



MONASH University

Longitudinal examination of multiple symptom reporting in Australian veterans of the 1990-1991 Gulf War

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Abstract

Background

Increased prevalence of symptoms across multiple body systems are reportedly a major health concern among Gulf War veterans. A case definition of this multiple symptom reporting called multisymptom illness (MSI), is often used for epidemiological and clinical investigations. However, little is understood as to the longitudinal and longer-term consequences of high symptom reporting in Gulf War veterans.

Aims

To examine longitudinal changes in Australian Gulf War veterans' symptom reporting, with particular emphasis on the associations between symptom reporting and health service utilisation, disability compensation, chronic disease incidence, health-related quality of life and general health.

Methods

A cohort of male Australian Gulf War veterans and a military comparison group was assembled and assessed in 2000-2003(Wave-1), and followed up in 2011-2012(Wave-2). At each time point, a multi-system 63-item symptom checklist was administered as part of a larger postal questionnaire that collected data on health behaviours, doctor diagnosed medical problems/conditions and health service use. At Wave-2, additional

data on health service use and Department of Veterans' Affairs (DVA) disability compensation were collected from the Medicare Benefits Schedule, Pharmaceutical Benefits Scheme and DVA. In addition, a systematic review and meta-analysis on MSI in Gulf War veterans was conducted. The review incorporated studies from multiple countries. A range of statistical methods were used to assess the relationship between deployment and health outcomes; including regression models for binary, ordinal and nominal data. Exploratory factor analysis was used to investigate patterns of symptom reporting.

Results

697 Gulf War veterans and 659 comparison group members from Wave-1 participated again at Wave-2. Symptom reporting in both Gulf War veterans and the comparison group increased over time, however at a similar rate. Exploratory factor analysis showed no significant changes in patterns of symptom reporting over time. In the ten years of follow-up, Gulf War veterans who had high symptom reporting at Wave-1 were more likely to develop cardiovascular, musculoskeletal and psychological disorders than veterans with low symptom reporting. The systematic review indicated that odds of MSI were over two-and-a-half times higher in Gulf War veterans than other military personnel. Additional analyses from our cohort showed that MSI cases identified at Wave-1 had more general practitioner visits, medical specialist visits, hospitalisations and DVA disability compensation claims in the period between Wave-1 and Wave-2

than those without MSI but their health service use and disability compensation was comparable to that of participants with chronic diseases.

Conclusions

Twenty years post-Gulf War, the magnitude of symptom reporting among Gulf War veterans increased although the patterns of symptom reporting were stable over time. Gulf War veteran's symptom reporting remained higher than that of other military personnel and the Wave-1 prevalence gap between the groups was unchanged at Wave-2. High symptom reporting was predictive of chronic disease onset in the longer-term and increased use of primary and secondary healthcare services. The trajectories observed over the ten-year follow-up show that high symptom reporting persists more than 20 years post-war, indicating high future healthcare needs of personnel with multiple symptom reporting.

General Declaration



In accordance with Monash University Doctorate Regulation 17.2 Doctor of Philosophy and Research Master's regulations the following declarations are made:

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes 4 original papers published in peer reviewed journals and 1 unpublished (but submitted) original paper. The core theme of the thesis is to improve understanding of the health of Australian veterans of the 1990-1991 Gulf War by exploring longitudinal changes in symptom reporting and how symptom reporting is related to health service utilisation, disability compensation, chronic diseases, general health and well-being. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Monash Centre for Occupational and Environmental Health under the supervision of Professor Malcolm Sim, Professor Andrew Forbes and Doctor Helen Kelsall. The

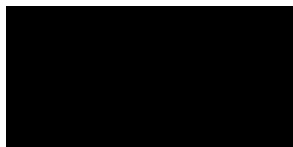
inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of Chapters 3 to 7 my contribution to the work involved the following:

Thesis chapter	Publication title	Publication status	Nature and extent of candidate's contribution
3	Increased symptom reporting persists in 1990-991 Gulf War veterans 20 years post deployment	Published	Contributed to implementation of the Wave-2 study; initiated and developed research question for this chapter; designed the manuscript; analysed the data; drafted and finalised the manuscript. Extent of contribution: 80%
4	Stability of symptom patterns in Australian Gulf War veterans: 10-year longitudinal study	Published	Contributed to the implementation of the Wave-2 study; initiated and developed the research questions; designed the manuscript; analysed the data; drafted and finalised the manuscript. Extent of contribution: 80%
5	New onset of chronic diseases and changes in lifestyle risk factors among Gulf War veterans: A longitudinal comparison of high and low symptom reporters	Published	Contributed to the implementation of the Wave-2 study; initiated and developed the research questions; designed the manuscript; analysed the data; drafted and finalised the manuscript. Extent of contribution: 80%
6	Multisymptom illness in Gulf War veterans: A systematic review and meta-analysis	Published	Conducted an updated literature search of the topic; reviewed abstracts from the updated search; reviewed, extracted and summarised data from the selected manuscripts; designed the manuscript; conducted meta-analysis; drafted and finalised the manuscript. Extent of contribution: 70%
7	Comparability of health service use by veterans with multisymptom illness and those with chronic diseases	Accepted subject to major revisions	Contributed to the implementation of the Wave-2 study; initiated and developed the research questions; designed the manuscript; analysed the data; drafted and finalised the manuscript. Extent of contribution: 80%

I have not renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

Student signature:



Date: 28/03/2016

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student and co-authors' contribution to this work.

Main Supervisor signature:

Date:

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“Without counsel purposes fail; but with many counsellors they succeed.” Proverbs 15 vs. 22

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List of Publications and Awards

Publications by the Candidate Relevant to the Thesis

Gwini SM, Kelsall HL, Sim MR, Ikin JF, McFarlane AC and Forbes AB. Stability of symptom patterns in Australian Gulf War veterans: 10-year longitudinal study. *Occupational and Environmental Medicine*, 2016; 73: 195-198.

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Gwini SM, Kelsall HL, Ikin JF, Sim MR, McFarlane AC and Forbes AB. New Onset of Chronic Diseases and Changes in Lifestyle Risk Factors Among Gulf War Veterans: A Longitudinal Comparison of High and Low Symptom Reporters. *Journal of Occupational and Environmental Medicine*, 2016 Aug; 58(8):770-7.

Gwini SM, Forbes AB, Sim MR and Kelsall HK. Multisymptom illness in Gulf War veterans: A systematic review and meta-analysis. *Journal of Occupational and Environmental Medicine*, 2016 Jul; 58(7):659-67.

Additional peer-reviewed publications

Ikin JF, McKenzie DP, Gwini SM, Kelsall HL, Creamer M, McFarlane AC, Clarke DM, Wright B and Sim M. Major depression and depressive symptoms in Australian Gulf War veterans 20 years after the Gulf War. *Journal of Affective Disorders*, 2016; 189 (1): 77-84.

Ikin JF, Kelsall HL, McKenzie DP, Gwini SM, Forbes AB, Glass DC, McFarlane AC, Clarke D, Wright B, Del Monaco AD and Sim MR. Cohort Profile: The Australian Gulf War Veterans' Health Study cohort. *International Journal of Epidemiology*, 2016 January; 189 (1): 77-84.

Kulkarni J, Gavrilidis E, Gwini SM, Worsley R, Grigg J, Warren A, Gurvich C, Gilbert H, Berk M and Davis SR. Effect of Adjunctive Raloxifene Therapy on Severity of Refractory Schizophrenia in Women: A Randomized Clinical Trial. *JAMA Psychiatry*, 2016; 73(9): 947-954.

Conference oral presentations

Gwini S, Forbes A, Ikin J, Sim M and Kelsall H. Persisting increase in multiple symptom reporting in Australian veterans of the 1990-91 Gulf War. *JMVH* 2015; 23(4):58-59.

Gwini S, Forbes A, Sim M and Kelsall H. Do lifestyle risk factors differ for serving and ex-serving Australian Defence Force personnel? The Australian Gulf War Veterans' Health Study. *JMVH* 2015; 23(4): 26.

Gwini S, McFarlane E, Benke G and Sim M. Reliability of electronic cemetery records in ascertaining vital status in historical cohorts. *Australasian Epidemiologist*, Vol. 21, No. 3,

Dec 2014: 83-86. Available at:

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Awards

Award name: Monash Postgraduate Travel grant

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Purpose: Conference travel

Award name: Student Conference Award

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Year: 2014

Purpose: Conference attendance

Award name: Conference Award

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Purpose: Conference attendance

Abbreviations

CIDI	Composite International Diagnostic Interview
CDC	Centers for Disease Control and Prevention
DVA	Department of Veterans' Affairs
HSA	Health Services Australia
IOM	Institute of Medicine
MBS	Medicare Benefits Scheme
MSI	Multisymptom illness
PBS	Pharmaceutical Benefits Scheme
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
PTSD	Post-traumatic stress disorder
RPBS	Repatriation Pharmaceutical Benefits Scheme
SOP	Statement of Principles
US	United States
UK	United Kingdom

Chapter 1: Introduction

1.1 Background to the 1990-1991 Gulf War

Following Iraq's invasion of Kuwait in 1990, coalition forces were deployed to the Persian Gulf (referred to as the Gulf War). Among these were military forces from the United Kingdom (UK), United States of America (US), France, Canada, Denmark and Australia. The first deployment of the Australian military forces was in August 1990 and by the end of September 1991, most Australian troops had returned home. Compared with other wars, this war was considerably shorter as air strikes lasted for approximately six weeks while ground battle lasted for five days.

Even though the combat period was short with few fatalities and casualties, the military personnel were faced with psychological stressors such as constant fear of one's life, constant threat and fear of chemical or biological weapons attack and exposure to dead and decaying bodies. They were also exposed to environmental and medical agents before or during their deployment. Reported environmental exposures include smoke and dust, depleted uranium, smoke from oil fires and sprayed

pesticides. There were also medical exposures including multiple vaccinations, anti-warfare agents, prophylaxis (e.g. nerve agent prophylaxis) and antimalarial medication.^(1, 2) In a recent review, White et al. (2015)⁽³⁾ concluded that symptom reporting found among Gulf War veterans was linked to exposure to pesticides or Pyridostigmine bromide during the Gulf War, but the evidence for the relationship between symptomatology and other exposures was weak. Pesticide exposure was mainly associated with overall symptom severity^(1, 4), as well as gastrointestinal and neuropsychological symptoms^(5, 6). Pyridostigmine bromide was reportedly associated with overall symptom severity.⁽¹⁾ The majority of exposure information was self-reported as many of the exposures were not recorded during the period of conflict. Due to lack of objective data on deployment exposures, quantifying the majority of exposures in Gulf War veterans has not been possible, and ‘deployment’ to the Gulf War continues to be assessed as an important exposure *per se*.

The deployment from Australia comprised 1,871 personnel, majority of whom were from the Royal Australian Navy.⁽⁷⁾ There were a number of deployments covering three main operations; Operation Damask I, Operation Damask II and Operation Damask III. Other personnel were deployed to the clearance diving team and the Task Group Medical Support Element (deployed on an American hospital ship). Operation Damask I was the first deployment to leave Australia in August 1990 and was deployed in the Gulf of Oman. Two of the three deployed ships left the conflict region in December 1990, before the beginning of the air strikes while the other ship left the region in January 1991, after the air strikes. Personnel on these deployments

participated in frigate firing, searching of enemy ships and experienced a number of 'false' chemical and fire alarms.

Following Damask I, Damask II deployment was released to the Gulf of Oman and the Gulf of Hormuz in December 1990. Two of the three ships on this deployment departed the Gulf region in March 1991 and the other departed in May 1991. Among other exposures, some personnel on these ships were exposed to dust storms and smoke from oil fires.

Operation Damask III involved the re-deployment of Her Majesty's Australian Ship (HMAS) Darwin, from Operation Damask I, and the ship arrived in the Gulf in June 1991. Personnel on this ship were possibly exposed to dust storms and smoke from oil wells. Throughout all deployments, there were no Australian fatalities.

1.2 Health of Gulf War veterans

After the war, veterans of the Gulf War from different countries began to report multiple symptoms across multiple body systems. Table 1 presents the most common symptoms reported in some of the large health studies of Gulf War veterans from several countries.

1.2.1 Prevalence of symptoms

Table 1 shows that although the order of the 10 most frequent symptoms varied across the different cohorts, the type of symptoms listed were fairly similar. This indicated that symptom reporting was common among Gulf War veterans, regardless of the country of origin. Furthermore, symptom reporting among Gulf War veterans was significantly higher compared with that of other military personnel not deployed to the Gulf War.^(5, 8-12)

1.2.2 Medical disorders/conditions in Gulf War veterans

Within the early years post-Gulf War, veteran health epidemiological studies were conducted to establish whether this excess symptom reporting by Gulf War veterans was a result of already known disorders/conditions or whether the symptom reporting resembled a new disease/condition/syndrome. Some of the epidemiological studies assessed the prevalence of diseases/conditions in Gulf War veterans and found that some symptom reporting could be explained by known diseases/conditions. ^(8, 10, 13-18)

Table 1: 10 most common symptoms reported by Gulf War veterans from international veterans' health epidemiological studies

Australian study ⁽⁹⁾	UK study ⁽⁸⁾	US DVA study ⁽¹⁰⁾	US Kansas Veteran Study ⁽¹¹⁾	French study ⁽¹⁶⁾	Danish Peacekeepers study ⁽⁵⁾
N=1456	N=2735	N=15000	N= 2396	N=5666	N=686
Feeling unrefreshed after sleep (66%)	Feeling unrefreshed after sleep (56.1%)	Runny nose (56%)	Not feeling rested after sleep (42%)	Headaches (82.9%)	Concentration or memory difficulties (31.2%)
Fatigue (66%)	Irritability of outbursts of anger (55.2%)	Headache (54%)	Pain in joints (37%)	Sleeping difficulties (70.9%)	Abnormal feeling of fatigue (26.4%)
Headaches (61%)	Headaches (53.5%)	Unrefreshing sleep (47%)	Fatigue (36%)	Irritability (68.8%)	Awakening with a feeling of fatigue and exhaustion after a whole night's sleep (25.2%)
Sleeping difficulties (60%)	Fatigue (50.7%)	Anxiety (45%)	Problems falling or staying asleep (33%)	Backache (62.9%)	Unusual feeling of fatigue during the day (24.8%)
Irritability/outbursts of anger (57%)	Sleeping difficulties (48.0%)	Joint pain (45%)	Sinus congestion (33%)	Memory difficulties (56.0%)	Depression or sadness (22.6%)
Low back pain (52%)	Forgetfulness (44.9%)	Back pain (44%)	Problems remembering recent information (32%)	Fatigue (54.6%)	Feeling of nervousness, irritability or agitation (21.0%)
General muscular aches or pains (52%)	Joint stiffness (40.0%)	Fatigue (38%)	Feeling irritable/angry outbursts (31%)	Difficulty to find words (52.8%)	Problems sleeping all night (19.8%)
Flatulence or burping (46%)	Loss of concentration (39.7%)	Ringling in ears (37%)	Numbness or tingling in extremities (29%)	Numbness or tingling (45.3%)	Problems falling asleep (19.4%)
Forgetfulness (46%)	Flatulence and burping (34.1%)	Heartburn (37%)	Headaches (29%)	Gastralgia (42.7%)	Repeated fits of headache (19.2%)
Difficulty finding the right word (45%)	Pain without swelling or redness in several joints (32.2%)	Difficulty sleeping (37%)	Eyes very sensitive to light (25%)	Tinnitus (42.5%)	Numbness or tingling in hands or feet (14.1%)

Since 2000, the US Institute of Medicine (IOM) has produced a number of reports on Gulf War veterans' health, a series entitled 'Gulf War and Health'.⁽¹⁹⁻²⁸⁾ For each report, a committee was convened to aggregate evidence on specific topics related to Gulf War veterans' health including assessments of Gulf War exposures. Three of these reports, Volumes 4, 8 and 10,^(22, 26, 28) have been dedicated to summarising the health effects of the 1990-1991 Gulf War, particularly assessing symptom reporting and prevalence of diseases. The committees weighed the evidence and classified diseases and conditions into one of the following categories on the basis of the strength of available evidence for the association between Gulf War deployment and diseases: (i) sufficient evidence of a causal relationship; (ii) sufficient evidence of an association; (iii) limited/suggestive evidence of an association; (iv) inadequate/insufficient evidence to determine whether an association exists; and (v) limited/suggestive evidence of no association. The conditions classified in categories (i) and (ii) in the most recent IOM report -Volume 10⁽²⁸⁾, were depression,⁽²⁹⁾ alcohol and substance abuse,⁽³⁰⁾ chronic fatigue,^(8, 31) functional gastrointestinal symptoms⁽³²⁾ and post-traumatic stress disorder⁽³³⁾ (Figure 1).

In addition to the connections between Gulf War deployment and diseases presented by the IOM, epidemiological studies have also shown general health and wellbeing of Gulf War veterans to be worse than that of other military personnel.^(34, 35) Symptoms of pain were also reportedly more common among Gulf War veterans than other military personnel.^(36, 37)

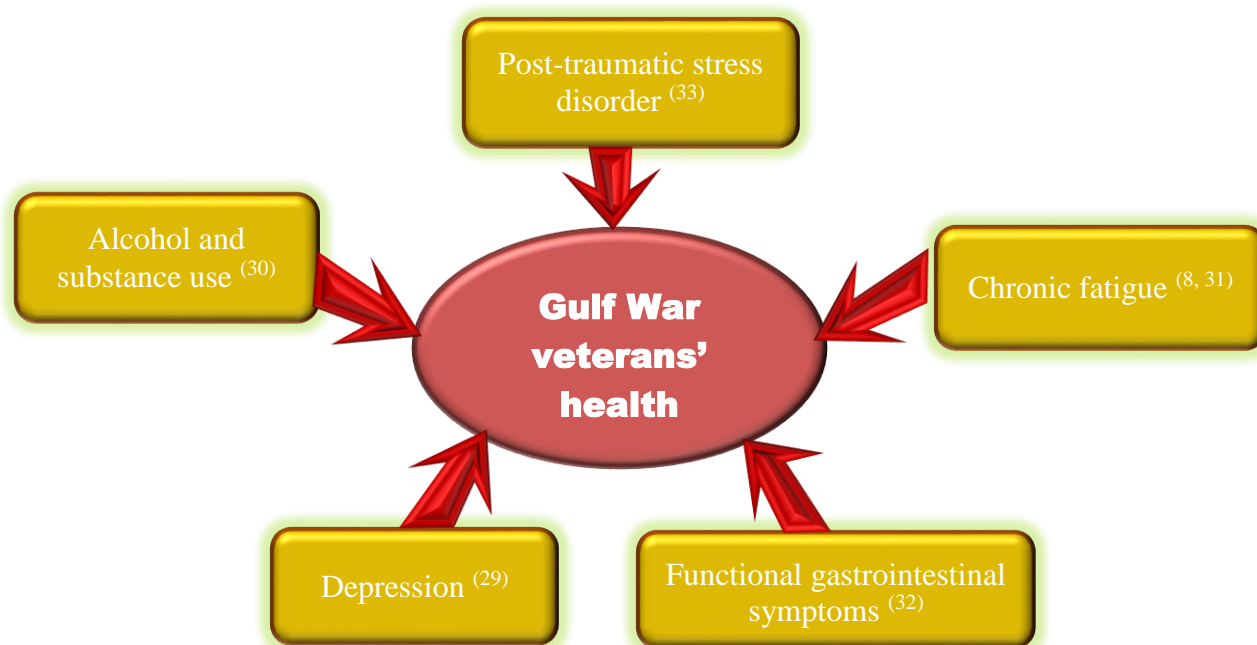


Figure 1: Diseases/conditions with sufficient evidence for a causal relationship or association with Gulf War deployment

However, even after considering known disorders and conditions such as post-traumatic stress disorder (PTSD) and chronic fatigue, excess symptom reporting was still observed.^(26, 28, 38) Therefore this suggested that known diseases/conditions were inadequate in explaining excess symptom reporting. Further explorations of patterns inherent in Gulf War veterans' symptom reporting were also conducted. This research involved using medical experts' opinions and statistical methods, such as exploratory factor analysis (EFA) and latent class/cluster analysis (LCA) to establish a case definition for the multiple symptom reporting.^(4, 18, 39-45) EFA is a statistical method of grouping together correlated variables, so as to reduce a large number of symptoms to fewer symptom groups.⁽⁴⁶⁾ LCA, on the other hand, groups together subjects with

similar responses on a number of chosen variables.⁽⁴⁷⁾ For Gulf War veterans' symptom reporting, both EFA and LCA were used to assess patterns of symptom reporting thereby identifying which symptoms were reported together or which Gulf War veterans had similar symptom reporting. The findings from these studies have indicated that although Gulf War veterans reported significantly *more* symptoms compared with military personnel not deployed to the Gulf War, the *patterns* of symptom reporting were similar in Gulf War veterans and other military personnel; and it was not considered that the symptom patterns resembled one specific disease nor could the symptom reporting be defined as a new disease/condition.

1.2.3 Multisymptom illness

As there was no specific disease that could fully describe Gulf War veterans' symptom reporting, a case definition of this multiple symptom reporting was developed to assist in epidemiological assessment and aid diagnosis or treatment of veterans. A number of terms are used for this case definition, including multisymptom illness, chronic multisymptom illness, Gulf War illness or Gulf War syndrome. IOM⁽⁴⁸⁾ recommends the use of the term Gulf War illness to indicate the deployment to which the case definition was derived but our preference is to use the term multisymptom illness as the same illness is reportedly prevalent in veterans of other wars, including the Afghanistan and Iraq Wars^(38, 49).

Three main case definitions have been proposed; the Haley syndrome definitions by Haley;⁽⁴²⁾ the Centers for Disease Control and Prevention (CDC) definition established by Fukuda et al.;⁽⁴¹⁾ and the Kansas definition by Steele.⁽¹¹⁾

The Haley syndrome definitions⁽⁴²⁾ were the first to be published. These define multisymptom illness either mathematically using factor analysis or using a clinical definition. In the mathematical definition, veterans were grouped as cases if they had a factor score⁽⁵⁰⁾ (a composite value that is estimated from a number of variables and represents the person's level on a latent/unmeasured variable/factor) greater than or equal to 1.5. The other definition, the clinical definition, defined MSI as the presence of five of eight signs or symptoms; namely fatigue, arthralgia or low back pain, headache, intermittent diarrhoea without bloody stools, neuropsychiatric complaints of forgetfulness, difficulty in concentrating, depression, memory loss, or easy irritability, difficulty in sleeping, low-grade fever and weight loss. In addition, cases were excluded if they had been diagnosed with medical or psychological conditions.

The CDC definition,⁽⁴¹⁾ which is the most commonly used definition, defines MSI as the presence of one or more chronic symptoms (for at least six months) from at least two of three categories namely fatigue, mood-cognition (symptoms of feeling depressed, difficulty remembering or concentrating, feeling moody, feeling anxious, trouble finding the right words or difficulty sleeping) and musculoskeletal (symptoms of joint pain, joint stiffness or muscle pain), where the two latter categories were identified in an

exploratory analysis of symptoms. This definition was compiled from a Gulf War veterans' study comprised of a cohort of US Air Force military personnel who were still serving with the Defence Force at the time of the study.

The third definition was derived from the Kansas Gulf War veterans' Health Initiative Program (US), often referred to as the Kansas cohort. As a first step in defining multisymptom illness, Steele *et al.* (2000)⁽¹¹⁾ grouped together symptoms that were highly correlated and six groups with high internal reliability were identified; fatigue and sleep problems, pain symptoms, neurologic/cognitive/mood symptoms, gastrointestinal symptoms, respiratory symptoms and skin symptoms. Multisymptom illness was defined as present if a subject reported at least one symptom of moderate severity or ≥ 2 symptoms from the same group in at least three of the six symptom groups. This cohort comprised separated or retired military personnel who had been deployed to the Gulf War between August 1990 and July 1991.

Due to the varied definitions used in epidemiological studies, the prevalence of multisymptom illness in Gulf War veterans has been varied, ranging from 14%⁽⁵¹⁾ to 62%⁽⁸⁾. Regardless of these differences, there is consensus among studies that multisymptom illness prevalence in Gulf War veterans is significantly higher than in other military personnel not deployed to the Gulf, with prevalence differences ranging from 10%^(51, 52) to 30%⁽⁴¹⁾. The IOM⁽⁴⁸⁾ recommends the use of either the CDC or Kansas definitions because they “capture the most common symptoms” among the veterans.

1.3 Longitudinal changes in Gulf War veterans' symptom reporting

Longitudinal studies assessing Gulf War veterans' changes in symptom reporting are scarce, and so little is known about the longer term consequences of high symptom reporting. A longitudinal study (with a four-year follow-up) conducted among UK Gulf War veterans reported that at follow-up, there was no significant change in total number of symptoms, although overall health of Gulf War veterans had improved, as indicated by change in other outcomes such as the 36-item Short Form (SF36) physical function subscale, prevalence of PTSD and fatigue.⁽⁵³⁾ However, Gulf War veterans' health was still worse than that of other military personnel.⁽⁵³⁾ In another study among veterans from the US Gulf War Registry, Gulf War veterans' symptom reporting was reportedly unchanged over time.⁽⁵⁴⁾ The other currently reported longitudinal studies of Gulf War veterans have not provided longitudinal comparisons of symptoms; for example US Gulf War veterans' study among veterans from Fort Devens followed participants over three assessments but have reported on different outcomes from each assessment ⁽⁵⁵⁻⁵⁷⁾ and a US study, the National Cohort of Gulf War and Gulf Era Veterans, followed up their cohort over three health studies but have not provided a longitudinal changes in symptom reporting for those participating at more than one study time point. ^(10, 34, 58) Therefore, because of the few studies assessing changes in symptom reporting over time, there is still a need for more research into the longer-term trajectories of symptom reporting among Gulf War veterans.

The longitudinal studies in the UK and US cohorts^(34, 53, 54, 58-60) provided an insight into changes in symptom reporting and general health of Gulf War veterans compared with other military personnel but gaps in our understanding around longitudinal changes of Gulf War veterans symptomatology remained. Such questions included whether it was likely that symptom reporting by Gulf War veterans was transient; whether there were longer term health outcomes associated with high symptom reporting; and whether the pattern of symptom reporting by Gulf War veterans had manifested into a clearer pattern which could distinguish Gulf War veterans' symptom reporting from that of other military personnel.

The health of Australian veterans of the 1990-1991 Gulf War and a military comparison group was first assessed in 2000-2002 (Wave-1) and when a follow-up study of this cohort was established in 2011 (Wave-2), this provided an opportunity to investigate longitudinal changes in Gulf War veterans' symptom reporting and the associated health effects.

1.4 Research aims, questions and thesis outline

The main aims of the research presented in this thesis were to investigate Australian Gulf War veterans' symptom reporting 20 years post-war, with emphasis on longitudinal changes in symptom reporting as well as the associations between

symptom reporting and health service utilisation, chronic disease incidence, health-related general health and quality of life.

This thesis is presented in eight chapters. Chapter 1, within which this outline is contained, provides a background of the problem and a rationale for the research.

Chapter 2 describes the Australian Gulf War veterans' study cohort, participation rates for both the first and second waves, and the overall study methodology. Chapters 3-7 are results chapters and cover five research questions of the thesis as outlined below. The specific objectives of each chapter are also presented below.

Chapter 3:

Research question: Has Gulf War veterans' symptom reporting changed over time and how do these changes compare with those of other military personnel?

Objective: To investigate the prevalence, incidence and persistence of Gulf War veterans' symptom reporting at Wave-2 and compare with other military personnel.

Chapter 4:

Research question: Have the patterns of symptom reporting by Gulf War veterans changed over time?

Objective: To investigate inherent patterns of Gulf War veterans' symptom reporting (i.e. as conveyed through factor analysis) at Wave-2 and compare those patterns with patterns observed at Wave-1 or observed in the comparison group.

Chapter 5:

Research question: What are the longer-term health effects of Gulf War veterans' symptom reporting and how does it compare across veterans with different symptom reporting?

Objective: to investigate whether Gulf War veterans can be grouped according to their patterns of symptom reporting. If so, compare incidence of chronic diseases, general health and wellbeing and prevalence of lifestyle risk factors across groups of Gulf War veterans.

Chapter 6:

Research question: How does the prevalence of MSI compare with that among other military personnel who were not deployed to the Gulf War?

Objective: to synthesise literature on the prevalence of multisymptom illness in Gulf War veterans deployed to the 1990-1991 Gulf War and how it compares to that of other military personnel.

Chapter 7

Research question: How does health service usage and disability compensation among those with MSI compare with that of other military personnel?

Objective: To compare health service use and disability compensation for military personnel with multisymptom illness (but no chronic diseases) with that of military personnel (i) with chronic diseases (with/without multisymptom illness); and (ii) with neither multisymptom illness nor chronic diseases.

The last chapter of the research, Chapter 8, discusses the findings of this research and how it can be useful for veterans, policymakers and researchers.

Chapter 2: Methods

The Australian Gulf War Veterans' Health Study

The Australian Gulf War Veterans' Health Study is a longitudinal study which has had two waves, a baseline (Wave-1) conducted in 2000-2003 and a follow-up (Wave-2) conducted in 2011-2012. Although this thesis is based on data collected from both waves, only those cohort members who participated at both time points are included.

Additionally, the study included both males and females but only the health of males is reported in this thesis. Females were excluded because there were only a small number of female participants (i.e. with only 30 participating at Wave-2).

2.1 Cohort description, recruitment and participation

2.1.1 Wave-1 of the Study

Description of Wave-1

In 2000, a health study was undertaken of Australian Defence Force personnel deployed to the Gulf War between August 1990 and September 1991. The main aim of this study was to investigate the health of Australian Gulf War veterans compared with that of a military comparison group. The study had multiple components, including a postal questionnaire, a comprehensive medical examination, blood work and a psychological assessment. With the exception of the postal questionnaire, participants were required to visit a Health Services Australia (HSA) Clinic in one of the ten locations across Australia. HSA was an organisation that specialised in work-related health, safety and travel; including workplace health and safety services, pre-employment assessments, medical assessments for government benefit, pension application and immigration purposes. Partial participation was permitted for those who were unable to attend the clinic for a health assessment.

Cohort description

The list of Gulf War veterans was compiled by DVA from the Gulf War Nominal Roll. All Gulf War veterans (N=1871), who were not known to be deceased, were invited to participate in the study and this comprised 1808 veterans. The majority of these veterans were from the Navy (84%) while 7% were from the Army and 9% from the Air Force.

Over three quarters (80.5%) of the veterans participated (i.e. completed all components of the study or the postal questionnaire only) and there were 6.6% refusals. Some of the non-participants were non-responders (i.e. n=3.8%; contact details were believed to be accurate but despite all contact efforts they could not be contacted) or not contactable (i.e. n=4.8%; there was evidence that suggested that the available contact details were incorrect and the veterans had not received the study invitation packages).

With the help of the researchers, DVA randomly selected the comparison group from the 26456 military personnel who were serving in the Australian Defence Force at the time of the Gulf War, and were eligible for Gulf War deployment, but were not deployed. It was postulated that participation rate in the comparison group would be low (i.e. 60%), hence more comparison group members than Gulf War veterans were selected. These military personnel were frequency matched to Gulf War veterans on age, sex, military rank and branch of service, and a sample size of 4604 was obtained. The Wave-1 participation rate in the comparison group was 56.8%. About a fifth (17.8%) refused to participate, 4.5% were non-responders and 8.9% were not contactable.

Participant recruitment process

A study invitation pack was compiled which included invitation letters from the Minister of Veterans Affairs, the study's Consultative Forum, Monash University and HSA study team; an Explanatory statement, a consent form, a questionnaire and the study team's contact details. The *Consultative Forum* was a group of veteran

representatives from several veteran groups and service bodies which was established to provide a link between the study team and the veteran and service communities. The study invitation packs were mailed out in batches and the first reminder pack, which was similar to the first invitation pack, was sent two weeks after the dispatch of the initial package. To increase recruitment rates, follow-up phone calls were made if no response was received two weeks after initial reminder. A number of strategies were employed to increase participation and these included searching multiple sources (e.g. Electoral Roll, Telstra White pages and Health Insurance Commission databases) for update-to-date contact details; country-wide media publications (e.g. television and newspaper); the inclusion of a personally addressed letter from the Minister of Veterans' Affairs; and arranging for the Department of Defence to allow serving members to participate in the study when on duty.

2.1.2 Wave-2 of the Study

Description of Wave-2

In 2011-2012, the second wave of the Gulf War Veterans' Health Study was conducted. The overall aim of this study was to assess the longer-term health sequelae of Gulf War deployment. This wave also included multiple components; a postal questionnaire, a telephone administered psychological interview and data linkages to DVA and Medicare Australia.

Cohort description

All Wave-1 study participants (i.e. those who had at least completed the questionnaire) were invited to participate at Wave-2, excluding those known to be deceased or who had refused further participation at Wave-1 or whose mailing addresses could not be verified. Participation at Wave-2 was lower than at Wave-1. On the basis of those Wave-1 participants who were presumed contactable at Wave-2, participation rate was 53.6% among Gulf War veterans and 46.6% in the comparison group. A summary of Wave-2 participation is presented in Figure 2.

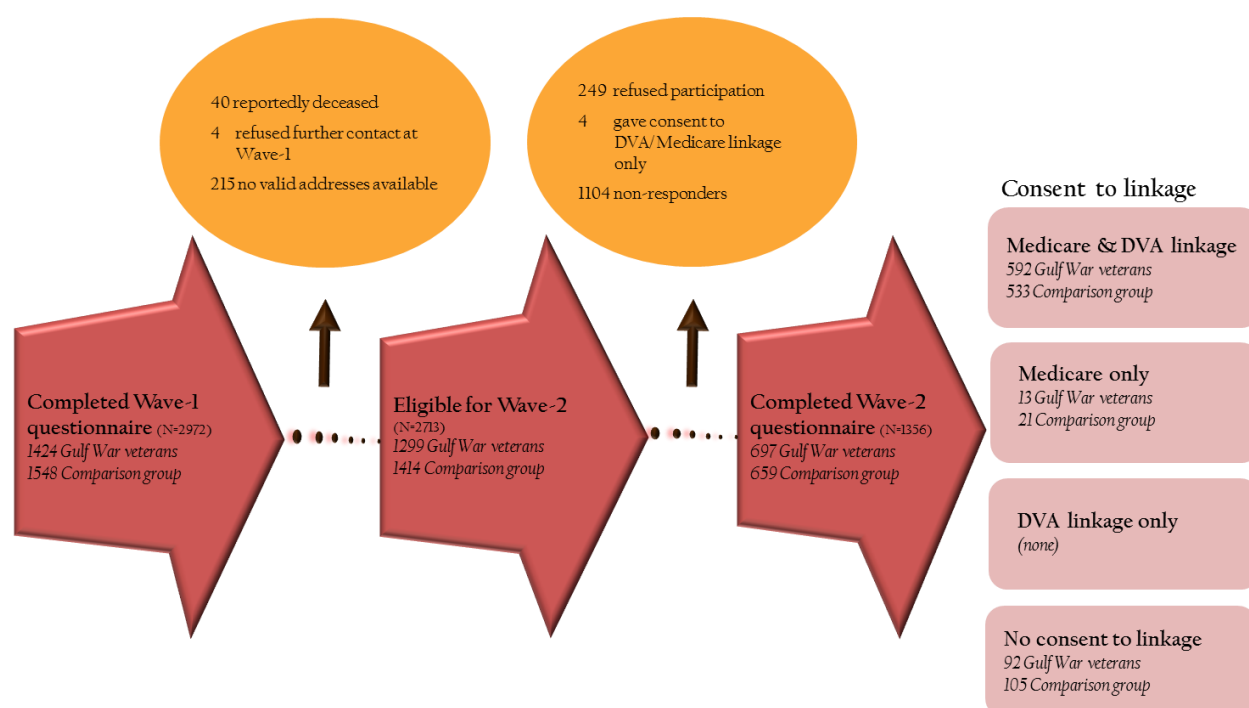


Figure 2: Summary of cohort participation at Wave-2

Participant recruitment process

A study invitation pack comprising a letter from the study's Chief Investigator, an endorsement from the Repatriation Commissioner, a letter from the study's Advisory Committee, the study's Explanatory statement, a consent form, a questionnaire, a reply paid envelope and the Australian Defence Human Research Ethics Committee's Guidelines for Volunteers was mailed to all 2713 potential participants. A reminder postcard was sent to non-responders three weeks after the dispatch of the initial invitation pack. If no response was received in three weeks, a follow-up pack was sent which contained a letter from the study's Chief Investigator, a questionnaire, the consent form, a reply paid envelope and the Explanatory statement.

Wave-2 contact details were mainly sourced from Wave-1 data. However, in 2007-2008 participants with stored blood samples from Wave-1 were contacted with regards to future storage of their samples, and 75% responded. These data provided more up-to-date contact information. In addition to multiple reminders, recruitment was also maximised by checking the Electoral Roll and attempting telephone contact in order to obtain updated addresses.

2.2 Ethical considerations

Wave-1 Participant Consent and Ethics Approvals

Participants provided informed written consent (consent form attached in Appendix A). An Explanatory statement was provided, which described the aims of the study, the extent of participant's involvement, potential risks and inconveniences of participation, confidentiality and privacy, contact details of the study team and the Advisory Committee (a group appointed by DVA whose responsibilities were to provide advice on the conduct of the study, promote the study and inform their represented groups about the study). On the consent form, participants could agree to participate to all or some of the study's components.

The study received ethics approval from the following Ethics Committees:

- Australian Defence Medical Ethics Committee
- DVA Human Research Ethics Committee
- Monash University's Standing Committee on Ethics in Research Involving Humans

Wave-2 Participant Consent and Ethics Approvals

Similar to Wave-1, participants provided informed written consent (consent form attached in Appendix B). An Explanatory statement that described the study was provided to participants. It explicitly explained the benefits of the study, who was participating, what participation involved and that participation was voluntary, risks

and inconveniences of participation, confidentiality and privacy, how the results would be disseminated and contact details of the Monash University research team and the Ethics Committees. Participants were given an option to consent separately to completing the postal questionnaire, the over-the-phone psychological interview and giving researchers access to their Medicare Australia records and DVA-held health data through record linkage.

The study received ethics approval from the following Ethics Committees:

- Australian Defence Human Research Ethics Committee
- DVA Human Research Ethics Committee
- Monash University Human Research Ethics Committee
- Department of Human Services External Request Evaluation Committee (Medicare)

2.3 Data collection

2.3.1 Wave-1 data collection

Postal questionnaire

The postal questionnaire administered at Wave-1 asked about demographic characteristics of participants (e.g. gender, marital status, date of birth and highest education attained), health outcomes (e.g. symptom reporting), health behaviours (e.g. smoking status), civilian occupations post-1991, military deployments post-1991 and

military service exposures (during the Gulf War or elsewhere). The questionnaire is attached in Appendix C.

Medical assessment

Wave-1 included a comprehensive medical assessment. All Wave-1 participants were invited to attend a health assessment at a HSA clinic, although some health assessments were conducted off-site where mobile assessors were required. At the clinic, participants were assessed by a nurse, clinical psychologist and a medical doctor.

The clinical psychologist assessed participants for probable presence of psychological conditions including depression and PTSD. In doing so, the psychologist administered the Composite International Diagnostic Interview version 2.1 (CIDI)⁽⁶¹⁾, which is a structured interview designed for assessment of mental disorders for epidemiological, clinical and research purposes. The CIDI instrument contains 11 questionnaires/modules, for different mental conditions, which score whether a participant satisfies the diagnostic criteria for the particular condition. The diagnostic criteria are based on the 10th revision of the International Classification of Diseases (ICD-10)⁽⁶²⁾ and the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)⁽⁶³⁾. The CIDI is useful for assessing prevalence, burden and severity of mental disorders. The interview is designed to be administered by trained clinicians and non-clinicians. Six of the eleven questionnaires/modules were administered (i.e. somatoform and dissociative

disorders, anxiety disorders including PTSD, depressive and dysthymic disorders, manic and bipolar affective disorders, and psychoactive substance use disorders).

The medical doctors conducted a medical assessment of participants including a physical examination (e.g. respiratory, neurological, musculoskeletal and skin examinations), a review of the self-reported medical conditions in the postal questionnaire and supervision of a fitness test. The doctors were blinded as to whether participants had been to the Gulf War or not.

2.3.2 Wave-2 data collection

Postal questionnaire

The Wave-2 questionnaire asked about participant characteristics, health outcomes (e.g. symptom reporting), health-behaviours (e.g. smoking status), military service and civilian employment since Wave-1. The Wave-2 postal questionnaire is attached to Appendix D.

Psychological interview

The same CIDI version as that used at Wave-1 was administered at Wave-2, and the same six modules as at Wave-1 were administered at Wave-2. The interviews were conducted over the phone by trained interviewers, who were blinded to whether participants were Gulf War veterans or not. The interview also contained additional

questions for the assessment of eating disorders, schizophrenia, psychoses and intermittent explosive anger disorder.

Data linkage with DVA and Medicare Australia

DVA and Medicare Australia data linkages were undertaken only at Wave-2 to obtain more objective data on participants' health service use. Identifying information of participants who had given consent to DVA linkage and/or Medicare linkage were submitted to the respective institutions for linkages to their health-related databases. The identifying information included names, date of birth, addresses and any previous names as well as Medicare or DVA client numbers where they were available. The linkage requested health service use data accumulated between 1st of January 2001 and 15th of August 2012.

The linkage to Medicare Australia included access to data from two of its databases, the Medicare Benefits Schedule (MBS) and the Pharmaceutical Benefits Scheme (PBS). Medicare Australia is an entity of the Australian Government and it provides a wide range of healthcare services to all Australian residents. The MBS is a listing of healthcare services that are subsidised by Medicare.⁽⁶⁴⁾ Data received from the MBS included details of the subsidised service (i.e. the date the health service was provided, classification of the service provided), the service provider and costs of the service. The PBS is a database of pharmaceuticals dispensed to the public at subsidised prices⁽⁶⁵⁾. Data received from the PBS included the description of the dispensed medication, date dispensed, costs of

prescription, details of the prescriber and the Anatomical Therapeutic Chemical (ATC) Code of the prescription.

Data linkage with DVA was targeted at health-related data that was held by the Department. The cohort was linked to six sets of data including details of disability compensation claims submitted by veterans to DVA, DVA-held MBS data, Repatriation Pharmaceutical Benefits Scheme (RPBS; contains items on the PBS and additional pharmaceuticals that are only subsidised to approved military personnel), DVA-funded hospitalisation, DVA treatment card history (the cards that allow veterans to receive subsidised healthcare or pharmaceuticals) and data on other medical treatment subsidised by DVA. Hospitalisation data was only available for the period January 2007 to August 2012.

2.3.3 Summary of collected data relevant for this research

Listed in Table 2 are the different data collected in the two waves and were used in results Chapters 3-7 of this thesis. The main differences between Wave-1 and Wave-2 data collection techniques was the inclusion of a comprehensive face-to-face medical assessment with blood tests at Wave-1 but not Wave-2 and the inclusion of Medicare and DVA data linkages at Wave-2 but not Wave-1. In addition, the psychological interview was administered face-to-face by a psychologist at Wave-1 but at Wave-2 it was administered over the phone by trained interviewers.

An important health outcome for the research presented herein was the 63-item symptom questionnaire, which included respiratory, cardiovascular, musculoskeletal, dermatological, gastrointestinal, genitourinary, neurological, neuropsychological, cognitive and psychological symptoms. Participants were asked about the occurrence of symptoms in the past month and, if symptoms were experienced, to indicate whether the symptoms were mild, moderate or severe in nature. The symptom list was based on the symptom questionnaire developed and used by the UK King's College Gulf War Illness Research Unit, which was developed from the Hopkins Symptom Checklist⁽⁶⁶⁾. It also included some symptoms used in other overseas symptom prevalence surveys. Similar symptom questionnaires and symptoms have been used in a number of overseas postal surveys investigating the health of their country's Gulf War veterans.

Table 2: Description of sources of data from Wave-1 and Wave-2

Data Source	Description of data collected (relevant to this thesis)	
	Wave-1	Wave-2
Postal questionnaire	<ul style="list-style-type: none"> • demographic characteristics (age, highest education level attained, marital status) • Short Form 12-item Health Survey (SF-12) version 1⁽⁶⁷⁾, which is a validated questionnaire for assessing general mental and physical health. (Questions G1-G7) • 63-item symptom checklist (items 1-63 of Question G20) • Doctor diagnosed/treated medical conditions - Participants were asked to indicate whether or not they were diagnosed or treated for each of 58 medical conditions, and if so, indicate the year they were first diagnosed and whether or not they were treated in the year preceding the study. (Question G21) • Smoking history (Questions G28-G30) • Alcohol use measured using the World Health Organization's Alcohol Use Disorders Identification Test (AUDIT),⁽⁶⁸⁾ which is a screening tool used to identifying hazardous or harmful alcohol consumption. (Questions G31-G40) 	<ul style="list-style-type: none"> • demographic characteristics (age, education) (Questions A1-A4) • Short Form 12-item Health Survey (SF-12) version 1 for general health and wellbeing. (Questions D1-D8) • 63-item symptom checklist (Question D10) • Doctor diagnosed/treated medical conditions - list of medical conditions that could have been treated or diagnosed between Wave-1 and Wave-2. (Question D29) • Hospitalisations in the 12-months preceding Wave-2 (Question D30) • Consultations with health professionals (except general practitioners and specialist medical doctors) and hospital related visits in the 12 months preceding Wave-2, excluding hospitalisations. (Question D31) • Smoking history (Question H1) • Alcohol use measured using the World Health Organization's Alcohol Use Disorders Identification Test (AUDIT),⁽⁶⁸⁾ which is a screening tool used to identifying hazardous or harmful alcohol consumption. (Questions H2) • Health-related quality of life which was measured using the World Health Organisation Quality of Life Questionnaire (WHOQoL-Bref)⁽⁶⁹⁾ (Question J3-J23) • Self-reported measured weight, waist circumference (Section K)

Psychological interview using the Composite International Diagnostic Interview version 2.1 ⁽⁶¹⁾	<ul style="list-style-type: none"> • 12-months major depression • 12-month post-traumatic stress disorder. <p>The interview was conducted face-to-face with a psychologist.</p>	<ul style="list-style-type: none"> • 12-months major depression • 12-months post-traumatic stress disorder. <p>The interview was conducted over the phone by trained interviewers.</p>
Medical assessment by a registered nurse	<ul style="list-style-type: none"> • height, weight and waist circumference measured by a registered nurse. 	N/A
Data linkage with Medicare Australia, specifically the Medicare Benefits Schedule and the Pharmaceutical Benefits Scheme	N/A	<ul style="list-style-type: none"> • general practitioner consultations • specialist doctor consultations • pharmaceuticals dispensed
Data linkage with the health database held by the Department of Veterans Affairs (DVA)	N/A	<ul style="list-style-type: none"> • general practitioner consultations • specialist doctor consultations • pharmaceuticals dispensed through the Repatriation Pharmaceutical Benefits Scheme (RPBS) • list and details of disability compensation claims submitted to DVA, including whether or not the claims were accepted, the disability and service the claims were for.

