintain contact with these people and repeat data collection at least every five years. Stronger causal associations can be identified by analyses of longitudinal data collected from the same individuals at multiple time points. A longitudinal health surveillance program would provide an evidence base for the ADF comparable with international military research programs, such as the King's Centre for Military Health Research Cohort in the UK and the US Millennium Cohort.

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