2.4 Statistical analysis

A range of statistical methods were used to address each of the objectives and are outlined in detail in Chapters 3-7. In summary, categorical outcomes were summarised using frequencies and percentages, while continuous/interval data were summarised as means with their standard deviations or as medians (with their lower and upper quartiles) when the data were skewed.

To establish the relationship between categorical outcomes and participant characteristics and other health outcomes, a number of regression techniques were used to either estimate risk ratios or odds ratios. In Chapter 3 log-binomial regression⁽⁷⁰⁾ was used to investigate three binary outcomes; (i) the presence of symptoms reported as either present or absent; (ii) persistence of symptoms reported as either persistent (if reported both at Wave-1 and Wave-2) or not persistent; and (iii) new reporting of symptoms defined as either incident (if the symptom was not reported at Wave-1 but was reported at Wave-2) or absent. Log-binomial regression⁽⁷⁴⁾ was chosen because it is a good estimator of prevalence/risk ratios. In Chapters 5 and 7, logistic regression⁽⁷⁴⁾ was used instead to establish the relationship between binary outcomes and participants characteristics and other health outcomes to allow uniform reporting estimates because other outcomes were analysed using extensions of logistic regression (i.e. nominal and ordinal regression). Nominal regression was used for nominal outcomes (e.g. smoking status) and ordinal regression (e.g. body mass index) was used for ordinal data. ⁽⁷⁵⁾

Linear regression models⁽⁷⁶⁾ were used to establish the relationship between continuous-scale items (e.g. SF-12 scores and quality of life scores in Chapter 5) and predictors (e.g. age, rank, study group). However, when the data were skewed (particularly count data e.g. number of general practitioner consultations) and summarised as medians, unadjusted robust (median) regression ⁽⁷⁷⁾ was used to compare medians across groups of categorical variables.

In Chapter 4, exploratory factor analysis⁽⁷¹⁾ was used to examine patterns of symptoms at Wave-1 and Wave-2 while Tucker's Congruence Coefficient⁽⁷²⁾ was used to compare the factor structures across study groups and time. Negative binomial regression⁽⁷³⁾ was used to compare counts of symptoms across study groups. Chapter 6 presents results of the systematic review and meta-analysis. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines⁽⁷⁸⁾, while random effects models (using the method of DerSimonian and Laird)⁽⁷⁹⁾ were used to produce pooled odds ratios.

Most of the analyses were conducted using Stata Statistical Software version 13.0 (StataCorp, Texas). The other software used were MPlus V.7 (Muthén & Muthén, 1998–2012) for exploratory factor analysis and Excel's add-in called Meta XL (Meta XL 1.3, EpiGear International Brisbane, Australia) was used to obtain pooled odds ratios in the systematic review.

Chapter 3: Longitudinal changes in symptom reporting

As reporting of multiple symptoms remains a health concern among Gulf War veterans, longitudinal assessment of symptom reporting is important in monitoring changes in health of this group of veterans. In this chapter, results from longitudinal assessment of symptom reporting are presented by comparing Gulf War veterans' symptom reporting at Wave-1 and Wave-2 with symptom reporting in the comparison group. The measures of change in symptom reporting were:

- Change in prevalence of each symptom from Wave-1 to Wave-2;
- Comparison of Wave-1 and Wave-2 *prevalence gap*. The prevalence gap was calculated for each symptom and was equal to the symptom prevalence difference between Gulf War veterans and the comparison group;
- An assessment of individual participant's change in symptom reporting, which was reported as symptom incidence (new reporting of a symptom at Wave-2) and persistence (reporting of a symptom at both Wave-1 and Wave-2).

The results from this assessment were published in the *American Journal of Industrial Medicine*.

Declaration for Thesis Chapter 3

Declaration by candidate

In the case of Chapter 3, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Initiation and development of the research question; contributed to implementation of the Wave-2 study; designed the manuscript; analysed the data; drafted and finalised the manuscript.	80%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Andrew B Forbes	Designed the Wave-1 and Wave-2 studies; provided statistical analysis guidance; assisted in the preparation of the manuscript and reviewed the manuscript.	
Helen L Kelsall	Designed the Wave-1 and Wave-2 study; contributed to questionnaire design; assisted in the preparation of the manuscript and reviewed the manuscript.	
Jillian F Ikin	Designed the study; contributed to questionnaire design; coordinated the study and reviewed the manuscript.	
Malcolm R Sim	Designed the Wave-1 and Wave-2 study; contributed to questionnaire design, assisted in the preparation of the manuscript and reviewed the manuscript.	

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate's
Signature

		Date 28/03/2016
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Main
Supervisor's
Signature

	Date
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Increased Symptom Reporting Persists in 1990–1991 Gulf War Veterans 20 Years Post Deployment

Stella M. Gwini, MSc,* Andrew B Forbes, PhD, Helen L. Kelsall, PhD, Jillian F. Ikin, PhD, and Malcolm R. Sim, PhD

Background Following the 1990–1991 Gulf War, Gulf War veterans (veterans) reported health symptoms more commonly than non-deployed groups. This article examines symptom persistence, incidence and prevalence 20 years on.

Methods In 2000–2003 and 2011–2012, a 63-item symptom checklist was administered to 697 veterans and 659 comparison group. Symptomatology was compared using log-binomial regression.

Results Both veterans and comparison group reported significantly increased prevalence (3–52%) over time in more than half the symptoms, with a similar overall rate of increase. Half the symptoms had higher incidence (risk-ratios ranged 1.43–1.50) and a quarter were more persistent (risk-ratios ranged 1.12–1.20) in veterans than the comparison group.

Conclusions Symptomatology increased in both groups over time, but persisted to a similar extent and had higher incidence among veterans than the comparison group. The gap in symptom prevalence between the two groups remained unchanged. These findings suggest enduring health consequences of Gulf War service. *Am. J. Ind. Med.* 58:1246–1254, 2015. © 2015 Commonwealth of Australia. American Journal of Industrial Medicine © 2015 Wiley Periodicals, Inc.

KEY WORDS: Gulf War; symptoms; incidence; longitudinal study; persistence; veterans

INTRODUCTION

In the first decade following the 1990–1991 Gulf War, veteran health research studies conducted in several coalition countries including the United States, United Kingdom,

Australia, France, and Canada investigated the patterns and predictors of illness among Gulf War veterans. A consistent finding was that Gulf War veterans had higher than expected rates of multiple physical and psychological symptoms when compared to non-Gulf deployed military comparison groups [Gilroy 1998; Unwin et al., 1999; Cherry et al., 2001; Barrett et al., 2002b; Kelsall et al., 2009]. Now, approximately 20 years after the Gulf War little is known about the longer term health of Gulf War veterans and whether this increased symptom burden, relative to comparable military groups, persists.

The majority of Gulf War veteran health studies to date have been cross-sectional studies, whereas longitudinal studies are needed to consider long-term sequelae of increased symptom reporting post deployment. The few longitudinal studies that have been undertaken have found that the prevalence of symptoms and other health outcomes

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(such as medical conditions, functional impairment and post-traumatic stress disorder) remains higher among Gulf War veterans indicating poorer health than other military comparison groups [Hotopf et al., 2003; Kang et al., 2009; Li et al., 2011]. A study among United Kingdom (UK) Gulf War veterans in 2000–2001 showed that the higher prevalence of symptoms, compared with non-Gulf deployed comparison groups, was due to both higher incidence (new reporting of symptoms at follow-up) and greater persistence of symptoms over the 3–4 year period since the cohort was first assessed in 1997 [Hotopf et al., 2003]. The prevalence gap between Gulf War veterans and comparison groups across several health outcomes had narrowed slightly but Gulf War veterans continued to experience poorer health than the military comparison groups. A study with a 10-year follow-up from baseline in 1995 to a follow-up in 2005 found that United States (US) Gulf War veterans were more likely to report increased somatic symptoms than a comparison group [Kang et al., 2009], and persistent poorer health and incident conditions based on several measures than the comparison group, but somatic symptom count was not assessed longitudinally. These longitudinal studies among Gulf War veterans have given some insight into symptom reporting in Gulf War veterans compared with other military groups since the 1990–1991 Gulf War. Among other outcomes, increased symptom reporting in Gulf War veterans is one of the indicators of poorer health in this group that is therefore important to monitor into the future. However, little is understood as to whether the difference in symptom reporting between Gulf War veterans and military comparison groups is greater now than it was in the first decade after the war, which will be addressed in this paper.

The aim of this article is to assess the current prevalence and longitudinal change in symptomatology among Australian veterans of the 1990–1991 Gulf War by comparing symptom data from two waves of the Australian Gulf War Veterans' Health Study; conducted in 2000–2003 (Wave-1) [Kelsall et al., 2004] and in 2011–2012 (Wave-2). The hypotheses are that (i) symptom prevalence in Gulf War veterans is higher at Wave-2 compared with Wave-1; (ii) the gap in symptom prevalence between Gulf War veterans and a military comparison group is wider at Wave-2 than it was 10 years earlier; (iii) the increase in symptom prevalence over time is a synergy of symptom persistence (i.e., repeated reporting of symptoms at Wave-1 and Wave-2) and incidence (i.e., new symptom onset at Wave-2).

MATERIALS AND METHODS

Study Population and Recruitment

Participants in the first wave, sometimes referred to as "baseline study," were invited to take part in a follow-up

study (Wave-2). A detailed description of the Wave-1 study recruitment has been reported previously [Kelsall et al., 2004; Sim and Kelsall, 2006]. At Wave-1, Gulf War veterans ($n = 1,808$) who were not known to be residing permanently overseas or to be deceased were invited to participate, and 81% participated. A comparison group of 2,796 randomly selected Australian Defence Force (ADF) personnel who were in operational units at the time of the Gulf War, but who were not deployed to that conflict, were frequency matched to Gulf War veterans by age, gender, rank and branch of service, and 57% participated.

The Wave-2 eligible cohort included all surviving Wave-1 participants, excluding those who declined further follow-up or whose last known postal addresses were invalid. Up to four attempts at postal contact were made, followed by telephone/e-mail contact attempt. Fifty-four percent of Gulf War veterans and 47% of the comparison group agreed to participate. This article presents symptom reporting among male participants only, as the number of female subjects ($n = 30$) was too small for meaningful analysis.

Data Collection

Data used in this article were derived from a self-reported questionnaire which contained a 63-item general health symptom checklist that was developed from a symptom list used in a survey among UK Gulf War veterans [Unwin et al., 1999]. The symptom checklist included symptoms that spanned multiple body systems to include respiratory, cardiovascular, gastrointestinal, neurological, sexual functioning, and psychological symptoms. The checklist was administered at both the first and second waves. Participants were asked to report whether or not the symptoms had occurred in the past month. The questionnaire also contained the 12-item Short-Form Health Survey (SF-12), World Health Organization's Alcohol Use Disorders Identification Test (AUDIT) tool and questions pertaining to marital status, highest education level attained and smoking status. The SF-12 is a validated tool and contains at least one question on eight health concepts including physical functioning, role limitations due to physical health or emotional problems, general health, bodily pain, vitality, social functioning, psychological distress and psychological well being [Ware et al., 1996]. The 12 questions were scored on two domains, the mental and physical health components, to give scores between 0 and 100 for each domain, with lower scores indicating poorer health [Ware et al., 1995]. The AUDIT was developed by the World Health Organisation for use in screening persons with excessive alcohol consumption [Saunders et al., 1993], and AUDIT caseness was defined by scores ≥ 10 [McKenzie et al., 2006]. In addition, version 2.1 of the Composite International Diagnostic Interview (CIDI) [WHO Collaborating Centre for Mental Health and

Substance Abuse, 1997] was used to define psychiatric diagnosis according to DSM-IV criteria including post-traumatic stress disorder (PTSD) in the past 12 months.

Statistical Analysis

Data were analysed using Stata version 13.0 (StataCorp, Texas). χ^2 Method of association were used to determine the relationship between categorical variables, t tests to compare continuous variables, while Wilcoxon rank sum test was used to compare medians of skewed continuous variables. Prevalence of each symptom was calculated as the fraction of total number of participants who reported the symptom as present. Negative-binomial regression was used to compare the average number of prevalent symptoms reported by Gulf War veterans and the comparison group. Prevalence of each symptom was then modelled using log-binomial regression to obtain risk ratios (RR) [Wacholder, 1986] comparing symptom prevalence among Gulf War veterans and comparison group, adjusting for age, rank and branch of service in August 1990. Log-binomial regression was chosen over logistic regression as it provides direct estimates of risk ratios. In instances where the log-binomial failed to converge, log-normal distribution with robust variance estimator was used as suggested by Cummings [2009]. Possible confounding of covariates of interest was examined by adding each covariate one at a time to the negative binomial and log-binomial regression models of study group on total number of symptoms. Effect modification was also assessed by including in the model an interaction between the covariate of interest and study group variable. Covariates of interest were age, branch of service, military rank in August 1990, marital status, highest level of education, PTSD caseness, smoking status, and AUDIT caseness.

Assessment of variation in symptom reporting over time involved three distinct components. The first component was a between-study-group comparison that compared longitudinal change in symptom prevalence between Gulf War veterans and the comparison group. This was assessed using an interaction term (i.e., between study group and time) in the log-binomial regression, with the repeated measures of individuals accommodated using a robust (sandwich) variance estimator. The other two components assessed symptom prevalence in subsets of individuals based on their symptomatology at Wave-1. The first, defined as *symptom persistence*, assessed whether participants who reported a symptom as present at Wave-1 also reported the same symptom at Wave-2. This was analysed using log-binomial regression among participants who reported the symptom as present at Wave-1. The second, defined as *symptom incidence*, assessed whether participants who had reported a symptom as absent at Wave-1 had reported it as present at the second wave. This was analysed using log-binomial

regression among participants who reported the symptom as absent at Wave-1. Adjustment in these models was made for age, rank and branch of service in August 1990.

Ethics Approval

Ethics approval for the study was received from Monash University Human Research Ethics Committee (HREC), Australian Department of Veterans' Affairs HREC, and the Australian Defence Forces HREC. Participants provided written consent.

RESULTS

Comparison of Wave-2 Participants and Non-Participants

There were 697 Gulf War veterans and 659 comparison group participants at Wave-2. Military service characteristics and Wave-1 health outcomes (SF-12 median scores and number of symptoms) of Wave-2 participants versus non-participants are presented in Table I. In both study groups, Wave-2 participants were on average older than non-participants ($P < 0.001$). Officers were more likely to participate ($P < 0.001$). SF-12 physical health component scores were similar for participants and non-participants while mental health component scores for Wave-2 non-participants were significantly lower than for participants. Overall, reporting of the 63 symptoms among the two study groups at Wave-1 was similar for Wave-2 participants and non-participants, as indicated by the median scores in Table I.

Characteristics of Wave-2 Participants

Table I also shows that the age, branch of service and rank distribution among Wave-2 participants was significantly different for the two study groups with more Gulf War veterans in the younger age group. There were more Navy personnel and lower ranked personnel in the veterans' group compared with comparison group.

Symptom Prevalence Summary

Figure 1 compares the symptom prevalence between the two study groups (top left and bottom right quadrants) and over the two waves (top right and bottom left quadrants) for each study group. Looking first at the top left quadrant which shows a plot of Wave-1 symptom prevalence for the two study groups, the crosses (representing prevalence of each of the 63 symptoms) are above the dashed diagonal line (which represents equal symptom prevalence for Gulf War veterans

TABLE 1. Characteristics of Wave-2 participants and Non-Participants

Characteristic	Gulf War veterans		Comparison group	
	Non-participants ^a , n = 702	Participants, n = 897	Non-participants ^a , n = 874	Participants, n = 859
Age, years (as of 1 January 2012) ^{aa} : n (%)				
<45	305 (43.5)	201 (28.8)	315 (36.0)	129 (19.6)
45–54	315 (44.9)	373 (53.5)	425 (48.6)	368 (55.8)
≥55	82 (11.6)	123 (17.7)	134 (15.4)	162 (24.6)
Branch of service in August 1990 ^c : n (%)				
Navy	614 (87.5)	599 (85.9)	663 (75.9)	449 (68.2)
Army	38 (5.4)	46 (6.6)	97 (11.1)	72 (10.9)
Air force	50 (7.1)	52 (7.5)	114 (13.0)	138 (20.9)
Rank in August 1990 ^c : n (%)				
Officer	111 (15.8)	148 (21.2)	187 (21.4)	202 (30.6)
Other ranks—supervisory	320 (45.7)	355 (50.9)	397 (45.4)	334 (50.7)
Other ranks—nonsupervisory	270 (38.5)	194 (27.9)	290 (33.2)	123 (18.7)
Wave-1 SF-12 median scores: median (Q25; Q75)				
Mental health component ^{ba}	50.6 (38.5; 56.0)	51.4 (41.1; 56.6)	53.8 (45.8; 57.5)	55.0 (47.6; 57.6)
Physical health component ^c	52.2 (44.4; 55.5)	52.2 (45.1; 55.6)	53.1 (46.2; 55.9)	53.5 (46.9; 55.9)
Number of symptoms at Wave-1 ^c : median (Q25; Q75)	13 (6; 21)	12 (6; 19)	9 (4; 16)	9 (4; 15)

SF-12, 12-item short form health survey; Q25, lower quartile; Q75, upper quartile.

^aIncludes all Wave-1 participants who did not participate at Wave-2, with the exception of those known to be deceased.^bNon-participants differ from participants (p value < 0.05).^cDistribution of Wave-2 participants differed between study groups (p value < 0.05).

and the comparison group); hence, demonstrating higher prevalence among Gulf War veterans than the comparison group at Wave-1 for most symptoms. A similar contrast of the two study groups in the bottom right quadrant shows that the prevalence of symptoms was also highest among Gulf War veterans than the comparison group at Wave-2. The top right quadrant shows that symptom prevalence at Wave-2 in Gulf War veterans was higher than at Wave-1 for most symptoms. Prevalence of some symptoms in the comparison group was higher at Wave-2 than at Wave-1, although the proportion of symptoms with higher prevalence at Wave-2 than at Wave-1 in the comparison group was less than that observed in Gulf War veterans.

Symptom Prevalence at Wave-2

The mean number of symptoms reported at Wave-2 was significantly higher among Gulf War veterans than the comparison group (mean: 16.9; $sd = 11.8$ vs. 12.5; $sd = 10.0$, ratio of means: 1.36, 95%CI 1.24–1.48). The relationship between study group and total number of symptoms was not confounded by age or military rank or branch of service in August 1990, PTSD diagnosis at Wave-1, marital status, highest level of education, smoking status and AUDIT

caseness; although the ratio of mean number of symptoms reported by Gulf War veterans versus the comparison group differed by participants' age in August 1990 (see Supplementary Figure S1 and Table S1, "Supporting Information. pdf"). Symptom reporting in Gulf War veterans relative to the comparison group was greatest in those aged less than 20 years at deployment (ratio of mean number of symptoms = 2.09; 95%CI 1.49–2.93) and this difference lessened with increasing age in August 1990 (ratio of mean number of symptoms = 1.43, 1.24, 1.36 for 20–24, 25–34 and ≥35 years, respectively; p value for trend = 0.033).

The prevalence of symptoms at Wave-2 ranged from 1% to 71% among Gulf War veterans and 1% to 60% among comparison group (Fig. 1, top right and bottom left quadrants, respectively). The prevalence of 43 of the 63 symptoms was significantly higher in Gulf War veterans than in the comparison group. The largest differences were observed for the following symptoms with more than twice as many Gulf War veterans as comparison group reporting the symptom; skin ulcers (RR 2.54 95%CI 1.36–4.72), skin infections (RR 2.28 95%CI 1.57–3.32) and feeling disoriented (RR 2.14 95%CI 1.42–3.21). Fifty per cent or more Gulf War veterans than comparison group reported symptoms of loss of control over bladder or bowels, stomach cramps, diarrhea, increased sensitivity to smell or light,

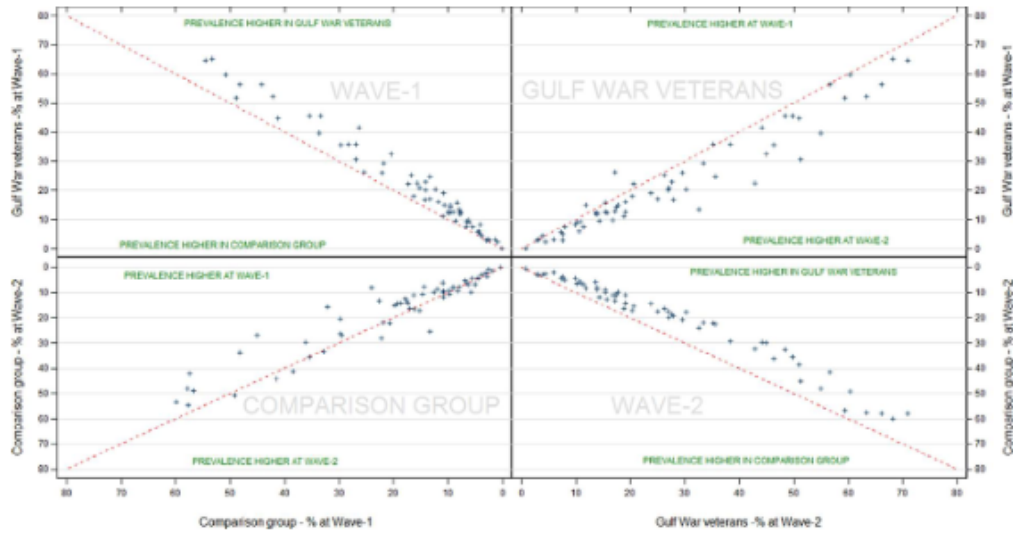


FIGURE 1. Comparison of symptom prevalence between study groups and between longitudinal waves. Top left quadrant: comparison of Wave-1 symptom prevalence between Gulf War veterans and comparison group. Bottom right quadrant: comparison of Wave-2 symptom prevalence between Gulf War veterans and comparison group. Top right quadrant: comparison of Wave-1 and Wave-2 symptom prevalence in the Gulf War veterans. Bottom left quadrant: comparison of Wave-1 and Wave-2 symptom prevalence in the comparison group.

feeling feverish, shaking, alcohol intolerance, night sweats, distressing dreams, and rash or skin irritation. In addition, the 15 most commonly reported symptoms among Gulf War veterans at Wave-2 were similar to those observed at Wave-1, with the exception of two symptoms. A Supplementary table (see Supplementary Table S2, "Supporting Information.pdf") is provided which presents the prevalence of all 63 symptoms at Wave-2.

Change in Symptom Prevalence Since Wave-1

Table II presents the change in prevalence from Wave-1 to Wave-2, persistence and incidence for the 15 most commonly reported symptoms at Wave-2 amongst Gulf War veterans. A significant increase in symptom prevalence from Wave-1 to Wave-2 was observed for 9/15 symptoms in Gulf War veterans and 8/15 symptoms in the comparison group. A comparison of prevalence change over time in Gulf War veterans versus comparison group revealed that for 13 of 15 symptoms there was no evidence for a difference between the two study groups in the Wave-1 to Wave-2 prevalence change. Overall, a significant increase in symptom prevalence from Wave-1 to Wave-2 was observed for 34/63 (54%) symptoms among Gulf War veterans and 25/63 (40%) among comparison group, with only 5/63 symptoms showing

significant differences in prevalence change between Gulf War veterans and comparison group. (see Supplementary Table S3, "Supporting Information.pdf," for the results of change in prevalence for all 63 symptoms.)

Persistence and Incidence of Symptoms Since Wave-1

Figure 2 illustrates persistence and incidence of symptoms in Gulf War veterans and the comparison group. The figure shows that Gulf War veterans had higher symptom persistence than the comparison group for the majority of symptoms, even though this difference was not statistically significant for 11/15 most common symptoms (Table II) and for 49/63 symptoms overall (Supplementary Table S4, "Supporting Information.pdf"). Incidence of symptoms, on the other hand, was significantly higher among Gulf War veterans than comparison group for 7/15 most common symptoms (Table II) and for more than half ($n = 34$) of all 63 symptoms overall (Supplementary Table S4, "Supporting Information.pdf").

To assess whether the relationship between symptom persistence and Gulf War deployment was confounded or modified by PTSD, age or rank or branch of service in August 1990, or smoking status or AUDIT caseness; we adjusted for these factors and their interaction with

TABLE II. Changes in Symptom Reporting From Wave-1 to Wave-2 (Prevalence Change, Persistence and Incidence) for the 15 Most Frequently Reported Symptoms Among Gulf War Veterans at Wave-2

Symptoms	Change in symptom prevalence from Wave-1 to Wave-2			Persistence of symptoms			Incidence of symptoms		
	Gulf War veterans (1), RR ^d (95%CI)	Comparison group (2), RR ^d (95%CI)	(1) vs. (2) ^a , p value	Gulf War veterans, n/N ^c (%)	Comparison group, n/N ^c (%)	Gulf War vs. comparison group, RR ^d (95%CI)	Gulf War veterans, n/N ^c (%)	Comparison group, n/N ^c (%)	Gulf War vs. Comparison group, RR ^d (95%CI)
Feeling unrefreshed after sleep	1.09 (1.03, 1.15)	1.06 (0.98, 1.14)	0.565	380/448 (84)	269/357 (75)	1.12 (1.04, 1.20)	110/245 (45)	107/295 (36)	1.17 (0.94, 1.45)
Fatigue	1.05 (0.99, 1.12)	1.12 (1.04, 1.21)	0.188	358/450 (79)	261/349 (74)	1.05 (0.97, 1.14)	113/242 (47)	130/305 (43)	1.10 (0.91, 1.33)
Sleeping difficulties	1.18 (1.10, 1.26)	1.20 (1.11, 1.31)	0.725	316/388 (81)	237/312 (76)	1.06 (0.97, 1.16)	139/302 (46)	139/337 (41)	1.11 (0.93, 1.32)
General muscle aches or pains	1.22 (1.13, 1.31)	1.37 (1.25, 1.51)	0.048	285/361 (78)	208/274 (75)	1.00 (0.92, 1.09)	153/331 (46)	165/377 (44)	1.04 (0.89, 1.22)
Headaches	1.02 (0.95, 1.10)	0.98 (0.90, 1.06)	0.426	296/413 (71)	226/331 (68)	1.05 (0.95, 1.15)	121/280 (43)	94/322 (29)	1.44 (1.14, 1.82)
Low back pain	1.15 (1.07, 1.23)	1.16 (1.07, 1.25)	0.860	282/357 (79)	249/318 (78)	1.01 (0.93, 1.10)	128/334 (38)	118/331 (36)	1.10 (0.90, 1.34)
Irritability/outbursts of anger	1.01 (0.94, 1.09)	0.94 (0.86, 1.04)	0.277	285/392 (72)	181/286 (63)	1.10 (0.98, 1.22)	107/301 (36)	89/363 (25)	1.43 (1.12, 1.84)
Stiffness in several joints	1.40 (1.28, 1.53)	1.42 (1.27, 1.57)	0.794	215/273 (78)	165/219 (75)	1.07 (0.97, 1.18)	165/420 (39)	146/432 (34)	1.08 (0.90, 1.29)
ringing in the ears	1.69 (1.52, 1.87)	1.66 (1.48, 1.87)	0.981	183/213 (85)	146/175 (83)	1.03 (0.94, 1.12)	172/482 (36)	147/478 (31)	1.14 (0.96, 1.36)
Flatulence or burping	1.14 (1.05, 1.25)	0.95 (0.85, 1.05)	0.006	223/311 (71)	166/270 (62)	1.13 (1.00, 1.27)	131/384 (34)	83/383 (22)	1.50 (1.19, 1.90)
Difficulty finding the right word	1.08 (1.00, 1.16)	1.01 (0.91, 1.13)	0.351	232/317 (73)	145/230 (63)	1.16 (1.03, 1.31)	111/375 (30)	87/422 (21)	1.43 (1.11, 1.85)
Forgetfulness	1.07 (0.98, 1.17)	0.99 (0.88, 1.11)	0.259	224/314 (71)	129/216 (59)	1.16 (1.02, 1.33)	109/377 (29)	85/436 (20)	1.47 (1.14, 1.90)
Pain, without swelling or redness, in several joints	1.30 (1.17, 1.44)	1.21 (1.06, 1.38)	0.419	171/247 (69)	114/194 (58)	1.20 (1.03, 1.39)	149/447 (33)	122/458 (27)	1.21 (0.99, 1.49)
Avoiding doing things or situations	1.38 (1.24, 1.54)	1.46 (1.26, 1.69)	0.541	167/226 (73)	88/131 (67)	1.12 (0.96, 1.30)	144/467 (31)	106/518 (21)	1.47 (1.18, 1.83)
Loss of concentration	1.08 (0.98, 1.19)	1.13 (0.99, 1.29)	0.632	196/288 (68)	103/172 (59)	1.16 (0.99, 1.36)	110/407 (27)	92/481 (19)	1.34 (1.05, 1.72)

^aValue for change in prevalence (i.e., Wave-2 prevalence divided by Wave-1 prevalence) observed in Gulf War group compared with change in prevalence observed in the comparison group.^bThe denominator for the percentages, N, is the number of participants who reported the symptom as present at Wave-1.^cThe denominator for percentages, N, is the number of participants who did not report the symptom as present at Wave-1.^dRelative risks (RR) were adjusted for age, branch of service and military rank in August 1990.

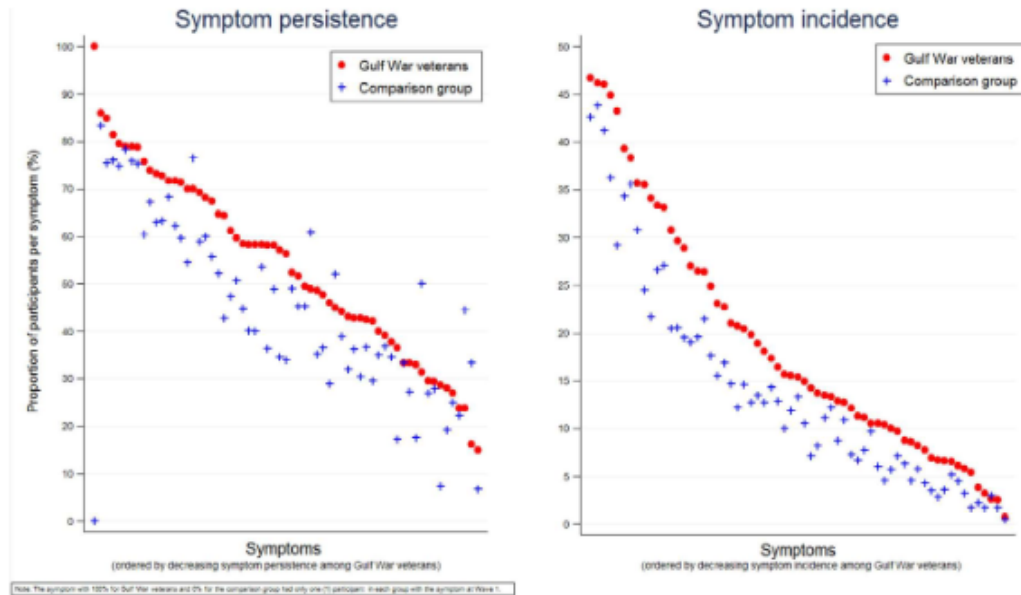


FIGURE 2. Symptom persistence and incidence for Gulf War veterans and non-Gulf War veterans.

deployment. These further analyses revealed no confounding effect by any of the factors but that symptom persistence in Gulf War veterans and comparison group differed for participants with/without PTSD at Wave-1, with a higher risk ratio among those with PTSD. Due to low prevalence of PTSD at Wave-1, sub-group analyses were only conducted among those without PTSD at Wave-1 and these analyses showed that symptom persistence among Gulf War veterans and comparison group were similar for about three-quarters of symptoms, which was consistent with results observed in the whole cohort (Results not shown). No effect modification was observed for the other factors.

DISCUSSION

This longitudinal study, approximately 20 years after the 1990–1991 Gulf War and 10 years after our baseline study of this cohort, has found the prevalence of symptoms among Australian Gulf War veterans to be higher than it was 10 years ago, and is still higher than the military comparison group for most symptoms. However, the change in prevalence was similar for Gulf War veterans and the comparison group over the 10-year period. One-quarter of symptoms were more persistent and around half the symptoms had higher incidence in Gulf War veterans than the comparison group, but the changes were not large enough to increase the prevalence gap between Gulf War veterans

and the comparison group. Estimates of the relationship between deployment and symptom persistence were not confounded or modified by age at deployment, military rank, branch of service, smoking status, and alcohol consumption but for most symptoms, the difference in symptom persistence among Gulf War veterans and the comparison group was larger in PTSD cases than in non-PTSD cases.

The differences between Wave-2 symptomatology in Gulf War veterans and the comparison group highlights that ill-health continues to be significantly in excess among Gulf War veterans compared with other military personnel, and these differences cannot be explained by veteran characteristics. Similar continued excess symptom reporting in Gulf War veterans was observed in a cohort of UK Gulf War veterans [Hotopf et al., 2003]. Other previous studies have shown high morbidity among veterans of the Vietnam War, Korean War, and World War II even at 50 years post-war [Eisen et al., 1991; Hunt and Robbins, 2001; Ikin et al., 2007], suggesting that the health effects of war on veterans, are rather long term than transient.

Some psychological health disorders such as PTSD have been associated with high symptom reporting [Baker et al., 1997; Engel et al., 2000; Barrett et al., 2002a]. However, even after accounting for PTSD in our study, symptomatology remained significantly higher in Gulf War veterans than the comparison group indicating that PTSD could only partially explain the differences between the groups.

It is common for symptomatology to increase with time. However, our study's finding of higher prevalence at Wave-2

than at Wave-1 for more than half of the symptoms among Gulf War veterans is in contrast with findings of the UK Gulf War veterans' study [Hotopf et al., 2003] where decreased symptom prevalence (as measured by total number of symptoms) was observed. While the design of the UK study and our study are reasonably similar, our follow up period is around twice as long, 20 years post deployment and 10 years since baseline assessment (compared with 3–4 years of follow-up), thereby demonstrating continual symptom reporting over a longer period of time.

Change in symptom prevalence over time can be expressed as a combination of symptom persistence and incidence and these two measures can significantly impact the prevalence gap between two groups at two time points. In our study, overall symptom persistence was fairly similar between Gulf War veterans and the comparison group (significantly higher in Gulf War veterans for 14 of 63 symptoms), even after adjusting for confounding by factors such as PTSD, age, smoking status, and alcohol consumption. On the other hand, symptom incidence was higher among Gulf War veterans than the comparison group for more than half of the symptoms suggesting that the difference in symptom prevalence observed in our study at Wave-2 is probably a result of increases in new symptom manifestation in Gulf War veterans at a higher rate than in the comparison group. Although symptom prevalence was not reported in a Gulf War veterans' study conducted in the United States, a similar pattern of persistence and incidence was observed in chronic diseases reported by Gulf War veterans followed up from 1995 to 2005 [Li et al., 2011].

Hotopf et al. [2003] reported that the prevalence gap between Gulf War veterans and their comparison group had slightly narrowed over a 3–4 year follow-up period in 2001, while Li et al. [2011] in a US study reported an increased gap between Gulf War veterans and the comparison group in 2005. These findings contrast with our findings of a similar prevalence gap between Australian Gulf War veterans and the comparison group at 10 year follow-up in 2010–2012, which is the longest follow up of Gulf War veterans. Another study of a different group of US Gulf War veterans by Ozakinci et al. [2006] found that there was no significant change in symptom reporting between their studies conducted in 1995 and 2000. This study had no comparison group and this limited its utility for comparative purposes. The differences between the findings of our study and the UK and US studies could be attributed to several factors, such as the longer length of time between first and second study, differences in the comparison groups, and variations in the healthcare systems across countries.

The strengths of our study include the longitudinal nature of the study design, use of the same 63-item past-month symptom questionnaire at Wave-1 and Wave-2 that provided an opportunity to compare data from two time points, inclusion of a randomly sampled matched military

comparison group, longer term follow up and first time reporting of symptom outcomes for Gulf War veterans more than 20 years after the 1991 Gulf War. This length of time enabled longer-term effects of Gulf War deployment on symptomatology to be assessed than has been undertaken previously.

Participation rates at the second wave were moderate despite a dedicated contact and recruitment strategy. An assessment of participation bias was conducted and the self-reported health status, as measured by Wave-1 SF-12 scores, of Wave-2 participants versus non-participants was found to be reasonably similar. Furthermore, a comprehensive evaluation conducted at Wave-1 showed that the study results were robust to any possible participation bias as a result of some differences in demographic profiles of the two study groups [Kelsall et al., 2004].

In summary, Australian Gulf War veterans are still reporting more symptoms than the military comparison group after a 10-year period and more than 20 years since the 1990–1991 Gulf War, but the difference in persistence and incidence between the two groups was not great enough to result in a significantly widened prevalence gap between Gulf War veterans and the military comparison group. In addition, the difference in symptom reporting could not be explained by confounding due to age, rank, branch of service, smoking status, alcohol consumption, or PTSD caseness. The increased burden of symptom reporting in Gulf War veterans persists 20 years after the 1990–1991 Gulf War. Important, however, is the need to consider the relationship between this persistent increased symptom reporting burden and long term morbidity, especially as veterans age, and this will be the topic of further research. Any such relationships are important to better understand the impacts of symptomatology on veterans, their families, and the community. These findings can assist health care providers, care givers and service providers better understand and address health care needs of Gulf War veterans.

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DISCLAIMER

The views expressed in the Article do not necessarily represent the views of the Minister for Veterans' Affairs or the Department of Veterans' Affairs. The Commonwealth of Australia does not give any warranty nor accept any liability in relation to the contents of the Article.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web-site.

Conflict of interest: None declared.

SUPPLEMENTARY TABLES

Increased symptom reporting in 1990-1991 Gulf War veterans 20 years post deployment

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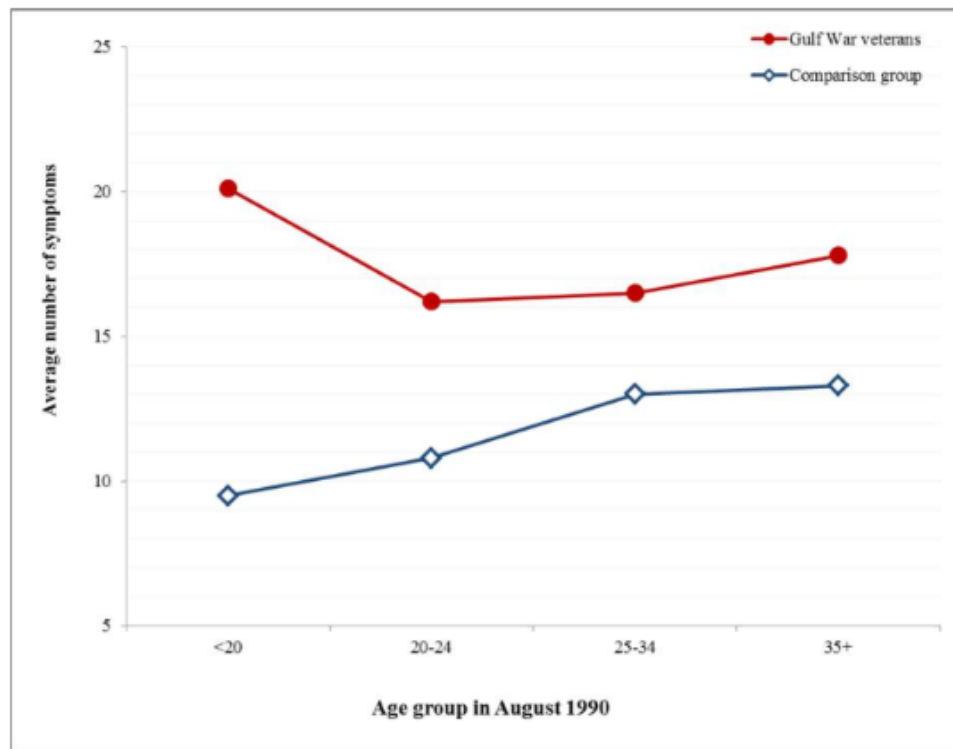


Figure S1: Total number of symptoms reported at Wave-2 by age group and study group

Table S1: Relationship between deployment and total number of reported symptoms, adjusting for possible confounders and/or effect modifiers

	Test for confounding (Gulf War veterans vs. Comparison group)	Test for effect modification
	RoM (95% CI)	p-value
Unadjusted effect estimate	1.36 (1.24, 1.48)	
Possible confounders		
<i>Characteristics at deployment (August 1990)</i>		
Age group (years)	1.37 (1.25, 1.50)	0.012
Branch of service	1.33 (1.21, 1.45)	0.57
Military rank	1.32 (1.21, 1.44)	0.10
<i>Wave-1 psychological health</i>		
Post-traumatic stress disorder (PTSD)	1.31 (1.20, 1.43)	0.93
<i>Wave-2 characteristics</i>		
Marital status	1.35 (1.24, 1.48)	0.65
Highest level of education level	1.35 (1.24, 1.47)	0.55
Smoking status	1.33 (1.22, 1.45)	0.27
Audit caseness	1.31 (1.21, 1.43)	0.98
Abbreviations: RoM- ratio of means		

Table S2: Comparison of symptom prevalence at Wave-2

Symptom	Gulf War veterans: n(%) N=697	Comparison group: n(%) N=659	RR _{adj} (95% CI)
Feeling unrefreshed after sleep	493 (70.8)	377 (57.7)	1.19 (1.10 , 1.29)
Fatigue	473 (68.2)	392 (59.9)	1.12 (1.03 , 1.21)
Sleeping difficulties	457 (66.0)	377 (57.8)	1.12 (1.03 , 1.21)
General muscle aches or pains	440 (63.3)	375 (57.4)	1.07 (0.98 , 1.16)
Headaches	418 (60.2)	322 (49.2)	1.18 (1.07 , 1.31)
Low back pain	412 (59.4)	371 (56.7)	1.05 (0.96 , 1.15)
Irritability/outbursts of anger	393 (56.5)	271 (41.6)	1.30 (1.16 , 1.46)
Stiffness in several joints	381 (54.9)	315 (48.2)	1.11 (1.00 , 1.23)
Ringing in the ears	356 (51.1)	295 (45.0)	1.12 (1.00 , 1.24)
Flatulence or burping	354 (50.9)	252 (38.5)	1.28 (1.13 , 1.44)
Difficulty finding the right word	345 (49.6)	232 (35.5)	1.37 (1.21 , 1.56)
Forgetfulness	334 (48.3)	214 (32.8)	1.43 (1.25 , 1.63)
Pain, without swelling or redness, in several joints	321 (46.2)	236 (36.1)	1.26 (1.11 , 1.44)
Avoiding doing things or situations	312 (44.9)	194 (29.9)	1.46 (1.26 , 1.69)
Loss of concentration	307 (44.1)	195 (29.8)	1.43 (1.24 , 1.65)
Loss of interest in sex	298 (42.8)	211 (32.2)	1.32 (1.15 , 1.53)
Itchy or painful eyes	266 (38.2)	193 (29.5)	1.27 (1.09 , 1.48)
Feeling distant or cut-off from others	247 (35.5)	148 (22.7)	1.49 (1.25 , 1.78)
Rash or skin irritation	245 (35.3)	146 (22.3)	1.54 (1.28 , 1.84)
Shortness of breath	233 (33.5)	144 (22.0)	1.46 (1.22 , 1.75)
Problems with sexual functioning	226 (32.5)	157 (24.0)	1.36 (1.14 , 1.62)
Distressing dreams	208 (30.1)	117 (17.8)	1.61 (1.31 , 1.97)
Indigestion	206 (29.6)	136 (20.8)	1.38 (1.13 , 1.67)
Increased sensitivity to noise	194 (27.9)	126 (19.3)	1.38 (1.13 , 1.69)
Feeling jumpy/easily startled	191 (27.5)	122 (18.7)	1.41 (1.15 , 1.73)
Tingling or burning sensation in hands/feet	188 (27.1)	130 (19.8)	1.31 (1.08 , 1.59)
Rapid or pounding heart beat	186 (26.9)	114 (17.4)	1.45 (1.17 , 1.79)
Diarrhoea	183 (26.3)	106 (16.2)	1.53 (1.23 , 1.90)
Dry mouth	174 (25.1)	115 (17.6)	1.37 (1.11 , 1.70)
Night sweats	166 (23.9)	96 (14.7)	1.56 (1.25 , 1.96)
Chest pain	143 (20.6)	100 (15.3)	1.25 (0.99 , 1.58)
Persistent cough	142 (20.4)	112 (17.1)	1.17 (0.93 , 1.48)
Loss of sensation in hands/feet	133 (19.2)	94 (14.4)	1.27 (1.00 , 1.62)
Stomach cramps	133 (19.1)	71 (10.8)	1.66 (1.27 , 2.19)
Passing urine more often	131 (18.9)	107 (16.4)	1.19 (0.94 , 1.49)
Increased sensitivity to light	123 (17.7)	64 (9.8)	1.68 (1.27 , 2.22)
Wheezing	121 (17.5)	71 (10.9)	1.47 (1.11 , 1.93)
Sore throat	120 (17.2)	87 (13.3)	1.28 (0.98 , 1.66)
Unintended weight gain > 4kg	119 (17.1)	72 (11.0)	1.45 (1.09 , 1.91)
Loss of balance or coordination	117 (16.8)	72 (11.0)	1.44 (1.10 , 1.90)

Symptom	Gulf War veterans: n(%) N=697	Comparison group: n(%) N=659	RR _{adj} (95% CI)
Toothache	109 (15.7)	83 (12.7)	1.20 (0.92 , 1.57)
Alcohol intolerance	107 (15.5)	59 (9.0)	1.61 (1.18 , 2.18)
Loss of or decrease in appetite	106 (15.3)	65 (9.9)	1.49 (1.11 – 2.00)
Constipation	100 (14.4)	78 (11.9)	1.20 (0.91 , 1.58)
Dizziness or blackouts	97 (13.9)	59 (9.0)	1.42 (1.04 , 1.92)
Shaking	96 (13.9)	52 (7.9)	1.60 (1.16 , 2.19)
Skin infections	94 (13.5)	38 (5.8)	2.28 (1.57 , 3.32)
Mouth ulcers	82 (11.8)	54 (8.2)	1.46 (1.04 , 2.05)
Double vision	79 (11.4)	45 (6.9)	1.47 (1.04 , 2.09)
Feeling feverish	76 (11.0)	41 (6.3)	1.67 (1.15 , 2.41)
Increased sensitivity to smell	74 (10.6)	37 (5.7)	1.71 (1.17 , 2.49)
Nausea	71 (10.2)	43 (6.6)	1.44 (1.00 , 2.07)
Feeling disorientated	69 (9.9)	30 (4.6)	2.14 (1.42 , 3.21)
Tender/painful swelling of lymph glands	56 (8.1)	33 (5.0)	1.42 (0.94 , 2.14)
Loss of control over bladder or bowels	53 (7.6)	25 (3.8)	1.89 (1.19 – 3.00)
Lump in throat	52 (7.5)	30 (4.6)	1.52 (0.99 , 2.34)
Difficulty speaking	51 (7.3)	30 (4.6)	1.48 (0.96 , 2.29)
Skin ulcers	41 (5.9)	13 (2.0)	2.54 (1.36 , 4.72)
Burning sensation in sex organs	31 (4.5)	17 (2.6)	1.50 (0.85 , 2.62)
Vomiting	27 (3.9)	19 (2.9)	1.16 (0.63 , 2.12)
Pain on passing urine	22 (3.2)	19 (2.9)	1.06 (0.58 , 1.93)
Unintended weight loss >4kg	20 (2.9)	20 (3.1)	0.87 (0.47 , 1.61)
Seizures or convulsions	6 (0.9)	3 (0.5)	1.35 (0.32 , 5.69)

Table S3: Change in symptom prevalence from Wave-1 to Wave-2

Symptom	Gulf War veterans N=697	Comparison group N=659	Comparison of prevalence change between the two groups
	RR (95% CI)	RR (95% CI)	p-value
Feeling unrefreshed after sleep	1.09 (1.03 , 1.15)	1.06 (0.98 , 1.14)	0.565
Fatigue	1.05 (0.99 , 1.12)	1.12 (1.04 , 1.21)	0.188
Sleeping difficulties	1.18 (1.10 , 1.26)	1.20 (1.11 , 1.31)	0.725
General muscle aches or pains	1.22 (1.13 , 1.31)	1.37 (1.25 , 1.51)	0.048
Headaches	1.02 (0.95 , 1.10)	0.98 (0.90 , 1.06)	0.426
Low back pain	1.15 (1.07 , 1.23)	1.16 (1.07 , 1.25)	0.860
Irritability/outbursts of anger	1.01 (0.94 , 1.09)	0.94 (0.86 , 1.04)	0.277
Stiffness in several joints	1.40 (1.28 , 1.53)	1.42 (1.27 , 1.57)	0.794
Ringing in the ears	1.69 (1.52 , 1.87)	1.66 (1.48 , 1.87)	0.981
Flatulence or burping	1.14 (1.05 , 1.25)	0.95 (0.85 , 1.05)	0.006
Difficulty finding the right word	1.08 (1.00 , 1.18)	1.01 (0.91 , 1.13)	0.351
Forgetfulness	1.07 (0.98 , 1.17)	0.99 (0.88 , 1.11)	0.259
Pain, without swelling or redness, in several joints	1.30 (1.17 , 1.44)	1.21 (1.06 , 1.38)	0.419
Avoiding doing things or situations	1.38 (1.24 , 1.54)	1.46 (1.26 , 1.69)	0.541
Loss of concentration	1.08 (0.98 , 1.19)	1.13 (0.99 , 1.29)	0.632
Loss of interest in sex	1.89 (1.65 , 2.17)	2.06 (1.72 , 2.48)	0.414
Itchy or painful eyes	1.08 (0.96 , 1.21)	1.09 (0.94 , 1.26)	0.832
Feeling distant or cut-off from others	1.46 (1.28 , 1.67)	1.70 (1.39 , 2.08)	0.224
Rash or skin irritation	0.98 (0.87 , 1.10)	0.79 (0.67 , 0.93)	0.033
Shortness of breath	1.15 (1.01 , 1.30)	1.01 (0.85 , 1.20)	0.232
Problems with sexual functioning	2.40 (1.99 , 2.89)	2.99 (2.32 , 3.84)	0.122
Distressing dreams	1.46 (1.27 , 1.69)	1.46 (1.18 , 1.81)	0.989
Indigestion	1.14 (1.01 , 1.30)	0.94 (0.79 , 1.12)	0.071
Increased sensitivity to noise	1.67 (1.41 , 1.98)	1.33 (1.08 , 1.64)	0.109
Feeling jumpy/easily startled	1.20 (1.05 , 1.37)	1.34 (1.10 , 1.63)	0.405
Tingling or burning sensation in hands/feet	1.30 (1.11 , 1.53)	1.31 (1.08 , 1.60)	0.874
Rapid or pounding heart beat	1.35 (1.16 , 1.58)	1.24 (1.00 , 1.55)	0.528
Diarrhoea	1.04 (0.89 , 1.22)	0.97 (0.78 , 1.20)	0.587
Dry mouth	1.51 (1.27 , 1.79)	1.34 (1.08 , 1.65)	0.404
Night sweats	1.26 (1.07 , 1.48)	1.38 (1.10 , 1.73)	0.530
Chest pain	0.91 (0.78 , 1.07)	0.89 (0.72 , 1.10)	0.832
Persistent cough	1.14 (0.95 , 1.37)	1.07 (0.86 , 1.32)	0.591
Loss of sensation in hands/feet	1.52 (1.23 , 1.88)	1.85 (1.43 , 2.40)	0.231
Stomach cramps	1.19 (0.98 , 1.45)	0.91 (0.71 , 1.17)	0.088
Passing urine more often	1.72 (1.36 , 2.17)	1.51 (1.20 , 1.89)	0.408
Increased sensitivity to light	1.19 (0.99 , 1.42)	0.92 (0.72 , 1.20)	0.111

Symptom	Gulf War veterans N=697	Comparison group N=659	Comparison of prevalence change between the two groups
	RR (95% CI)	RR (95% CI)	p-value
Wheezing	1.23 (1.01, 1.51)	1.14 (0.88, 1.48)	0.641
Sore throat	0.68 (0.56, 0.82)	0.52 (0.42, 0.66)	0.108
Unintended weight gain > 4kg	1.36 (1.08, 1.70)	1.12 (0.85, 1.46)	0.298
Loss of balance or coordination	1.71 (1.35, 2.17)	1.74 (1.28, 2.38)	0.920
Toothache	1.26 (0.99, 1.60)	1.28 (0.95, 1.73)	0.934
Alcohol intolerance	0.99 (0.80, 1.23)	1.08 (0.80, 1.46)	0.636
Loss of or decrease in appetite	1.19 (0.96, 1.49)	1.10 (0.82, 1.47)	0.586
Constipation	1.50 (1.17, 1.91)	1.39 (1.04, 1.86)	0.701
Dizziness or blackouts	1.12 (0.90, 1.41)	1.21 (0.87, 1.66)	0.789
Shaking	1.18 (0.96, 1.45)	1.04 (0.76, 1.42)	0.474
Skin infections	1.10 (0.87, 1.40)	0.59 (0.41, 0.84)	0.004
Mouth ulcers	0.79 (0.62, 1.00)	0.86 (0.63, 1.17)	0.675
Double vision	1.52 (1.11, 2.06)	1.28 (0.88, 1.88)	0.498
Feeling feverish	1.20 (0.90, 1.58)	0.95 (0.66, 1.36)	0.300
Increased sensitivity to smell	1.77 (1.32, 2.36)	1.27 (0.85, 1.92)	0.219
Nausea	1.13 (0.88, 1.46)	1.07 (0.74, 1.54)	0.791
Feeling disorientated	1.21 (0.92, 1.60)	1.11 (0.72, 1.73)	0.735
Tender/painful swelling of lymph glands	1.09 (0.78, 1.51)	0.76 (0.52, 1.11)	0.163
Loss of control over bladder or bowels	2.64 (1.68, 4.16)	1.27 (0.77, 2.09)	0.036
Lump in throat	1.49 (1.03, 2.17)	1.12 (0.68, 1.85)	0.371
Difficulty speaking	1.30 (0.92, 1.85)	1.04 (0.68, 1.60)	0.391
Skin ulcers	1.95 (1.20, 3.16)	1.44 (0.66, 3.16)	0.541
Burning sensation in sex organs	1.94 (1.13, 3.32)	2.87 (1.29, 6.38)	0.433
Vomiting	0.87 (0.54, 1.39)	0.77 (0.48, 1.24)	0.713
Pain on passing urine	1.05 (0.62, 1.79)	1.07 (0.65, 1.75)	0.978
Unintended weight loss >4kg	1.02 (0.58, 1.82)	1.28 (0.67, 2.43)	0.613
Seizures or convulsions	6.00 (0.99, 36.30)	2.98 (0.30, 30.02)	0.648

Table S4: Persistence and incidence of symptoms

Symptoms	Persistence of symptoms			Incidence of symptoms		
	Gulf War veterans n/N ^a (%)	Comparison group n/N ^a (%)	Gulf War vs. Comparison group RR (95% CI)	Gulf War veterans n/N ^b (%)	Comparison group n/N ^b (%)	Gulf War vs. Comparison group RR (95% CI)
Feeling unrefreshed after sleep	380/448 (84)	269/357 (75)	1.12 (1.04, 1.20)	110/245 (45)	107/295 (36)	1.17 (0.94, 1.45)
Fatigue	358/450 (79)	261/349 (74)	1.05 (0.97, 1.14)	113/242 (47)	130/305 (43)	1.10 (0.91, 1.33)
Sleeping difficulties	316/388 (81)	237/312 (76)	1.06 (0.97, 1.16)	139/302 (46)	139/337 (41)	1.11 (0.93, 1.32)
General muscle aches or pains	285/361 (78)	208/274 (75)	1.00 (0.92, 1.09)	153/331 (46)	165/377 (44)	1.04 (0.89, 1.22)
Headaches	296/413 (71)	226/331 (68)	1.05 (0.95, 1.15)	121/280 (43)	94/322 (29)	1.44 (1.14, 1.82)
Low back pain	282/357 (79)	249/318 (78)	1.01 (0.93, 1.10)	128/334 (38)	118/331 (36)	1.10 (0.90, 1.34)
Irritability/outbursts of anger	285/392 (72)	181/286 (63)	1.10 (0.98, 1.22)	107/301 (36)	89/363 (25)	1.43 (1.12, 1.84)
Stiffness in several joints	215/273 (78)	165/219 (75)	1.07 (0.97, 1.18)	165/420 (39)	148/432 (34)	1.08 (0.90, 1.29)
Ringing in the ears	183/213 (85)	146/175 (83)	1.03 (0.94, 1.12)	172/482 (36)	147/478 (31)	1.14 (0.96, 1.36)
Flatulence or burping	223/311 (71)	168/270 (62)	1.13 (1.00, 1.27)	131/384 (34)	83/383 (22)	1.50 (1.19, 1.90)
Difficulty finding the right word	232/317 (73)	145/230 (63)	1.16 (1.03, 1.31)	111/375 (30)	87/422 (21)	1.43 (1.11, 1.85)
Forgetfulness	224/314 (71)	129/216 (59)	1.16 (1.02, 1.33)	109/377 (29)	85/436 (20)	1.47 (1.14, 1.90)
Pain, without swelling or redness, in several joints	171/247 (69)	114/194 (58)	1.20 (1.03, 1.39)	149/447 (33)	122/458 (27)	1.21 (0.99, 1.49)
Avoiding doing things or situations	167/226 (73)	88/131 (67)	1.12 (0.96, 1.30)	144/467 (31)	106/518 (21)	1.47 (1.18, 1.83)
Loss of concentration	196/288 (68)	103/172 (59)	1.16 (0.99, 1.36)	110/407 (27)	92/481 (19)	1.34 (1.05, 1.72)
Loss of interest in sex	119/157 (76)	61/101 (60)	1.23 (1.00, 1.53)	178/538 (33)	150/553 (27)	1.25 (1.03, 1.51)
Itchy or painful eyes	148/248 (60)	88/174 (51)	1.20 (0.99, 1.44)	117/444 (26)	103/478 (22)	1.16 (0.92, 1.45)
Feeling distant or cut-off from others	116/172 (67)	49/88 (56)	1.14 (0.90, 1.44)	130/522 (25)	99/563 (18)	1.37 (1.08, 1.73)
Rash or skin irritation	144/248 (58)	67/184 (36)	1.57 (1.25, 1.97)	101/445 (23)	79/468 (17)	1.32 (1.00, 1.73)
Shortness of breath	118/202 (58)	64/143 (45)	1.20 (0.95, 1.51)	114/493 (23)	79/511 (16)	1.48 (1.14, 1.92)
Problems with sexual functioning	65/93 (70)	39/51 (77)	0.99 (0.82, 1.21)	159/600 (27)	118/601 (20)	1.36 (1.09, 1.69)

Symptoms	Persistence of symptoms			Incidence of symptoms		
	Gulf War veterans	Comparison group	Gulf War vs. Comparison group	Gulf War veterans	Comparison group	Gulf War vs. Comparison group
	n/N ^a (%)	n/N ^a (%)	RR (95% CI)	n/N ^b (%)	n/N ^b (%)	RR (95% CI)
Distressing dreams	98/140 (70)	43/79 (54)	1.25 (0.98, 1.58)	109/550 (20)	73/575 (13)	1.49 (1.13, 1.97)
Indigestion	116/180 (64)	62/145 (43)	1.41 (1.13, 1.78)	89/514 (17)	73/509 (14)	1.17 (0.88, 1.57)
Increased sensitivity to noise	71/116 (61)	44/93 (47)	1.32 (1.00, 1.73)	121/576 (21)	82/559 (15)	1.37 (1.05, 1.77)
Feeling jumpy/easily startled	102/158 (65)	48/92 (52)	1.27 (1.01, 1.59)	88/536 (16)	72/560 (13)	1.23 (0.91, 1.65)
Tingling or burning sensation in hands/feet	75/143 (52)	49/100 (49)	1.11 (0.86, 1.44)	112/550 (20)	81/554 (15)	1.33 (1.03, 1.73)
Rapid or pounding heartbeat	81/139 (58)	37/92 (40)	1.52 (1.14, 2.03)	104/550 (19)	76/561 (14)	1.33 (1.00, 1.76)
Diarrhoea	75/177 (42)	40/109 (37)	1.12 (0.84, 1.50)	107/518 (21)	66/543 (12)	1.68 (1.26, 2.25)
Dry mouth	68/117 (58)	42/86 (49)	1.08 (0.81, 1.42)	104/575 (18)	72/565 (13)	1.39 (1.06, 1.84)
Night sweats	77/132 (58)	38/71 (54)	1.13 (0.86, 1.48)	88/562 (16)	58/582 (10)	1.54 (1.12, 2.11)
Chest pain	73/153 (48)	41/112 (37)	1.29 (0.95, 1.73)	68/536 (13)	59/539 (11)	1.07 (0.76, 1.49)
Persistent cough	53/124 (43)	38/105 (36)	1.13 (0.81, 1.56)	88/570 (15)	73/547 (13)	1.13 (0.84, 1.53)
Loss of sensation in hands/feet	42/86 (49)	31/51 (61)	0.75 (0.55, 1.02)	90/604 (15)	63/601 (11)	1.38 (1.01, 1.87)
Stomach cramps	49/111 (44)	30/77 (39)	1.10 (0.77, 1.58)	83/584 (14)	41/577 (7)	1.93 (1.33, 2.79)
Passing urine more often	35/78 (45)	37/71 (52)	0.89 (0.64, 1.24)	95/613 (16)	69/581 (12)	1.35 (1.01, 1.81)
Increased sensitivity to light	60/103 (58)	28/70 (40)	1.42 (1.02, 1.97)	62/591 (11)	35/583 (6)	1.65 (1.11, 2.46)
Wheezing	48/97 (50)	28/62 (45)	1.02 (0.71, 1.46)	72/593 (12)	43/589 (7)	1.56 (1.08, 2.25)
Sore throat	51/182 (28)	32/167 (19)	1.34 (0.85, 2.12)	69/513 (14)	54/488 (11)	1.17 (0.84, 1.64)
Unintended weight gain > 4kg	34/87 (39)	24/65 (37)	1.09 (0.66, 1.82)	83/604 (14)	48/586 (8)	1.54 (1.10, 2.17)
Loss of balance or coordination	35/68 (52)	19/42 (45)	1.01 (0.68, 1.5)	81/626 (13)	53/611 (9)	1.43 (1.03, 1.99)
Toothache	28/85 (33)	11/63 (18)	1.80 (0.97, 3.37)	81/607 (13)	72/591 (12)	1.04 (0.77, 1.40)
Alcohol intolerance	40/106 (38)	19/55 (35)	1.09 (0.69, 1.74)	66/582 (11)	40/597 (7)	1.56 (1.06, 2.30)
Loss of or decrease in appetite	38/89 (43)	18/59 (31)	1.71 (1.08, 2.69)	67/605 (11)	46/594 (8)	1.38 (0.96 – 2.00)
Constipation	32/66 (49)	20/57 (35)	1.29 (0.81, 2.06)	66/626 (11)	58/597 (10)	1.07 (0.77, 1.51)

Symptoms	Persistence of symptoms			Incidence of symptoms		
	Gulf War veterans n/N ^a (%)	Comparison group n/N ^a (%)	Gulf War vs. Comparison group RR (95% CI)	Gulf War veterans n/N ^b (%)	Comparison group n/N ^b (%)	Gulf War vs. Comparison group RR (95% CI)
Dizziness or blackouts	37/86 (43)	16/50 (32)	1.31 (0.78, 2.21)	59/609 (10)	43/603 (7)	1.28 (0.88, 1.86)
Shaking	45/80 (56)	17/50 (34)	1.81 (1.12, 2.91)	50/610 (8)	35/603 (6)	1.38 (0.91, 2.09)
Skin infections	31/85 (37)	11/64 (17)	1.96 (1.05, 3.63)	63/608 (10)	27/590 (5)	2.25 (1.41, 3.59)
Mouth ulcers	31/105 (30)	17/63 (27)	1.23 (0.74, 2.04)	51/588 (9)	37/591 (6)	1.29 (0.85, 1.96)
Double vision	15/51 (29)	10/36 (28)	0.86 (0.44, 1.69)	64/641 (10)	35/618 (6)	1.58 (1.06, 2.35)
Feeling feverish	21/63 (33)	12/44 (27)	1.17 (0.59, 2.33)	54/630 (9)	28/608 (5)	1.80 (1.14, 2.84)
Increased sensitivity to smell	24/42 (57)	10/29 (35)	1.87 (1.03, 3.37)	50/653 (8)	27/624 (4)	1.58 (1.01, 2.47)
Nausea	29/63 (46)	11/38 (29)	1.79 (1.02, 3.16)	41/631 (7)	32/614 (5)	1.14 (0.73, 1.77)
Feeling disoriented	24/57 (42)	8/27 (30)	1.57 (0.76, 3.25)	44/638 (7)	22/627 (4)	1.99 (1.21, 3.25)
Tender/painful swelling of lymph glands	14/52 (27)	11/44 (25)	1.04 (0.52, 2.04)	42/641 (7)	22/609 (4)	1.57 (0.95, 2.59)
Loss of control over bladder or bowels	8/20 (40)	7/20 (35)	1.05 (0.43, 2.56)	45/675 (7)	18/633 (3)	2.22 (1.29, 3.82)
Lump in throat	10/35 (29)	2/27 (7)	2.76 (0.26, 29.9)	40/658 (6)	28/627 (5)	1.32 (0.82, 2.11)
Difficulty speaking	13/39 (33)	10/30 (33)	0.80 (0.41, 1.56)	38/656 (6)	20/621 (3)	1.70 (1.01, 2.87)
Skin ulcers	5/21 (24)	2/9 (22)	1.07 (0.25, 4.64)**	36/672 (5)	11/645 (2)	2.72 (1.38, 5.37)
Burning sensation in sex organs	5/16 (31)	3/6 (50)	0.30 (0.07, 1.23)	26/679 (4)	14/648 (2)	1.52 (0.82, 2.83)
Vomiting	5/31 (16)	8/24 (33)	0.40 (0.06, 2.63)	21/663 (3)	11/629 (2)	1.64 (0.78, 3.44)
Pain on passing urine	5/21 (24)	8/18 (44)	0.57 (0.22, 1.43)	17/672 (3)	11/636 (2)	1.46 (0.69, 3.08)
Unintended weight loss >4kg	3/20 (15)	1/15 (7)	1.75 (0.18, 17.25)	17/659 (3)	19/624 (3)	0.79 (0.41, 1.52)
Seizures or convulsions	1/1 (100)	0/1 (0)	***	5/694 (1)	3/652 (1)	1.15 (0.26, 5.17)

^a The denominator for the percentages, 'N', is the number of participants who reported the symptom as present at Wave-1.

^b The denominator for percentages, 'N', is the number of participants who did not report the symptom as present at Wave-1.

** Unadjusted due to small numbers and distribution across covariates – all seven participants were Navy at deployment and none were Officers.

Chapter 4: Changes in patterns of symptom reporting

In Chapter 3 we found that overall symptom persistence was similar for Gulf War veterans and the comparison group but symptom incidence was higher in Gulf War veterans for half the symptoms. However, the differences between the two groups were not large enough to increase the prevalence gap. An important question related to these findings was whether there were specific symptomatology patterns among Gulf War veterans at Wave-2, and if patterns were present, a further question was related to comparability of Wave-1 and Wave-2 patterns. At Wave-1, Forbes et al. ⁽⁴⁰⁾ carried out exploratory factor analysis on 62 of the 63 symptoms (excluding one symptom with very low prevalence) and showed that the patterns of symptoms reported by Gulf War veterans in this cohort exhibited three groups of symptoms; one group with symptoms reflecting psychophysiological distress, and the other two groups reflected cognitive distress and arthro-neuromuscular distress. In addition, these patterns were also present in the comparison group. Therefore in this chapter, the main aim was to compare Wave-1 and Wave-2 symptom patterns through factor analysis so as to establish whether the

patterns of symptoms had changed over time. If the symptom patterns were found to be stable, a secondary objective was to compare levels of symptom reporting for each identified factor. This Chapter used data from the Wave-1 and Wave-2 postal questionnaires.

The manuscript from the assessment of symptom patterns presented in this Chapter was published in *Occupational and Environmental Medicine* journal.

Declaration for Thesis Chapter 4

Declaration by candidate

In the case of Chapter 4, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Contributed to implementation of the Wave-2 study; initiated and developed the research questions; designed the manuscript; analysed the data; drafted and finalised the manuscript.	80%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Helen L Kelsall	Contributed to the conception and design of the study; assisted in the preparation of the manuscript and reviewed the manuscript.	
Malcolm R Sim	Contributed to conception and design of the study, assisted in the preparation of the manuscript and reviewed the manuscript.	
Jillian F Ikin	Contributed to conception and design of the study; coordinated the study and reviewed the manuscript.	
Alexander C MacFarlane	Contributed to development of key ideas for the chapter; and reviewed the manuscript.	
Andrew B Forbes	Contributed to conception and design of the study; provided statistical analysis guidance; assisted in the preparation of the manuscript and reviewed the manuscript.	

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate's
Signature

		Date 28/03/2016
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Main
Supervisor's
Signature

	Date
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Stability of symptom patterns in Australian Gulf War veterans: 10-year longitudinal study

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SHORT REPORT

Stability of symptom patterns in Australian Gulf War veterans: 10-year longitudinal study

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ABSTRACT

Objectives Previously we established that symptoms reported by 1990–1991 Gulf War veterans were correlated and exhibited a pattern with 3 factors (psychophysiological distress, somatic distress and arthroneuromuscular distress), and this pattern was similar to that observed in a military comparison group. In this follow-up study, we examined whether the patterns of symptomatology have changed over time.

Methods Using data on 56 symptoms that was collected in 2000–2003 (wave 1) and 2011–2012 (wave 2) from an Australian cohort of Gulf War veterans (veterans) and a military comparison group, exploratory factor analysis was conducted and Tucker's Congruence Coefficient (TCC) was used to determine factor structure similarity across study groups and waves.

Results The results showed that the 3 factors observed at wave 1 were still present at wave 2, and factor structures across study groups and study waves were fairly similar, with TCC ranging 0.86–0.92. Veterans consistently reported more symptoms across all 3 factors. Veterans' symptomatology specific to psychophysiological distress increased between waves 1 and 2 (ratio of means 1.15; 95% CI 1.07 to 1.25) but psychophysiological distress symptomatology was constant in the comparison group (ratio of means 0.97; 95% CI 0.89 to 1.06). Somatic and arthroneuromuscular distress symptomatology significantly increased over time for both study groups, although at a similar rate.

Conclusions While the symptom groupings (measured by the 3 factors) remained unchanged at 10 years of follow-up, and remained comparable between Gulf War and comparison group, symptomatology continued to be elevated in Gulf War veterans than in the comparison group, and was most evident for psychophysiological distress.

INTRODUCTION

Increased reporting of multiple symptoms across body systems, usually in excess of that reported by military comparison groups, is a consistent finding in studies of veterans of the 1990–1991 Gulf War from the UK, USA, France, Canada and Australia.¹ Factor analysis is a statistical technique that has been used in Gulf War veterans' health research to investigate whether the pattern of symptom reporting in Gulf War veterans is similar or different to that in a military comparison group, for which different symptom patterns may have represented symptoms of an illness specific to Gulf War veterans. In factor analysis using data from cross-sectional studies,^{2–6} researchers have shown high

What this paper adds

- Several studies conducted after the 1990–1991 Gulf War revealed that symptoms reported by Gulf War veterans were correlated and could be grouped into three or more factors.
- Among Australian Gulf War veterans, three factors were identified, namely psychophysiological distress, somatic distress and arthroneuromuscular distress but these factors were similar to those observed in a military comparison group.
- The current study showed that the previously observed patterns of symptom reporting still hold 10 years after first assessment and more than 20 years post-Gulf War and are still replicable in other military personnel.
- Gulf War veterans' psychophysiological distress symptomatology significantly increased over time while no changes were observed among other military personnel.
- Twenty years post-Gulf War, this study's findings do not show the emergence of an underlying pattern of symptoms which differs from that of other military personnel, but increased psychophysiological distress and overall excess symptomatology suggests ongoing poorer health in Gulf War veterans.

correlations between reported symptoms, with three or more symptom groupings. In most studies, these groupings did not represent a distinctive pattern among Gulf War veterans as these groupings could be replicated in other military personnel not deployed to the Gulf War.

In 2000–2003, a study was conducted among Australian Gulf War veterans and three indicative factors (or symptom groupings), namely psychophysiological distress, somatic distress and arthroneuromuscular distress, were identified with similar symptom patterns observed in the military comparison group.³ The conclusions from the Australian cohort were consistent with several studies of USA and UK Gulf War veterans that included a comparison group.^{2–5} However, what is not known is whether the pattern of symptomatology has changed over time and whether there is the emergence of a new pattern of underlying symptoms in Gulf War veterans.

In this paper, we examine whether symptomatology reported by Gulf War veterans in a follow-up



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study exhibited the same symptom patterns (ie, factor structure) as previously observed in 2000–2003 or as observed in a military comparison group. Longitudinal changes in factor-specific symptomatology were also assessed with the aim of identifying whether changes in symptom reporting were similar across factors and study groups.

METHODS

Study population

In 2000–2003 (wave 1) a cohort of male veterans of the 1990–1991 Gulf War and a military comparison group were studied, and in 2011–2012 (wave 2), wave 1 study participants (not known to be deceased) were followed up. Details of the wave 1 study recruitment process were presented previously.⁷ The comparison group, frequency matched on age, gender, military rank and branch of service to Gulf War veterans, comprised of military personnel who were serving in the Australian Defence Force in 1990–1991 but were not deployed to the Gulf War. As of wave 1, a third of the comparison group had been on at least one active deployment. Of the 1456 Gulf War veterans and 1588 comparison group wave 1 participants, 697 (54%) and 659 (47%), respectively, participated at wave 2.

Data collection

Postal questionnaires containing the same 63-item checklist of multisystem symptoms were administered at waves 1 and 2. Each symptom was reported as absent or present (mild or moderate or severe). Symptoms with a prevalence <5% (combined mild/moderate/severe) were excluded from analyses so as to stabilise the estimation process, and this process dropped 7 of the 63 symptoms. Participants with two or more symptom responses missing were excluded from analyses, leaving 680 (98%) Gulf War veterans and 645 (98%) in the comparison group.

Statistical analysis

To establish whether the symptom patterns at waves 1 and 2 were similar, exploratory factor analysis (EFA), with Promax rotation, was conducted in MPlus V7 (Muthén & Muthén, 1998–2012) using a three-factor solution on four separate datasets: Gulf War veterans' waves 1 and 2 symptomatology, and comparison group's waves 1 and 2 symptomatology. The three-factor solution was prespecified from the initial factor analysis carried out in the same cohort at wave 1.³ Even though the number of factors was predefined, the scree plot was checked to validate this choice. The adequacy of the four models was assessed using the root mean square error of approximation (RMSEA) and the standardised root mean squared residual (SRMR).

The observed factor loadings were compared using Tucker's Congruence Coefficient (TCC), which is a correlation coefficient used to compare factor structures when confirmatory factor analysis might be computationally unreliable or inefficient, as it may be here with 56 symptoms involved. TCCs were computed for each factor in each of the following four comparisons: wave 1 vs 2 for each of Gulf War and comparison groups; Gulf War veterans' group versus comparison group at each time point. Factor similarity was judged as $TCC \geq 0.95$ = equal factor structures and $0.85 \leq TCC \leq 0.94$ = fairly similar factor structures.⁸

Stata Statistical Software Release V.13 (StataCorp LP, Station College, Texas, USA) was used for the rest of the analyses. Study group characteristics were compared using the χ^2 statistics for categorical data and either the t tests or non-parametric

equivalents for continuous/interval data. Wave 1 symptomatology and factor scores for wave 2 participants and non-participants were examined to establish if there were any inherent differences between the groups. Wave 1 factor scores were calculated on the basis of the iterative factor scoring method that is implemented in Mplus.⁹

To compare changes in factor-specific symptomatology over time, for each factor we counted the number of symptoms endorsed by each participant at waves 1 and 2. The list of symptoms for each factor were based on the EFA conducted at wave 1 by Forbes *et al.*³ In the EFA, a factor loading cut-off of 0.40 was used for interpreting the factor structure and distinguishing which symptoms were associated with which factor(s). The same rule was applied to the data presented in this paper, whereby any symptom with a factor loading greater than 0.40 was assigned to be moderately/highly associated with that factor and were listed as belonging to that factor. This resulted in 16, 20 and 6 symptoms being listed under the psychophysiological distress, somatic distress and arthronemuscular distress factors, respectively. At wave 1, there was strong correlation between factor scores and total symptom counts (ie, ranged 0.7–0.8); hence, for this report, we chose to use total symptom counts, instead of factor scores, to compare factor-specific changes because symptom counts are easy to interpret and contextualise within symptomatology and are valid measures for between-group comparisons.

Random-intercept negative binomial regression models were used to compare the average number of symptoms across study groups, time and factors, adjusting for age, rank and branch of service in August 1990 (time of first Australian Gulf War deployment). Random effect terms for each individual were used to account for the correlation between the repeated assessments on each individual. Relative measures were reported as ratio of means with 95% CIs.

RESULTS

More than half (57%) of Gulf War veterans and 46% of the comparison group were aged 50 years and above at wave 2. There were 22% and 31% Gulf War veterans and comparison group members, respectively, ranked as Officers in August 1990. Over three-quarters of Gulf War veterans were in the Navy (85% vs 7% Army and 8% Air Force) in August 1990, while the distribution was slightly different for the comparison group (69% Navy vs 11% Army and 20% Air Force). One-third (33.6%) of the comparison group had been on an active deployment since the Gulf War, while there were 38.8% Gulf War veterans who had other active deployments besides since the Gulf War.

The wave 2 participants were also compared with non-participants to investigate the likelihood of participation bias at wave 2. The number of symptoms reported at wave 1 by Gulf War veterans who participated at waves 1 and 2 was comparable to that reported by Gulf War veterans who participated at wave 1 only (median: 12 vs 13; $p=0.187$). Similarly, no significant differences were observed in the comparison group (both participants and non-participants had a median of nine symptoms). Additional comparisons of the wave-1 factor scores calculated from the factor structure established by Forbes *et al.*³ at wave 1 revealed no statistically significant differences between scores among Gulf War veterans or comparison group members who participated at wave 2 and those who only participated at wave 1 ($p>0.05$ for all comparisons).

The scree plots from all four factor analyses supported the three-factor solution, with one dominant factor and minor

contributions from a further two to four factors. The percentage of total variance explained by all three factors was 47.9% and 54.8% for Gulf War veterans' waves 1 and 2 symptomatology, respectively. In the comparison group, the percentage was 46.1% (wave 1) and 49.9% (wave 2). The models showed adequate goodness of fit, with RMSEA<0.05 and SRMR<0.08 (see online supplementary file, table S1). We also visually inspected the factor scores for each symptom in each factor solution to ensure that the list of symptoms loading onto each of the factors (ie, with a factor loading >0.4) was the same as that observed at wave 1. Overall, the list of symptoms was as observed at wave 1 (see online supplementary file, tables S2.1–2.3) and the factor labels chosen to describe the factors extracted at wave 1 were still applicable to the three factors presented in this paper.

Table 1A presents the TCCs of factor loadings observed in Gulf War veterans and the comparison group at each time point. The overall structure coefficients (right hand column) indicate that the factor structures at waves 1 and 2 were at least fairly similar since TCC was above 0.85. Comparisons between study groups or study periods showed good correlation of factor loadings within the psychophysiological distress and somatic distress factors, which was indicated by the high TCC ranging from 0.81 to 0.95. However, comparisons of the arthroneuromuscular distress' factor loadings were comparatively lower.

To complement the comparison of factor structures, table 1B–C presents study group comparisons of changes in symptom counts from wave 1 to 2 by factor. For all three factors and at both waves, Gulf War veterans had a higher average number of symptoms than the comparison group. The average number of factor 1 symptoms reported by Gulf War veterans increased significantly from wave 1 to 2, while there was no change in average number of symptoms reported by the comparison group ($p<0.05$). The increase in factors 2 and 3 symptom reporting was similar for the two study groups ($p=0.57$ and $p=0.51$, respectively).

DISCUSSION

Our findings have shown that the overall pattern of symptomatology among Australian Gulf War veterans remained unchanged 10 years after initial assessment, with three factors representing psychophysiological distress, somatic distress and arthroneuromuscular distress. Furthermore, the symptom pattern (ie, factor structure) in Gulf War veterans and the military comparison group remain similar. The stability of symptom patterns indicates that the patterns observed at wave 1 remain. Twenty years post-Gulf War, this study's findings do not show the emergence of an underlying pattern of symptoms which differs from that of other military personnel.

Even though the overall pattern of symptomatology was unchanged, symptom reporting under each factor and time point was more frequent in Gulf War veterans compared with the comparison group. There is a scarcity of information on longitudinal changes in patterns of Gulf War veterans' symptomatology with which to compare our findings; however, our findings of a similar factor structure in Gulf War veterans and comparison groups but increased symptom reporting in Gulf War veterans are broadly consistent with most cross-sectional studies.^{2 5 10} The continued excess in multisystem symptomatology across all factors is suggestive of persistent poorer health in Australian Gulf War veterans. Longitudinal studies of US and UK Gulf War veterans have reported persistent poorer health (eg, increased chronic fatigue and post-traumatic stress disorder) among Gulf War veterans.^{11 12}

In our study, the level of somatic distress and arthroneuromuscular distress symptomatology increased comparably for Gulf War veterans and the comparison group while psychophysiological distress symptomatology increased only for Gulf War veterans. Our finding of differential changes in psychophysiological distress symptomatology may suggest a difference in the relationship between psychological/physiological stressors and symptoms in Gulf War veterans and the military comparison group. These findings may be explained by the occurrence of delayed onset post-traumatic stress disorder

Table 1 Comparison of symptom reporting patterns at waves 1 and 2

	Psychophysiological distress (factor 1)	Somatic distress (factor 2)	Arthroneuromuscular distress (factor 3)	Overall (all factors combined)
1A. Comparison of factor similarity using TCC				
Wave 1: Gulf war veterans vs comparison group	0.88	0.95	0.78	0.88
Wave 2: Gulf war veterans vs comparison group	0.91	0.95	0.86	0.92
Gulf War veterans: wave 1 vs 2	0.92	0.94	0.89	0.92
Comparison group: wave 1 vs 2	0.81	0.95	0.73	0.86
1B. Symptom counts at each wave*				
Wave 1: Gulf War veterans; mean (SD)	2.7 (2.9)	5.1 (4.4)	2.1 (1.9)	10.0 (8.0)
Wave 1: comparison group; mean (SD)	2.2 (2.4)	3.7 (3.8)	1.8 (1.7)	7.7 (6.6)
Wave 1: GW veterans vs comparison group; RoM† (95% CI)	1.19 (1.05 to 1.35)	1.41 (1.26 to 1.59)	1.19 (1.07 to 1.32)	1.28 (1.16 to 1.42)
Wave 2: Gulf War veterans; mean (SD)	3.1 (3.2)	6.4 (4.9)	2.7 (1.9)	12.2 (8.8)
Wave 2: comparison group; mean (SD)	2.2 (2.6)	4.6 (4.3)	2.3 (1.8)	9.1 (7.5)
Wave 2: GW veterans vs comparison group; RoM† (95% CI)	1.42 (1.25 to 1.60)	1.45 (1.30 to 1.62)	1.15 (1.04 to 1.26)	1.36 (1.24 to 1.50)
1C. Changes in symptom reporting from wave 1 to 2				
Gulf War veterans; RoM† (95% CI)	1.15 (1.07 to 1.25)	1.26 (1.19 to 1.34)	1.27 (1.19 to 1.36)	1.25 (1.19 to 1.31)
Comparison group; RoM† (95% CI)	0.97 (0.89 to 1.06)	1.23 (1.15 to 1.32)	1.32 (1.22 to 1.42)	1.18 (1.11 to 1.27)
Gulf War veterans vs comparison group: p value	0.005	0.57	0.51	0.12

*Maximum number of symptoms for factor 1=16; factor 2=20; factor 3=6.

†Ratio of means adjusted for age, rank and branch of service in August 1990.

RoM, ratio of means; TCC, Tucker Congruence Coefficient; GW, Gulf War.

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(PTSD) in this population, where PTSD symptoms become more apparent in the years after exposure to the stress.¹³ This form of PTSD has been reported in a previous US study of Gulf War veterans which identified an increase in PTSD prevalence over time.¹¹ Moreover, the Gulf War deployment was reportedly different from other war deployments; in conflict duration and predeployment service/postdeployment service/support¹⁴ which could further explain the disparities between Gulf War veterans' symptomatology and that of other military personnel.

Strengths of this study included the longer term follow-up and the first time study of longitudinal symptom pattern changes. A limitation of the study was the lower wave 2 participation rates; however, this is unlikely to bias our findings because comparisons of wave 2 participants' and non-participants' wave 1 general health, symptom reporting and factor scores revealed reasonably similar health status.

In summary, our findings have shown that symptomatology continued to be elevated in Gulf War veterans, and this was more marked for psychophysiological distress, at a 10-year follow-up. The stability of symptom factor patterns does not suggest the emergence of a different underlying pattern of symptoms to the previously observed pattern, nor is the pattern different to that observed in a comparison group. Future research among Gulf War veterans could explore explanations for increased psychophysiological symptom reporting and its relationship to other health outcomes observed among Gulf War veterans.

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Contributors SMG contributed to the design of the short report; contributed to acquisition of data; designed the manuscript; analysed and interpreted data; drafted and finalised the manuscript. HUK contributed to the conception and design of the study; contributed to acquisition of data; contributed to the design of the manuscript; assisted in the interpretation of data; revised and approved the final manuscript. MRS contributed to the conception and design of the study; contributed to acquisition of data; revised and approved the final manuscript. JFI contributed to the conception and design of the study; acquisition of data; revised and approved the final manuscript. ACM contributed to the conception and design of the study; revised and approved the final manuscript. ABF contributed to the conception and design of the study; provided guidance for data analysis; assisted in the interpretation of data and preparation of the manuscript; revised and approved the final manuscript.

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Competing interests None declared.

Patient consent Obtained.

Ethics approval The study received ethics approval from the Monash University Human Research Ethics Committee, Department of Veterans' Affairs Human Research Ethics Committee and the Australian Defence Human Research Ethics Committee.

Provenance and peer review Not commissioned; externally peer reviewed.

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Online Supplementary file

1.0 Factor solution

Table 1: Model results of the exploratory factor analyses, with Promax rotation

Measure	Gulf War veterans' factor analyses		Comparison groups' factor analysis	
	Wave-1 symptomatology	Wave-2 symptomatology	Wave-1 symptomatology	Wave-2 symptomatology
% variance explained in model				
Psychophysiological distress (F1)	20.8	23.2	18.0	18.2
Somatic distress (F2)	18.1	23.3	20.2	23.0
Arthro-neuromuscular distress (F3)	9.0	8.3	7.9	8.7
Inter-factor correlation in final model				
F1 vs F2	0.701	0.681	0.654	0.616
F1 vs F3	0.712	0.609	0.513	0.582
F2 vs F3	0.633	0.567	0.513	0.592
Final model goodness of fit				
RMSEA	0.028	0.035	0.020	0.026
SRMR	0.062	0.056	0.075	0.074

Abbreviations: CFI=comparative fit index; RMSEA=root mean squared error of approximation; SRMR=standardised root mean squared residual; TLI=Tucker-Lewis Index

2.0 Promax factor loadings

Table 2.1-2.3 present the factor loadings for each symptom and on each of the three factors for both Wave-1 and Wave-2. The factor loadings are all calculated using data from Wave-2 participants only. The second column in the tables (i.e. 'Listed under this factor') indicates symptoms that had a factor loading greater than 0.4 in the original factor analysis (with all Wave-1 participants) published by Forbes et al.¹; and these symptoms were used to interpret and name that factors at Wave-1. In each of the four exploratory factor analyses, factor loadings greater than 0.4 are highlighted.

Table 2.1: Promax rotation loadings for the psychophysiological distress factor, by study group and period

Symptoms	Listed under this factor *	Wave-1		Wave-2	
		GW	CG	GW	CG
Wheezing	✓	1.064	0.627	0.807	0.768
Shortness of breath	✓	0.95	0.429	0.534	0.531
Persistent cough	✓	0.844	0.611	0.769	0.582
Swelling of lymph glands	✓	0.668	0.569	0.654	0.557
Dry Mouth	✓	0.643	0.491	0.522	0.632
Feeling feverish	✓	0.638	0.982	0.533	0.592
Nausea	✓	0.629	0.81	0.642	0.763
Difficulty speaking	✓	0.567	0.501	0.49	0.227
Rapid or pounding heartbeat		0.562	0.417	0.361	0.395
Chest Pain		0.548	0.362	0.439	0.441
Loss of or decrease in appetite	✓	0.544	0.52	0.452	0.294
Increased sensitivity to smell		0.508	0.241	0.449	0.13
Indigestion	✓	0.503	0.335	0.578	0.62
Toothache		0.489	0.202	0.327	0.189
Sore Throat	✓	0.468	0.525	0.713	0.702
Stomach cramps	✓	0.456	0.475	0.782	0.665
Increased sensitivity to light		0.453	0.422	0.497	0.215
Diarrhoea	✓	0.437	0.591	0.689	0.655
Skin infections		0.417	0.095	0.461	0.302

¹ Forbes AB, McKenzie DP, Mackinnon AJ et al. The health of Australian veterans of the 1991 Gulf War: factor analysis of self-reported symptoms. *Occup Environ Med* 2004;61:1014-20.

Symptoms	Listed under this factor *	Wave-1		Wave-2	
		GW	CG	GW	CG
Dizziness, fainting or blackouts	✓	0.415	0.476	0.523	0.262
Loss of balance or coordination	✓	0.412	0.657	0.57	0.109
Unintended weight gain >4kg		0.41	0.116	0.194	0.203
Constipation	✓	0.387	0.28	0.697	0.478
Feeling jumpy/easily startled		0.378	0.189	0.122	0.162
Increased sensitivity to noise		0.373	0.267	0.34	0.001
Tingling or burning sensation in hands/feet		0.349	0.532	0.425	0.176
Itchy or painful eyes		0.331	0.263	0.491	0.493
Double vision		0.327	0.51	0.528	0.415
Shaking		0.325	0.409	0.452	0.28
Night sweats		0.289	0.438	0.394	0.405
Ringing ears		0.282	0.22	0.187	0.033
Headaches		0.274	0.235	0.347	0.465
Rash or skin irritation		0.27	0.19	0.389	0.346
Loss of sensation in hands/feet		0.259	0.648	0.446	0.206
Mouth ulcers		0.246	0.056	0.349	0.219
Passing urine more often		0.206	0.336	0.501	0.509
Alcohol intolerance		0.189	0.397	0.291	0.311
Flatulence or burping	✓	0.189	0.246	0.587	0.536
Avoiding doing things or situations		0.172	-0.01	0.098	-0.075
Feeling distant or cut-off from others		0.17	0.058	0.073	-0.006
Distressing dreams		0.159	0.174	0.195	0.074
Sleeping difficulties		0.157	-0.24	-0.034	0.369
Irritability/Outbursts of anger		0.138	0.019	0.087	0.134
Fatigue		0.132	-0.148	-0.035	0.413
Muscle aches or pains		0.084	0.061	0.06	0.09
Low back pain		0.078	0.072	0.085	0.144
Difficulty finding the right word		0.059	0.034	0.287	0.136
Unrefreshed after sleep		0.05	-0.267	-0.078	0.41
Loss of interest in sex		-0.067	0.231	0.015	-0.214
Problems with sexual functioning		-0.084	0.283	0.051	-0.227
Loss Of concentration		-0.1	-0.068	0.214	0.024
Forgetfulness		-0.107	-0.089	0.286	0.028
Pain in several joints (no swelling or redness)		-0.177	-0.051	-0.021	-0.039
Stiffness in several joints		-0.225	-0.027	-0.132	0.028

Abbreviations: CG=comparison group; GW=Gulf War veterans

* The lists are based on the exploratory factor analysis conducted among Gulf War veterans at Wave-1 and is reported by Forbes AB, McKenzie DP, Mackinnon AJ, Kelsall HL, McFarlane AC, Ikin JF, Glass DC and Sim MR. The health of Australian veterans of the 1991 Gulf War: factor analysis of self-reported symptoms. *Occup Environ Med* 2004; **61**:1014-1020.

Table 2.2: Promax Rotation Loadings for the somatic distress factor, by study group and period

Symptoms	Listed under this factor *	Wave-1		Wave-2	
		GW	CG	GW	CG
Loss of concentration	✓	0.891	0.872	0.762	0.815
Feeling distant from others	✓	0.829	0.792	0.788	0.864
Unrefreshed after sleep	✓	0.825	0.823	0.865	0.654
Forgetfulness	✓	0.792	0.813	0.622	0.732
Loss of interest in sex	✓	0.755	0.575	0.685	0.776
Problems with sexual functioning	✓	0.745	0.447	0.553	0.736
Sleeping difficulties	✓	0.719	0.757	0.779	0.602
Avoiding doing things or situations	✓	0.698	0.764	0.761	0.845
Fatigue	✓	0.682	0.675	0.786	0.563
Irritability/Outbursts of anger	✓	0.672	0.682	0.708	0.743
Distressing dreams	✓	0.657	0.594	0.626	0.586
Feeling jumpy/easily startled	✓	0.601	0.666	0.784	0.689
Difficulty finding the right word	✓	0.587	0.698	0.549	0.618
Increased sensitivity to noise	✓	0.38	0.499	0.462	0.561
Alcohol intolerance		0.322	0.318	0.324	0.23
Passing urine more often		0.305	0.332	-0.053	0.148
Shaking	✓	0.3	0.321	0.411	0.64
Difficulty speaking	✓	0.284	0.455	0.298	0.622
Night sweats		0.28	0.273	0.243	0.237
Increased sensitivity to smell	✓	0.274	0.42	0.417	0.503
Loss of or decrease in appetite	✓	0.25	0.317	0.442	0.613
Headaches		0.232	0.213	0.184	0.186
Dizziness or blackouts		0.205	0.332	0.139	0.367
Increased sensitivity to light	✓	0.204	0.341	0.308	0.339
Loss of balance or coordination		0.188	0.309	0.146	0.468
Ringing ears		0.168	0.142	0.288	0.251
Flatulence or burping		0.139	0.122	-0.005	-0.017
Itchy or painful eyes		0.127	0.285	0.026	0.149
Double vision		0.12	0.37	0.145	0.199
Loss of sensation in hands/feet		0.106	-0.194	-0.165	0.174
Constipation		0.097	0.138	-0.047	0.029
Persistent cough		0.093	-0.139	0.019	-0.218
Unintended weight gain >4kg		0.089	0.371	0.345	0.33
Rapid or pounding heartbeat		0.083	0.279	0.507	0.474
Tingling or burning sensation in hands/feet		0.069	-0.082	-0.067	0.145
Dry Mouth		0.067	0.208	0.126	0.197
Pain in several joints (no swelling or redness)		0.049	0.06	0.106	-0.023

Symptoms	Listed under this factor *	Wave-1		Wave-2	
		GW	CG	GW	CG
Rash or skin irritation		0.038	0.162	0.018	0.083
Diarrhoea		0.03	-0.046	-0.04	-0.077
Low back pain		0.025	0.027	0.16	0.074
Skin infections		0.023	0.19	0.018	0.097
Mouth ulcers		0.015	0.145	-0.036	0.026
Chest Pain		-0.011	0.128	0.125	0.063
Toothache		-0.015	0.223	-0.013	0.005
Stomach cramps		-0.015	0.003	-0.07	0.03
Nausea		-0.018	-0.095	0.218	0.134
Stiffness in several joints		-0.029	-0.06	0.064	-0.096
Indigestion		-0.043	0.059	0.026	-0.014
Muscle aches or pains		-0.059	0.081	0.109	0.014
Wheezing		-0.062	-0.128	0.088	-0.182
Feeling feverish		-0.063	-0.159	0.277	0.255
Tender/Painful swelling of lymph glands		-0.074	0.058	-0.055	-0.02
Shortness of breath		-0.094	0.142	0.208	0.203
Sore Throat		-0.099	-0.157	-0.139	-0.285

Abbreviations: CG=comparison group; GW=Gulf War veterans

* The lists are based on the exploratory factor analysis conducted among Gulf War veterans at Wave-1 and is reported by Forbes AB, McKenzie DP, Mackinnon AJ, Kelsall HL, McFarlane AC, Ikin JF, Glass DC and Sim MR. The health of Australian veterans of the 1991 Gulf War: factor analysis of self-reported symptoms. *Occup Environ Med* 2004; **61**:1014-1020.

Table 2.3: Promax Rotation Loadings for arthro-neuromuscular distress factor, by study group and period

Symptoms	Listed under this factor*	Wave-1		Wave-2	
		GW	CG	GW	CG
Stiffness in several joints	✓	1.107	0.953	1.01	0.977
Pain in several joints (no swelling or redness)	✓	0.987	0.863	0.806	0.91
General muscle aches or pains	✓	0.785	0.65	0.707	0.718
Low back pain	✓	0.575	0.557	0.484	0.539
Loss of sensation in hands/feet	✓	0.404	0.301	0.544	0.485
Loss of balance or coordination		0.347	-0.047	0.135	0.263
Tingling or burning sensation in hands/feet	✓	0.305	0.323	0.444	0.505
Flatulence or burping		0.3	0.224	0.012	0.119
Double vision		0.274	-0.241	0.07	0.087
Feeling feverish		0.247	-0.035	0.048	0.008
Stomach cramps		0.243	0.267	0.019	-0.023
Rash or skin irritation		0.239	0.123	0.139	0.064
Alcohol intolerance		0.196	0.023	-0.045	0.15
Constipation		0.192	0.066	0.063	0.099
Indigestion		0.182	0.229	0.028	0.007
Passing urine more often		0.172	-0.022	0.145	0.008
Nausea		0.17	-0.045	-0.066	-0.186
Difficulty finding the right word		0.162	-0.017	-0.005	0.003
Itchy or painful eyes		0.155	0.078	0.115	-0.038
Mouth ulcers		0.147	0.156	0.139	0.161
Ringing ears		0.14	0.178	0.126	0.371
Night sweats		0.135	0.077	0.114	0.136
Forgetfulness		0.128	0.077	-0.03	0.077
Dizziness or blackouts		0.12	0.013	0.057	0.15
Tender/Painful swelling of lymph glands		0.115	0.095	0.231	0.134
Sore Throat		0.108	0.056	-0.072	0.064
Skin infections		0.106	0.338	0.075	0.017
Chest Pain		0.103	0.194	0.087	0.085
Problems with sexual functioning		0.089	-0.015	0.016	0.192
Increased sensitivity to light		0.088	-0.065	0.074	0.241
Loss Of concentration		0.086	0.061	-0.055	0.05
Shaking		0.085	0.019	-0.045	-0.121
Dry Mouth		0.084	-0.023	0.064	0.007
Diarrhoea		0.083	0.026	-0.056	-0.046
Toothache		0.077	-0.016	0.19	0.186
Headaches		0.075	0.23	0.052	0.058

Symptoms	Wave-1		Wave-2		
	Listed under this factor*	GW	CG	GW	CG
Loss of interest in sex		0.063	-0.164	-0.032	0.125
Rapid or pounding heartbeat		0.062	0.012	-0.079	-0.201
Fatigue		0.056	0.303	0.175	-0.105
Difficulty speaking		0.046	-0.267	0.078	-0.078
Distressing dreams		0.024	-0.022	0.022	0.163
Avoiding doing things or situations		-0.005	0.059	0.007	0.116
Increased sensitivity to smell		-0.006	-0.005	0.036	0.194
Unrefreshed after sleep		-0.006	0.32	0.125	-0.182
Loss of or decrease in appetite		-0.007	-0.106	-0.097	-0.176
Unintended weight gain >4kg		-0.007	0.085	0.075	0.196
Increased sensitivity to noise		-0.043	-0.01	0.043	0.23
Sleeping difficulties		-0.069	0.274	0.121	-0.13
Irritability/Outbursts of anger		-0.072	0.076	0.034	-0.058
Feeling jumpy/easily startled		-0.092	-0.07	0.029	0.024
Shortness of breath		-0.147	0.074	0.055	0.033
Feeling distant or cut-off from others		-0.19	-0.059	-0.031	-0.058
Wheezing		-0.366	-0.042	-0.241	0.032
Persistent cough		-0.395	-0.014	-0.346	0.102

Abbreviations: CG=comparison group; GW=Gulf War veterans

^a The lists are based on the exploratory factor analysis conducted among Gulf War veterans at Wave-1 and is reported by Forbes AB, McKenzie DP, Mackinnon AJ, Kelsall HL, McFarlane AC, Ikin JF, Glass DC and Sim MR. The health of Australian veterans of the 1991 Gulf War: factor analysis of self-reported symptoms. *Occup Environ Med* 2004; **61**:1014-1020.

Chapter 5: Incidence of chronic diseases at follow-up

This Chapter explores the longer term health outcomes of high symptom reporting, which are particularly important as Chapter 3 showed that symptom reporting increased over time and the results from Chapter 4 indicated an increase in psychophysiological distress.

Previous international research on the prevalence of symptoms has indicated that symptom reporting is prevalent only among a proportion of Gulf War veterans, with at least 35% unaffected veterans. ^(12, 15, 18, 80, 81) Hence the first objective of this Chapter was to group Gulf War veterans according to their symptom reporting. Unlike in Chapter 4 where we examined groupings of correlated *symptoms* through factor analysis, in this Chapter we sought to group *participants* with similar symptom reporting. It was hypothesised that groups of Australian Gulf War veterans with different symptom reporting existed; where symptom reporting patterns across groups could differ by

types of symptoms reported e.g. anatomically or physiologically related symptoms, or symptom reporting could differ by the number of symptoms reported. Therefore latent class analysis was used to identify these groups of veterans, and no assumptions about the groups were made.

After the identification of groups of veterans, the second objective was to compare longer term incidence of chronic diseases and prevalence of lifestyle risk factors across these groups.

The results from this research were accepted for publication in the *Journal of Occupational and Environmental Medicine*.

Declaration for Thesis Chapter 5

Declaration by candidate

In the case of Chapter 5, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Contributed to the implementation of the study; initiated and developed the research questions; designed the manuscript; analysed the data; drafted and finalised the manuscript.	80%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only

Chapter 5: Chronic diseases incidence

Helen L Kelsall	Contributed to the conception and design of the study; assisted in the preparation of the manuscript and reviewed the manuscript.	
Malcolm R Sim	Contributed to conception and design of the study, assisted in the preparation of the manuscript and reviewed the manuscript.	
Jillian F Ikin	Contributed to conception and design of the study; coordinated the study and reviewed the manuscript.	
Alexander C MacFarlane	Contributed to development of key ideas for the chapter; and reviewed the manuscript.	
Andrew B Forbes	Contributed to conception and design of the study; provided statistical analysis guidance; assisted in the preparation of the manuscript and reviewed the manuscript.	

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate's
Signature

		Date 28/03/2016
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Main
Supervisor's
Signature

	Date
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ORIGINAL ARTICLE

New Onset of Chronic Diseases and Changes in Lifestyle Risk Factors Among Gulf War Veterans

A Longitudinal Comparison of High and Low Symptom Reporters

Stella M. Gwini, MSc, Helen L. Kelsall, PhD, Jil F. Ikin, PhD, Malcolm R. Sim, PhD, Alexander C. McFarlane, PhD, and Andrew B. Forbes, PhD

Objective: The aim of this study was to compare new chronic diseases onset and longitudinal changes in lifestyle risk factors between Gulf War veterans with different symptom reporting. **Methods:** Data were collected from Gulf War veterans over two periods, and participants were grouped according to baseline symptom reporting. Logistic, nominal, and ordinal regressions were used for between-group comparisons. **Results:** The veterans comprised low, moderate, and high symptom reporters. New onset of sleep apnea [odds ratio (OR) = 9.49; 95% confidence interval (CI) = 3.48 to 25.86], musculoskeletal (OR = 8.70; 95% CI = 4.17 to 18.17), psychological (OR = 5.36; 95% CI = 2.46 to 11.70), and cardiovascular (OR = 3.86; 95% CI = 1.33 to 11.23) conditions was elevated in high versus low symptom reporters. Although odds of obesity and alcohol use increased over time and smoking halved, the changes were similar across groups. **Conclusions:** These findings show increasing obesity and alcohol use, and indicate that high symptomatology among veterans may predict future disease onset.

Reporting of multiple symptoms, with no specific etiology, in terms of total number of symptoms or a combination of several symptoms that span several body systems has been more common among veterans of the 1990 to 1991 Gulf War than among other military groups.^{1–5} As the Gulf War veterans age, it is important to understand the likelihood of high symptomatology manifesting in other ways in the longer term, for example, in chronic diseases. A longitudinal study conducted in 2005 among United States (US) Gulf War veterans showed that new onset of arthritis, hypertension, and coronary heart disease at follow-up was higher among Gulf War veterans than among other military personnel.⁶ Even though the study did not report on longitudinal relationships between symptomatology and chronic disease, the findings suggested an increasing burden of ill-health among Gulf War veterans. Hence, it is important to examine the longer-term changes or emergence of chronic diseases among Gulf War veterans, especially among those with high levels of symptomatology.

It is insufficient to assess prevalence of chronic diseases without considering their risk factors, as many chronic diseases are

strongly associated with lifestyle factors such as smoking, obesity, and high alcohol consumption.⁷ Cross-sectional studies have shown that Gulf War veterans have increased chronic fatigue, joint and muscle pain, depression, and posttraumatic stress disorder (PTSD) than other military groups.^{8–11} Many of these conditions are directly associated with lifestyle risk factors; for example, musculoskeletal pain is reportedly higher among smokers and ex-smokers than among nonsmokers.¹² Hence, for Gulf War veterans, an understanding of current prevalence as well as changes in prevalence of risk factors that might exacerbate existing health problems or increase symptomatology or result in increased incidence of chronic diseases is important.

There is scarce information from longitudinal studies on how symptomatology among Gulf War veterans is associated with the prevalence of lifestyle factors and new onset of chronic diseases. The aim of this paper was to classify Australian veterans of the 1990 to 1991 Gulf War into groups on the basis of their symptom reporting and compare new onset of chronic diseases and changes in lifestyle risk factors (smoking, alcohol use, and obesity) across these veteran groups.

METHODS

Study Population

In 2000 to 2002 (Wave-1), a cohort of all 1871 Australian veterans of the 1990 to 1991 Gulf War was assembled. They were predominantly male (98%) and the majority had served with the Navy (84%). Eighty-one percent ($n = 1456$) of the eligible Gulf War veterans participated at Wave-1; a more detailed description of Wave-1 study recruitment was previously described in detail.¹³ Wave-1 participants, who were not known to be deceased, were invited to participate at Wave 2 in 2011 to 2012. Due to the small proportion of women who participated in this survey, this paper only reports on male study participants. The participation rate at Wave-2 among males was 54% ($n = 697$).

Data Collection

Information on date of birth, military rank, and branch of service in August 1990 (timing of the first Australian Gulf War deployment) was collected from the Department of Veterans' Affairs at Wave-1. At both Wave-1 and Wave-2, postal questionnaires were administered to collect information on marital status; highest educational level attained; employment status; smoking status; alcohol use; waist circumference; symptomatology; self-reported, doctor-diagnosed, or treated medical conditions; physical and mental health; and chronic fatigue (defined as presence of extreme tiredness or fatigue following normal activities and occurring for 6 or more months in the preceding year).¹⁴ The Wave-2 questionnaire also collected information on health-related quality of life.

Height, weight, and waist circumference were measured at Wave-1 during a physical examination, while at Wave-2 participants were given instructions on measuring and self-reporting weight and waist circumference. Height and weight measurements were then

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used to calculate body mass index (BMI), which was categorized as normal weight (18.5 to 24.99 kg/m²), overweight (25 to 29.99 kg/m²), and obese (≥ 30.0 kg/m²).¹⁵ Waist circumference, a measure of abdominal or central adiposity that predicts obesity-related disorders, was used as an indicator of cardiovascular risk, categorized as indicating low (≤ 94 cm), moderate (95 to 102 cm), or high risk (> 102 cm) of cardiovascular disease.¹⁶

High alcohol consumption, referred to as hazardous/harmful alcohol use, was defined using the World Health Organization's Alcohol Use Disorders Identification Test (AUDIT) and participants with hazardous/harmful alcohol use were those with an AUDIT score greater than or equal to 10.¹⁷

The Study Short Form 12 Health Survey (SF-12) version-1¹⁸ was used to assess mental and physical health at Wave-1 and Wave-2. Item scores were transformed and aggregated into Mental and Physical Component Summary Scores (MCS and PCS, respectively). Health-related quality of life was measured using 24 items of the abbreviated World Health Organization Quality of Life questionnaire (WHOQoL-Bref) (excluding the first two items), which were scored onto the physical, psychological, social relationships, and environmental domains.¹⁹

Symptomatology was assessed using a 63-item symptom checklist with symptoms spanning multiple body systems, including respiratory, cardiovascular, gastrointestinal, neurological, sexual functioning, and psychological. The list of symptoms and their prevalence at Wave-1 and Wave-2 is presented elsewhere.²⁰ Participants were asked to indicate whether or not each of the listed symptoms was present in the month preceding study participation. Responses to these 63 symptoms were used to stratify Gulf War veterans into groups as well as to identify veterans with multisymptom illness. Multisymptom illness was defined as the presence of one or more moderate to severe symptom/s in the past month from at least three of four categories (fatigue, psycho-physiological, cognitive, and arthro-neuromuscular), where the three latter categories comprised three factors identified using factor analysis conducted in this cohort at Wave-1.^{21,22} This was a modified version of the Centers for Disease Control and Prevention's multisymptom illness definition.

At Wave-1 and Wave-2, participants were also asked to indicate whether or not a doctor had diagnosed them with diabetes, depression, anxiety, PTSD, hypertension, asthma, sleep apnea, stomach/duodenal ulcers, or colitis/Crohn disease and when they had been diagnosed. Medical conditions only assessed at Wave-2 were heart attack, heart failure and angina, osteoporosis, osteoarthritis, rheumatoid arthritis, gout, polyps in the bowel, or functional dyspepsia.

Statistical Analysis

Latent Class Analysis, conducted in MPlus version 7 (Muthén and Muthén 2012, Los Angeles, CA), was used to group Gulf War veterans into unobserved categories (latents) depending on their symptomatology at Wave-1. This grouping method ensured that veterans within a group had similar symptomatology (eg, reporting same symptoms or similar magnitude of symptom reporting), but veterans in different groups had different symptom reporting. No prior assumptions on patterns of grouping were made. Symptoms with prevalence less than 5% were excluded to ensure stability of the latent class model estimation process, leaving 56 symptoms. In addition, only Wave-1 participants who had also participated at Wave-2 and had responses for at least 55 of the 56 symptoms were included for analyses. This inclusion criterion resulted in 680 (98%) Gulf War veterans remaining for analyses. Bayesian Information Criteria (BIC), log-likelihood, entropy, and Lo-Mendell-Rubin adjusted log-likelihood test (LMR-aLT) were used to determine the optimum number of veteran groups.²³ BIC and log-likelihood (absolute value) are model goodness of fit measures, and the best model has the lowest value.²⁴ Entropy is a measure of classification certainty and it ranges

from 0 (no certainty) to 1 (truly certain)²⁵; therefore, better models have higher entropy. LMR-aLT tests the hypothesis that the model with one less class is parsimonious.²⁶ After determining the groups of veterans, the incidence of diseases/conditions and the prevalence changes in lifestyle risk factors were compared across veteran groups. In this paper, incident cases were participants self-reporting a disease/condition diagnosis at Wave-2 but not at Wave-1 (ie, new cases diagnosed between 2001 and 2011). Disease incidence was only assessed among those who had not been diagnosed with the disease/condition at Wave-1.

The remainder of the analysis was conducted using Stata 13 (StataCorp 2013, College Station, TX). Count data and interval data were summarized as means and standard deviations (SDs), while categorical data were summarized as frequencies and percentages. The association between categorical outcome variables was established using Chi-square and Kendall rank correlation tau statistics. Univariate linear regression with robust sandwich variance estimators were used to compare means across veteran groups. Further relationships between variables were determined using logistic regression for binary outcomes, nominal regression for nominal outcomes, and generalized ordered logit proportional odds regression²⁷ for ordinal outcomes with robust sandwich variance estimators for cross-sectional data and with clustered sandwich variance estimator for repeated measures. Where the proportional odds assumption was not violated in logistic regression for ordered data, only one model coefficient was reported. Unless otherwise specified, regression models were adjusted for age (< 20 , 20 to 24, 25 to 34, and ≥ 35 years), rank (officer and nonofficer), and branch of service (Navy, Army, and Air Force) at deployment in August 1990, and smoking status, alcohol use, BMI, and highest educational level attained as at Wave-1. Quality of life scores were adjusted for age, rank, branch of service, smoking status, alcohol use, and SF-12 scores.

RESULTS

Latent Class Analysis of Gulf War Veterans' Wave-1 Symptomatology

After fitting the latent class analysis model to Wave-1 symptom reporting, a BIC of 37,136.0 was obtained for a one-class model, which declined to 32,724.1 for a two-class model, 31,560.0 for a three-class model, and 31,243.3 for a four-class model, while the log-likelihood was -18,474.3, -16,173.0, -15,495.5, and -15,241.8, respectively. Entropy for the two-class model was 0.932, three-class model was 0.923, and the four-class model was 0.903. The LMR-aLT showed that the three-class model was parsimonious compared with the four-class model ($P = 0.76$). On the basis of the model statistics and examination of class probabilities, a three-class model was selected as the best model.

In order to determine the actual differences between the three classes (which we refer to as groups from this point forward), we examined each group's symptomatology using the probabilities that were estimated from the latent class model, with the aim of identifying whether symptom reporting across groups differed by type of symptoms reported by each group or by number of symptoms. (See Web Figure 1, <http://links.lww.com/JOEM/A293>). The estimated probabilities represented the likelihood that a veteran in the group would report a symptom. This process indicated that the differences in symptom reporting across the three groups were based on the number of reported symptoms rather than the types of reported symptoms. Hence, the groups were described as containing veterans with high, moderate, and low symptom counts with 80 (11.8%), 328 (48.2%), and 272 (40.0%) participants in each group, respectively. The average number of symptoms reported by veterans with high symptomatology was 34 (SD 7.7) and this decreased to 16 (SD 4.5) among veterans with moderate symptomatology and five (SD 2.9) among those with

low symptomatology. In addition, the Wave-1 prevalence of each symptom for each group is presented in the Web file, Web File Table 1 (<http://links.lww.com/JOM/A293>). The most common symptoms in the group with highest symptom reporting were sleeping difficulties, unrefreshed after sleep, fatigue, loss of concentration, forgetfulness, difficulty finding the right word, avoiding doing things or situations, muscle aches or pains, and irritability/outbursts of anger and stiffness in several joints. This list of 10 most prevalent symptoms was fairly similar across the groups.

Deployment and Participant Characteristics

Table 1 presents the distribution of deployment characteristics, demographic characteristics, and prevalence of lifestyle factors at Wave-1. The table summarizes that veterans with highest symptom counts were more likely to be nonofficers, smokers, or have high waist circumference, harmful/hazardous alcohol use or lower levels of education than those with moderate or low symptom counts.

Incidence of Diseases/Conditions

The prevalence of diabetes, asthma, sleep apnea, hypertension, psychological disorders, multisymptom illness, and chronic fatigue at Wave-1 was highest among those with high symptom counts compared with groups with moderate and low symptom

counts (Table 2). Of the doctor-diagnosed medical conditions presented, the most common conditions among veterans with high symptom counts were multisymptom illness and psychological conditions, while the most common among those with low symptom counts were asthma and hypertension, respectively.

The incidence of musculoskeletal conditions, psychological conditions, sleep apnea, and multisymptom illness was significantly higher among veterans with moderate and high symptom counts relative to those with low symptom counts. The incidence of cardiovascular conditions was four times higher among veterans reporting high versus low number of symptoms in the 10 years that had elapsed, but there was no significant difference between groups with moderate and low number of symptoms. Incidence of diabetes and gastrointestinal conditions increased with increasing symptom counts, but the differences were not statistically significant.

General Physical and Mental Health/Well-Being

Figure 1 shows the variations in physical and mental health by magnitude of symptom reporting. The bar chart (lower chart) represents SF-12 scores at Wave-1, while the upper chart represents the adjusted change in SF-12 scores from Wave-1 to Wave-2. At Wave-1, PCS and MCS were lowest among veterans with the highest number of symptoms ($P < 0.001$ for both PCS and

TABLE 1. Deployment and Participant Characteristics by Veteran Grouping

	Magnitude of Symptom Reporting			Test of Association <i>P</i>
	Low <i>N</i> = 272 <i>n</i> (%)	Moderate <i>N</i> = 328 <i>n</i> (%)	High <i>N</i> = 80 <i>n</i> (%)	
Age at Gulf War deployment, yrs				
<20	18 (6.6)	32 (9.8)	8 (10.0)	0.928
20–24	71 (26.1)	76 (23.2)	18 (22.5)	
25–34	144 (52.9)	175 (53.4)	40 (50.0)	
≥35	39 (14.4)	45 (13.6)	14 (17.5)	
Rank at deployment				
Nonofficer	196 (72.1)	263 (80.4)	72 (90.0)	0.001
Officer	76 (27.9)	64 (19.6)	8 (10.0)	
Branch of service at deployment				
Navy	235 (86.4)	277 (84.5)	71 (88.8)	0.636
Army	17 (6.2)	22 (6.7)	6 (7.4)	
Air force	20 (7.4)	29 (8.8)	3 (3.8)	
Marital status at Wave-1				
Single/never married	34 (12.5)	34 (10.5)	13 (16.5)	0.174
Married/De facto	217 (80.1)	255 (78.5)	55 (69.6)	
Divorced/Separated/Widowed	20 (7.4)	36 (11.0)	11 (13.9)	
Highest education level attained at Wave-1				
Secondary	87 (32.7)	112 (35.1)	34 (42.5)	0.027
Certificate/Diploma	128 (48.1)	161 (50.5)	40 (50.0)	
Tertiary degree	51 (19.2)	46 (14.4)	6 (7.5)	
Body mass index at Wave-1				
Normal weight	61 (23.0)	64 (19.6)	19 (24.6)	0.199
Overweight	147 (55.5)	178 (54.6)	35 (45.5)	
Obese	57 (21.5)	84 (25.8)	23 (29.9)	
Smoking status at Wave-1				
Never	136 (50.2)	129 (39.5)	30 (37.5)	0.015
Ex-smoker	86 (31.7)	111 (33.9)	24 (30.0)	
Current	49 (18.1)	87 (26.6)	26 (32.5)	
Alcohol use at Wave-1				
AUDIT <10	237 (87.1)	240 (73.2)	47 (59.5)	<0.001
Harmful/hazardous drinking (AUDIT ≥10)	35 (12.9)	88 (26.8)	32 (40.5)	
Waist circumference for CVD-risk at Wave-1				
Low	112 (42.4)	113 (34.7)	25 (32.4)	0.028
Moderate	83 (31.4)	110 (33.7)	26 (33.8)	
High	69 (26.2)	103 (31.6)	26 (33.8)	

AUDIT, Alcohol Use Disorders Identification Test; CVD, cardiovascular risk.

TABLE 2. Prevalence and Incidence of Diseases/Conditions by Magnitude of Symptom Reporting

	Prevalence at Wave-1			Incident Cases Between 2001 and 2011 (the Denominator for Incidence Equals Total Number of Participants in That Group Minus Number of Wave-1 Cases)			
	Low N = 272		Moderate N = 328		High N = 80		Difference Between Moderate and Low
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Doctor-diagnosed or confirmed medical conditions							
Diabetes ^a	0 (0.0)	1 (0.3)	2 (2.5)	7 (2.6)	16 (5.0)	5 (6.6)	1.52 (0.38–6.01)
Asthma ^a	16 (6.1)	45 (13.9)	11 (14.3)	7 (2.7)	3 (1.1)	3 (4.4)	2.12 (0.44–10.22)
Sleep apnea ^a	1 (0.4)	11 (3.4)	11 (13.9)	9 (3.4)	24 (7.7)	14 (21.2)	9.40 (3.47–25.46)
Hypertension	25 (9.4)	25 (7.9)	13 (16.5)	38 (15.6)	59 (19.7)	10 (15.4)	0.88 (0.37–2.06)
Psychological disorders ^{a,†,‡}	14 (5.2)	45 (13.7)	42 (53.2)	30 (11.6)	74 (26.2)	16 (42.1)	5.34 (2.46–11.63)
Cardiovascular conditions [§]	NM	NM	NM	7 (2.6)	9 (2.8)	7 (9.2)	3.96 (1.37–11.45)
Musculoskeletal conditions [¶]	NM	NM	NM	24 (11.1)	70 (26.9)	29 (49.2)	8.70 (4.16–18.19)
Gastrointestinal disorders ^{**}	NM	NM	NM	38 (14.0)	53 (16.2)	14 (17.5)	1.51 (0.73–3.13)
Symptom-based conditions							
Multisymptom illness [†]	3 (1.1)	77 (23.7)	68 (88.3)	26 (9.9)	59 (23.8)	5 (55.6)	11.33 (2.55–50.36)
Chronic fatigue [‡]	0 (0.0)	15 (4.6)	23 (29.9)	17 (6.4)	38 (12.2)	9 (16.7)	2.54 (0.99–6.47)

C, confidence interval; NM, not measured; OR, odds ratio.

^aThe denominator for percentage incidence differs by outcome and group; the denominator equals total number of participants in that group minus number of Wave-1 cases.

[†]Adjusted for military rank, age and branch of service in August 1990; smoking status, alcohol use, body mass index, occupational status, and highest attained education at Wave-1.

[‡]Chi-square test $P < 0.05$ for the association between disease/condition and magnitude of symptom reporting at Wave-1.

[§]Psychiatric disorders include anxiety, depression, PTSD, and other psychological conditions.

[¶]Cardiovascular conditions include heart attack, angina, and heart failure.

^{**}Musculoskeletal disorders include osteoporosis, osteoarthritis, rheumatoid arthritis, gout, and other arthritis.

^{**}Gastrointestinal disorders include irritable bowel syndrome, stomach or duodenal ulcers, and other gastrointestinal disorders.

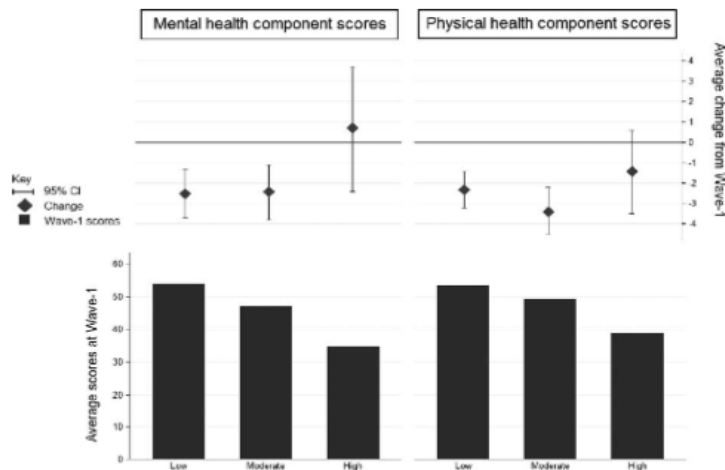


FIGURE 1. SF-12 scores at Wave-1 and adjusted change in scores from Wave-1 to Wave-2 by magnitude of symptom reporting (Lower scores = poorer health status).

MCS). Similarly, the average Wave-2 PCS and MCS were least among high symptom reporters, with scores of 37.4 (SD 10.0) and 35.2 (SD 10.5). MCS among veterans with moderate and low symptom counts were 44.5 (SD 11.6) and 51.5 (SD 9.4) at Wave-2, respectively, while PCS scores were 45.7 (SD 10.3) and 51.0 (SD 7.5) ($P < 0.001$ for both PCS and MCS). Figure 1 shows that Wave-1 to Wave-2 changes in average PCS and MCS scores among veterans with high symptom counts were not statistically significant, but statistically significant decreases in average PCS and MCS scores were observed among veterans with moderate or low symptom counts.

Figure 2 illustrates the average quality of life scores at Wave-2 across the four domains of the WHOQOL-Bref. The group of

veterans reporting the highest number of symptoms had the lowest scores in all four domains; the physical domain scores significantly increased from among those with high through to those with low symptom counts ($P = 0.044$), and so did psychological domain scores ($P = 0.015$) and environmental domain scores ($P = 0.043$). No significant increase was observed for the social relationships domain scores ($P = 0.101$).

Lifestyle Risk Factors and Cardiovascular Risk at Wave-2

Table 3 summarizes that at Wave-2, the proportion of Gulf War veterans who were obese or had harmful/hazardous alcohol consumption or high waist circumference significantly increased

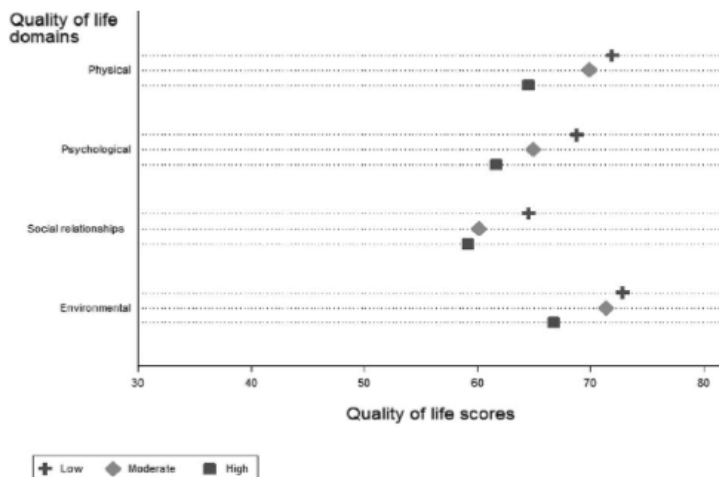


FIGURE 2. Dot plot illustrating adjusted average quality of life (WHOQOL-BREF) domain specific scores at Wave-2 by magnitude of symptom reporting (Lower scores = poorer quality of life).

from low to high symptom reporters, but the group differences in current smoking were of borderline significance. The table also illustrates that the odds of obesity and high waist circumference at Wave-2 across all three groups were significantly increased from Wave-1, with a similar rate of increase across all three groups. Unlike the changes observed for obesity and waist circumference, the odds of smoking in all three groups were significantly halved over the two study waves, while the odds of harmful/hazardous alcohol use significantly increased over time among veterans reporting low or moderate number of symptoms, but were unchanged among those with a high number of symptoms. Additional analyses were conducted by redefining harmful/hazardous drinking using the usual AUDIT score cut-off of at least 8,²⁸ and the prevalence of harmful/hazardous alcohol use at Wave-2 was 53.2%, 45.3%, and 28.5% among high, moderate, and low symptom reporters, respectively.

DISCUSSION

Using latent class analysis, we identified three groups of Gulf War veterans that differed by magnitude of symptomatology, classified as low, moderate, and high symptom reporting veterans. Over the longer term of follow-up, the group of veterans with the highest symptom count, which comprised just over one-tenth of participants, had higher incidence of several chronic diseases including sleep apnea, psychological disorders, cardiovascular, and musculoskeletal conditions. In addition, incidence of conditions of multisymptom illness and chronic fatigue increased with symptom reporting, consistent with the symptom-based nature of their definition. No significant differences in incidence of diabetes, asthma, hypertension, and gastrointestinal conditions were observed. Consistent with the high incidence of chronic diseases, participants with high symptomatology had the highest prevalence of obesity, harmful alcohol use and high waist circumference, and poorer physical and mental health and well-being at Wave-2. Comparison of Wave-1 and Wave-2 general health (through SF-12) showed that both mental and physical health had declined among veterans reporting low or moderate number of symptoms

but not among those reporting a high number of symptoms. The prevalence of obesity and high waist circumference had significantly increased in all three veteran groups, while smoking prevalence was halved. However, the differences in longitudinal changes in lifestyle risk factors were comparable across the three groups of veterans.

This study's finding of excess morbidity among veterans with high symptomatology indicates the enormous burden of ill-health in this group compared with those with low symptomatology. Although many studies have shown that symptomatology is higher among Gulf War veterans than other military personnel,^{1,3-5} it is imperative that any intervention acknowledges that symptomatology is not the same across all Gulf War veterans. Furthermore, the fact that high count of symptoms is associated with higher prevalences of obesity and alcohol indicates a strong link between symptomatology and health behaviors.

The increased incidence of chronic diseases among high symptom reporters also shows that ill-health as a result of elevated symptomatology that was initially observed at Wave-1 is likely to extend into the future with the possibility of translating into known chronic diseases in the longer term. There is growing literature within PTSD research that shows the likelihood of delayed onset of PTSD postmilitary deployment and also that for some veterans, PTSD or symptoms of other conditions related to PTSD (eg, harmful alcohol use) can be observed at initial assessment, although there might be insufficient symptoms to warrant a diagnosis at that point in time.^{29,30} These reports from PTSD research together with the findings of this study suggest that either delayed onset or delayed diagnosis of chronic diseases among Gulf War veterans with high symptomatology is probable. This can occur as a result of the continuous experience of symptomatology underpinned by increased allostatic load as a consequence of disrupted homeostatic regulation or the progression of symptoms such that disease diagnosis or ascertainment becomes clearer in the future. Hence, a comprehensive assessment that takes into account presenting comorbidities at each assessment and frequent health assessments among veterans with high symptomatology is imperative.

TABLE 3. Lifestyle Risk Factors at Wave-2 by Magnitude of Symptom Reporting

Risk Factors at Wave-2	Magnitude of Symptom Reporting			Comparison Across Classes (P)
	Low N = 272	Moderate N = 328	High N = 80	
Body mass index: n (%)				
Normal weight	41 (16.1)	39 (12.3)	9 (12.7)	0.012
Overweight	139 (54.5)	158 (49.7)	32 (45.1)	
Obese	75 (29.4)	121 (38.1)	30 (42.3)	
Change from Wave-1: OR* (95% CI) (normal vs overweight vs obese)	1.53 (1.25–1.87)	1.77 (1.49–2.12)	2.02 (1.32–3.09)	0.57
Smoking status: n (%)				
Never	130 (48.0)	125 (38.2)	29 (36.7)	0.055
Ex-smoker	116 (42.8)	159 (48.6)	36 (45.6)	
Current	26 (9.3)	43 (13.2)	14 (17.7)	
Change from Wave-1: OR* (95% CI) (current vs never)	0.55 (0.40–0.76)	0.50 (0.39–0.65)	0.54 (0.35–0.83)	0.90
Alcohol use: n (%)				
AUDIT score <10	218 (80.7)	219 (67.0)	46 (58.2)	<0.001
Harmful/hazardous alcohol use (AUDIT score ≥10)	52 (19.3)	108 (33.0)	33 (41.8)	
Change from Wave-1: OR* (95% CI)	1.64 (1.15–2.34)	1.37 (1.04–1.79)	1.06 (0.66–1.70)	0.35
Waist circumference: n (%)				
Low	61 (23.3)	62 (19.3)	10 (13.2)	0.001
Moderate	88 (33.6)	83 (25.9)	19 (25.0)	
High	113 (43.1)	176 (54.8)	47 (61.8)	
Change from Wave-1: OR* (95% CI) (Low vs moderate vs high)	2.25 (1.82–2.78)	2.51 (2.05–3.06)	3.14 (2.14–4.62)	0.30

CI, confidence interval; OR, odds ratio.

*Adjusted for age group, military rank, and branch of service at deployment.

Furthermore, the high prevalence and incidence of multiple chronic diseases that are either psychological or physical or physiological shown in our study among those reporting a high number of symptoms indicates that the high symptomatology is associated with all these facets of health. Recognizing this is particularly important as concepts such as “no health without mental health”³¹ can be easily misinterpreted as suggesting that psychological, physical, and physiological health outcomes can be disentangled, whereas they are all intertwined.²⁹ The direction of the relationship is not always clear cut, that is, which condition results/exacerbates the other condition and often the causal relationships can be bi-directional. For example, studies in the general population have shown that sleep apnea can either cause or exacerbate cardiovascular disease,³² depression,³³ PTSD,³⁴ and osteoporosis,³⁵ while depression and PTSD are important risk factors for cardiovascular diseases^{36,37} and PTSD symptoms are risk factors for rheumatoid arthritis.³⁸ Therefore, categorizing symptomatology as either physical or psychological does not take account of complex neurobiological dysregulation that is shared in physical and psychological disorders.

There is a scarcity of Gulf War veterans' studies that compare longitudinal changes in lifestyle risk factors across levels of symptomatology, but the increase in the prevalence of obesity and harmful/hazardous alcohol use reported in this study highlights the continued need for promoting healthy lifestyle, lifestyle risk factor reduction, and chronic disease prevention programs in veteran populations. Smoking prevalence, in contrast, was halved over time, which is a positive finding given its relationship with chronic diseases and symptom-based conditions. Declines in smoking prevalence have also been observed in the Australian general population (Australian Institute of Health and Welfare, 2013 National Drug Strategy Household Survey), but the prevalence drop in this cohort of Gulf War veterans is much higher than that observed in the same age group in the general population.

A strength of this study is the use of longitudinal data, hence providing a broader understanding of health issues among Gulf War veterans. In addition, this study is one of the first to investigate longitudinal changes in both chronic diseases and lifestyle risk factors by Gulf War veterans' levels of symptomatology.

One of the limitations of this study was the moderate participation rate, which was slightly lower than that observed in the UK follow-up study of Gulf War veterans³⁹ but much better than that observed in a US study.⁴⁰ The moderate participation rate then reduced the power of the study to detect group differences for low prevalent chronic diseases. However, a comparison of Wave-1 outcomes for Wave-2 participants and nonparticipants suggested that participation bias would have a minimal effect on the studies' findings, as the levels of symptomatology in these two groups were comparable.

In summary, this study has found that the future manifestation of some chronic diseases is more likely among Gulf War veterans with high symptom counts than those with lower symptom counts. For both Gulf War veterans and health service providers, this suggests that in the longer term, the health of Gulf War veterans with high symptom reporting will worsen. This group of veterans with highest symptomatology also had the highest prevalence of obesity and alcohol use at follow-up. Over time, smoking prevalence improved in all three groups of Gulf War veterans, while obesity prevalence and harmful alcohol use increased (except among high symptom reporters). However, the rate of change in lifestyle risk factors was not significantly different across the groups. The combination of poorer health and elevated unhealthy lifestyle factors in the group with highest symptom reporting suggests that this group may benefit from an integrated approach to health promotion and disease prevention and management of existing conditions. Furthermore, the increases in the prevalence of lifestyle risk factors among veterans with low or moderate symptomatology warrants monitoring of chronic disease incidence in this group.

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Web File

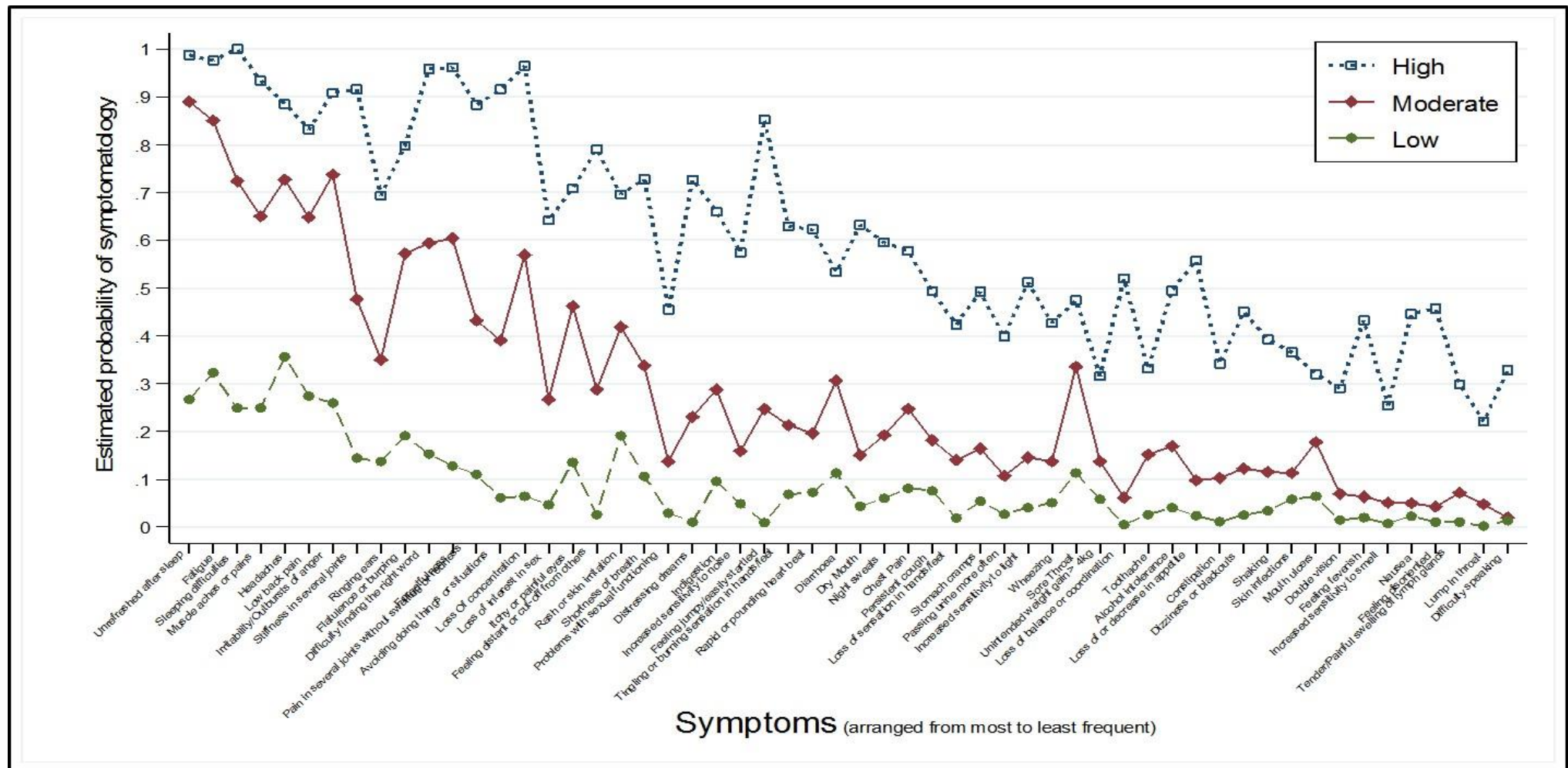


Figure 1: Estimated probability of symptom reporting by group

Web File - Table 1: Prevalence of symptoms at Wave-1, arranged according to frequency of symptoms in the group with high symptom reporting

Symptom	Magnitude of symptom reporting		
	Low	Moderate	High
	N=272	N=328	N=80
	%	%	%
Sleeping difficulties	23.9	71.6	100.0
Unrefreshed after sleep	23.9	89.6	98.8
Fatigue	31.6	84.1	97.5
Loss of concentration	5.1	56.4	97.5
Forgetfulness	11.8	60.1	96.3
Difficulty finding the right word	14.3	59	96.3
Avoiding doing things or situations	5.9	38.1	93.8
Muscle aches or pains	24.4	64.0	92.5
Irritability/outbursts of anger	25.1	72.9	91.3
Stiffness in several joints	14.3	47.0	91.3
Pain in several joints without swelling or redness	11.0	42.1	88.8
Headaches	33.8	72.6	87.5
Feeling jumpy/easily startled	0.4	24.7	85.0
Low back pain	26.1	64.6	82.5
Feeling distant or cut-off from others	2.2	28.7	81.3
Flatulence or burping	18.4	57.3	78.8
Shortness of breath	9.9	33.8	72.5
Itchy or painful eyes	13.3	45.4	72.5
Distressing dreams	1.1	22.9	72.5
Rash or skin irritation	19.2	40.5	70.0
Ringing ears	12.9	35.1	68.8
Rapid or pounding heart beat	6.6	19.5	65.0
Tingling or burning sensation in hands/feet	7.4	20.1	65.0
Dry mouth	4.4	14.4	65.0
Indigestion	8.8	28.7	63.7
Loss of interest in sex	4.8	26.5	63.7
Chest pain	7.7	24.3	60.0
Increased sensitivity to noise	5.2	15.2	60.0
Night sweats	6.6	18.3	60.0
Loss of or decrease in appetite	2.2	10.1	56.3
Loss of balance or coordination	0.4	6.1	55.0
Diarrhoea	11.0	30.2	53.8

Symptom	Magnitude of symptom reporting		
	Low	Moderate	High
	N=272	N=328	N=80
	%	%	%
Alcohol intolerance	4.0	16.5	51.3
Stomach cramps	4.8	16.5	50.0
Persistent cough	7.4	18.3	50.0
Increased sensitivity to light	3.7	14.0	50.0
Feeling disoriented	1.1	4.3	48.8
Problems with sexual functioning	2.9	13.5	47.5
Sore throat	10.3	33.2	46.3
Dizziness or blackouts	2.6	11.9	46.3
Loss of sensation in hands/feet	1.8	13.4	45.6
Feeling feverish	1.8	6.1	45.0
Nausea	2.2	5.2	45.0
Passing urine more often	2.6	10.7	42.5
Wheezing	4.8	13.8	41.3
Shaking	3.3	11.3	40.0
Skin infections	6.3	10.7	36.3
Constipation	1.1	10.4	35.4
Mouth ulcers	5.9	17.7	35.0
Difficulty speaking	1.5	1.8	33.8
Toothache	2.6	14.9	32.5
Unintended weight gain > 4kg	5.9	13.4	30.4
Double vision	1.5	7.0	28.7
Tender/Painful swelling of lymph glands	0.7	7.3	27.8
Increased sensitivity to smell	0.7	4.9	26.3
Lump In throat	0.0	4.9	24.1

Chapter 6: Multisymptom illness systematic review

Multisymptom illness, a case definition for Gulf War veteran's symptom reporting, is often used to summarise the high symptom reporting presented in Chapters 3-5. A number of cross-sectional studies investigating the prevalence of multisymptom illness in Gulf War veterans have been published since 1998. We conducted a systematic review and meta-analysis with the aim obtaining a pooled estimate of the difference in the prevalence of multisymptom illness between Gulf War veterans and other military personnel.

The investigations resulted in a manuscript that was accepted for publication in the *Journal of Occupational and Environmental Medicine*.

Declaration for Thesis Chapter 6

Declaration by candidate

In the case of Chapter 6, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Conducted an updated literature search; reviewed abstracts from the updated search; reviewed, extracted and summarised data from the selected manuscripts; designed the manuscript; conducted meta-analysis; drafted and finalised the manuscript.	70%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Helen L Kelsall	Contributed to the conception and design of the study; assisted in the preparation of the manuscript and reviewed the manuscript.	
Malcolm R Sim	Contributed to conception and design of the study, assisted in the preparation of the manuscript and reviewed the manuscript.	
Andrew B Forbes	Contributed to conception and design of the study; provided statistical analysis guidance; assisted in the preparation of the manuscript and reviewed the manuscript.	

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's
Signature

		Date 28/03/2016
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Main
Supervisor's
Signature

	Date
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Multisymptom Illness in Gulf War Veterans

A Systematic Review and Meta-Analysis

Stella M. Gwini, MSc, Andrew B. Forbes, PhD, Malcolm R. Sim, PhD, and Helen L. Kelsall, PhD

Objective: The aim of this study was to conduct a systematic review and meta-analysis of multisymptom illness (MSI) in 1990 to 1991 Gulf/Afghanistan/Iraq War veterans. **Methods:** Electronic databases were searched from January 1990, June 2014 for studies on MSI prevalence in Gulf/Afghanistan/Iraq War veterans, based on the Centers for Disease Control and Prevention MSI case definition, and which included a military comparison group. **Results:** Seven studies were identified among US, UK, and Australian Gulf War veterans; no studies were identified in Afghanistan/Iraq War veterans. MSI prevalence in Gulf War veterans and comparison groups ranged from 26 to 65% and from 12 to 37%, respectively. More recent studies were larger, with improved designs. The pooled odds ratio comparing Gulf War veterans to other military groups was 2.74 (95% confidence interval 2.15 to 3.51). **Conclusion:** The systematic review showed that MSI was most prevalent in Gulf War veterans, emphasizing the health burden of MSI in this veteran population.

On return from war, veterans of the 1990 to 1991 Gulf War (Gulf War veterans) reported increases in a wide range of physical and psychological symptoms. Earlier efforts to establish any specific diagnosis found no unique pattern or constellation of symptoms that had a clear etiology or prognosis¹; hence, symptomatology in this group of veterans continued to be an important health concern. Although an early review that included four studies found increased odds of multisymptom illness (MSI) in Gulf War veterans compared with military personnel,² research on Gulf War veterans' health and multiple symptom reporting has continued, with more publications from veteran epidemiological studies since the review. In addition, countries that deployed troops to the 1990 to 1991 Gulf War have also deployed troops to Afghanistan and Iraq Wars and concerns of whether postdeployment health among veterans of these latter wars present similar or different problems to the 1990 to 1991 Gulf War have arisen.³

Learning Objectives

- Summarize the findings of studies to date on multisymptom illness (MSI) among Gulf War veterans, including the conclusions of previous meta-analysis.
- Discuss the findings of the updated meta-analysis of MSI among Gulf War veterans, including comparison with Afghanistan and Iraq War veterans.
- Discuss the implications for management of and research on MSI among veterans.

The reporting of multiple and unexplained symptoms by Gulf War veterans has been described and characterized as MSI, due in part to the involvement of multiple symptoms extending across several body systems. Other terms such as Gulf War illness, chronic MSI, unexplained illness, medically unexplained illness, or Gulf War Syndrome have been used. In 2014, the United States (US) Institute of Medicine (IOM) recommended that the Veterans Affairs (VA) Department use the term Gulf War illness rather than chronic MSI, partly because the latter term was not specific to the population and its unique experiences, and did not reflect the geographic area relevant to the group in which it was identified.⁴ However, in our systematic review, we use the term MSI as we considered it best reflects the review's case definition.

Several case definitions of MSI have been developed. In 1998, Fukuda et al⁵ developed a case definition for MSI, also known as the Centers for Disease Control and Prevention (CDC) MSI definition, and this has been adopted by several researchers as is or with slight modifications.^{6–12} Other definitions of MSI that exert more stringent rules on the CDC definition of MSI or use slightly different methods to elucidate the pattern of symptomatology have been utilized by Haley et al,¹³ Steele,¹⁴ Bourdette et al,¹⁵ and Kang et al.¹⁶ In the 2014 IOM report, the two case definitions by Fukuda et al⁵ and Steele¹⁴ were recommended because they closely represent the multisystem patterns of reported symptoms.⁴

In 2004,¹⁷ the US Research Advisory Committee on Gulf War Veterans' Illnesses described the prevalence of MSI from four studies (three in US, one in UK Gulf War veterans) and highlighted that the prevalence of multisymptom conditions was elevated in Gulf War veterans compared with personnel not deployed to the Gulf War. In 2006, Thomas et al² published a meta-analysis based on these four studies and showed that the odds of MSI were three and a half times higher in Gulf War veterans than the other military personnel, but there was a considerable variation in the methodological quality of the four studies.² Since then, there have been several studies conducted among Gulf War veterans, including in Gulf War veterans deployed from Australia and France, and the odds of MSI may have changed. Some limitations in Gulf War veterans' studies conducted pre-2000 included the relatively small size of the study samples and that some were prone to selection bias because study populations were from selected branches of service, for example, Air Force or Navy^{5,13,18,19} or selected areas of residence,^{20–22} and this reduced the external validity of the studies' outcomes. Some of these limitations have since been addressed in more recent studies,^{23–25} which were not available at the time of the review by Thomas et al.² Also, there has

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been interest in MSI among veterans of more recent deployments to Afghanistan and Iraq War.

The current systematic review aimed to critically and systematically review the literature on MSI in veterans of the 1990 to 1991 Gulf War compared with other military personnel, as well as to conduct meta-analysis to obtain pooled effect estimates. In addition to Gulf War veterans, the systematic review also sought information on the prevalence of MSI in Afghanistan and Iraq War veterans.

METHODS

The design, conduct, and reporting of the systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.²⁶

Search Strategy

Database searches were conducted for peer-reviewed articles or reports published between January 1, 1990, and June 30, 2014. The databases searched were MEDLINE, MEDLINE-in-process, PILOTS, PsychINFO, Cochrane Reviews, and Embase. Additional sources searched were the System for Information on Grey Literature in Europe (SIGLE); the US, United Kingdom (UK), and Australian Departments of Veterans' Affairs and Defence Forces' Web sites. Only peer-reviewed studies in the published literature were included in the review. The search terms used were based on the free-text and Medical Subject Headings of the condition of interest (multisymptom or multi-symptom or multiple symptom or multiple-symptom), the area of operation (Gulf War or Desert Storm or Iraqi Freedom or Enduring Freedom and their variants), and search terms for selecting papers on military personnel (military personnel or military veterans or soldier or deployed or active duty or service personnel).

Study Inclusion and Exclusion Criteria

To be included in the systematic review, studies needed to satisfy the following inclusion criteria: (1) the study population consisted of military personnel deployed to the Gulf War (1990 to 1991) or Afghanistan (2001-) or Iraq War (2003 to 2011). Studies conducted among treatment-seeking populations, for example, studies among veterans from VA treatment facilities were excluded; (2) studies were published in English; (3) studies included a military comparison group that differed in its level of deployment exposure to the corresponding conflict. Nondeployed personnel were defined as personnel who did not serve in the primary area of conflict, while deployed-elsewhere were personnel deployed to areas of conflict other than the primary area of interest, for example, Germany or Bosnia; (4) MSI definition was based on the CDC definition developed by Fukuda et al⁵ or its variants; and (5) the study provided enough information to calculate odds of MSI by deployment.

Multisymptom Illness Case Definition

The CDC definition of MSI⁵ was used in this systematic review because it represented an internationally accepted definition of multisystem symptom reporting and was consistent with recent recommendations by the US IOM.⁴ Variants of the definition were accepted only if the symptom definitions represented multisystems of the body. The CDC definition identifies MSI as present if the subject has one or more chronic symptoms (for at least six months) from at least two of three categories namely fatigue, mood-cognition (symptoms of feeling depressed, difficulty remembering or concentrating, feeling moody, feeling anxious, trouble finding the right words, or difficulty sleeping) and musculoskeletal (symptoms of joint pain, joint stiffness, or muscle pain), where the two latter categories were identified in an exploratory analysis of symptoms

reported in their study of US Gulf War veterans.⁵ The specific definitions used in each included study are presented in Table 1.²⁷

Selection of Studies

After duplicates had been removed, abstracts were independently reviewed by two researchers (SG/JB and HK) and the researchers convened to compile a list of full-text articles/reports to be considered for the review. Articles agreed upon for full-text review were reviewed independently by the researchers (SG and HK) and studies to be included in the review were agreed upon. Figure 1 shows the number of articles/reports at each stage of the systematic review process.

Data Extraction

Quantitative and other relevant data were extracted by one researcher using standard data extraction forms developed for the review and cross-checked by another member of the research team. The data extracted from each article included demographic and military service characteristics of the study population or sample, the MSI prevalence, and other relevant subgroup statistics on MSI.

Quality and Risk of Bias Assessment

We assessed the overall risk of bias in each included study using a 10-item instrument developed by Hoy et al.²⁸ Four items were based on external validity and six items were based on internal validity of the included studies. An additional item was added that assessed the availability of, and adjustment for, possible confounding factors such as age, sex, military rank, branch of service, and duty status. Individual items were assessed as high or low risk of bias, and used to assess the study's overall risk of bias. The included studies were assessed independently by two researchers (SG and HK) and any discrepancies were resolved through discussion. The assessments for overall risk of bias results are presented together with the study descriptions in Table 1.

Statistical Analyses

Meta-analysis was conducted to aggregate odds ratios across the selected studies. One study^{10,11} reported results separately for males and females and these results were combined using formulas adapted from McNeil.²⁹ Where two or more comparison groups were included in a study, statistics from all groups were summarized in Table 1, but only the data from the comparison group with nondeployed military personnel were considered for meta-analyses. Conventional random effects models using the method of DerSimonian and Laird³⁰ were used to produce pooled odds ratios with 95% confidence intervals (95% CIs) based on the standard normal distribution. Heterogeneity across studies was reported using the I²-statistic, which is the proportion of total variability across studies that is not attributed to chance. This analysis was conducted in Meta XL (Meta XL 1.3; EpiGear International Brisbane, Australia). Where two or more results for the same cohort, at the same point in time were available, only the main result including the largest proportion of the cohort was included in the systematic review.

Meta-regression,³¹ in Stata 13 (Stata Statistical Software: Release 13, Stata Corp LP, TX), was used to compare the pooled odds ratio for studies with a low risk of bias versus studies with a high risk of bias. In addition, a separate meta-analysis was conducted for the group of studies that used the CDC definition.

Only visual inspection of a funnel plot was used to assess publication bias, as the number of included studies was low (ie, <10) and any statistical tests such as Egger's method or Begg's method would have very low power to distinguish chance from actual funnel plot asymmetry.³²

Two studies were identified that had been conducted by the same research group^{8,16} and possibly involved an overlap of participants. Hence, we repeated the analyses using Bayesian random

TABLE 1. Characteristics of Studies Included in the Systematic Review of Multisymptom Illness in Gulf War Veterans Compared with Non-Gulf War Military Personnel, January 1990 to June 2014

Ref.	Data Collection Mode; Study Period	Study Groups	Multisymptom Illness (MSI) Case Definition	Prevalence (%)		Adjusted Odds Ratio	95% CI	Participation Rates, Assessment of Overall Risk of Bias
				GWV	Comparison Group			
Fukuda et al ⁵	Cross sectional study with self-administered questionnaires, 1995	US Air Force personnel stationed at 4 Air Force bases and in-service at the time of study.	CDC definition: Presence, for 6 months or more, of at least one symptom from two or more symptom groupings, namely (1) fatigue; (2) mood/cognition (ie, feeling depressed, difficulty remembering or concentrating, feeling moody, feeling anxious, trouble finding right words, or difficulty sleeping); and (3) musculoskeletal (ie, joint pain/stiffness or muscle pain). The symptom groupings mood/cognition and musculoskeletal were derived through exploratory principle components analysis in this study group.	39	14	4.08 (unadjusted)	3.39–4.93	Participation rates: 61% and it was not presented separately for GWV and non-GWV.
Proctor et al ²⁷	Cross-sectional study with self-administered questionnaires, 1994–1996.	Gulf War veterans and Germany-deployed military personnel (deployed during Gulf War) from Ft Devens (Massachusetts, US).	CDC-derived definition: Presence, for 6 months or more, of at least one symptom from two or more symptom groupings, namely (1) fatigue (ie, fatigue or easily tired); (2) mood/cognition (ie, frequent periods of feeling depressed, forgetfulness, difficulty concentrating, crying easily, excessive anger or irritability, frequent periods of anxiety and nervousness, inability to fall asleep, restless or unsatisfying sleep, or awake earlier than desired); and (3) musculoskeletal (ie, neck aches/stiffness or joint pains). The symptoms also needed to have begun during or after the Gulf War.	Severe:		16.18 (unadjusted)	8.99–29.14	Confounding: Adjusted OR for combined mild-moderate and severe MSI was not provided. Assessment of overall risk of bias: High.
				6	0.7			
				45	15			
Steele et al ¹⁴	Cross-sectional study with self-administered questionnaires, 1994–1996.	Gulf War veterans and Germany-deployed military personnel (deployed during Gulf War) from Ft Devens (Massachusetts, US).	CDC-derived definition: Presence, for 6 months or more, of at least one symptom from two or more symptom groupings, namely (1) fatigue (ie, fatigue or easily tired); (2) mood/cognition (ie, frequent periods of feeling depressed, forgetfulness, difficulty concentrating, crying easily, excessive anger or irritability, frequent periods of anxiety and nervousness, inability to fall asleep, restless or unsatisfying sleep, or awake earlier than desired); and (3) musculoskeletal (ie, neck aches/stiffness or joint pains). The symptoms also needed to have begun during or after the Gulf War.	65.3	32.6	2.4	1.1–5.3	Participation rates: 62% in GWV and 51% in non-GWV. Nonresponse bias was assessed only among GWV and participants differed from nonparticipants with respect to sex, race/ethnicity, age, education, and symptomatology. Other factors were similar (ie, employment status, marital status, alcohol/drug use, or service status). ¹⁹
				Overall:		3.26	2.48–4.28	Confounding: ORs adjusted for participation bias, age, and psychiatric cases. Assessment of overall risk of bias: High.
				47.2	19.8			
Steele et al ¹⁴	Cross-sectional telephonic interview; 1998	US GWV and non-GWV residing in Kansas	CDC-derived definition: Presence of at least one symptom from two or more symptom groupings, namely (1) fatigue; (2) mood/cognition (ie, feeling down/depressed, memory problems, difficulty concentrating, trouble finding words, problems falling, or staying asleep); and (3) musculoskeletal (ie, joint or muscle pain).	Overall:		3.26	2.48–4.28	Participation rates: 93% GWV and 88% in non-GWV. Participation was significantly higher among females than males.
				47.2	19.8			
				Overall:				
47.2	19.8							

TABLE 1. (Continued)

Ref.	Data Collection Mode; Study Period	Study Groups	Multisymptom Illness (MSI) Case Definition	Prevalence (%)			Participation Rates, Assessment of Overall Risk of Bias
				GWV	Comparison Group	Adjusted Odds Ratio	
Unwin et al ^{10,11}	Cross-sectional postal survey, 1997	N = 1548 GWV	CDC-derived definition: Presence, for a month or more, of at least one symptom from two or more symptom groupings, namely (1) fatigue; (2) mood/cognition (ie, depression, poor concentration/memory, moodiness, anxiety, word-finding difficulties, or sleep difficulties); and (3) musculoskeletal (ie, joint or muscle pain, joint stiffness).				Confounding: OR was adjusted for age, gender, rank, service branch, component, income, and education level. Assessment of overall risk of bias: Low
		N = 482 Comparison group					
		UK male and female veterans of the 1991 Gulf War; 1992–1997					
		Bosnia war and non-deployed veterans (also termed Gulf-Era veterans).					
		N = 3510 GWV					
Kelsall et al ⁹	Cross-sectional postal survey, 2000–2002	N = 2040 Bosnia veterans	CDC definition: Presence, for a month or more, of at least one symptom rated as moderate/severe from three or more symptom groupings, namely (1) fatigue; (2) psycho-physiological distress (eg, vomiting/nausea, stomach cramps, diarrhea, wheezing, indigestion, persistent cough, fainting, dizziness, difficulty speaking); (3) cognitive distress (eg, loss of concentration, feeling distant, sleeping difficulties, distressing dreams, irritability/outbursts of anger); and (4) arthro-neuromuscular distress (eg, joint stiffness, general muscle aches, low back pain, joint pain without swelling, or redness). The symptom groupings psycho-physiological distress, cognitive distress, and arthro-neuromuscular distress were derived through exploratory factor analysis of symptoms reported by Australian GWV. ¹⁵				Confounding: ORs were adjusted for age, marital status, rank, education, employment, discharge status, smoking status, alcohol consumption, general health questionnaire scores. Assessment of overall risk of bias: Low
		N = 2600 Gulf-Era veterans					
		Australian male veterans of the 1991 Gulf War and randomly sampled military comparison group.					
		N = 1381 GWV					
		N = 1377 Comparison group					

TABLE 1. (Continued)

Ref.	Data Collection Mode; Study Period	Study Groups	Multisymptom Illness (MSI) Case Definition	Prevalence (%)		Adjusted Odds Ratio	95% CI	Participation Rates, Assessment of Overall Risk of Bias
				GWV	Comparison Group			
Blanchard et al ⁸	Cross-sectional face-to-face interviews, 2001	US Gulf War veterans and nondeployed military personnel	CDC-derived definition: Presence, for 6 months or more, of at least one symptom from two or more symptom groupings, namely (1) general fatigue; (2) mood/cognition (ie, feeling depressed, feeling irritable, difficulty thinking/concentrating, feeling worried/tense/anxious, problems finding words, problems getting to sleep); and (3) musculoskeletal (ie, joint pain, muscle aches/pain).	28.9	15.8	2.16	1.61–2.90	Participation rates: 53% in GWV & 39% in non-GWV. Nonresponse bias was assessed and participants were more likely to be female, older, white, in the reserve, and using results of an earlier study were more likely to have reported more symptoms and illnesses than non-participants.
		N = 1035 GWV						Confounding: OR was adjusted for age, gender, race, education, duty type, service branch, rank, income, deployment exposures, psychiatric conditions and self-reported doctor diagnosed medical conditions.
		N = 1116 Comparison group						Assessment of overall risk of bias: Low
Kang et al ¹⁶	Cross-sectional postal and telephonic interviews, 2003–2005	US GWV and nondeployed Gulf Era personnel.	Presence of several different symptoms together that persisted for 6 months or more and could not be adequately explained through medical or psychiatric diagnoses. The list of symptoms might include things like fatigue, muscle/joint pain, headaches, memory problems, digestive problems.	36.5	11.7	3.05	2.77–3.36	Participation bias: 40% GWV and 27% non-GWV. Nonrespondents were more likely to be younger, single, nonwhite, or enlisted rank in 1991 than participants.
		N = 6111 GWV						Confounding: OR adjusted for age, gender, race, body mass index, cigarette smoking, rank, branch of service, unit component (active duty, National Guard, or reserve).
		N = 3859 Comparison group						Assessment of overall risk of bias: High

CDC, Centers for Disease Control and Prevention; GWV, Gulf War veterans; non-GWV, none Gulf War veterans; OR, odds ratio; UK, United Kingdom; US, United States.

effects models with “delta splitting” so as to accommodate the overlap of participants. The *metahdep*^{33,34} function in the R software (R: A language and environment for statistical computing; R Development Core Team, Vienna, Austria) was used. As results differed negligibly from the conventional random effects analysis, we report only the conventional random effects results here.

RESULTS

The systematic review identified 2573 records with 2445 abstracts (excluding duplicates) and 130 full-text articles were assessed for eligibility (Fig. 1). Eight articles from seven studies on Gulf War veterans were selected, five reported on US^{5,8,14,16,27} veterans, two on UK veterans,^{10,11} and another on Australian veterans.⁹ The two UK articles were published from one study, with one article reporting on males and another on females. The results of these papers have been combined for the purposes of meta-analyses. No studies comparing the prevalence of MSI in Afghanistan or Iraq War veterans to other military personnel were identified over the period of this review. Hence, the remainder of this paper is based on Gulf War veterans alone.

The key features of the included studies are summarized in Table 1 and the studies are arranged according to the year in which data were collected. All studies were cross-sectional and data collection methods were similar across studies with the exception of two studies that conducted telephonic interviews only¹⁴ or in combination with postal questionnaires.¹⁶ The study populations in the majority of studies included military personnel invited from across the range of branches of service, with the exception of the study by Fukuda et al,⁵ which was conducted among Air Force personnel only. Another difference in branch of service composition was observed in the study by Kelsall et al⁹ in which the deployed contingent and study population was predominantly Navy. The comparison group used in most studies^{5,8,9,14,16} comprised nondeployed military personnel, whilst the comparison group in two studies comprised personnel deployed elsewhere; Unwin et al^{10,11} used two comparison groups wherein one comprised nondeployed personnel and the other were Bosnia deployed veterans (April 1992 to February 1997) and Proctor et al²⁷ used a comparison group composed of personnel deployed to Germany at the time of the 1990 to 1991 Gulf War.

The definition of MSI used in four studies^{8,10,11,27} was similar to the CDC definition,³ which had fatigue and two symptom groupings. Kelsall et al⁹ used a modified version of the CDC definition in which fatigue and three symptom groupings were used, of which the three symptom groupings were based on factor analysis empirically derived in Australian Gulf War veterans.³⁵ Kang et al¹⁶ used a definition indicating multisystem health symptoms, although the definition was not fully described. We sought clarification from the authors but did not receive a response.

Participation rates across studies were variable, with higher rates in studies reported by Steele¹⁴ and Kelsall et al,⁹ while studies by Fukuda et al,⁵ Proctor et al,²⁷ and Unwin et al^{10,11} had participation rates between 60 and 70% and the two studies from the US National Health Survey Cohort^{8,16} had lower participation. Three studies were assessed to have a high overall risk of bias (Fukuda et al,⁵ Proctor et al,³⁴ and Kang et al¹⁶).

The prevalence of MSI in Gulf War veterans was variable across studies, and ranged from 26% in Australian Gulf War veterans⁹ to over 60% in one US study.³⁴ Although the prevalence was considerably lower in the comparison groups in the studies, there was also considerable range in prevalences across the studies, from 12% in the military comparison group of the US study by Kang et al¹⁶ to 37% among veterans of the Bosnian war reported by Unwin et al.^{10,11} All studies but one, Fukuda et al,⁵ reported adjusted odds ratios that were used in the meta-analyses.

Pooled odds ratios showed that the odds of MSI were more than two and a half times greater in Gulf War veterans than the

comparison groups (odds ratio: 2.74; 95% CI: 2.15 to 3.51) (Fig. 2). Between-study heterogeneity was high ($I^2 = 91\%$). Figure 2 also presents the study-specific effect sizes.

Subgroup analysis by risk of bias showed that the estimated pooled odds ratio among studies with a low risk of bias was 2.33 (95% CI: 1.87 to 2.91; $I^2 = 77\%$) and the estimate from studies with a high risk of bias was 3.51 (95% CI: 2.41 to 5.13; $I^2 = 91\%$), although meta-regression indicated that the two odds ratios by risk of bias were not significantly different ($P = 0.10$). Subanalysis was conducted only using the five studies that adopted the CDC definition with three symptom groupings (ie, excluding the studies by Kang et al¹⁶ and Kelsall et al⁹). On the basis of these five studies, the odds of MSI were almost three times higher among Gulf War veterans than the comparison groups (odds ratio: 2.93; 95% CI: 2.06 to 4.18; $I^2 = 91\%$), and odds ratio was similar to that observed for the pooled odds ratio for all seven studies.

Sensitivity analyses were conducted by excluding one study at a time and re-running the analysis (Table 2). The range of odds ratios observed was narrow, ranging from 2.48 (95% CI 2.02 to 3.51) when the study by Fukuda et al⁵ was excluded to 2.98 (95% CI 2.35 to 3.78) when the study by Kelsall et al⁹ was excluded. A visual inspection of the funnel plot (presented in Web Figure 1, <http://links.lww.com/JOM/A270>) did not indicate evidence of clear publication bias.

DISCUSSION

Seven studies meeting the systematic review's eligibility criteria and comparing the prevalence of MSI in Gulf War veterans and other military groups were identified. The prevalence of MSI across the seven studies was consistently higher in Gulf War veterans than other military personnel, with pooled odds of MSI that were more than two and a half times greater in Gulf War veterans. Heterogeneity among the included studies was high. Subgroup analysis by study risk of bias showed that the pooled odds ratio in studies with a low risk of bias was slightly lower than the pooled odds ratio in studies with a high risk of bias, although the difference was not statistically significant. The overall odds of MSI remained significantly elevated in Gulf War veterans for all sensitivity analyses.

Although we found no published papers on MSI in Afghanistan/Iraq War veterans over the period of this systematic review, a recent study (published after the end of our search dates) based on the US Millennium Cohort found prevalence of 22% among nondeployed personnel, 15% among those deployed without combat, and 30% among those deployed with combat, where the prevalence among those deployed in combat was comparable with some Gulf War studies.^{8,9,16} The adjusted odds ratio for MSI was 0.89 (95% CI 0.85 to 0.94) for personnel deployed to Afghanistan or Iraq War in the three years before participation compared with those who had not been deployed to this conflict, and 1.70 (95% CI 1.63 to 1.78) for those deployed to Afghanistan or Iraq War in combat versus nondeployed personnel.³⁶ Although the odds of MSI were higher in Afghanistan or Iraq War veterans deployed in combat than those not deployed, the odds ratio was considerably lower (1.70 vs 2.74) than the pooled estimate observed among Gulf War veterans in our systematic review.

The results of our systematic review indicate that Gulf War deployment continues to be strongly associated with increased MSI, affecting a considerable proportion of Gulf War veterans, and in consideration of the numbers of personnel deployed to the Gulf War, with 697,000 from the US and 53,000 from the UK.³⁷ MSI has the potential to impact on large numbers of veterans. The earlier systematic review of MSI by Thomas et al² published in 2006 reported a pooled odds ratio of 3.62 (95% CI 2.75 to 4.76). With the inclusion of three more studies^{8,9,16} that studied MSI in Gulf War veterans from 2000 onwards, our systematic review and meta-analyses have provided updated and more robust estimates of the odds of MSI in Gulf War veterans than other military personnel. The

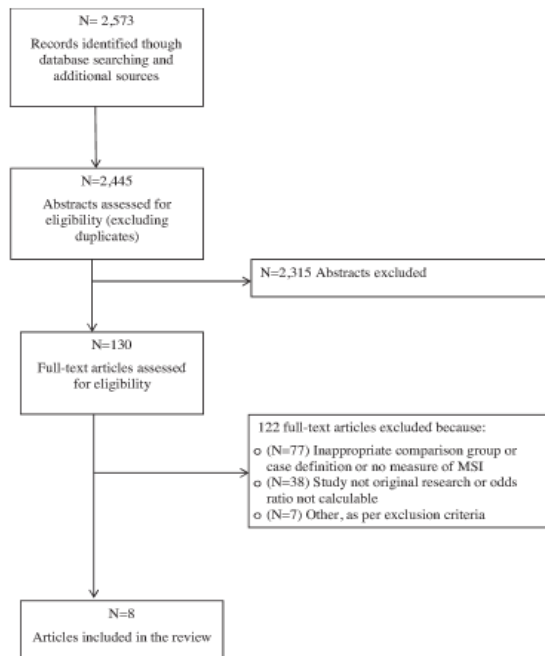


FIGURE 1. Preferred reporting items for systematic reviews and meta-analyses (PRISMA), flowchart of the systematic review, January 1990 to June 2014.

three additional studies included in the current review were generally larger than the earlier studies; with 6111, 1381, and 1035 Gulf War veterans in the US study by Kang et al,¹⁶ the Australian study by Kelsall et al,⁹ and the US study by Blanchard et al,⁸ respectively; and the studies were more representative of the Gulf War veteran population. Two of the three studies were assessed as low risk of bias. Furthermore, this systematic review has included data on veterans from an additional country, that is, Australia. Including only four studies, the previous review by Thomas et al² had limited capability to conduct subgroup analyses focused on study-specific characteristics, such as risk of bias.

The range of MSI prevalence reported across the seven studies was wide, ranging from 26 to 65% in Gulf War veterans. The highest prevalence estimates in Gulf War veterans were observed in two studies^{10,27} conducted within 10 years of the Gulf War, while the lowest prevalence estimates in Gulf War veterans were observed among the later studies.^{8,9,16} The wide range in prevalence could be attributed to a number of factors, including the length of time between study inception and the 1990 to 1991 Gulf War, differences in cohort compositions, and the variable list of symptoms used to assess MSI. Subanalysis to investigate causes of heterogeneity across studies showed that the odds were only slightly higher in the subgroup using a definition resembling the CDC definition and heterogeneity remained similar, suggesting that the considerable heterogeneity observed across studies could not be explained only by the variability in MSI definition. The forest plot shows visually that the lowest odds of MSI were found in Australian Gulf War veterans⁹ and the highest odds were found in the US Gulf War veteran study population on which the CDC definition was developed.⁵

The prevalence of MSI in the comparison groups was relatively high. This poses questions of the specificity of the case

definition, which was a consideration of a recent report on MSI by the IOM.⁴ To illustrate the definition's low specificity, Smith et al⁶ used 10 symptoms and the CDC definition as the basis for defining MSI and showed that 27 combinations of symptoms were possible, which suggested that there is a considerable variation in the combination of symptoms possible under the CDC definition of MSI. In light of these factors, it is likely that the current definitions of MSI are not specific enough to differentiate the individual symptoms contributing to MSI in Gulf War veterans from the individual symptoms contributing to other unexplained multiple symptoms reported in the military comparison groups and in the general community. Although the CDC definition of MSI has low specificity, it represents the varied symptomatology most commonly reported in veterans. A consideration for further research may be the refinement of the case definition in a veteran population more generally representative of the Gulf War veteran population, as well as a follow-up on the IOM's recommendations,⁴ which suggest further examination of evidence on aspects important for the development of the case definition, namely symptom onset, duration, severity, frequency, and exclusionary criterion.

A strength of this systematic review, and which builds on the previous review, was the inclusion of studies that were larger, less prone to selection bias, and were from multiple international cohorts. The current review mainly used adjusted study-specific estimates instead of unadjusted estimates and hence was less prone to overestimation of effect size.³⁸ In addition, the case definition adopted for the systematic review was clear and could be applied uniformly in the inclusion criteria. Although some studies have used other variants of the MSI case definition,^{13,15,39} the CDC definition is internationally recognized and is supported by the Committee on the Development of a Consensus Definition for Chronic Multisymptom Illness in 1990 to 1991 Gulf War veterans under the auspices of the US IOM.⁴

A limitation in the understanding of MSI in Gulf War veterans is that the case definitions are not fully and clinically validated, in part because there is no consensus as to what objective measures of health could be used as a gold standard for defining MSI. Some studies^{6,13,35} have attempted to validate the definition using statistical methods and clinical measures, but an agreement is yet to be reached. The study in which the CDC definition was developed had some recognized limitations; for example, it was restricted to Air Force personnel and included only still serving members. Our risk of bias assessment recognized these limitations

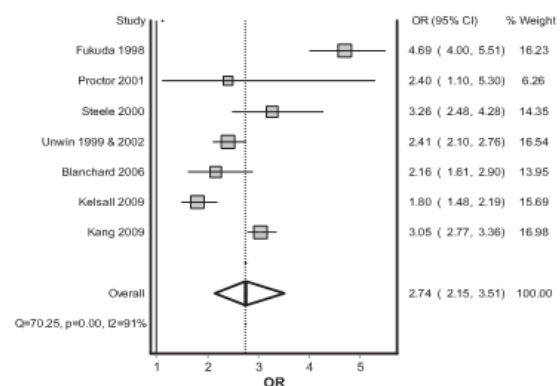


FIGURE 2. Forest plot illustrating pooled and study specific odds ratios in the eight papers reporting multisymptom illness in Gulf War veterans compared with other military personnel (Unwin 1999 and 2002 combined).

TABLE 2. Multisymptom Illness Systematic Review in Gulf War Veterans Compared With Nondeployed Personnel: Pooled Odds Ratios Obtained by Excluding Studies One by One

Excluded Study	Pooled OR	95% CI	Cochran Q	I ²
Fukuda et al ⁵	2.48	2.03–3.03	29.1	83
Proctor et al ²⁷	2.77	2.14–3.58	70.0	93
Steele et al ¹⁴	2.66	2.02–3.51	69.5	93
Unwin et al ^{10,11}	2.81	2.08–3.78	61.4	92
Blanchard et al ⁸	2.85	2.18–3.73	66.3	92
Kelsall et al ⁹	2.98	2.35–3.78	45.0	89
Kang et al ¹⁶	2.68	1.91–3.75	68.3	93

and assessed the study's risk of bias as high. In addition, several well conducted prevalence studies that did not have any military comparison group were excluded. Exclusion of these studies was important because aggregating prevalence across studies only gives an estimate of the number and proportion of persons affected in the group of interest but does not allow for relative estimates.

In summary, the systematic review and meta-analysis showed that the prevalence of MSI was higher in Gulf War veterans, and the pooled odds of MSI was over two and a half times greater in Gulf War veterans than the other military personnel; a finding that was robust to risk of bias and definition of MSI. These findings are important for clinicians and other health care providers. Importantly, they highlight the continuing problem and magnitude of MSI in Gulf War veterans, calling for ongoing awareness of the need for timely health assessments and health care for Gulf War veterans. Clinicians will need to acknowledge that MSI is prevalent among Gulf War veterans and recognize that the condition requires similar consideration as other diseases and conditions prevalent in this group of veterans, for example, PTSD⁴⁰ and chronic fatigue syndrome.⁴¹ Continued research into the most effective treatments or management of MSI is warranted as is research on the effects of MSI on veterans' quality of life, physical, and mental functioning.

ACKNOWLEDGMENT

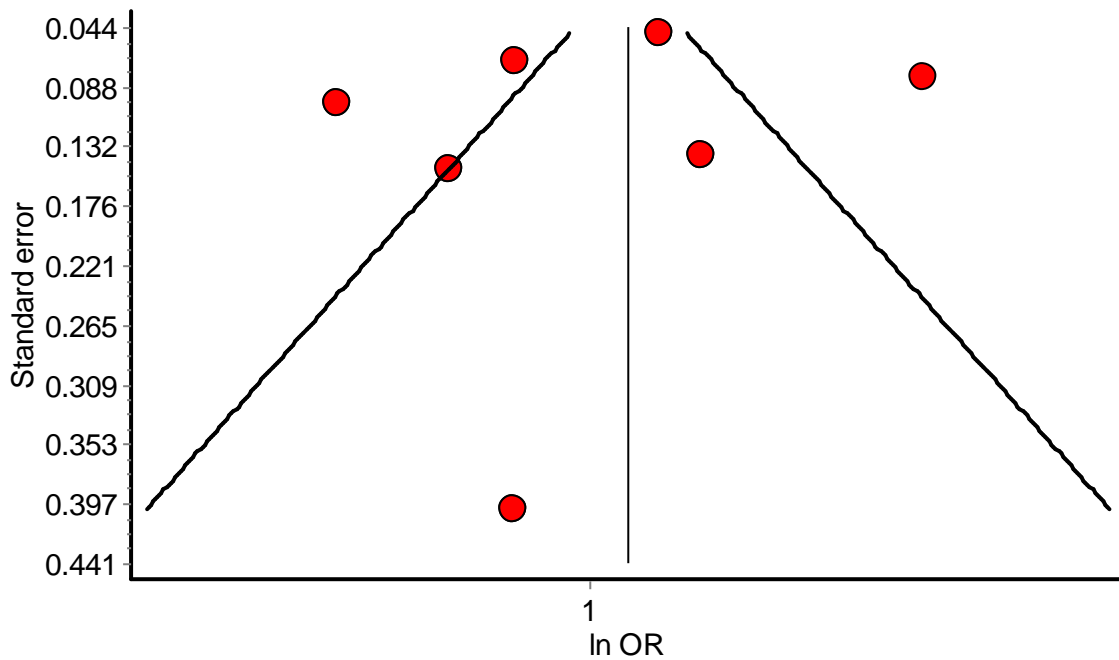
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Supplementary material



Web Figure 1. Funnel plot with 95% CI intervals for the log(odds ratio) of the meta-analysis of multisymptom illness in Gulf War veterans compared to non-deployed military personnel

Chapter 7: Health service use/Disability claims and Multisymptom Illness

An understanding of health service utilisation is important in the management of diseases/conditions and informs consumers (e.g. veterans), policy makers including Government, Department of Defence and Department of Veterans' Affairs, as well as health service providers.⁽⁸²⁾ Given that MSI affects a considerable proportion of Gulf War veterans and other military personnel, as observed in Chapter 6, it is therefore important to examine health service utilisation among military personnel with multisymptom illness. In this Chapter, the first objective was to identify health services used by military personnel with multisymptom illness and compare these with usage by other military personnel. We used two comparison groups of other military personnel; one group with chronic diseases with or without multisymptom illness and a healthier group with neither MSI nor chronic diseases.

As disability compensation is likely to influence health service utilisation, ⁽⁸³⁾ our second objective was to investigate whether disability compensation claims among

military personnel with multisymptom illness was any different to that of the two comparison groups.

In this Chapter, data collected at Wave-2 from Medicare and the Department of Veterans' Affairs together with that collected through the postal questionnaire were used.

The results from these investigations led to a manuscript that was submitted to the *Medical Care* journal.

Declaration for Thesis Chapter 7

Declaration by candidate

In the case of Chapter 7, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Contributed to implementation of the Wave-2 study; initiation and development research question for this Chapter; designed the manuscript; analysed the data; drafted and finalised the manuscript.	80%

The following co-authors contributed to the work. If co-authors are students at Monash University, the extent of their contribution in percentage terms must be stated:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Andrew B Forbes	Designed the Wave-1 and Wave-2 studies; provided statistical analysis guidance; assisted in the preparation of the manuscript and reviewed the manuscript.	
Malcolm R Sim	Designed the Wave-1 and Wave-2 study; contributed to questionnaire design, assisted in the preparation of the manuscript and reviewed the manuscript.	
Helen L Kelsall	Designed the Wave-1 and Wave-2 study; contributed to questionnaire design; assisted in the preparation of the manuscript and reviewed the manuscript.	

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work*.

Candidate's
Signature

		Date 28/03/2016
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Main
Supervisor's
Signature

	Date
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Comparability of health service use by veterans with multisymptom illness and those with chronic diseases

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Abstract – 248
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Running title: Health service use and MSI

ABSTRACT

Objective: Multisymptom illness (MSI) is prevalent among military cohorts but little is known about their healthcare. We compared health service utilisation and disability claims among military personnel with MSI (but no chronic diseases), those with chronic diseases and those without MSI or chronic diseases.

Methods: Personnel with MSI, identified using a modified Centers for Disease Control and Prevention MSI definition, and the other two groups were identified from a Gulf War veterans' study conducted in 2000-2003(Wave-1). In 2011-2012(Wave-2), the cohort was linked to the national Medicare and Department of Veterans' Affairs(DVA) databases to obtain health service utilisation and disability claims data recorded between 2001-2012.

Results: More personnel with MSI, than those with neither MSI nor chronic diseases, had visited a general medical practitioner (risk ratio [RR]=1.24, 95% confidence interval [CI]=1.11,1.39) or was hospitalised (RR=2.01, 95% CI=1.44,2.80) in the 12-months preceding Wave-2 or had consulted a psychiatrist, gastroenterologist, neurologist or respiratory physician in the 10 years prior to Wave-2. Significantly more DVA disability claims were reported among personnel with MSI(44.3%) than those without MSI(27.2%; RR=1.54, 95% CI=1.23,1.93). No significant differences were observed between participants with MSI and those with chronic diseases for health service utilisation and number of disability claims.

Conclusion: Military personnel with MSI had significantly higher health service use and disability claims than those with neither MSI nor chronic diseases but were

comparable to personnel with chronic diseases. Hence recognition of the high health service needs of personnel with MSI is important to ensure adequate provision of health services.

Keywords: multisymptom illness, health service use, compensation

INTRODUCTION

Multisymptom illness (MSI), sometimes referred to as chronic MSI or Gulf War illness, is a major health problem among Gulf War veterans. (1) Recent reports have suggested that this condition is also prevalent among personnel returning from more recent Iraq and Afghanistan deployments.(2, 3) The main characteristic among personnel with MSI is the reporting of multiple symptoms that cannot be explained pathologically or by a disease. While there exists evidence on the prevalence of MSI, less is understood about health service use among those with MSI. The existing meagre evidence suggests increased clinic visits among those with MSI compared with those without MSI.(4) However, little is known about other health service use outcomes such as consultations with specialist doctors or allied health professionals (e.g. physiotherapist, chiropractor and social workers).

Although research into MSI has been undertaken for over 20 years, lack of agreement on the aetiology or diagnosis may mean that military personnel with this condition may not be successful in claims for disability compensation as some compensation schemes require a doctor's diagnosis or known aetiology for a claim to be accepted. Disability claims and compensation can also be used as indicators of health status and disability. Therefore, where data is available, it is important to investigate the outcomes of disability claims in military personnel who develop MSI.

Using self-report and linkage data from a longitudinal study of Gulf War veterans and a service, age and rank-matched military comparison group, we compared health service use and disability compensation claims among military personnel categorised into three mutually exclusive groups: personnel with MSI (but without chronic diseases), personnel with chronic diseases (who may or may not exhibit symptom reporting identical to MSI) and personnel with neither MSI nor chronic diseases.

METHODS

Cohort description

In 2000-2003 (Wave-1), a cohort comprising all Australian veterans of the 1990-1991 Gulf War and a military comparison group (military personnel who were serving in the Australian Defence Force at the time of the Gulf War but not deployed to the Gulf War) was compiled. In a follow-up study (Wave-2) (results not shown here) there were no significant differences in health service use between Gulf War veterans and the comparison; and at Wave-1 about one-in-five (16%) participants in the comparison group were classified as having MSI.⁽⁵⁾ Therefore, as the primary research questions in this paper were related to health service utilisation and disability claims among military personnel with MSI (but no chronic diseases) regardless of Gulf War deployment status, herein Gulf War veterans and the comparison group were combined.

Participation at Wave-1 was 66.2%. Details of recruitment were published earlier. (6, 7) In 2010-2011, Wave-1 participants (N=2779) who were not known to be deceased and whose contact information was available, were invited to participate at Wave-2. Participation at Wave-2 was 50%. Female participants comprised about one percent hence only data for male participants are presented. A detailed description of the Wave-2 recruitment process is published elsewhere. (8)

Data collection

At Wave-2, health service use, dispensed pharmaceuticals and disability data for the period 01 January 2001 to 15 August 2012 were obtained through linkages of consenting participants to routinely collected data held by Medicare Australia and the Australian Department of Veterans' Affairs (DVA) (including the Repatriation Pharmaceutical Benefits Scheme, RPBS). Collective data obtained from linkages with these databases included general medical practitioner (GP) consultations, medical specialist doctor consultations and dispensed medications. A questionnaire was also administered to collect additional data that was unavailable through data linkages, including hospital-related visits and visits to allied health professionals (particularly visits to a physiotherapist, hydrotherapist, chiropractor, audiologist, audiometrist, social/welfare worker and alcohol/drug worker visits).

Participants' demographic characteristics, military service, general health and wellbeing (assessed using the mental-health component scale (MCS) and physical-

health component scale (PCS) of the 12-item Short-Form Health Survey; SF-12 (9)), symptom reporting and doctor diagnosed medical conditions were collected at Wave-1 through a postal questionnaire. Psychological outcomes were assessed at Wave-1 using the Composite International Diagnostic Interview (CIDI) version 2.1 according to DSM-IV criteria. (10) Detailed information on the administration of the CIDI has been presented previously. (6)

Data Linkage

Medicare Australia (11) is a Government funded program for all Australian residents and it covers a wide range of healthcare services. The cohort was linked to two of Medicare's databases; the Medicare Benefits Schedule (MBS) (12) and Pharmaceutical Benefits Scheme (PBS). (13) The MBS lists all healthcare services subsidised by the government under the Medicare Scheme. The PBS lists medicines dispensed in Australia at a Government-subsidised price. Data from the RPBS, which contains a list of pharmaceuticals identical to those on the PBS and additional pharmaceuticals that are only dispensed to eligible military personnel, was obtained through data linkage with DVA.

Additionally, the DVA linkage provided data on disability compensation claims, which are claims for compensation that war veterans or military personnel submit to DVA for injuries or diseases or conditions occurring as a result of their military service. It is possible for personnel to submit multiple claims for different conditions

and deployments. The data provided included the date of lodgement, type of disability and the claim decision (accepted/declined). Disabilities were listed under 13 broad disease categories, which were based on Statements of Principles (SOP)(14). SOPs are legislative disease-specific tools that state the factors that must exist to establish a causal connection between military service and a particular disease/injury/death.

Definition of multisymptom illness

The Wave-1 questionnaire contained a 63-item symptom checklist in which participants had to indicate whether they had experienced the listed symptoms in the preceding month. Reporting of these symptoms was used to identify participants with MSI according to a modified Centers for Disease Control and Prevention definition,(15) incorporating the definition presented by Kelsall et al.(2009)(5) and the exclusion criteria suggested by Steele (2000).(16) MSI cases needed to satisfy all of the following criteria:

a) presence of one or more symptoms of at least moderate severity in the month preceding Wave-1 from at least three of four categories namely *fatigue*, *psychophysiological distress* (symptoms: vomiting, nausea, stomach cramps, diarrhoea, wheezing, indigestion, shortness of breath, dry mouth, feeling feverish, swelling of lymph glands, lump in throat, persistent cough, pain on passing urine, constipation, difficulty speaking, dizziness/fainting, loss of balance/coordination, sore throat, flatulence/burping, loss of bladder control, burning sex organs, skin ulcers and loss of

appetite) , *cognitive distress* (symptoms: difficulty speaking, loss of appetite, loss of concentration, feeling distant from others, unrefreshed after sleep, forgetfulness, loss of interest in sex, sleeping difficulties, avoiding things/situations, feeling jumpy, problems with sexual functioning, distressing dreams, irritability, difficulty finding the right word, feeling disoriented, increased sensitivity to noise/light/smells and shaking), and *arthro-neuromuscular distress* (symptoms: stiffness or pain in several joint, general muscle aches, loss of sensation in hands/feet, low back pain, tingling/burning in hands), where the latter three categories were identified through exploratory factor analysis(17); and

b) no medical/psychological conditions in the 12-months preceding Wave-1 participation that may have explained their symptom reporting or interfered with their symptom interpretation. The medical conditions considered were self-reported doctor diagnosis and/or treated medical conditions of cancer, diabetes, heart disease, chronic infections, thyroid problem, liver disease, renal disease, lupus, multiple sclerosis, psoriasis, stroke or injury resulting in hospitalisation for at least five days. Psychological conditions considered were major depression, post-traumatic stress disorder and alcohol use disorder which were doctor diagnosed/treated or CIDI-defined in the 12 months preceding the study participation.

Group definitions

Participants were divided into three mutually exclusive groups on the basis of the MSI definition:

- a) MSI group/cases – participants fulfilling the MSI definition;
- b) chronic disease group – participants who reported ≥ 1 of the conditions listed under the second criterion of the MSI definition. These participants may or may not have symptoms identical to MSI; and
- c) non-MSI group – participants with neither MSI nor chronic diseases.

Statistical analysis

Data were analysed using Stata version 13.1 (StataCorp, Texas, US). Continuous data were reported as means and the group means were compared using unadjusted linear regression. Skewed continuous data were summarised using medians with the lower (Q1) and upper (Q3) quartiles, and between group comparisons were done using unadjusted median/robust regression.⁽¹⁸⁾ Categorical data were reported as percentages and comparisons across the three groups were done using Chi-square method of association.

Level of health service use per group was reported as either recent (occurring in the 12 months preceding Wave-2 participation) or long term (occurring anytime in the 10 years preceding Wave-2 participation). The latter was particularly used for less common outcomes like specialist doctor consultations. For all outcomes, 12 months or 10 years was in reference to the date of interview for CIDI outcomes or questionnaire completion date for all other outcomes. Poisson regression with robust variance estimator ⁽¹⁹⁾ was used to obtain risk ratios (RR), with 95% confidence

intervals (CI), for the comparison of health service use and disability claims in the MSI group with the other two used as reference groups. Models for health service use outcomes were adjusted for branch of service in 1991 (Navy, Army and Air Force) and Wave-1 characteristics; age (<35, 35-39, 40-44, ≥ 45 years), last known rank (officer or non-officer), highest education attained (secondary, certificate/diploma, and undergraduate/postgraduate), smoking status and alcohol use (defined using a cut-off of 10 on the Alcohol Use Disorders Identification Test (AUDIT)). (20, 21) The presence of multiple disability claims per participant was accommodated in regression models by using a clustered sandwich variance estimator(22), with each individual representing a cluster.

Ethics approvals

The study received ethics approval from the Monash University Human Research Ethics Committee, Department of Veterans' Affairs Human Research Ethics Committee, Australian Defence Human Research Ethics Committee and the Department of Human Services External Request Evaluation Committee. Participants provided written informed consent.

RESULTS

Of the 1356 males who participated at both Wave-1 and Wave-2, MSI could be ascertained in 1288 participants and only data for these participants are presented in this paper. Based on data from Wave-1, 160 (12.4%) had MSI, 217 (16.9%) participants had at least one chronic disease or disorder and 911 (70.7%) did not have MSI or chronic diseases.

The average age of participants at Wave-1 was 39.8 years (standard deviation 6.9) and the age distribution was similar across the three groups (Table 1). The MSI group had less Officers and Army personnel than the other two groups while the hazardous alcohol use was highest among those with chronic diseases. Wave-1 general health and wellbeing (based on SF-12 scores) was significantly different across the three groups (Table 1). Separate comparisons of those with MSI against each of the two comparison groups showed that the MCS scores for those with MSI were significantly lower than for the non-MSI group ($P<0.001$) but were comparable to the chronic disease group ($P=0.19$) while PCS scores were significantly lower than those of the comparison groups.

Table 1. Participant characteristics status at Wave-1

	MSI cases (N=160)	Non-MSI group (N=911)	Chronic disease group (N=217)	Differences between the groups
	n(%)	n(%)	n(%)	p-value
Age (years)				
<35	44 (27.5)	233 (25.6)	61 (28.0)	0.73
35-39	35 (21.9)	257 (28.2)	58 (26.7)	
40-44	45 (28.1)	238 (26.1)	52 (24.0)	
≥ 45	36 (22.5)	183 (20.1)	46 (21.2)	
Last known rank				
Non-officer	130 (81.3)	639 (70.1)	163 (75.1)	0.009
Officer	30 (18.7)	272 (29.9)	54 (24.9)	
Branch of service				
Navy	136 (85.0)	697 (79.5)	180 (83.0)	0.02
Army	9 (5.6)	79 (8.7)	20 (9.2)	
Air Force	15 (9.4)	135 (14.8)	17 (7.8)	
Educational attainment				
Secondary school	58 (36.2)	278 (30.6)	81 (37.3)	0.07
Certificate/Diploma	79 (49.4)	449 (49.5)	107 (49.3)	
Undergraduate/Postgraduate	23 (14.4)	180 (19.9)	29 (13.4)	
Smoking status				
Never smoked	68 (42.5)	424 (46.6)	89 (41.0)	0.11
Former smoker	50 (31.2)	312 (34.4)	73 (33.6)	
Current smoker	42 (26.3)	173 (19.0)	55 (25.4)	
Alcohol use				
AUDIT score < 10	120 (75.0)	769 (84.4)	143 (66.2)	<0.001
AUDIT score ≥ 10	40 (25.0)	142 (15.6)	73 (33.8)	
General Health (SF-12): mean (sd)				
Mental health scores	43.8 (10.8)	52.6 (7.8)	42.1 (12.7)	<0.001
Physical health scores	43.2 (10.7)	51.8 (7.1)	46.2 (10.8)	<0.001

Abbreviations: AUDIT= Alcohol Use Disorders Identification Test; MSI=multisymptom illness; SF-12= 12-item Short Form Health Survey

Health Service Utilisation

The majority (N=1106; 86%) of participants gave consent to Medicare and/or DVA linkage. Of these, 64.4% had visited a GP in the 12 months preceding Wave-2 participation. The median number of visits was 4 (Q1=2, Q3=7) for MSI group, 3 (Q1=2; Q3=5) for non-MSI group and 4 (Q1=2, Q3=8) for the chronic disease group ($p<0.001$).

In the 12 months preceding Wave-2 participation, significantly more participants with MSI had at least one GP consultation compared with the non-MSI group, but no significant difference was observed with the chronic disease group (Table 2). A similar pattern was observed with specialist consultations in the 12-months preceding Wave-2 participation. (Table 2) Further analyses comparing trends over time in total number of GP consultations per year from 2001 to 2011 did not show significantly different trends between the MSI group and the two comparison groups ($P=0.150$ for chronic disease group and $P=0.137$ for non-MSI/non chronic disease group).

Table 2 also shows that about a fifth of participants with MSI and a quarter in the chronic disease group had consulted more than one specialist doctor in the past 12-months preceding Wave-2, compared with 10% in the non-MSI group. Similar patterns were observed in the 10-years prior to Wave-2.

In the chronic disease group, 40.9% of participants had symptom reporting that satisfied the first criterion of the multisymptom illness definition (i.e. presence of symptoms). Further comparison in this subgroup did not reveal significant differences in GP consultations (78.1% vs. 70.2%; $RR=1.10$ 95% CI 0.91, 1.32; $P=0.341$), specialist doctor consultations (27.3% vs. 16.5%; $RR=1.45$ 95% CI 0.84, 2.50; $P=0.184$) or allied health professional consultations (60.2% vs. 44.1%; $RR=1.18$ 95% CI 0.87, 1.60; $P=0.275$) in the past 12 months between those with symptoms and those without.

Almost half (46.3%) of MSI cases had received at least one pharmaceutical over the 12 months preceding Wave-2. This proportion was significantly greater than in the non-MSI group but similar to that observed in the chronic disease group (Table 2). The median number of dispensed prescriptions for MSI cases was 12 (Q1=6; Q3=42), 8 (Q1=2; Q3=16) for non-MSI group and 24 (Q1=6; Q3=57) for chronic disease group.

Table 2. General medical practitioner and specialist doctor consultations recorded on the MBS, and dispensed pharmaceuticals recorded on the PBS/RPBS in the period prior to Wave-2

	MSI cases (N=136)	Non-MSI group (N=781)	Chronic disease group (N=189)	MSI vs. non-MSI	MSI vs. chronic disease
	n(%)	n(%)	n(%)	RR ¹ (95% CI)	RR ¹ (95% CI)
At least one GP consultation in the past 12 months	104 (76.5)	469 (60.1)	139 (73.5)	1.24 (1.11, 1.39)	1.04 (0.92, 1.19)
At least one specialist doctor consultation in the past 12 months²					
Dermatologist	6 (4.4)	28 (3.6)	12 (6.4)	1.07 (0.44, 2.59)	0.68 (0.26, 1.79)
Psychiatrist	9 (6.6)	10 (1.3)	17 (9.0)	4.85 (1.98, 11.86)	0.82 (0.37, 1.81)
Gastroenterologist	9 (6.6)	22 (2.8)	9 (4.8)	2.44 (1.12, 5.29)	1.41 (0.55, 3.60)
Neurologist	3 (2.2)	10 (1.3)	6 (3.2)	1.82 (0.50, 6.70)	0.76 (0.21, 2.79)
At least one of dermatologist, psychiatrist, gastroenterologist, neurologist or respiratory physician	25 (18.4)	80 (10.2)	46 (24.3)	1.69 (1.11, 2.58)	0.83 (0.54, 1.28)
At least one specialist doctor consultations in the past 10 years					
Dermatologist	19 (14.0)	96 (12.3)	23 (12.2)	1.14 (0.71, 1.82)	1.07 (0.61, 1.90)
Psychiatrist	18 (13.2)	28 (3.6)	43 (22.8)	3.49 (1.98, 6.16)	0.66 (0.40, 1.11)
Gastroenterologist	29 (21.3)	94 (12.0)	38 (20.1)	1.79 (1.21, 2.65)	1.10 (0.71, 1.72)
Neurologist	15 (11.0)	39 (5.0)	29 (15.3)	1.96 (1.07, 3.60)	0.75 (0.41, 1.36)
Respiratory physician	19 (14.0)	61 (7.8)	28 (14.8)	1.70 (1.04, 2.80)	1.06 (0.61, 1.86)
At least one of dermatologist, psychiatrist, gastroenterologist, neurologist or respiratory physician	62 (45.6)	243 (31.1)	96 (50.8)	1.44 (1.16, 1.79)	0.94 (0.74, 1.19)
Consulted with ≥2 specialists in the past 10 years	27 (19.9)	59 (7.6)	45 (23.8)	2.50 (1.60, 3.90)	0.93 (0.60, 1.43)
At least one pharmaceutical dispensed in past 12 months	63 (46.3)	230 (29.5)	91 (48.2)	1.48 (1.19, 1.86)	0.98 (0.78, 1.24)

Abbreviations: GP=general practitioner; MBS=Medicare Benefits Schedule; MSI=multisymptom illness; PBS=Pharmaceutical Benefits Scheme; RPBS=Repatriation Pharmaceutical Benefits Scheme.

¹ RR adjusted for age, rank, branch of service, education, smoking status and alcohol use at Wave-1.

² Data for respiratory physicians not included because of very small numbers.

In addition to medical consultations listed in Table 2, significantly more participants in the MSI group than the non-MSI group had at least one consultation with an allied health professional but there were no significant differences with the chronic disease group (Table 3). Table 3 shows that hospital-related visits, including hospitalisations, were significantly higher in the MSI group than the non-MSI group but comparable with the chronic disease group.

Table 3. Self-reported allied health professional consultations and hospital-related visits in the 12-months prior to Wave-2

	MSI cases (N=160)	Non-MSI group (N=911)	Chronic disease group (N=217)	MSI vs. non- MSI	MSI vs. chronic disease
	n(%)	n(%)	n(%)	RR (95% CI)	RR (95% CI)
Consultations with allied health professionals¹	76 (47.5)	325 (35.7)	109 (50.2)	1.37 (1.13, 1.65)	1.01 (0.82, 1.24)
Hospital related visits					
At least one hospitalisation	36 (22.8)	105 (11.6)	55 (25.7)	2.01 (1.44, 2.80)	0.89 (0.61, 1.29)
At least one outpatients visit	33 (21.7)	120 (13.5)	54 (25.5)	1.58 (1.11, 2.25)	0.91 (0.62, 1.33)
At least one casualty/emergency department visit	31 (20.3)	102 (11.5)	43 (20.4)	1.66 (1.14, 2.40)	1.03 (0.68, 1.56)
At least one day clinic visit	73 (46.8)	265 (30.0)	92 (43.4)	1.56 (1.28, 1.90)	1.07 (0.85, 1.35)

Abbreviations: MSI- multisymptom illness

¹ Allied health professionals were physiotherapist, hydrotherapist, chiropractor, audiologist, audiometrist, social/welfare worker, alcohol/drug worker

Disability claims

Disability claims data were available for those consenting to DVA linkage (MSI group N=131, 82%; non-MSI group N=758, 83%; chronic disease group N=185, 85%). Half of participants with MSI submitted a disability claim (50.4%) which was one-and-a-half times more than the non-MSI group (29.0%; RR=1.63; 95% CI=1.33, 2.00) but not

significantly different to that in the chronic disease group (40.5%; RR=1.17; 95% CI=0.92, 1.49). Most of those who submitted claims had at least one successful claim (87.9% in MSI group, 93.6% in non-MSI group and 92.0% in chronic disease group; $p=0.288$). consequently, significantly more MSI cases (44.3%) had submitted at least one successful disability claim in the period 2001-2012 compared with 27.2% in the non-MSI group (RR=1.54; 95% CI=1.23, 1.93) and 37.3% in the chronic disease group (RR=1.13; 95% CI=0.86, 1.47). The median number of successful claims in the MSI group was four (Q1=1; Q3=7) compared with three (Q1=2; Q3=5, $P=0.043$) in non-MSI group and four (Q1=2; Q3=6, $P>0.999$) in chronic disease group. Over the follow-up period, there were a total of 2095 disability claims. About one fifth (21.3%) of the total claims were made by the MSI group, while 54.6% were made by the non-MSI group and 24.1% were from the chronic disease group. Musculoskeletal/connective tissue disorders and nervous system/sensory organ related disabilities were the most common disabilities claimed for. (Table 4) The majority (82.2%) of nervous system/sense organs related disability claims were for hearing loss and tinnitus.

Table 4 shows that in all three study groups, about two-thirds of the submitted disability claims were accepted. The proportion of accepted claims differed by type of disability claimed ($P<0.001$). Of the seven most commonly reported disabilities, the highest acceptance rates were for skin/subcutaneous tissue, neoplasms and nervous system/sensory organs. Lower acceptance rates were found for mental disorders and digestive system disorders. With the exception of mental disorders, the proportion of accepted claims in the MSI group was similar to the other two groups.

Table 4. Comparison of claim acceptance rate by type of disability

	Submitted claims				Accepted claims				
	All claims	MSI cases	Non-MSI group	Chronic disease group	All claims (%)	MSI cases (%)	Non-MSI group (%)	Chronic disease group (%)	Comparison between groups (χ^2 p-value)
Submitted claims	2,095	446	1,144	505	67.2	65.9	68.4	65.9	0.38
Type of disability									
Musculoskeletal/Connective tissue	463	108	285	70	73.4	81.5	70.5	72.9	0.09
Nervous systems/sense organs	292	62	175	55	88.0	85.5	88.0	90.9	0.67
Mental disorders	100	17	39	44	56.0	64.7	69.2	40.9	0.03
Injury	85	15	62	8	77.7	86.7	77.4	62.5	0.43
Skin/Subcutaneous tissue	80	17	47	16	88.8	94.1	85.1	93.8	0.47
Digestive system	60	15	32	13	43.3	33.3	43.8	53.9	0.55
Neoplasms	50	8	30	12	88.0	100.0	90.0	75.0	0.21
Other	113	28	62	23	48.7	39.3	48.4	60.9	0.31
Not stated ¹	852	176	412	264	57.8	50.6	58.7	61.0	--

Abbreviations: MSI- multisymptom illness

¹ Data on type of disability claim was missing from data collected through linkage but cannot be inferred as missing in the whole database.

Figure 1 shows that the proportion of disabilities in accepted claims (equal to number of accepted claims for a disability divided by number of total accepted claim in the group) was similar across the three groups, except for musculoskeletal/connective tissue claims which were significantly more common in the MSI group than the chronic disease group (RR=1.37, 95% CI=1.04, 1.81) and mental disorder claims which were significantly less common in the MSI group than the chronic disease group (RR=0.33, 95% CI=0.17, 0.66).

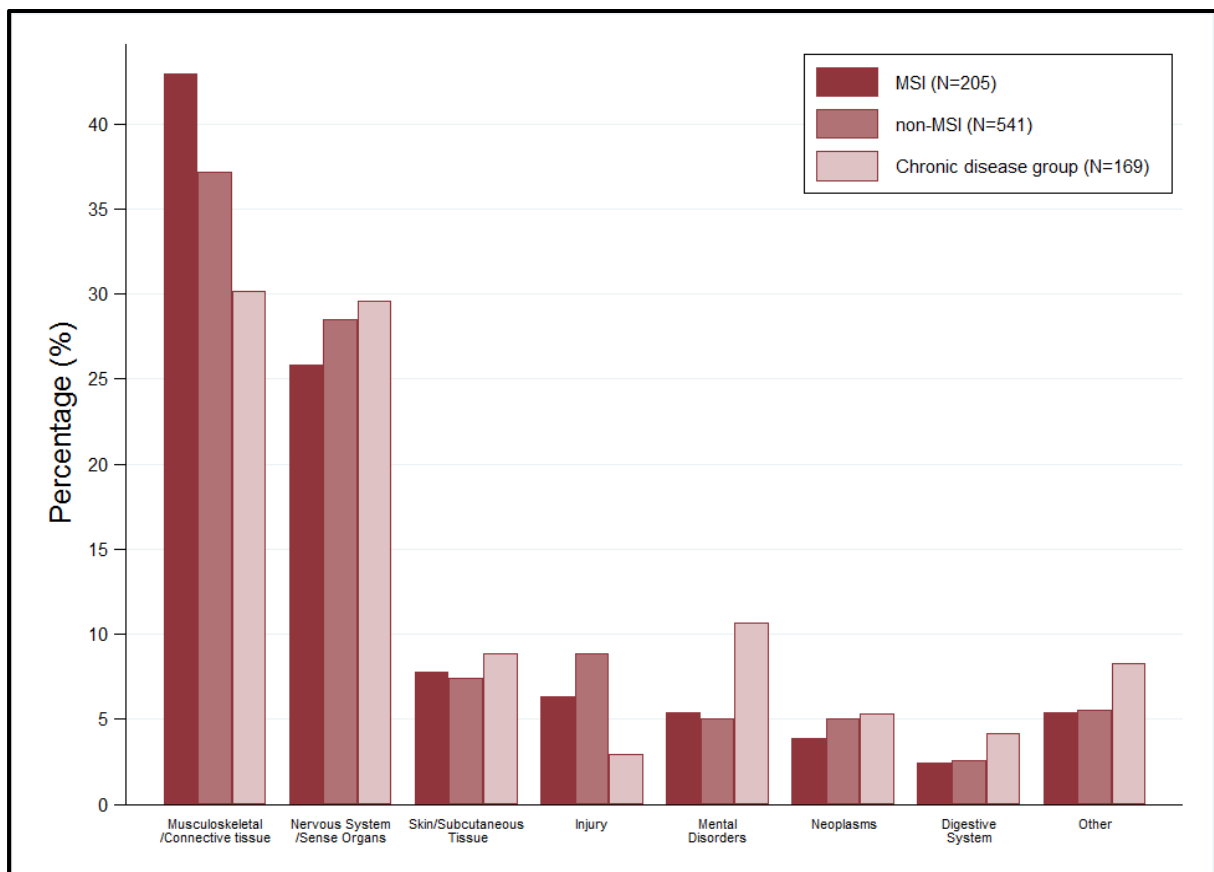


Figure 1. Proportion of the total number of accepted disability claims approved for the different types of disabilities, separated by study groups (N= total number of accepted claims)

DISCUSSION

This study assessed and compared health service utilisation among military personnel with MSI, compared with a non-MSI group and a chronic disease group, using linkages to national healthcare and veteran disability databases and self-reported data. Overall, health service use based on GP, specialist doctor and allied health consultations, and dispensed pharmaceuticals was increased in those defined as having MSI compared with those with neither MSI nor chronic disease. Health service use in those with MSI was similar to that of the chronic disease group.

Much of the research on health service use in veterans has not addressed health service use specifically for MSI cases but an earlier US study (4) among Gulf War veterans only found that MSI cases were more likely to have visited a clinic at least once in the previous 12 months and had more prescription medication, compared with those without MSI. This study's findings of elevated levels of health service use among those with MSI, which include both physical and mental health specialist use, extends previous findings from this cohort which indicated increased physical and psychological morbidity among those with MSI.(23) In addition, the increased health service use, together with the lower SF-12 scores, in this group, highlights that the general health and wellbeing of those with MSI was poorer than that of participants with neither MSI nor chronic diseases, similar to what was observed in the US study by Blanchard et al. (2006).(4) However, exploration of further development of chronic disease(s) in any of the three study groups was not possible through the data

available in this study; for instance, information on treatment received by participants and the chronology of disease/treatment/compensation was unavailable to the study.

The similarities in health service use by those with MSI and those with chronic diseases suggests that the health services for personnel with MSI could be designed or developed in line with a health management framework for chronic conditions such as the World Health Organisation's Innovative Care for Chronic Conditions (2002).(24) Such a framework can allow shared and improved understanding of risk factors, disease determinants, and coordinated multi-disciplinary provision of health services. Lange et al. (2013)(25) have also advocated for the need for a multidisciplinary team approach to management of MSI, emphasising that such an approach would benefit not only the health system, but also the military personnel themselves. The combined need for multidisciplinary teams highlights the importance of ensuring that collaborations between clinicians are supported and developed as some clinicians highlight this as a potential inhibitor in offering patients the best care.(26) Furthermore, the similarity between the MSI and chronic disease groups in health service use could indicate the complexities inherent in the diagnosis of MSI and treatment or medical care for patients with MSI. Therefore, establishing patient-centred care could aid deeper understanding of the condition and improved patient outcomes.(27)

There is scarce published information on the levels of disability compensation sought after or received by military personnel with MSI. Our study showed that the

proportion of those with MSI who had submitted a disability claim was significantly higher than that of participants with neither MSI nor chronic diseases but comparable with the chronic disease group; which was consistent with findings on health service use in these groups. However, when we assessed each claim, there were no important differences across the three groups with regards to proportion of submitted claims that were successful and the types of disabilities listed in the accepted claims. This suggests that no broad category of diseases or conditions were prominent in the MSI group. These findings also support previous findings of epidemiological studies (28, 29) and factor analyses (30, 31) conducted among Gulf War veterans which showed that the unexplained symptomatology and/or MSI reveals no specific disease/disorder. Although musculoskeletal/connective tissue related disability claims were the most common in all three study groups, the proportion was significantly higher for MSI cases. An explanation could be that the disease group constitutes many diseases/conditions that may be used to classify patients with medically unexplained symptomatology, conditions such as fibromyalgia and arthritis.

A strength of this study was the combination of objective linkage health data (from Medicare Australia and the Department of Veterans' Affairs) and self-reported data on health service use and disability claims. The use of the linkage data dealt with the possible recall bias problem faced when using self-reported data. Medical diseases/conditions were self-reported therefore reporting bias is still plausible, but however with a minimal effect as caseness was only defined after data collection and

participants were not aware of the group they fell under. An additional strength of this study was that we used two comparison groups which allowed us to compare the MSI group with a healthier group (non-MSI group) and an unhealthy group (chronic disease group). This paper also addresses health service use measures (i.e. specialist medical doctor consultations, hospital services utilisation other than hospitalisation as well as consultations with allied health professionals) and disability compensation which have not been previously explored in military personnel with MSI.

A further strength of the paper was the use of a stringent definition of MSI which aided in reducing classification bias in MSI definition by separating out participants who had chronic diseases/illnesses that could distort their symptomatology. The list of exclusionary medical conditions used for the MSI definition were based on those medical conditions previously utilised by Steele (2000)(16) and were also available in our study. Given so, it is possible that some participants with conditions such as dementia and neuromuscular disease could have been missed. However, given the comprehensiveness of the list used in defining MSI, the majority of participants with conditions that were likely to influence their symptom reporting were most likely to have been captured.

A limitation of the study was the relatively low participation at Wave-2. However, previously published tests of participation bias based on comparing Wave-1 characteristics (SF-12 scores and symptomatology) of Wave-2 participants and non-participants did not reveal significant differences in the health of the two groups.(8,

32) Although there was further minor attrition because some participants did not provide consent to Medicare and DVA linkages, the majority of Wave-2 participants had consented to the linkage. Additionally, it is possible that some specialist medical doctor consultations were not identified in the data if the costs were borne by participants and not claimed through Medicare. However, the effect of this linkage bias is likely to be very limited and even so for general practice consultations as the majority of these consultations are subsidised by Medicare.

In summary, we found significantly increased health service use and disability compensation claims in military personnel with MSI compared to those with neither MSI nor chronic diseases. However, we also found that health service use and disability compensation claims overall were similar in those with MSI and those with chronic diseases based on objective and self-reported data. These results indicate that health service use for personnel with MSI is high and further research would be required to assess this group's access to and adequacy of available health services. The MSI group also accessed a combination of physical and mental health services indicating the need for coordinated and multidisciplinary healthcare provision, with a combination of health services that can cater for both physical and mental health. Furthermore, tools such as SEQUenCE, which is a reliable tool for evaluating quality of care/service at an individual level, could be used to ensure suitability of services provided.(33) In May 2014, a Statement of Principles (SOP) for MSI was introduced for Australian military personnel.(14) Hence data relating to this SOP was unavailable when the data linkage for this study was conducted. Future research would need to

consider an assessment of disability compensation among MSI cases post introduction of this SOP.

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CONFLICT OF INTEREST None declared.

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Chapter 8: Discussion and Conclusions

8.1 Summary of findings

This thesis brings together and highlights some important evidence on the health of Australian Gulf War veterans and how it has changed over time. The findings show that Gulf War veterans' symptom reporting increased over time, and was still worse than that of a military comparison group although the prevalence gap between the two study groups observed at Wave-2 was similar to that observed at Wave-1. The high symptom reporting indicates both psychological and physical morbidity as shown by elevated incidence of both psychological and physical conditions among those with high symptom reporting and the finding that military personnel with multisymptom illness accessed a mixture of health services for both psychological and physical conditions.

Most symptoms reported by Gulf War veterans and the comparison group at the initial assessment (Wave-1) were highly correlated with other symptoms, forming three symptom groups representing psychophysiological distress, somatic distress and musculoskeletal distress. This pattern of symptom reporting with these three groupings was similar to that observed at Wave-2. The pattern also showed that in all three symptom groupings, Gulf War veterans' symptom reporting increased over time and was higher than that of the comparison group. However, Gulf War veteran's psychophysiological symptom reporting increased while no significant changes were observed in the comparison group. In addition, no significant differences between the two groups were observed for somatic distress and musculoskeletal distress symptom groupings.

The research presented herein also indicates that even though the pattern of symptom reporting was unchanged over time, in the longer term the high symptomatology was associated with higher incidences of chronic diseases such as cardiovascular disorders and psychiatric disorders. In addition, Gulf War veterans with high symptom reporting also reported highest levels of obesity and alcohol consumption. The prevalence of obesity significantly increased over time whilst the prevalence of smoking halved, regardless of levels of symptom reporting. The prevalence of high alcohol consumption only increased for veterans with low-moderate symptom reporting, and not for those with high symptom reporting. However, the changes in prevalence of lifestyle risk factors were similar across levels of symptom reporting.

The multisymptom illness systematic review consolidated research on Gulf War veterans from multiple countries. The review showed that the odds of multisymptom illness were much greater in Gulf War veterans than the comparison group. In our Australian cohort, we found that those military personnel with multisymptom illness (but no chronic diseases) had considerably higher health service use than those without multisymptom illness (and no chronic diseases) and was similar to that of military personnel with chronic diseases (with/without multisymptom illness). These health services included general practitioner consultations, medical specialist doctor consultations, consultations with allied health professionals, hospitalisations and other hospital related visits. Similar relationships were also observed with disability compensation claims, where those with multisymptom illness alone had significantly more claims than those without multisymptom illness and chronic diseases but disability compensation for those with multisymptom illness was comparable with that of military personnel with chronic diseases.

8.2 Discussion

Detailed discussions of findings from each results chapter are presented within those chapters but there are some major points across the different chapters that require further highlighting. Symptom reporting amongst Gulf War veterans is complex with a multitude of symptoms, over 63 symptoms investigated in this study, some of which meet the diagnostic criteria for some diseases such as chronic fatigue, PTSD,

depression, fibromyalgia but others cannot be explained by specific diseases/conditions.

Continued high symptom reporting more than 20 years post-war and the elevated health service use observed among those with multisymptom illness so long after the Gulf War, indicates that the symptomatology maybe permanent or may take long to resolve rather than transient. Similar findings of long term persistence of health outcomes (particularly anxiety, PTSD and depression) in military populations have also been reported among Korean War veterans, 50 years post-war.⁽⁸⁴⁾ Therefore symptomatology poses a considerable health burden on affected military personnel.

However, the finding that the prevalence gap between Gulf War veterans' and comparison groups' symptom reporting did not change over time suggests that the observed increases in symptom reporting may be associated with increasing age of veterans rather than with Gulf War deployment. The findings of this research which showed that of the three groupings of symptoms, i.e. factors, significant differences between Gulf War veterans and the comparison group were only observed for the psychophysiological distress factor, ⁽⁸⁵⁾ demonstrates that psychophysiological changes in Gulf War veterans could possibly play a role in the increasing symptomatology and higher incidence of chronic diseases among those with high symptomatology.

The literature contains mixed evidence ^(39, 40, 42, 85, 86) on whether symptom reporting among Gulf War veterans represents a disease or condition that is specific to Gulf War veterans, but the findings of similar patterns of symptom reporting by Gulf War veterans and the comparison group at both study waves shows that there is no unique syndrome in Gulf War veterans. However, regardless of the similar patterns of symptom reporting between groups, symptom reporting across all three factors was more common among Gulf War veterans than the comparison group.

However, it is of concern that the high symptom resulted in incidences of chronic diseases at a higher rate than would be expected among those with moderate to low symptom reporting. Whether the increased incidence of diseases is a result of allostatic loading⁽⁸⁷⁾ from symptomatology or is an indication of delayed onset chronic disease is worth further investigation. Allostatic loading refers to the wear and tear of the body and brain caused by homeostasis that results from fighting stress hormones and mediators which would have been triggered by exposure to long periods of chronic stress. On the other end, delayed onset of diseases occurs when diseases manifest a while after encounter with an exposure (i.e. later than usual) and the lengths of time between exposure and disease manifestation may vary by condition. For example, delayed onset of PTSD is defined as PTSD occurring six months or more after encounter with the stressor⁽⁶³⁾ while delayed onset depression maybe defined for depression diagnosis occurring three or more months after trigger⁽⁸⁸⁾ if the depression assessed as absent in the earlier periods. The high incidence of chronic diseases is likely to also be associated with high health service use and disability

compensation claims. Therefore recognition of these longer term trajectories of high symptom reporting are important for management or treatment of high symptom reporting or multisymptom illness.

As there is scarce literature on the longer term consequences of high symptom reporting among Gulf War veterans and other military personnel, or of longer term effects of medically unexplained symptoms report in the general population⁽⁸⁹⁾; literature comparing the incidence of chronic diseases among Gulf War veterans and other military personnel can provide some insight into the possible longer term effects of symptom reporting. International studies carried out after the Gulf War showed excess prevalence of some chronic diseases such as arthritis, colitis, gastritis and hypertension among Gulf War veterans compared with other military personnel but no excess prevalence was observed for other conditions such as diabetes and stroke. ⁽⁸⁻¹⁰⁾ The results from these studies indicated that some of Gulf War veterans' symptomatology was sufficient enough for disease diagnosis, but still residual symptomatology remained. Following an initial assessment, a longitudinal study of Gulf War veterans from a US cohort found a higher incidence of each of arthritis, hypertension and coronary artery disease at follow-up.⁽⁶⁰⁾ These results together with our findings strongly support the notion of delayed onset disease among Gulf War veterans with high symptom reporting.

An important finding from the research presented in this thesis was the change in lifestyle risk factors over time. This is particularly important as lifestyle risk factors such as high alcohol consumption ⁽⁹⁰⁾ can have an impact on psychophysiological stress. Management of lifestyle risk factors is also important for the prevention and management/control of many diseases and conditions. In my research it was found that those veterans with high symptom reporting also had the highest levels of obesity and alcohol consumption at Wave-2 compared with those with lower symptom reporting. Although this research was could not assess the direct relationships between symptom reporting and lifestyle risk factors because of the design of our study, increased levels of unhealthy lifestyle risk factors can exacerbate existing conditions, increase symptom reporting or result in increased incidence of chronic diseases. For example, uncontrolled alcohol use is known to worsen PTSD symptoms,⁽⁹¹⁾ musculoskeletal pain is reportedly higher among smokers and ex-smokers compared with non-smokers⁽⁹²⁾, and both PTSD and musculoskeletal problems are more prevalent among those with high symptom reporting.

The symptom reporting among Gulf War veterans or military personnel with multisymptom illness spanned both physical and psychological health outcomes and no specific disease was prominent; as shown by Gulf War veterans higher prevalence of symptom reporting across the whole range of symptoms and symptom patterns than the comparison group, the elevated incidence of several psychological and physical diseases/conditions among those with high symptom reporting; the use of a wide range of health services for both physical and psychological health as well as

compensation sought for a wide range of disabilities. This all demonstrates that Gulf War veterans' symptom reporting is multifaceted and similar to medically unexplained symptoms; as it may result in considerable health care costs and it additionally it poses a great challenge to treating physicians as they get frustrated that they are unable to help their patients, therefore affecting the health care services offered.⁽⁸⁹⁾

While this research focused on Gulf War veterans, it is important to note that the findings from this research may be applicable to other military personnel, particularly veterans from the more recent deployments to the Middle East. Recent epidemiological studies among Afghanistan War and Iraq War veterans indicate that symptomatology and multisymptom illness are prevalent in these groups.^(38, 49) In addition, the research presented in this thesis and research from other international cohorts,^(34, 41, 53, 80, 93) indicates that symptomatology and multisymptom illness exist among other military personnel not deployed to the Gulf War, although being less prevalent than in Gulf War veterans. Therefore the design of policies, psychosocial and health services to cater for Gulf War veterans in poor health over the long term should recognise that the condition is also found in groups other than Gulf War veterans and assessment of multisymptom illness should be extended to all veterans of current and future deployments.

8.3 Strengths and limitations of this research

One of the major strengths of this research was the longitudinal design which allowed the exploration of research questions that had not been addressed previously in Gulf War veterans' health research. With the use of a comparison group, we were able to show that the levels of symptomatology and the prevalence of multisymptom illness observed in Gulf War veterans is great than that which could be expected among military personnel. Another strength of the study was that all Gulf War veterans were invited to participate at Wave-1 and participation was good, hence population estimates were obtained. This research is also one of the first studies of war veterans to link questionnaire data to Medicare and DVA's administrative data. The linkages to these datasets provided more objective measures of Gulf War veterans' health and health service utilisation, and helped to overcome possible recall bias when using questionnaire data alone.

Nevertheless, the research also had its limitations. While participation at Wave-1 was high, the second wave of the study had a participation rate of 50%, which reduced the power of the study to observe statistically significant differences for some rare outcomes. However, assessments of participation bias conducted at both Wave-1 and Wave-2 revealed no substantive differences in characteristics and health outcomes of participants and non-participants.^(9, 85) The time difference between the first and second wave was relatively long, 10 years, therefore some health outcomes that could have occurred over the ten year, particularly those that were transient, might have

been missed. However, unlike the other studies among Gulf War veterans that had short follow-up periods therefore limiting their ability to assess longer term effects and trajectories of high symptom reporting, our study being one of the first to be conducted than two decades post-Gulf War provided the opportunity to investigate these effects. The Australian cohort of Gulf War veterans was predominantly Navy, therefore reducing its applicability to other international Gulf War veterans' cohorts that have a smaller proportion of personnel from the Navy.

8.4 Implications of this research

The high and increasing symptom reporting among Gulf War veterans calls for greater attention to the management of Gulf War veterans' health. There is a need to ensure that policies and programs are in place that support the recognition of Gulf War veterans' symptom reporting and multisymptom illness; policies and programs that ensure the veterans continue to receive appropriate and effective treatment and also that both symptom reporting and multisymptom illness are monitored among veterans from other deployments. Continued support of veterans through health management programs are imperative so as to strengthen and encourage veterans to maintain healthy lifestyles by stopping smoking, increasing physical activity and controlling alcohol consumption. This is particularly important in situation where veterans have separated from the military and civilian medical practitioners and other health care providers may not appreciate the persistence of these problems.

This research's finding of increasing symptom reporting and chronic disease prevalence calls for continued assessment and monitoring of Gulf War veterans' health. This being one of the first studies looking into future prognosis of high symptom reporting, it is important that future research investigates in other cohorts how symptom reporting may result in a higher incidence of chronic diseases, as well as the risk factors for this and pathways by which it may occur. These may include investigations into the aspect of allostatic loading resulting from high symptom reporting and multisymptom illness. Further research is also required to assess accessibility of health care services to Gulf War veterans with high symptom reporting and/or multisymptom illness.

There is an emerging literature on the characteristics of veterans seeking disability compensation and more research is required to better inform disability compensation patterns. A Statement of Principle (SOP) for MSI was added in 2014 to the list of compensable conditions for Australian military personnel, ⁽⁹⁴⁾ and this was after data linkage for our research, so this SOP could not be included in this research. The SOP states the conditions that must be present for military personnel to be eligible for DVA compensation for multisymptom illness. The addition of the SOP therefore allowed Gulf War veterans with multisymptom illness to receive compensation for multisymptom illness. Further research is therefore required to assess Gulf War veterans' disability compensation claims where the claimed disability falls under this SOP.

8.5 Conclusions

To conclude, the health of Gulf War veterans has worsened over time. While this research found no clear evidence of a unique disease among Gulf War veterans, Gulf War veterans, particularly those with high symptomatology, suffer from a greater incidence of several psychological and physical health conditions/diseases. The similarity in health service use by those with multisymptom illness and those with chronic diseases indicates that multisymptom illness cannot be ignored, nor can its impact on Gulf War veterans and the health care system. It is imperative that all involved in managing Gulf War veterans' health, including Gulf War veterans themselves, their families, DVA, the Department of Defence, health service planners and providers, acknowledge the health burden of symptom reporting and multisymptom illness amongst these veterans. The nature of health problems and health care needs of Gulf War veterans is likely to be complex, hence multidisciplinary teams or collaborative care may be required to provide for them the most appropriate health care and support.

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Appendices

Appendix A: Wave-1 Consent form



INFORMED CONSENT STATEMENT

Gulf War Veterans Health Study

I agree to take part in the Gulf War Veterans Health Study. I have had the aims of the project, and the procedures therein, satisfactorily explained to me and I have had the opportunity to read and ask questions arising from the Explanatory Statement. In signing this consent form I am declaring the following:

1

I have read and understand the information about the Study and have had explained to me the aims of this research project, and the procedures in which I will be involved.

I understand that I will need to devote time to completing the various parts of the study including a self-administered questionnaire and a medical examination.

I understand that I will have blood taken for testing.

I understand that there are some inconveniences and risks involved in participation including potential emotional distress, associated with answering questions about my Service or life experiences, and mild discomfort associated with procedures such as skin testing, fitness testing, breathing tests and blood sampling.

I understand that I am participating in this project in a voluntary capacity and that I can withdraw at any time. This withdrawal will be without penalty or detriment to career or hindrance to future medical care.

I understand that if any medical condition, requiring further investigation or treatment, is found as a result of the medical examination, the appropriate feedback will be provided to me or to my nominated medical practitioner.

I am co-operating in this project on condition that:

- the information I provide and results of my assessments will be kept confidential and only used for this project.
- the research reports will be made available to me at my request and
- any published reports of this study will preserve my anonymity

2

I agree that a sample of my blood serum may be stored indefinitely for potential and further medical research. This serum can not be used for any such purpose without my further specific written consent.

3

I agree that the researchers may check the records of the National Cancer Registry and National Childhood Malformations Registry against information I provide about my childrens' health.

4

I agree that the researchers may check my name against the records of the National Cancer Registry and National Deaths Registry.

5

I also agree that the researchers may obtain my Australian Defence Force medical record.

I consent to all of the above points 1 to 5.

Name..... HSA Witness

Signed...../.../... Signed...../.../...

OR

I consent to all of the above points except number/s _____ (please specify).

Name..... HSA Witness

Signed...../.../... Signed...../.../...

Appendix B: Wave-2 Consent form

PARTICIPANT CONSENT FORM *Australian Gulf War Veterans' Health Study 2011 Follow Up*

Important information

Complete this form to consent to participation in the Australian Gulf War Veterans' Health Study 2011 Follow Up by completing the postal questionnaire and telephone interview; and to request the release of DVA health data, and Medicare, Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS) claims information to the Australian Gulf War Veterans' Health Study 2011 Follow Up; or to indicate that you do not wish to participate in the Study.

Any changes to this form must be initialed by you, the signatory. Incomplete forms may result in the study not being provided with your information.

By signing this form, I acknowledge that:

1. I have read and understood the information about the Study as outlined in the Explanatory Statement. I have had the opportunity to ask questions and am fully informed about the Study.
2. I understand that participation in the Study is voluntary, that I can choose not to participate in part or all of the Study, and that I can withdraw at any time without penalty or detriment to career or hindrance to future medical care.

PARTICIPANT DETAILS

Mr ☐ Mrs ☐ Miss ☐ Ms ☐ Other ☐

Family name:

First given name: _____ Other given name (s): _____

Date of birth:

D	D
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M	M
---	---

Y	Y	Y	Y
---	---	---	---

Permanent address:

Postal address (if different to above):

To consent to participate in the entire study, please tick all of boxes 1, 2 and 3 below. Alternatively, please tick the boxes for the parts of the study that you agree to.

1. ☐ *I agree to participate in the Australian Gulf War Veterans' Health Study 2011 Follow Up by completing the postal questionnaire and telephone interview.*

AND

2. ☐ *I agree to DVA providing my DVA health data to the Australian Gulf War Veterans' Health Study 2011 Follow Up for the period 01/01/2001 to 31/12/2031.*

(If you have ever had a DVA file number, please provide one here.)

DVA file number if available

AND

3. ☐ *I authorise Medicare Australia to provide my Medicare, PBS and RPBS claims history to the Australian Gulf War Veterans' Health Study 2011 Follow Up for the period 01/01/2001 to 31/12/2031.*

My Medicare card number is:

--	--	--	--	--

7

Ref no.

9

OR

- ☐ *None of the above; I do not wish to participate in any part of the study.*

DECLARATION

DECLARATION
I declare that the information on this form is true and correct.

_____/_____/20____
Signature date

Signature

date

A sample of the information that may be included in your Medicare claims history:

Date of service	Date of Processing	Item number	Item description	Provider charge	Schedule Fee	Benefit paid	Patient out of pocket	Bill type
20/04/09	03/05/09	00023	Level B consultation	\$38.30	\$34.30	\$34.30	\$4.00	Cash
22/06/09	23/06/09	11700	ECG	\$29.50	\$29.50	\$29.50		Bulk Bill

Scrambled ordering Provider number*	Scrambled rendering Provider number*	Date of referral	Rendering Provider postcode	Ordering Provider postcode	Hospital indicator	Provider derived major speciality	Item category
	999999A		2300		N	General Practitioner	1
999999A	999999A	20/04/09	2300	2302	N	Cardiologist	2

A sample of the information that may be included in your PBS claims history:

Date of supply	Date of prescribing	PBS item code	Item description	Patient category	Patient contribution	Net Benefit	Scrambled Prescriber number*
06/03/09	01/03/09	03133X	Oxazepam Tablet 30mg	Concessional Ordinary	\$5.30	\$25.55	9999999
04/07/09	28/05/09	03161J	Diazepam Tablet 2mg	General Ordinary	\$30.85		9999999
Pharmacy postcode	Form Category	ATC Code	ATC Name	Prescriber derived major speciality			
2560	Original	N05 B A 04	Oxazepam	General Practitioner			
2530	Repeat	N05 B A 01	Diazepam	Psychiatrist			

* Scrambled Prescriber number refers to a unique scrambled prescriber number identifying the doctor who prescribed the prescription. Generally, each individual prescriber number will be scrambled and the identity of that prescriber will not be disclosed.

Appendix C: Wave-1 questionnaire

STUDY NUMBER



GULF WAR VETERANS' HEALTH STUDY

PARTICIPANT QUESTIONNAIRE

OFFICE USE ONLY	
PRE EXAM.	<input type="checkbox"/>
POST EXAM	<input type="checkbox"/>

THANK YOU
for participating in the Gulf War Veterans Health Study

Please read the following instructions regarding the completion of this questionnaire.

1. This questionnaire is to be completed by both Gulf War Veterans and other serving or former ADF members, who did not deploy to the Gulf War, but who have been invited to participate in the Gulf War Veterans' Health Study.
2. For the purpose of this study, **YOU ARE A GULF WAR VETERAN IF you were deployed in support of the Gulf War during the period of 2nd August 1990 to 4th September 1991 as part of ADF Operation Ozone, Operation Damask and Operation Habitat, or with overseas forces as part of Desert Shield and Desert Storm.**

The Gulf War Veteran Group does NOT include:

- i) those personnel who were on other Defence duties in the Middle East at the time,
- ii) personnel deployed in support of Operation Blazer after 4th September 1991,
- iii) personnel deployed in support of Operation Damask after 4th September 1991.

If you are not sure whether you are a Gulf War Veteran, or are not a Gulf War Veteran, according to the above definition, the names of all those included in this Study's Gulf War Veteran group are published in the Gulf War Nominal Roll. The Nominal Roll can be viewed at <http://www.dva.gov.au/commem/nomroll/gulf/index.htm>. Alternatively you could call 1800 502 302 to check if you are included.

3. When completing the questionnaire please **TICK** ☒ **ONLY** those boxes corresponding to your answers.

Please **DO NOT** place crosses ☒ in the boxes or circle the boxes ☐

RIGHT *WRONG*

4. Parts of the questionnaire are complicated to complete. Please be sure to read each question, and its instructions, **VERY CAREFULLY**.
5. Please be sure to ring the Study team if you are unsure about how to complete any section of this questionnaire. The freecall number is **1800 062 534**. Please call any time during business hours, Monday to Friday.

Question 1.

For the purpose of this study do you regard yourself as a Gulf War Veteran or NOT a Gulf War Veteran? Please refer to the definition provided on the previous page if you are not certain.

Please tick one.

- ☐ **I am a Gulf War Veteran**
 - You should complete ALL sections of this questionnaire.
 - Some tables in this questionnaire have columns labeled "Everyone" and columns labeled "GW Vets only"; you should complete BOTH columns where applicable.

- ☐ **I am NOT a Gulf War Veteran**
 - You should complete ALL sections of this questionnaire EXCEPT section C and any other questions marked "Gulf War Veterans Only"
 - Some tables in this questionnaire have columns labeled "Everyone" and columns labeled "GW Vets only"; you should complete ONLY the columns labeled "Everyone".

SECTION A: PERSONAL DETAILS

We have some general questions to begin with.

A1. Are you male or female? ☐ Male ☐ Female

A2. What is your date birth? ____ / ____ / 19 ____
day month year

A3. In which country were you born?

☐ Australia → please specify which State or Territory _____

☐ UK & Ireland

☐ Italy

☐ Greece

☐ Netherlands

☐ Germany

☐ New Zealand

☐ Malaysia

☐ USA

☐ Canada

☐ South Africa

☐ Other _____
please specify

A4. If NOT Australian born, what year did you first arrive in Australia 19 ____

A5. Do you regard yourself as being of Aboriginal or Torres Strait Islander origin? ☐ NO ☐ YES

A6. What language do you usually speak in your household

☐ English

☐ Other _____
please specify

A7. What is your current marital status? **Choose one.**

☐ Married

☐ De facto

☐ Separated

☐ Divorced

☐ Widowed

☐ Single, never married

☐ Other _____
please specify

A8. Since August 1991 has your marital status changed? **Select all that apply.**

Since August 1991 I have:

☐ Not changed my marital status

☐ Married, or started living with a partner

☐ Separated from a partner

☐ Divorced from a partner

☐ Been widowed

☐ Other _____
please specify

A. PERSONAL DETAILS

A9. Which category best describes the highest educational qualification you have completed?

Choose one.

- ☐ Primary school up to grade 6
- ☐ Secondary school up to grade 10
- ☐ Secondary school grades 11-12
- ☐ Certificate (trade, apprenticeship, technicians etc)
- ☐ Diploma (associate, undergraduate)
- ☐ Undergraduate degree
- ☐ Post-graduate degree

A10. What is your current occupational status?

Choose the most relevant option.

- ☐ Paid employment full-time
- ☐ Paid employed part-time/casual
- ☐ Volunteer/community work
- ☐ Student
- ☐ Home duties
- ☐ Retired
- ☐ Not working due to ill-health / TPI
- ☐ Unemployed
- ☐ Other _____

please specify

A11. Since August 1991 have you had a period of unemployment greater than 3 months?

☐ NO ☐ YES



If YES, was this period of unemployment primarily due to health problems?

☐ NO ☐ YES

A12. What is your main source of income now?

Choose one

- ☐ Wage or salary
- ☐ Own business or share in a partnership
- ☐ Disability pension
- ☐ Other government pension/allowance/benefit
- ☐ Child allowance
- ☐ Superannuation/annuity
- ☐ Dividends/interest/income from investments
- ☐ Other _____

please specify

GO TO SECTION B

SECTION B: MILITARY POSTINGS

B1. When you joined the ADF for military service were you:

☐ Navy ☐ Army ☐ Airforce ☐ Other _____
please specify

B2. What year did you first join the ADF? 19 ____

B3. Are you still a serving member of the ADF?

☐ YES ☐ NO If NO, What year did you leave? ____

Office use only

B4. In January 1991, what was your rank? _____

please specify

--	--

INSTRUCTIONS: Please answer the following questions about military postings, including postings with defence forces of other countries, that you have held for **3 months or more**. Please **DO NOT** include postings that you held as a reservist in the military.

B5. Please write in the year you started each non-reserve posting, the duration of the posting in years and months, the rank mostly held for that posting, the name of your unit, ship or squadron, your category/branch, corps or mustering and a brief description of your duties, the type of area that you worked in. Then please indicate whether you regularly worked with or handled pesticides, fuels, engine exhaust, or solvents during those postings.

Please start with your first posting and continue in order. If the duties were substantially the same from one posting to the next you may amalgamate the postings.

	Year Started	Duration in years & months	Rank Mostly held	Name of Unit/Ship/Squadron	Category/Branch, Corps or Mustering and a brief description of duties	Was it primarily? Select the most relevant option	Did you regularly work with or handle any of the following? Select all that apply
Eg	1975	2 yrs 6 mo	Able seaman	HMAS Success	Seaman, engine maintenance, painting ship	<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input checked="" type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input checked="" type="checkbox"/> Solvents <input checked="" type="checkbox"/> Fuels <input checked="" type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
1		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
2		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
3		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these

B. MILITARY POSTINGS

	Year Started	Duration in years & months	Rank Mostly held	Name of Unit/Ship/Squadron	Category/Branch, Corps or Mustering and a brief description of duties	Was it primarily? Select the most relevant option	Did you regularly work with or handle any of the following? Select all that apply
4		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
5		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
6		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
7		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
8		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
9		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
10		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
11		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these
12		____ yrs ____ mo				<input type="checkbox"/> Workshop <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Barracks <input type="checkbox"/> Ship above deck <input type="checkbox"/> Ship below decks	<input type="checkbox"/> Pesticides <input type="checkbox"/> Solvents <input type="checkbox"/> Fuels <input type="checkbox"/> Engine Exhaust <input type="checkbox"/> None of these

GO TO SECTION C

IF YOU ARE A GULF WAR VETERAN,
A COPY OF YOUR GULF WAR
DEPLOYMENT RECORD SHOULD BE
STAPLED HERE.

GULF WAR VETERANS ONLY SHOULD ANSWER THIS SECTION

If NOT a Gulf War Veteran, please go to SECTION D

SECTION C: YOUR DEPLOYMENT TO THE GULF WAR

We would like to know some specific details about your deployment to the Gulf War.

The Gulf War Nominal Roll records your service number, date entered the operational area, date departed the operational area, ship/unit/squadron, rank and corps/mustering. A copy of your Gulf War Nominal Roll record should be stapled to the previous page.

C1. Please check the details of the deployment record from the Nominal Roll, writing any necessary corrections clearly and directly on to the stapled sheet.

Please mark the box below to indicate that you have checked the attached Nominal Roll record and that you have made any needed corrections.

☐ **I have checked my Nominal Roll deployment record and have made any needed corrections.**

C2a. What were your primary duties during your deployment to the Gulf War?

(mark all boxes that apply)

- | | |
|---|--|
| <input type="checkbox"/> On board a frigate or destroyer | <input type="checkbox"/> Logistic support/staff duties |
| <input type="checkbox"/> On board a supply ship | <input type="checkbox"/> Medical |
| <input type="checkbox"/> On board a submarine | <input type="checkbox"/> Environmental health duties |
| <input type="checkbox"/> Mine countermeasures | <input type="checkbox"/> Airbase support |
| <input type="checkbox"/> Ground Crew | <input type="checkbox"/> Airfield guarding |
| <input type="checkbox"/> Engaged in combat/combat missions/combat patrols | |
| <input type="checkbox"/> Combat support/flight-line support/convoy protection | |
| <input type="checkbox"/> Other duty | _____ |

please specify

C2b. Please write your job title, or trade, applicable to when you were there (eg technician, cook, driver)

(job title or trade)

C3. During your Gulf War deployment were you:**a. attached to ship**☐ NO☐ YES

If YES, which ship?

- ☐ HMAS Darwin
☐ HMAS Sydney
☐ HMAS Adelaide
☐ USNS Comfort
☐ Other

- ☐ HMAS Brisbane
☐ HMAS Westralia
☐ HMAS Success

 please specify**b. attached to a static HQ**☐ NO☐ YES

If YES, which location?

- ☐ Australia
☐ Bahrain
☐ Iraq
☐ Other

- ☐ Saudi Arabia (eg Riyadh)
☐ UAE (eg Abu Dhabi)
☐ Oman (eg Muscat)

 please specify**c. did you serve as part of Operation Habitat?**☐ NO☐ YES**d. were you attached to a manoeuvre HQ?**☐ NO☐ YES

If YES, Where was the start deployment?
 Where was the finish deployment?

_____**C4. During your deployment to the Gulf on how many days did you have direct contact with, or were you exposed to, intense smoke from burning oil wells?**

☐ None ☐ 1-3 days ☐ 4-9 days ☐ 10-30 days ☐ more than 30 days ☐ Don't know

If 1 day or more

b. During the smoke and oil cloud, for how many hours on each of those days, on average, were you outside/on the upper decks?

☐ <1 hour ☐ 1-4 hours ☐ 5-8 hours ☐ >8 hours

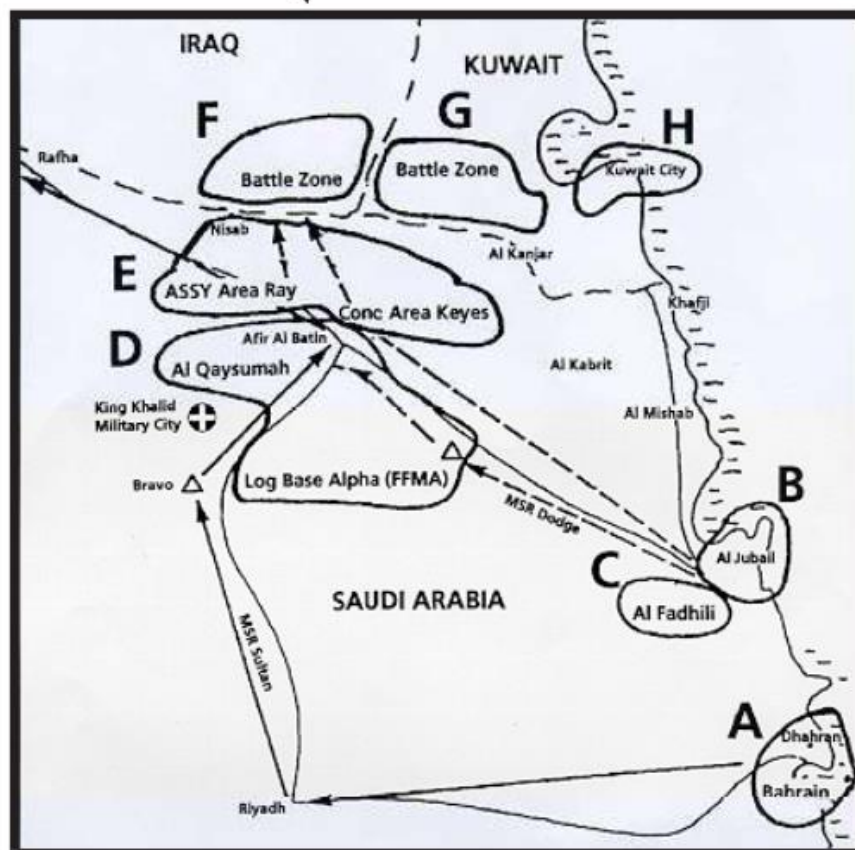
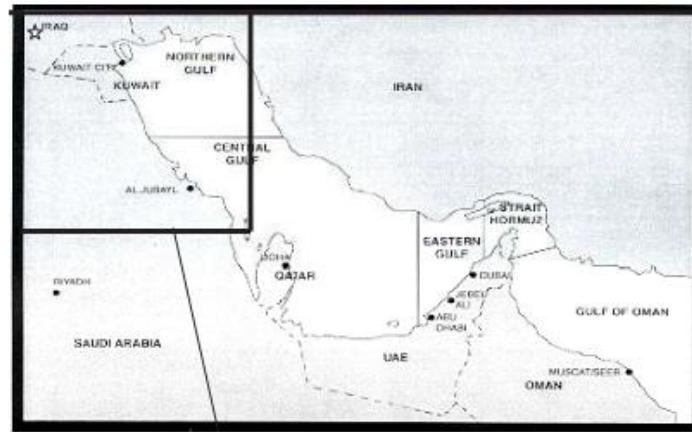
C5. During your deployment to the Gulf War did you serve, or at any time visit or set foot, on land in any of the countries surrounding the Persian Gulf waters (such as Saudi Arabia, Kuwait, Iraq, Iran etc)?☐ NEVER☐ YES

If YES please look at maps and answer question C6 on the next pages

If NEVER please go to QUESTION C7

C. GULF WAR DEPLOYMENT

Question C6. Use this map and the enlargement below to identify where you were on land in any of the countries surrounding the Persian Gulf waters



C. GULF WAR DEPLOYMENT

This map shows the main areas where **ground forces** were located. Several areas are listed on the map with a code (A to H). Please note that the location code includes the whole of the area circled.

Question C6 continued

Location Code	Examples	Location Code	Examples
A	Dahran, Bahrain	B	Al Jubail, e.g. Baldrick Lines
C	Devil Dog Dragoon Range, Al Fadhilli, St. Patrick's Camp Jerboa Range	D	Al Qaysyumah, Log Base Alpha (FFMA), Hafar Al Batin
E	Ex: Dibdibah Range or Charge Concentration Milton Keynes, Assemble Area Ray	F	Southern Iraq Battle Zone e.g. Bronze, Lead, Tungsten, Copper, Cobalt, Varsity
G	Kuwait (excluding Kuwait City)	H	Kuwait City

C6a. Please indicate in the table, at the bottom of the page, which ground locations you served at or visited during your Gulf War deployment and indicate when you were there. Please use the codes provided on the map OR, if you went to a location not coded on the map, please give its name.

Nb. The Aerial Bombardment commenced on 17th January 1991. The Main Battle took place in Areas F and G between 24th and 28th February 1991.

The example provided is for a veteran whose Gulf War deployment took him/her first to Al Jubail (Area B) between January 17 and February 28, subsequently to Bahrain (Area A) after February 28, and finally to Karachi (not coded on the map) also after February 28.

Example only

	Location	Before war was declared (pre Jan 17)	During the war (Jan 17–Feb 28)	After the cease-fire (post Feb 28)
1 st location	B	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2 nd location	A	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 rd location	Karachi	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Which ground locations did you serve at or visit?

	Location	Before war was declared (pre Jan 17)	During the war (Jan 17–Feb 28)	After the cease-fire (post Feb 28)
1 st location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 nd location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 rd location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 th location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 th location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 th location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 th location		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C6b. Were you near Khamisiyah in southern Iraq (☆on the top map) in March 1991?

☐ NO ☐ YES

C. GULF WAR DEPLOYMENT

C6c. Were you at camp Doha on July 11th, when the North Compound caught fire, or involved in the subsequent clean up operations?

☐ NO ☐ YES

GO TO Question C7

Section C continued VACCINATIONS & MEDICATIONS

We would like to know about vaccinations and medications you received as part of your deployment to the Gulf War.

If you have a written record of these vaccinations, e.g. your WHO International Certificates of Vaccination 'yellow book', please refer to it when completing this section; and bring the book with you to the medical examination. If you do not have your 'yellow book', please indicate this, but still complete this section to the best of your ability.

C7. Do you have your WHO 'yellow book' to refer to? ☐ YES ☐ NO

C8. As part of your Gulf War deployment, how many vaccinations did you receive:

before you left for the Gulf? ☐ none ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ >7 ☐ Don't know

Over what time period did you receive these?

☐ all in one session ☐ across 1 week ☐ across 2-4 weeks ☐ across a period > 4 weeks

in transit to the Gulf? ☐ none ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ >7 ☐ Don't know

Over what time period did you receive these?

☐ all in one session ☐ across 1 week ☐ across 2-4 weeks ☐ across a period > 4 weeks

while you were in the Gulf? ☐ none ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ >7 ☐ Don't know

Over what time period did you receive these?

☐ all in one session ☐ across 1 week ☐ across 2-4 weeks ☐ across a period > 4 weeks

C9. Which of the following vaccinations do you think you received:

Typhoid	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Cholera	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Diphtheria, Tetanus (ADT)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Pertussis (whooping cough)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Hepatitis B	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Measles, Mumps, Rubella (MMR)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Polio (oral Sabin)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Tuberculosis (BCG)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Hepatitis A (Havrix)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Smallpox	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Anthrax	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Plague	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know
Other	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Don't know

If Other, please specify _____

C10. Did you take anti-nerve agent pills (i.e. PB or NAPS)?

☐ NO ☐ YES ☐ Don't know

If YES,

a. Please estimate how many days you took them for in total? _ _ _ days

b. On average how many did you take each day?

☐ 1 ☐ 2 ☐ 3 ☐ >3 ☐ Don't know

C11. Did you take tablets to protect you against malaria (e.g. chloroquine or doxycycline)?

☐ NO ☐ YES ☐ Don't know

If YES,

a. please estimate how many days you took them for in total? _ _ _ days

C12. Did you take any anti-biological warfare tablets (Ciprofloxacin or Ciproxini)?

☐ NO ☐ YES ☐ Don't know

If YES,

a. please estimate how many days you took them for in total? _ _ _ days

C13. Did you have a significant reaction to any vaccinations or medications that you received?

☐ NO ☐ YES

If YES,

a. Please specify which vaccination(s) or medication(s) you reacted to

b. Which vaccination or medication resulted in the most severe reaction.

Please specify one _____

c. How long did this most severe reaction last? _ _ _ days

d. Did you need to seek medical advice for this reaction

☐ NO ☐ YES

GO TO SECTION D.

SECTION D: DEPLOYMENTS (Everyone should answer this section)

D1a. Have you been on an active deployment (war or peacekeeping). This does not include training exercises or goodwill visits (flying the flag).

☐ **YES** GO TO QUESTION D1b. ☐ **NO** GO TO SECTION E →

D1b. In the table below please indicate where you were actively deployed. Remember that this does not include training exercises or goodwill visits (flying the flag).

INSTRUCTIONS: From this list please mark the YES box for those active deployments which apply to you. Then, please write the year in which you were deployed, the approximate duration of your participation in that deployment and indicate whether you were ordered to serve on that deployment or whether you volunteered.

Were you deployed to:	Yes	Year First Deployed	Duration (Choose the nearest period) (If you went more than once show the total time)			Were you ordered to serve or did you volunteer to serve?		
			Less than one week	One week to less than one month	One month to less than 6 months	More than 6 months	Ordered	Volunteered
1. Angola	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Afghanistan	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Balkanís	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Bougainville 1997 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Cambodia 1993 -1999	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. East Timor 1999 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Egypt	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Former Rep of Yugoslavia 1997 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Gulf of Oman 1999	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Korea 1953 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Kuwait 1998 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Malaysia	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D1. continued

Were you deployed to:	Yes	Year Deployed	Duration (Choose the nearest period)				Were you ordered to serve or did you volunteer to serve?	
			Less than one week	One week to less than one month	One month to less than 6 months	More than 6 months	Ordered	Volunteered
13. Middle East 1956 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Mozambique 1994 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Namibia 1989-1990	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Papua New Guinea 1997-1998	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Persian Gulf (between 2/8/90 & 4/9/91)	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Persian Gulf (not between 2/8/90 & 4/9/91)	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Rwanda	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Sinai 1982-1986 & Sinai 1993 →	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Solomon Islands	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Somalia 1994	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Southern Ocean	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Thailand	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Vietnam	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Western Sahara	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Any other deployments overseas, please specify destination/s below. Do not include training exercises or goodwill visits (flying the flag).								
27.	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28.	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29.	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30.	<input type="checkbox"/>	----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Gulf War Vets

D. DEPLOYMENTS

D2. We would like to know about chemical or environmental contaminants that you may have been exposed to during the deployments you listed in Question D1.

INSTRUCTIONS: Please indicate whether or not you have experienced any of the activities and items, given below, during the deployments you listed at question D1. If YES, indicate whether it was experienced during your non-Gulf War deployments (section labeled 'Everyone'), and/or during your Gulf War deployment (section labeled 'GW Vets only'). Then estimate, for each section, how often you had the experience.

[illegible]

D. DEPLOYMENTS

D3.	<i>Everyone during non-Gulf War deployments</i>			<i>GW Vets only during the Gulf War deployment</i>		
During the deployments you listed in Question D1:	NO	DON'T KNOW	YES How often were you there? Rarely Sometimes Often	NO	DON'T KNOW	YES How often were you there? Rarely Sometimes Often
a. Were you in an area where chemical warfare agents had probably been used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

If No or Don't Know go to D4.

<p><i>If YES, ↓ (tick all that apply below)</i></p> <p>What chemical agents had been used?</p> <p><input type="checkbox"/> Nerve gas <input type="checkbox"/> Mustard gas <input type="checkbox"/> Other unknown <input type="checkbox"/> Other _____ please specify</p> <p>What made you think that chemical warfare agents had been used?</p> <p><input type="checkbox"/> I felt ill at the time <input type="checkbox"/> Saw dead or affected animals <input type="checkbox"/> Saw dead or affected people <input type="checkbox"/> Chemical alarms went off <input type="checkbox"/> I was told so <input type="checkbox"/> Another reason, _____ please specify</p>	<p><i>If YES, ↓ (tick all that apply below)</i></p> <p>What chemical agents had been used?</p> <p><input type="checkbox"/> Nerve gas <input type="checkbox"/> Mustard gas <input type="checkbox"/> Other unknown <input type="checkbox"/> Other _____ please specify</p> <p>What made you think that chemical warfare agents had been used?</p> <p><input type="checkbox"/> I felt ill at the time <input type="checkbox"/> Saw dead or affected animals <input type="checkbox"/> Saw dead or affected people <input type="checkbox"/> Chemical alarms went off <input type="checkbox"/> I was told so <input type="checkbox"/> Another reason, _____ please specify</p>
--	--

D4.	<i>Everyone during non-Gulf War deployments</i>			<i>GW Vets only during the Gulf War deployment</i>		
During the deployments you listed in Question D1:	NO	DON'T KNOW	YES How often did you use it? Rarely Sometimes Often	NO	DON'T KNOW	YES How often did you use it? Rarely Sometimes Often
a. Did you use a respirator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

If No or Don't Know go to D5.

<p><i>If YES, ↓ (tick all that apply below)</i></p> <p>Why did you use a respirator?</p> <p><input type="checkbox"/> Dust storms <input type="checkbox"/> Smoke from oil well fires <input type="checkbox"/> Chemical alarms <input type="checkbox"/> Biological alarms <input type="checkbox"/> Smoke forest fires <input type="checkbox"/> Another reason, _____ please specify</p>	<p><i>If YES, ↓ (tick all that apply below)</i></p> <p>Why did you use a respirator?</p> <p><input type="checkbox"/> Dust storms <input type="checkbox"/> Smoke from oil well fires <input type="checkbox"/> Chemical alarms <input type="checkbox"/> Biological alarms <input type="checkbox"/> Smoke forest fires <input type="checkbox"/> Another reason, _____ please specify</p>
---	---

D5.	<i>Everyone during non-Gulf War deployments</i>			<i>GW Vets only during the Gulf War deployment</i>		
During the deployments you listed in Question D1:	NO	DON'T KNOW	YES How often did you use it? Rarely Sometimes Often	NO	DON'T KNOW	YES How often did you use it? Rarely Sometimes Often
a. Did you use a chemical protective suit (NBC suit)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

If No or Don't Know go to D6.

<p><i>If YES, ↓ (tick all that apply below)</i></p> <p>Why did you use an NBC suit?</p> <p><input type="checkbox"/> Dust storms <input type="checkbox"/> Smoke <input type="checkbox"/> Chemical alarms <input type="checkbox"/> Biological alarms <input type="checkbox"/> Another reason, _____ please specify</p>	<p><i>If YES, ↓ (tick all that apply below)</i></p> <p>Why did you use an NBC suit?</p> <p><input type="checkbox"/> Dust storms <input type="checkbox"/> Smoke <input type="checkbox"/> Chemical alarms <input type="checkbox"/> Biological alarms <input type="checkbox"/> Another reason, _____ please specify</p>
---	---

D. DEPLOYMENTS

D6. a. During the deployments you listed in Question D1, were you ever issued with a personal insect repellent?

☐ NO ☐ YES

If YES please fill in the following table indicating which type of repellent and how often you used it.

	Everyone during non-Gulf War deployments					GW Vets only during the Gulf War deployment				
What was the personal insect repellent?	NO	DON'T KNOW	YES			NO	DON'T KNOW	YES		
			How often did you use it? Rarely Sometimes Often					How often did you use it? Rarely Sometimes Often		
1. Repellent MK1941, lotion, gel or cream	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Repellent sachet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Miticide (DBP)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Other (please name it)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. During the deployments you listed in Question D1, did you provide and use your own personal insect repellent (ie. non-military issue)

☐ NO ☐ YES

If YES please fill in the following table indicating which type of repellent and how often you used it.

	Everyone during non-Gulf War deployments			GW Vets only during the Gulf War deployment		
What was the personal insect repellent?	How often did you use it?			How often did you use it?		
	rarely sometimes often			rarely sometimes often		
Please name it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D7. During the deployments you listed in Question D1, did you ever apply pesticides including insecticides (but not including personal repellants) e.g. by spraying, fogging, laying bait etc?

☐ NO ☐ YES

If Yes, was it? (mark all those that apply)

- ☐ Permethrin based ☐ Baygon (Propoxur, Aprocarb) ☐ Bendicarb (Ficam)
☐ Diazinon ☐ Temephos (Abate) ☐ Malathion (Maldison)
☐ Other, unknown type ☐ Other, called _____
please specify

And please complete the following table about applying pesticides.

D8.	Everyone during non-Gulf War deployments					GW Vets only during the Gulf War deployment				
Did you ever?	NO	DON'T KNOW	YES			NO	DON'T KNOW	YES		
			How often did you use it? Rarely Sometimes Often					How often did you use it? Rarely Sometimes Often		
1. Spray/fog an outdoor area e.g. for mosquitoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Spray/fog an indoor area e.g. for cockroaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Spray your body (with pesticides, not personal repellants)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Spray your uniform or bedding?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Lay bait as a solid or liquid e.g. rat poison	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GO TO QUESTION D9

D. DEPLOYMENTS

POST DEPLOYMENT EXPERIENCES

D9. We would like to know about some of the experiences you may have had after returning from the deployments you told us about in question D1.

If you answered NO to question D1.a (no active deployments) please GO TO Section E

INSTRUCTIONS: Please indicate whether you have experienced any of the items listed below, as a result of having served in the deployments you listed at question D1. If YES, indicate whether it was related to non-Gulf War deployments (section labeled 'Everyone'), and/or during your Gulf War deployment (section labelled 'Gulf War Vets only'). Then estimate, for each section, whether you experienced the item a little, somewhat or a lot.

	Everyone After returning from non-Gulf War deployments			GW Vets only After returning from the Gulf War deployment				
As a result of having served in deployments listed in question D1, have you experienced, or felt, any of the following?	NO	YES			NO	YES		
		How much?				How much?		
		A little	Some	A lot		A little	Some	A lot
1. Greater self-pride?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Rewarded for a job well done?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. A greater appreciation for your country?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Jealousy or resentment from other Defence Force members?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Lack of recognition, or acknowledgement, of the value or nature of your deployment activities by the ADF or by the Australian Government?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Inadequately debriefed following your deployment activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Improved as a leader?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Tougher, more confident or more self assured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. More knowledgeable of world issues?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Disillusioned by the destruction or hopelessness that you witnessed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Valued and respected for your deployment activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Lack of recognition, or acknowledgement, of the value or nature of your deployment activities by the Australian people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. More appreciative of being alive?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. More respectful of other Australian and allied veterans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Well looked after by the ADF or the Australian Government?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Stronger bonds with the members of your ship/unit/squadron	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Proud to be an Australian veteran?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GO TO SECTION E

SECTION E: MILITARY SERVICE EXPOSURES (Everyone should answer this section)

E1. We would like to know about some of your experiences, during your **ENTIRE** military service, especially those experiences which may have been stressful or upsetting.

INSTRUCTIONS: Please indicate whether or not you were in contact with, or experienced, any of the items listed below, as part of your military service. If YES, indicate whether it was experienced during non-Gulf War service (section labeled 'Everyone'), and/or during your Gulf War service (section labeled 'GW Vets only'). Then estimate, for each section, how frequently you had the experience, and whether the experience made you feel unwell, stressed or uneasy.

	Everyone during non-Gulf War service				GW Vets only during the Gulf War service						
	NO	YES How often? Rarely Sometimes Often	AND did this experience make you feel unwell, stressed or uneasy?			NO	YES How often? Rarely Sometimes Often	AND did this experience make you feel unwell, stressed or uneasy?			
			NO	YES mildly	YES strongly			NO	YES mildly	YES strongly	
1. You were on a ship which suffered a collision or was otherwise damaged or sunk during deployment.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Artillery, rockets, missiles, mines or something similar, exploded in the air, in the water or on the ground close to you.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. You saw Defence personnel or civilians who were killed, dead, dying or maimed.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. You made a leadership decision which you think resulted in the death or injury of someone.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. You have suffered ill-effects of extreme heat or extreme cold.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. You had to eat food or drink water contaminated with smoke, oil, sewerage or other chemical or biological agents.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. You had to work, dive or bathe in water contaminated with smoke, oil, sewerage or other chemical or biological agents.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Operational rules of engagement prevented you from taking action which could protect you or others from harm.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. You experienced lack of leadership in your team, crew or unit.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. You came under small arms fire.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. You handled, buried or exhumed human bodies.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E1. continued	Everyone during non-Gulf War service			GW Vets only during the Gulf War service		
	NO	YES How often? Rarely Sometimes Often	AND did this experience make you feel unwell, stressed or uneasy? No YES mildly YES strongly	NO	YES How often? Rarely Sometimes Often	AND did this experience make you feel unwell, stressed or uneasy? NO YES mildly YES strongly
As part of your military service have you been in contact with, or have you experienced, any of the following?						
12. You encountered undetonated mines, including sea mines, or bobby traps while on patrol or at your duty station.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
13. You killed someone or think you might have killed someone.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
14. Your supplies or equipment were inadequate, insufficient or faulty.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
15. You were deployed to a combat situation against your will.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
16. You were attacked by civilians, bandits or other local militia groups.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
17. You were sexually harassed.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
18. You were responsible for detecting incoming attacks or for spotting land or sea-mines, where a mistake could place the lives of others at risk.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
19. You were required to administer medical for which you were not adequately trained or equipped, eg. geriatrics, pediatrics, palliative care. (Answer NO if not applicable)	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
20. You experienced a 'near miss' or 'very close call' incident where you were in imminent danger of being injured or killed.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
21. You were required to detonate, deactivate or otherwise handle live missiles, mines, bombs or other explosive devices.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
22. You handled or came into contact with POWs or displaced refugees.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
23. You had to board hostile vessels at sea.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
24. You had to decide who would receive life-saving medical care.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
25. You felt an overwhelming inability to protect yourself or others from harm.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
26. You were in fear for your life.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

E1. continued	Everyone during non-Gulf War service				GW Vets only during the Gulf War service					
	NO	YES How often? Rarely Sometimes Often	AND did this experience make you feel unwell, stressed or uneasy?			NO	YES How often? Rarely Sometimes Often	AND did this experience make you feel unwell, stressed or uneasy?		
			No	YES mildly	YES strongly			NO	YES mildly	YES strongly
As part of your military service have you been in contact with, or have you experienced, any of the following?										
27. You felt <u>not</u> sufficiently trained or prepared for military activities.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. You felt lack of togetherness or cohesion in your team or unit.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. You suffered burns or rashes on your skin as a result of exposure to oil or other chemicals in the air.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. You witnessed violent attacks on civilians including rape or other assaults.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. You were on formal alert for, or felt in threat of nuclear, biological or chemical agent attack.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. You were exposed to nuclear, biological or chemical warfare.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. You felt cut off or separated from family or significant others.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. You were on a ship or aircraft (including a helicopter) passing through hostile waters or air space.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. You sat with or cared for someone who was dying.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. You were in fear of artillery, missile, SCUD rocket or bomb attack.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. You had difficulty breathing as a result of exposure to oil, smoke, fumes, dust or other contaminants in the air.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. You carried out your duties wearing NBC suits (not including training exercises).	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. You felt alienated from other military personnel around you.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. You felt overwhelmed by the level of destruction or devastation or disease around you.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. On board a ship you feared death, injury or entrapment below the waterline as a result of missile attack or hitting a sea-mine.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. You were required to live in squalid, unsanitary or disease-ridden conditions.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. You feared attack from bandits, rebels or other local militia groups.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. You sustained an injury that required medical treatment.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E. MILITARY SERVICE EXPOSURES

SECTION F: CIVILIAN OCCUPATIONAL HISTORY (Everyone should answer this section)

F1. Have you ever been a CFA Volunteer? ☐ NO ☐ YES **If YES, for how long** ☐ <1 year ☐ 1-5 years ☐ 6-10 years ☐ >10 years

F2. Have you held any civilian jobs for more than 6 months? ☐ YES GO TO Question F3 ☐ NO PLEASE GO TO SECTION G

F3. For every civilian job that you have held for six months or more, please complete the table below. Please start with your first civilian job and add new jobs in order. Please write in the year you started each civilian job, your job title, the duration of the job in years and months, the industry, and the name of the Company or employer. Then indicate whether, as part of that job, you handled, worked with or were otherwise exposed to pesticides, fuels, engine exhaust, or solvents, and whether that job involved exposure to infectious diseases or trauma to others (such as violence, grief or death of others). An example is provided for you.

It may be useful to refer to your personal records, such as an old copy of a resume, to remind you about jobs which you may have forgotten.

	Year Started	Duration in years & months	Job Title	Industry Sector	Company/Employer	This job exposed me to:						Office Only
						Pesticides	Fuels	Engine Exhaust	Solvents	Infectious diseases	Trauma	
<i>e.g.</i>	1975	4 yrs 4 mo	Painter	Construction	Self-employed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
1		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		____ yrs ____ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	Year Started	Duration in years & months	Job Title	Industry Sector	Company/Employer	This job exposed me to:						Office Only
						Pesticides	Fuels	Engine Exhaust	Solvents	Infectious diseases	Trauma	
9		___ yrs ___ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		___ yrs ___ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		___ yrs ___ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		___ yrs ___ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		___ yrs ___ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		___ yrs ___ mo				<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

If you answered YES to pesticide exposure in the Table at F3, please answer question F4. If NO to pesticide exposure GO TO SECTION G.

F4. Please list the job number from the table at F3, the pesticides which you were exposed to and tell us the activity that led to exposure.

Job Number	Pesticide	Activity leading to Exposure
e.g. 4	Sheep dip, (Organophosphate type)	Mixing dip, Dipping sheep

Well done - you are half way there!

Keep up the good work.

Remember, the Study team is available on 1800 062 534 if you are unsure about how to complete any section of this questionnaire. Please call any time Monday to Friday during business hours.

SECTION G: YOUR HEALTH IN GENERAL *(Everyone should answer this section)***G1. In general, would you say your health is:**

- ☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

G2. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a Lot	Yes, Limited a Little	No, Not Limited at All
a. Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Climbing several flights of stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G3. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

- a. **Accomplished less** than you would like ☐ YES ☐ NO
 b. Were limited in the **kind** of work or other activities ☐ YES ☐ NO

G4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

- a. **Accomplished less** than you would like ☐ YES ☐ NO
 b. Didn't do work or other activities as **carefully** as usual ☐ YES ☐ NO

G5. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

- ☐ Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐ Extremely

G6. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.**How much of the time during the past 4 weeks.**

	All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
a. Have you felt calm and peaceful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Did you have a lot of energy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Have you felt downhearted and blue?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G7. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- ☐ All of the Time ☐ Most of the Time ☐ Some of the Time ☐ A little of the Time ☐ None of the Time

SECTION G: YOUR HEALTH IN GENERAL continued

We would like to know how you have been feeling **over the past few weeks**.
Please tick the box that most closely describes your experience for each question

- G8. Have you recently been able to concentrate on whatever you're doing?**
☐ Better than usual ☐ Same as usual ☐ Less than usual ☐ Much less than usual
- G9. Have you recently lost much sleep over worry?**
☐ Not at all ☐ No more than usual ☐ Rather more than usual ☐ Much more than usual
- G10. Have you recently felt that you are playing a useful part in things?**
☐ More so than usual ☐ Same as usual ☐ Less useful than usual ☐ Much less useful
- G11. Have you recently felt capable of making decisions about things?**
☐ More so than usual ☐ Same as usual ☐ Less so than usual ☐ Much less capable
- G12. Have you recently felt constantly under strain?**
☐ Not at all ☐ No more than usual ☐ Rather more than usual ☐ Much more than usual
- G13. Have you recently felt you couldn't overcome your difficulties?**
☐ Not at all ☐ No more than usual ☐ Rather more than usual ☐ Much more than usual
- G14. Have you recently been able to enjoy your normal day-to-day activities?**
☐ More so than usual ☐ Same as usual ☐ Less so than usual ☐ Much less than usual
- G15. Have you recently been able to face up to your problems?**
☐ More so than usual ☐ Same as usual ☐ Less able than usual ☐ Much less able
- G16. Have you recently been feeling unhappy and depressed?**
☐ Not at all ☐ No more than usual ☐ Rather more than usual ☐ Much more than usual
- G17. Have you recently been losing confidence in yourself?**
☐ Not at all ☐ No more than usual ☐ Rather more than usual ☐ Much more than usual
- G18. Have you recently been thinking of yourself as a worthless person?**
☐ Not at all ☐ No more than usual ☐ Rather more than usual ☐ Much more than usual
- G19. Have you recently been feeling reasonable happy, all things considered?**
☐ More so than usual ☐ About same as usual ☐ Less so than usual ☐ Much less than usual

G20. RECENT HEALTH SYMPTOMS

We would like to know about your health in the **PAST MONTH**.

Please indicate whether or not you have suffered any of the following symptoms in the PAST MONTH, and if so, please indicate whether your symptoms were mild, moderate or severe in nature.

<u>In the past month</u> have you suffered from	NO Not at all	YES Mild	Moderate	Severe
1. Chest pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Headaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Rapid or pounding heart beat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Irritability / outbursts of anger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Shortness of breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Wheezing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Sleeping difficulties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Feeling jumpy / easily startled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Feeling unrefreshed after sleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Fatigue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Double vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Intolerance to alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Itchy or painful eyes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Rash or skin irritation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Skin infections e.g. boils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Skin ulcers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Shaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Tingling or burning sensation in hands or feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Loss of sensation in hands or feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Feeling distant or cut off from others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Constipation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Flatulence or burping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Stomach cramps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Diarrhoea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Indigestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Dry mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Mouth ulcers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Toothache	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Persistent cough	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G20. RECENT HEALTH SYMPTOMS continued

<u>In the past month</u> have you suffered from	NO Not at all	YES		
		Mild	Moderate	Severe
30. Lump in throat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Sore throat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Forgetfulness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Dizziness, fainting or blackouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Seizures or convulsions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Feeling disorientated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Loss of concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Difficulty finding the right word	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Pain on passing urine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Passing urine more often	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Loss of control over bladder or bowels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Burning sensation in the sex organs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Loss of interest in sex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Problems with sexual functioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Increased sensitivity to noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Increased sensitivity to light	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Increased sensitivity to smells or odours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Ringing in the ears	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Avoiding doing things or situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Pain, without swelling or redness, in several joints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Stiffness in several joints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. General muscle aches or pains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Loss of balance or coordination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Difficulty speaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Low back pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Night sweats which soak the bed sheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Feeling feverish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Tender or painful swelling of lymph glands in neck, armpit or groin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Loss of, or decrease in, appetite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Nausea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Vomiting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Distressing dreams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Unintended weight gain greater than 4kg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Unintended weight loss greater than 4kg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G20. RECENT HEALTH SYMPTOMS continued

*Please indicate whether or not you have experienced any of the following symptoms in the **PAST MONTH**.*

<u>In the past month</u> have you experienced	NO	YES
64. Difficulty lifting objects above your head, or from a high shelf	<input type="checkbox"/>	<input type="checkbox"/>
65. Difficulty undoing buttons	<input type="checkbox"/>	<input type="checkbox"/>
66. Difficulty turning doorknobs or unscrewing jars	<input type="checkbox"/>	<input type="checkbox"/>
67. Difficulty getting up from sitting in a chair or couch without the use of your arms	<input type="checkbox"/>	<input type="checkbox"/>
68. Problems with tripping, or your feet slapping, while walking	<input type="checkbox"/>	<input type="checkbox"/>
69. Difficulty recognising hot from cold water	<input type="checkbox"/>	<input type="checkbox"/>
70. Difficulty feeling pain, cuts or injuries	<input type="checkbox"/>	<input type="checkbox"/>
71. Feeling unsteady walking on uneven ground	<input type="checkbox"/>	<input type="checkbox"/>
72. Feeling unsteady walking in the dark	<input type="checkbox"/>	<input type="checkbox"/>
73. Feeling like you may fall over because of your unsteadiness	<input type="checkbox"/>	<input type="checkbox"/>
74. Numbness, 'asleep feeling' or prickling sensation in your hands or arms	<input type="checkbox"/>	<input type="checkbox"/>
75. Numbness, 'asleep feeling' or prickling sensation in your feet or legs	<input type="checkbox"/>	<input type="checkbox"/>
76. Burning, deep aching pain or tenderness in your hands or arms	<input type="checkbox"/>	<input type="checkbox"/>
77. Burning, deep aching pain or tenderness in your feet or legs	<input type="checkbox"/>	<input type="checkbox"/>
78. Unusual sensitivity or tenderness of your skin when clothes or bedclothes rub against you	<input type="checkbox"/>	<input type="checkbox"/>
79. Feeling like you will faint, or fainting, when you stand up from a lying or sitting position	<input type="checkbox"/>	<input type="checkbox"/>
80. Difficulty swallowing food (more than occasionally)	<input type="checkbox"/>	<input type="checkbox"/>

G21. DIAGNOSED OR TREATED MEDICAL CONDITIONS

We would like to know whether a medical doctor has ever diagnosed you with, or treated you for, any of the following medical problems or conditions.

If YES, please indicate the year you were first diagnosed, and whether you have been treated by a medical doctor for this condition in the past year.

Has a medical doctor ever diagnosed you with, or treated you for any of the following medical problems or conditions?	NO	YES	If YES		Office only
			Year first diagnosed	Treated by a doctor in the past year	
1. High blood pressure	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
2. Heart disease or condition	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
3. Stroke	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
4. Epilepsy	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
5. Migraines	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
6. Motor neurone disease	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
7. Multiple sclerosis	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
8. Asthma	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
9. Bronchitis	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
10. Pneumonia	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
11. Tuberculosis (TB)	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
12. Other lung disease, e.g. emphysema	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
13. Stomach or duodenal ulcers	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
14. Colitis / Crohn's disease	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
15. Hepatitis or yellow jaundice	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
16. Cirrhosis of the liver	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
17. Bowel disorder e.g. diarrhoea, constipation, bleeding	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
18. Irritable bowel syndrome	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
19. Kidney disease e.g. stones, infection, bleeding	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
20. Bladder disease e.g. infection, bleeding	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
21. Incontinence or difficulty passing urine	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
22. Diabetes	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
23. A thyroid problem	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
24. Blood disorder; e.g. anaemia	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
25. Malaria	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
26. Any significant infections e.g. hepatitis, HIV, pneumonia, glandular fever, leishmaniasis	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
27. Arthritis or rheumatism	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
28. Fibrositis or fibromyalgia	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
29. Back or neck problems	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	

Has a medical doctor ever diagnosed you with, or treated you for any of the following medical problems or conditions?	NO	YES	If YES		Office only
			Year first diagnosed	Treated by a doctor in the past year	
30. Joint problems	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
31. Eye or vision problems e.g. glaucoma	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
32. Sinus problems	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
33. Ear infection	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
34. Hearing loss	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
35. Dermatitis	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
36. Eczema	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
37. Psoriasis	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
38. Malignant melanoma	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
39. Other skin cancer e.g. squamous cell or basal cell skin cancers	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
40. Any other kind of cancer, tumour or malignancy (please specify type) _____	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
41. Any other skin problem	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
42. Any disease of the hair or scalp, including hair loss	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
43. Chronic Fatigue Syndrome	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
44. Alcohol abuse or dependency	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
45. Drug abuse or dependency	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
46. Anxiety, stress or depression	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
47. Post Traumatic Stress Disorder	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
48. Other psychiatric or psychological condition needing treatment or counseling (please specify type) _____	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
49. Sleep apnoea	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
50. Narcolepsy	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
51. Hayfever	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
52. Yeast disease or candidiasis	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
53. Multiple chemical sensitivity or environmental illness	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
54. Sick building syndrome	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
55. Food allergy	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
56. Any disease of the genital organs	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
57. Low fertility	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
58. Sexual problems	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	

G21 cont...
WOMEN ONLY:

Has a medical doctor ever diagnosed you with, or treated you for any of the following medical problems or conditions?	NO	YES	If YES		Office only
			Year first diagnosed	Treated by a doctor in the past year	
59. Premenstrual tension	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
60. Period problems	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
61. Miscarriages	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	

EVERYONE COMPLETE THE NEXT QUESTIONS:

G22. Apart from those listed in the table at G21, are there any other medical problems or conditions which a medical doctor has diagnosed you with, or treated you for?

☐ NO ☐ YES

If YES, please complete the following table indicating which condition/s, what year were you first diagnosed, and have you been treated for that condition by a medical doctor in the past year?

G10a. Which condition	Year first diagnosed	Treated by a doctor in the past year	Office only
	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	
	_____	<input type="checkbox"/> NO <input type="checkbox"/> YES	

G23. During the past twelve months have you been hospitalised overnight or longer because of illness or injury?

☐ NO ☐ YES

If YES, please specify why and for how many days:

1st hospitalisation in past 12 months days Why? _____

2nd hospitalisation in past 12 months days Why? _____

3rd hospitalisation in past 12 months days Why? _____

4th hospitalisation in past 12 months days Why? _____

G24. Thinking back over the past two weeks, did you stay in bed or at home all or part of any day because you did not feel well or as a result of illnesses or injury?

☐ NO ☐ YES

MEDICATIONS**G25. Have you EVER had an allergic reaction to any medication?**☐ NO☐ YES

If YES, which medications:

G26. Are you CURRENTLY taking any medicines including tablets, creams, inhalers, or other drugs?☐ NO☐ YES

If YES, what kind:

☐ tablets

please name them

☐ creams

please name them

☐ inhalers

please name them

☐ other drugs

please name them

FAMILY HISTORY**G27. Has anyone in your immediate family** (that is your parents, brothers, sisters or grandparents) **had a history of:**

a. Asthma?

☐ NO☐ YES

b. A stroke when they were less than 65 years of age?

☐ NO☐ YES

c. A heart attack when they were less than 65 years of age?

☐ NO☐ YES

d. Diabetes?

☐ NO☐ YES

e. Cancer?

☐ NO☐ YES

If YES to cancer at G27e, please complete the following table, indicating the relationship of the family member to you, the type of cancer and the family member's age at diagnosis. If NO, go to question G28.

Relationship of family member to you	Type of cancer	Age at diagnosis
Example: <i>father</i>	<i>bowel</i>	<i>55 yrs</i>

SMOKING & ALCOHOL

G28. Over your lifetime, would you have smoked as much as 100 cigarettes or a similar amount of tobacco?

☐ YES

☐ NO

If Yes go to Question G29

If NO go question G31 over the page

G29. Do you currently smoke as much as one cigarette per day (or 1 cigar per week or 1 ounce of tobacco per month)?

☐ NO

☐ YES

If YES

a. How old were you when you started smoking as much as one cigarette per day (or 1 cigar per week or 1 ounce of tobacco per month)?

_____ Age in years

b. What is the average number of cigarettes per day, grams of tobacco per day and/or number of cigars per week that you currently smoke?

_____ cigarettes per day

_____ grams of tobacco per day (don't include tobacco from cigarettes or cigars)

_____ cigars per week

If NO to G29 answer G30. If YES to G29 go to question G31 next page

G30. Have you ever smoked as much as one cigarette per day (or 1 cigar per week or 1 ounce of tobacco per month)?

☐ NO

☐ YES

If YES:

a. How old were you when you started smoking as much as one cigarette per day (or 1 cigar per week or 1 ounce of tobacco per month)?

_____ Age in years

b. How old were you when you stopped smoking as much as one cigarette per day (or 1 cigar per week or 1 ounce of tobacco per month)?

_____ Age in years

c. What was the average number of cigarettes per day, grams of tobacco per day and/or number of cigars per week that you smoked?

_____ cigarettes per day

_____ grams of tobacco per day (don't include tobacco from cigarettes or cigars)

_____ cigars per week

GO TO question G31.

G31. How often do you have a drink containing alcohol?

- ☐ Never
 ☐ Once a month or less
 ☐ 2 to 4 times a month
 ☐ 2 to 3 times a week
 ☐ 4 or more times a week

If Never, GO TO QUESTION G41.

In answering the following questions, please remember that a standard drink contains 10g of pure alcohol

Each of these is a standard drink:	1 Middy/Pot of Standard Beer	1 Glass of Wine	1 Glass of Sherry or Port	1 Nip of Spirits
------------------------------------	------------------------------	-----------------	---------------------------	------------------

G32. How many 'standard' drinks (see above) containing alcohol do you have on a typical day when you are drinking?

- ☐ 1 or 2
 ☐ 3 or 4
 ☐ 5 or 6
 ☐ 7 to 9
 ☐ 10 or more

G33. How often do you have six or more drinks on one occasion?

- ☐ Never
 ☐ Less than once a month
 ☐ Monthly
 ☐ Weekly
 ☐ Daily or almost daily

G34. How often during the last 3 months have you found that you were not able to stop drinking once you had started?

- ☐ Never
 ☐ Less than once a month
 ☐ Monthly
 ☐ Weekly
 ☐ Daily or almost daily

G35. How often during the last 3 months have you failed to do what was normally expected from you because of drinking?

- ☐ Never
 ☐ Less than once a month
 ☐ Monthly
 ☐ Weekly
 ☐ Daily or almost daily

G36. How often during the last 3 months have you needed a drink in the morning to get yourself going after a heavy drinking session?

- ☐ Never
 ☐ Less than once a month
 ☐ Monthly
 ☐ Weekly
 ☐ Daily or almost daily

G37. How often during the last 3 months have you had a feeling of guilt or remorse after drinking?

- ☐ Never
 ☐ Less than once a month
 ☐ Monthly
 ☐ Weekly
 ☐ Daily or almost daily

G38. How often during the last 3 months have you been unable to remember what happened the night before because you had been drinking?

- ☐ Never
 ☐ Less than once a month
 ☐ Monthly
 ☐ Weekly
 ☐ Daily or almost daily

G39. Have you or someone else been injured as a result of your drinking?

- ☐ No
 ☐ Yes, but not in the last 3 months
 ☐ Yes, during the last 3 months

G40. Has a relative, a friend, a doctor or other health professional been concerned about your drinking or suggested you cut down?

- ☐ No
 ☐ Yes, but not in the last 3 months
 ☐ Yes, during the last 3 months

LIFE EXPERIENCES

Below is a list of problems and complaints that people sometimes have in response to stressful life experiences.

Please consider the event or group of events, military or non-military, in your life that you found most stressful or upsetting. Read the list of problems and complaints below and indicate how much you have been bothered by each problem or complaint **in the past month** in relation to that stressful experience.

G41a. The event, or group of events, you experienced was _____ in _____

Event/s year

G41b. As a result of that/those events have you had:	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing <i>memories, thoughts</i> or <i>images</i> of the stressful experience?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Repeated, disturbing <i>dreams</i> of the stressful experience?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Suddenly <i>acting</i> or <i>feeling</i> as if the stressful experience <i>were happening again</i> (as if you were reliving it)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Feeling <i>very upset</i> when <i>something reminded you</i> of the stressful experience?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Having <i>physical reactions</i> (eg heart pounding, trouble breathing, sweating) when <i>something reminded you</i> of the stressful experience?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Avoiding <i>thinking about</i> or <i>talking about</i> the stressful experience or avoiding <i>having feelings</i> related to it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Avoiding <i>activities</i> or <i>situations</i> because <i>they reminded you</i> of the stressful experience?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Trouble <i>remembering important parts</i> of the stressful experience?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. <i>Loss of interest</i> in activities that you used to enjoy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Feeling <i>distant</i> or <i>cut off</i> from other people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Feeling as if your <i>future</i> somehow will be <i>cut short</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Trouble <i>falling</i> or <i>staying asleep</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Feeling <i>irritable</i> or having <i>angry outbursts</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Having <i>difficulty concentrating</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Being " <i>super alert</i> " or watchful or on guard?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Feeling <i>jumpy</i> or easily startled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

YOUR CHILDREN'S HEALTH AND YOUR PREGNANCY HISTORY (including your partner's)

We would now like to ask you some questions about your pregnancy history (if you are female) or that of your spouse/partner/s (if you are male). You may need to refer to your spouse/partner/s, or to your Child Health Record, to assist you in answering these questions. Your answers to these questions will help us compare your experience with information held in Australian National Registries, as well as the experiences of military personnel and their families as a whole.

G42. How many times have you EVER been pregnant or fathered a pregnancy?

_____ times
 please specify

If your answer to G42 is zero (0) please GO TO G47. If one or more, proceed with G43.

G43. Have any of these pregnancies resulted in:

- | | | |
|----------------------------|-----------------------------|------------------------------|
| a miscarriage | <input type="checkbox"/> NO | <input type="checkbox"/> YES |
| a still birth | <input type="checkbox"/> NO | <input type="checkbox"/> YES |
| a termination of pregnancy | <input type="checkbox"/> NO | <input type="checkbox"/> YES |

G44. If you answered YES in question G43, please provide additional information, if known, about those particular pregnancies in the following table.

If you answered NO, please GO TO G45.

PREGNANCY EVENT	1 st pregnancy	2 nd pregnancy	3 rd pregnancy	4 th pregnancy	5 th pregnancy
Miscarriage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Still birth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Termination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Date of the event	__/__/____	__/__/____	__/__/____	__/__/____	__/__/____
Hospital name					
Hospital State					
Known cause of the event or physical problem, if any					
Baby's sex if known	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not known	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not known	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not known	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not known	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not known
Mother's full name at the time					
Mother's postcode at the time	_____ <input type="checkbox"/> Not known	_____ <input type="checkbox"/> Not known	_____ <input type="checkbox"/> Not known	_____ <input type="checkbox"/> Not known	_____ <input type="checkbox"/> Not known
Mother's date of birth	__/__/____ <input type="checkbox"/> Not known	__/__/____ <input type="checkbox"/> Not known	__/__/____ <input type="checkbox"/> Not known	__/__/____ <input type="checkbox"/> Not known	__/__/____ <input type="checkbox"/> Not known

G45a. For all of your live born children, please list their name, date of birth, sex, and birth weight (if known) and number of weeks the baby was when it was born.
(Nb. Full term is 40 weeks).

	1 st child	2 nd child	3 rd child	4 th child	5 th child
Child's full name					
Date of birth	/ /	/ /	/ /	/ /	/ /
Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female	<input type="checkbox"/> Male <input type="checkbox"/> Female	<input type="checkbox"/> Male <input type="checkbox"/> Female	<input type="checkbox"/> Male <input type="checkbox"/> Female	<input type="checkbox"/> Male <input type="checkbox"/> Female
Birth weight If known	____ grams or ____ lbs oz <input type="checkbox"/> Not known	____ grams or ____ lbs oz <input type="checkbox"/> Not known	____ grams or ____ lbs oz <input type="checkbox"/> Not known	____ grams or ____ lbs oz <input type="checkbox"/> Not known	____ grams or ____ lbs oz <input type="checkbox"/> Not known
Number of weeks pregnant when baby was born (if known)	____ weeks <input type="checkbox"/> Not known	____ weeks <input type="checkbox"/> Not known	____ weeks <input type="checkbox"/> Not known	____ weeks <input type="checkbox"/> Not known	____ weeks <input type="checkbox"/> Not known

G45b. Have any of these children died, had a cancer, birth defect, or other serious health problem?

☐ **NO** Go to question G46

☐ **YES** Please complete the rest of the table below, keeping the information in the corresponding column for the child or children above

Cancers?	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type
Birth defects or chromosomal abnormalities?	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type
Other serious health problems?	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type	<input type="checkbox"/> NO <input type="checkbox"/> YES specify type
Has any child died?	<input type="checkbox"/> NO <input type="checkbox"/> YES --/--/---- specify date specify cause of death	<input type="checkbox"/> NO <input type="checkbox"/> YES --/--/---- specify date specify cause of death	<input type="checkbox"/> NO <input type="checkbox"/> YES --/--/---- specify date specify cause of death	<input type="checkbox"/> NO <input type="checkbox"/> YES --/--/---- specify date specify cause of death	<input type="checkbox"/> NO <input type="checkbox"/> YES --/--/---- specify date specify cause of death
Name of Hospital of birth					
Hospital State					
Mother's full name at the time of birth					
Mother's postcode at the time of birth	<input type="checkbox"/> Not known	<input type="checkbox"/> Not known	<input type="checkbox"/> Not known	<input type="checkbox"/> Not known	<input type="checkbox"/> Not known
Mother's date of birth	--/--/---- <input type="checkbox"/> Not known	--/--/---- <input type="checkbox"/> Not known	--/--/---- <input type="checkbox"/> Not known	--/--/---- <input type="checkbox"/> Not known	--/--/---- <input type="checkbox"/> Not known

G46. Have any of your pregnancies or births involved twins or multiple births?

☐ NO

☐ YES

If YES describe which ones from the tables at G44 and G45.

example: *Table G45, 2nd child and 3rd child are twins.*

G47. Have you and your partner ever experienced difficulties getting pregnant despite trying for at least 12 months?

☐ NO

☐ YES

If YES:

a. What year did those difficulties getting pregnant begin?

____ year ____

b. Have you sought or undertaken infertility treatment?

☐ NO

☐ YES

c. If YES, was there any cause for your infertility found?

☐ NO

☐ YES _____
please specify

d. Have you managed to get pregnant or father a pregnancy since then?

☐ NO

☐ YES → **Which year?** _____
year

→ **GO TO SECTION H.**

Section H. FINAL QUESTIONS

As a check of our coverage in this questionnaire, please answer these final questions.

H1. Are there other important military experiences or exposures we have not asked you about?

☐ NO

☐ YES

If YES, please give details in the space provided here.

H2. Are there other important health concerns we have not asked you about?

☐ NO

☐ YES

If YES, please give details in the space provided here.

H3. Do you have any additional comments you would like to add?

☐ NO

☐ YES

If YES, please give details in the space provided here or on additional pages.

SECTION I: CONTACT DETAILS

Note: to ensure confidentiality of your information, this page will be removed by the Study team and stored separately from the rest of the questionnaire.

Please fill in details of your current name

Surname

All given names

Your preferred given name

If you have ever changed your name please provide details here.

Previous surname

Given names if different

Years used (start/end) to

Other previous surname

Other given names

Years used (start/end) to

Please give your current address, telephone contact numbers and email address (if applicable)

Street number or PO Box

Street

Suburb/Town

State Postcode

Phone numbers Email address/es

Home <input type="text"/>	Home <input type="text"/>
Work <input type="text"/>	Work <input type="text"/>
Mobile <input type="text"/>	

ALTERNATIVE CONTACT DETAILS

INSTRUCTIONS: *In case you move and we lose contact with you, please give us the names of up to two relatives or friends who may be able to tell us where you are. These should be people who are at long-term addresses but who are not living with you. We would only use these alternative contacts in the event that we could not contact you at the address you have provided on the previous page.*

FIRST ALTERNATIVE CONTACT

Surname	<input type="text"/>
Given names	<input type="text"/>
Street number	<input type="text"/>
Street	<input type="text"/>
Suburb/Town	<input type="text"/>
State	<input type="text"/> Postcode <input type="text"/>
Phone no/s	<input type="text"/>

SECOND ALTERNATIVE CONTACT

Surname	<input type="text"/>
Given names	<input type="text"/>
Street number	<input type="text"/>
Street	<input type="text"/>
Suburb/Town	<input type="text"/>
State	<input type="text"/> Postcode <input type="text"/>
Phone no/s	<input type="text"/>

SECTION J: NOMINATED MEDICAL PRACTITIONER

Upon completion of your medical assessments, at Health Services Australia, a summary of your results will be sent to you. This will include results of the blood tests and results of various tests of physical and mental functioning.

If Health Services Australia find a condition that requires further medical follow up or investigation, it is very important that they forward that information to an appropriate medical practitioner.

The Study team invites you to nominate a personal medical practitioner or general practitioner to whom we can send a second copy of your results.

If you do not have a personal medical practitioner or some other local practitioner who you care to nominate, OR if you only have an Australian Defence Force medical practitioner to whom you do not wish results to go, Health Services Australia will send you a copy of your results as usual.

If you would like to nominate a medical practitioner, to receive a copy of your medical assessment results, please write their contact details here and sign the consent box below; providing Health Services Australia with your permission that they forward a second copy of your results to the nominated person.

I wish to nominate a medical practitioner . ☐ YES ☐ NO

Medical practitioner's name

Name of the medical practice
(business name)

Street number

Street

Suburb/Town

State Postcode

Phone no/s

I give my consent for Health Services Australia to send a copy of my medical examination results, collected for the purpose of the Gulf War Veterans Health Study, to the practitioner whom I have nominated above.

Name

Signature

Date

Appendix D: Wave-2 questionnaire

barcode



MONASH University

Gulf War Veterans' Health Study - 2011 Follow Up

PARTICIPANT QUESTIONNAIRE



HMAS *Brisbane*, HMAS *Adelaide*, HMAS *Success*, HMAS *Darwin* and HMAS *Sydney* in the Gulf of Oman
(Photo: LSPH Kym Degener)



HMAS *Brisbane* Gulf Deployment
(Photo: Navy PR)




Preparing against a chemical warfare threat.
(Photo: Navy PR)

THANK YOU

for participating in the Gulf War Veterans' Health Study 2011 Follow Up

Please read the following instructions for completing the questionnaire

1. It is important that you have read and signed the Consent Form that accompanied this questionnaire.
2. Please be sure to read each question and its instructions very carefully.
3. Unless directed otherwise, EVERY question should be completed if possible.
Please choose the best available response to each question, even if there is not one that suits perfectly. Some parts of the questionnaire may seem repetitive, but each section has its own unique purpose.
4. Please use **BLACK OR BLUE PEN ONLY** to complete the questionnaire. If you make a mistake simply cross it out and clearly mark the correct answer.
5. When completing the questionnaire please place crosses ☒ in the boxes.
Please do NOT circle the boxes 
6. Alternatively, when required, please write clear numbers in the number boxes provided.

For example

1	5
---	---

 years

7. If you have any questions please call the Monash University research team on **1800 729 913**.
Please call any time during business hours, Eastern Standard Time, Monday to Friday, or leave a message outside of these hours.

SUPPORT

If you find completing this questionnaire distressing in any way you can talk to someone about it. Please consider:

- **Lifeline** 13 11 14
- **Defence All Hours Support Line (AHSL)** 1800 628 036
- **Veterans and Veterans' Families Counselling Service (VVCS)** 1800 011 046

SECTION A - BACKGROUND INFORMATION

Please provide some information about your personal or demographic details and how these have changed since 1st January 2001.

A1. What is your date of birth?

D	D	M	M	Y	Y	Y	Y
---	---	---	---	---	---	---	---

A2. What is your current marital status?

Choose one

- | | |
|--|--|
| <input type="checkbox"/> ₁ Married or de facto | <input type="checkbox"/> ₅ Never married |
| <input type="checkbox"/> ₂ Divorced | <input type="checkbox"/> ₆ Other (please specify) |
| <input type="checkbox"/> ₃ Separated but not divorced | |
| <input type="checkbox"/> ₄ Widowed | |

A3. Since 1st January 2001, has your marital status changed?

Select all that apply

Since 1st January 2001 I have:

- | | |
|--|---|
| <input type="checkbox"/> Not changed my marital status | <input type="checkbox"/> Been widowed |
| <input type="checkbox"/> Married, or started living with a partner | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Divorced | |
| <input type="checkbox"/> Separated but not divorced | |

A4. Which category best describes the highest educational qualification you have completed?

Choose one

- | | |
|--|--|
| <input type="checkbox"/> ₁ Secondary school up to grade 10 | <input type="checkbox"/> ₅ Undergraduate degree |
| <input type="checkbox"/> ₂ Secondary school grades 11-12 | <input type="checkbox"/> ₆ Post-graduate degree |
| <input type="checkbox"/> ₃ Certificate (trade, apprenticeship, technicians etc) | <input type="checkbox"/> ₇ Other (please specify) |
| <input type="checkbox"/> ₄ Diploma (associate, undergraduate) | |

A5. Since 1st January 2001 have you had a period of unemployment greater than 3 months?

- ☐ ₁ No ☐ ₂ Yes → If YES, was this period of unemployment primarily due to health problems? ☐ ₁ No ☐ ₂ Yes



A6. What is your main source of income now?

Choose one

- | | |
|--|--|
| <input type="checkbox"/> ₁ Wage or salary | <input type="checkbox"/> ₅ DVA-provided pension/income support |
| <input type="checkbox"/> ₂ Child allowance | <input type="checkbox"/> ₇ Other government pension/allowance/benefit |
| <input type="checkbox"/> ₃ Dividends/interest/income from investments | <input type="checkbox"/> ₈ Other (please specify) |
| <input type="checkbox"/> ₄ Superannuation/annuity | |
| <input type="checkbox"/> ₅ Own business or share in a partnership | |

- A7.** What is the total of all wages, government benefits, pensions, allowances and other income your household usually receives? Do not deduct tax, superannuation contributions, health insurance, amounts salary sacrificed or other automatic deductions.
(Note: If you are sharing a household with someone who is not a partner and they live independently then record **your income only**)

Choose **one**

- | | |
|--|--|
| <input type="checkbox"/> ₁ negative income | <input type="checkbox"/> ₆ \$50,000 – \$79,999 per year |
| <input type="checkbox"/> ₂ nil income | <input type="checkbox"/> ₇ \$80,000 – \$99,999 per year |
| <input type="checkbox"/> ₃ \$1 – \$9,999 per year | <input type="checkbox"/> ₈ \$100,000 – \$199,999 per year |
| <input type="checkbox"/> ₄ \$10,000 – \$29,999 per year | <input type="checkbox"/> ₉ \$200,000 or more per year |
| <input type="checkbox"/> ₅ \$30,000 – \$49,999 per year | |

SECTION B - RECENT AUSTRALIAN DEFENCE FORCE SERVICE

- B1.** Are you currently a serving member of the regular Australian Defence Force (ADF)?

- ☐ ₁ Yes
- ☐ ₂ No → If NO did you ☐ Discharge to the Reserves? In what year?

Y	Y	Y	Y
---	---	---	---
- ☐ Discharge out of the ADF completely? In what year?

Y	Y	Y	Y
---	---	---	---

- B2.** To the nearest year, how long have/had you served with the ADF?

- a. as a regular?

--	--

 years
- b. as a reservist?

--	--

 years

- B3.** What is your CURRENT rank or what WAS your rank when you left the military?

- ☐ ₁ Senior Commissioned Officer (CMDR / LTCOL / WGCDR and above)
- ☐ ₂ Commissioned Officer (LCDR / MAJ / SQNLDR and below)
- ☐ ₃ Senior Non-Commissioned Officer (PO / SGT and above)
- ☐ ₄ Junior Non-Commissioned Officer (LS / CPL and below)
- ☐ ₅ Other ranks (AB / SMN / PTE / LAC / AC or equivalent)

- B4.** Have you been on an ADF operational deployment since 1st January 2001?
(war-like, peace operations, peacekeeping, peace-monitoring, or humanitarian support)
This does not include training exercises or good will visits (flying the flag).

- ☐ ₁ Yes ☐ ₂ No, If NO please go to **Section C** on page 6.

B5. If YES to B4 on previous page, please indicate which of the following major Operations you have been deployed on since **1st January 2001**? (please complete as much information as you can).

Note: We ask whether you were involved in a combat role for each deployment. For the purpose of this question a combat role has been defined as either:

- during deployment your main duties were any of combat (e.g. Infantry, Artillery, etc), Security, Training local police / army, Oil platform protection, Clearance diver, Boarding party, EOD (Bomb disposal, IED Technician) + Engineering Source OR
- during deployment you had experiences such as coming under fire; discharging own weapon; being in a threatening situation and unable to respond; potential for combat exposure (e.g. experienced in-direct fire), went on combat patrols or missions, feared you had been exposed to a contagious disease, toxic agent or injury (e.g. radioactivity, HIV, or chemical warfare); in danger of being killed or injured; handled/ saw dead bodies; there were casualties among people close to you; you were witness to human degradation and misery; your own actions or inactions resulted in injury or death to others.

Country	Operation name	Year your deployment/s started	Number of times deployed in that year	Total time deployed in MONTHS in that year	Combat role (select if YES)
<input type="checkbox"/> , Afghanistan or areas supporting operations in Afghanistan	<input type="checkbox"/> , OP SLIPPER	<input type="checkbox"/> 2001	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2002	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2003	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2004	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2005	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2006	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2007	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2008	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2009	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2010	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2011	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="checkbox"/> , Iraq or areas supporting operations in Iraq	<input type="checkbox"/> , OP BASTILLE	<input type="checkbox"/> 2001	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2002	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
	<input type="checkbox"/> , OP FALCONER	<input type="checkbox"/> 2003	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

Country	Operation name	Year your deployment/s started	Number of times deployed in that year	Total time deployed in MONTHS in that year	Combat role (select if YES)
<input type="checkbox"/> , Iraq or areas supporting operations in Iraq	<input type="checkbox"/> , OP CATALYST	<input type="checkbox"/> 2003	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2004	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2005	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2006	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2007	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2008	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2009	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
	<input type="checkbox"/> , OP KRUGER	<input type="checkbox"/> 2009	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2010	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2011	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="checkbox"/> , Solomon Islands	<input type="checkbox"/> , OP ANODE	<input type="checkbox"/> 2003	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2004	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2005	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2006	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2007	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2008	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2009	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2010	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2011	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="checkbox"/> , Bougainville	<input type="checkbox"/> , OP BEL ISI II	<input type="checkbox"/> 2001	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2002	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2003	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

Country	Operation name	Year your deployment/s started	Number of times deployed in that year	Total time deployed in MONTHS in that year	Combat role (select if YES)
<input type="checkbox"/> East Timor	<input type="checkbox"/> OP TANAGER	<input type="checkbox"/> 2001	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2002	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
	<input type="checkbox"/> OP CITADEL	<input type="checkbox"/> 2002	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2003	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2004	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
	<input type="checkbox"/> OP SPIRE	<input type="checkbox"/> 2004	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2005	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
	<input type="checkbox"/> OP ASTUTE, OP CHIRON, OP TOWER	<input type="checkbox"/> 2005	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2006	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2007	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2008	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2009	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2010	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
		<input type="checkbox"/> 2011	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

B6. Since 1st January 2001 what other war like, peace operations, peacekeeping, peace-monitoring or humanitarian support operations have you been deployed on, including assisting the Multinational Force and Observers (e.g. *OP Mazurka*) or UN missions (e.g. *OP Palate*, *OP Riverbank*, *OP Azure*), Humanitarian Missions (e.g. *OP Sumatra Assist*, *OP Pakistan Assist*), secondments to foreign militaries (e.g. *OP Enduring Freedom*, *OP Herrick*) and border protection (e.g. *OP Resolute*)? If none, skip to Section C on the next page.

Country	Operation name	Year your deployment/s started	Number of times deployed in that year	Total time deployed in MONTHS in that year	Combat role (select if YES)
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

SECTION C - CIVILIAN EMPLOYMENT

C1. Since 1st January 2001, have you held any civilian (non-ADF) jobs for **more than 3 months**?

☐ No → Please go to C2 over the page. ☐ Yes → Please complete the table below.

For every job that you have held outside of the ADF for 3 months or more since 1st January 2001, please complete the table below. There are some examples provided. Please include any jobs where you may have been contracted back to an ADF-related work place or Operation. Please start with any non-ADF job you had in January 2001 and add new jobs in order. **Please estimate what year you started each job and the number of years and months you held that job.** It may be useful to refer to your personal records, such as an old copy of a resume, to remind you about jobs which you may have forgotten.

Year started	Duration job held (years and months)		Job Title	Main job duties	Employer	Industry	Country (if not Australia)	No. of hours per week	No. of weeks per year
1 9 9 9	4	4 mo	Material's engineer	Material's fatigue testing	DSTO	Defence		4 0	4 8
2 0 0 3	5	0 mo	Unit manager	Managing Material's Science Unit, some applied research	CSIRO	Science & technology		4 0	4 8
2 0 0 8	1	0 mo	Leave without pay for family reasons	N/A	N/A	N/A			
2 0 0 9	2	6 mo	Unit manager	Managing Material's Science Unit, some applied research	CSIRO	Science & technology		3 2	4 8

Your civilian jobs held for more than 3 months since January 2001

Year started	Duration job held (years and months)		Job Title	Main job duties	Employer	Industry	Country (if not Australia)	No. of hours per week	No. of weeks per year
Y Y Y Y		mo							
Y Y Y Y		mo							
Y Y Y Y		mo							
Y Y Y Y		mo							
Y Y Y Y		mo							

Year started	Duration job held (years and months)	Job Title	Main job duties	Employer	Industry	Country (if not Australia)	No. of hours per week	No. of weeks per year
Y Y Y	Y Y Y mo							
Y Y Y	Y Y Y mo							
Y Y Y	Y Y Y mo							
Y Y Y	Y Y Y mo							
Y Y Y	Y Y Y mo							
Y Y Y	Y Y Y mo							
Y Y Y	Y Y Y mo							

C2. Since January 2001, have you done any of the following types of voluntary work for emergency service, community welfare, health or humanitarian aid organisations?
Choose all that apply

- ☐ Search and rescue
- ☐ First aid/medical care
- ☐ Fire fighting
- ☐ Counselling/supportive listening
- ☐ Overseas humanitarian aid work
- ☐ None of the above

SECTION D - HEALTH and WELL BEING

D1. In general, would you say your health is:

- ☐ ₁ Excellent ☐ ₂ Very good ☐ ₃ Good ☐ ₄ Fair ☐ ₅ Poor

D2. The following items are about activities you might do during a typical day. Does **your health now** **limit you** in these activities? If so, how much?

- | | Yes,
Limited a
Lot | Yes,
Limited a
Little | No,
Not Limited
at All |
|--|---------------------------------------|---------------------------------------|---------------------------------------|
| a. Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b. Climbing several flights of stairs | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

D3. During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

- | | | |
|--|---|--|
| a. Accomplished less than you would like | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| b. Were limited in the kind of work or other activities | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |

D4. During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

- | | | |
|--|---|--|
| a. Accomplished less than you would like | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |
| b. Didn't do work or other activities as carefully as usual | <input type="checkbox"/> ₁ Yes | <input type="checkbox"/> ₂ No |

D5. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

- ☐ ₁ Not at all ☐ ₂ A little bit ☐ ₃ Moderately ☐ ₄ Quite a bit ☐ ₅ Extremely

These questions are about how you feel and how things have been with you during the **past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

D6. How much of the time during the **past 4 weeks**.

- | | All of
the Time | Most of
the Time | A Good
Bit of the
Time | Some of
the Time | A Little of
the Time | None of
the Time |
|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a. Have you felt calm and peaceful? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ | <input type="checkbox"/> ₆ |
| b. Did you have a lot of energy? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ | <input type="checkbox"/> ₆ |
| c. Have you felt down? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ | <input type="checkbox"/> ₆ |

D7. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

- ☐ ₁ All of the Time ☐ ₂ Most of the Time ☐ ₃ Some of the Time ☐ ₄ A little of the Time ☐ ₅ None of the Time

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D8. How much **bodily** pain have you had during the **past 4 weeks**?

- ☐ ₁ None ☐ ₂ Very mild ☐ ₃ Mild ☐ ₄ Moderate ☐ ₅ Severe ☐ ₆ Very severe

D9. We would like to know how your health has been in general over the past few weeks. Choose the answer which you think most nearly applies to you.

Have you recently:

a. been able to concentrate on whatever you're doing?

- ☐₁ Better than usual ☐₂ Same as usual ☐₃ Less than usual ☐₄ Much less than usual

b. lost much sleep over worry?

- ☐₁ Not at all ☐₂ No more than usual ☐₃ Rather more than usual ☐₄ Much more than usual

c. felt that you are playing a useful part in things?

- ☐₁ More so than usual ☐₂ Same as usual ☐₃ Less useful than usual ☐₄ Much less useful

d. felt capable of making decisions about things?

- ☐₁ More so than usual ☐₂ Same as usual ☐₃ Less so than usual ☐₄ Much less capable

e. felt constantly under strain?

- ☐₁ Not at all ☐₂ No more than usual ☐₃ Rather more than usual ☐₄ Much more than usual

f. felt you couldn't overcome your difficulties?

- ☐₁ Not at all ☐₂ No more than usual ☐₃ Rather more than usual ☐₄ Much more than usual

g. been able to enjoy your normal day-to-day activities?

- ☐₁ More so than usual ☐₂ Same as usual ☐₃ Less so than usual ☐₄ Much less than usual

h. been able to face up to your problems?

- ☐₁ More so than usual ☐₂ Same as usual ☐₃ Less able than usual ☐₄ Much less able

i. been feeling unhappy and depressed?

- ☐₁ Not at all ☐₂ No more than usual ☐₃ Rather more than usual ☐₄ Much more than usual

j. been losing confidence in yourself?

- ☐₁ Not at all ☐₂ No more than usual ☐₃ Rather more than usual ☐₄ Much more than usual

k. been thinking of yourself as a worthless person?

- ☐₁ Not at all ☐₂ No more than usual ☐₃ Rather more than usual ☐₄ Much more than usual

l. been feeling reasonably happy, all things considered?

- ☐₁ More so than usual ☐₂ About same as usual ☐₃ Less so than usual ☐₄ Much less than usual

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D10. Please indicate whether or not you have suffered any of the following symptoms in the past month, and if so, please indicate whether your symptoms were mild, moderate or severe in nature.

<u>In the past month</u> have you suffered from:	NO Not at all	YES Mild	YES Moderate	YES Severe
1. Chest pain	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2. Headaches	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
3. Rapid or pounding heart beat	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
4. Irritability / outbursts of anger	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
5. Shortness of breath	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6. Wheezing	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
7. Sleeping difficulties	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
8. Feeling jumpy / easily startled	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
9. Feeling unrefreshed after sleep	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
10. Fatigue	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
11. Double vision	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
12. Intolerance to alcohol	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
13. Itchy or painful eyes	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
14. Rash or skin irritation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
15. Skin infections e.g. boils	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
16. Skin ulcers	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
17. Shaking	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
18. Tingling or burning sensation in hands or feet	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
19. Loss of sensation in hands or feet	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
20. Feeling distant or cut off from others	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
21. Constipation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
22. Flatulence or burping	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
23. Stomach cramps	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
24. Diarrhoea	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
25. Indigestion	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
26. Dry mouth	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
27. Mouth ulcers	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
28. Toothache	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
29. Persistent cough	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
30. Lump in throat	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
31. Sore throat	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
32. Forgetfulness	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
33. Dizziness, fainting or blackouts	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
34. Seizures or convulsions	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
35. Feeling disorientated	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
36. Loss of concentration	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
37. Difficulty finding the right word	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
38. Pain on passing urine	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
39. Passing urine more often	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
40. Loss of control over bladder or bowels	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
41. Burning sensation in the sex organs	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

<i>In the past month have you suffered from:</i>	NO Not at all	YES Mild	YES Moderate	YES Severe
42. Loss of interest in sex	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
43. Problems with sexual functioning	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
44. Increased sensitivity to noise	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
45. Increased sensitivity to light	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
46. Increased sensitivity to smells or odours	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
47. Ringing in the ears	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
48. Avoiding doing things or situations	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
49. Pain, without swelling or redness, in several joints	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
50. Stiffness in several joints	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
51. General muscle aches or pains	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
52. Loss of balance or coordination	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
53. Difficulty speaking	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
54. Low back pain	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
55. Night sweats which soak the bed sheets	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
56. Feeling feverish	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
57. Tender or painful swelling of lymph glands in neck, armpit or groin	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
58. Loss of, or decrease in, appetite	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
59. Nausea	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
60. Vomiting	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
61. Distressing dreams	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
62. Unintended weight gain greater than 4kg	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
63. Unintended weight loss greater than 4kg	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

D11. Please indicate whether or not you have suffered any of these symptoms in the ***past month***.

<i>In the past month have you experienced:</i>	No	Yes
1. Difficulty lifting objects above your head, or from a high shelf	<input type="checkbox"/> 1	<input type="checkbox"/> 2
2. Difficulty undoing buttons	<input type="checkbox"/> 1	<input type="checkbox"/> 2
3. Difficulty turning doorknobs or unscrewing jars	<input type="checkbox"/> 1	<input type="checkbox"/> 2
4. Difficulty getting up from sitting in a chair or couch without the use of your arms	<input type="checkbox"/> 1	<input type="checkbox"/> 2
5. Problems with tripping, or your feet slapping, while walking	<input type="checkbox"/> 1	<input type="checkbox"/> 2
6. Difficulty recognising hot from cold water	<input type="checkbox"/> 1	<input type="checkbox"/> 2
7. Difficulty feeling pain, cuts or injuries	<input type="checkbox"/> 1	<input type="checkbox"/> 2
8. Feeling unsteady walking on uneven ground	<input type="checkbox"/> 1	<input type="checkbox"/> 2
9. Feeling unsteady walking in the dark	<input type="checkbox"/> 1	<input type="checkbox"/> 2
10. Feeling like you may fall over because of your unsteadiness	<input type="checkbox"/> 1	<input type="checkbox"/> 2
11. Numbness, "asleep feeling" or prickling sensation in your hands or arms	<input type="checkbox"/> 1	<input type="checkbox"/> 2
12. Numbness, "asleep feeling" or prickling sensation in your feet or legs	<input type="checkbox"/> 1	<input type="checkbox"/> 2
13. Burning, deep aching pain or tenderness in your hands or arms	<input type="checkbox"/> 1	<input type="checkbox"/> 2
14. Burning, deep aching pain or tenderness in your feet or legs	<input type="checkbox"/> 1	<input type="checkbox"/> 2
15. Unusual sensitivity or tenderness of your skin when clothes or bedclothes rub against you	<input type="checkbox"/> 1	<input type="checkbox"/> 2
16. Feeling like you will faint, or fainting, when you stand up from a lying or sitting position	<input type="checkbox"/> 1	<input type="checkbox"/> 2
17. Difficulty swallowing food (more than occasionally)	<input type="checkbox"/> 1	<input type="checkbox"/> 2

D12. We are interested in learning more about your pain intensity and disability. For the following questions with a scale of 0-10 please place a cross in **ONE** box only. Please complete these questions regardless of whether you have pain.

a. How would you rate your pain on a 0-10 scale at the present time, that is right now, where 0 is 'no pain' and 10 is 'pain as bad as could be'?

	0	1	2	3	4	5	6	7	8	9	10	
No pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pain as bad as could be

b. In the past 6 months, how intense was your worst pain rated on a 0-10 scale where 0 is 'no pain' and 10 is 'pain as bad as could be'?

	0	1	2	3	4	5	6	7	8	9	10	
No pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pain as bad as could be

c. In the past 6 months, on the average, how intense was your pain rated on a 0-10 scale where 0 is 'no pain' and 10 is 'pain as bad as could be'? (That is, your usual pain at times you were experiencing pain.)

	0	1	2	3	4	5	6	7	8	9	10	
No pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pain as bad as could be

d. About how many days in the last 6 months have you been kept from your usual activities (work, school or housework) because of pain?

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	days
----------------------	----------------------	----------------------	----------------------	------

e. In the past 6 months, how much has pain interfered with your daily activities rated on a 0-10 scale where 0 is 'no interference' and 10 is 'unable to carry on any activities'?

	0	1	2	3	4	5	6	7	8	9	10	
No interference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unable to carry on any activities

f. In the past 6 months, how much has pain changed your ability to take part in recreational, social and family activities where 0 is 'no change' and 10 is 'extreme change'?

	0	1	2	3	4	5	6	7	8	9	10	
No change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Extreme change

g. In the past 6 months, how much pain has changed your ability to work (including housework) where 0 is 'no change' and 10 is 'extreme change'?

	0	1	2	3	4	5	6	7	8	9	10	
No change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Extreme change

D13. Please indicate below if you have had pain or tenderness over the past 7 days in any of the areas listed below. *Be sure to mark right and left sides separately.*

<input type="checkbox"/> Shoulder, Left	<input type="checkbox"/> Upper leg, Left	<input type="checkbox"/> Upper back
<input type="checkbox"/> Shoulder, Right	<input type="checkbox"/> Upper leg, Right	<input type="checkbox"/> Lower back
<input type="checkbox"/> Upper arm, Left	<input type="checkbox"/> Lower leg, Left	<input type="checkbox"/> Neck
<input type="checkbox"/> Upper arm, Right	<input type="checkbox"/> Lower leg, Right	<input type="checkbox"/> No pain in any of these areas
<input type="checkbox"/> Lower arm, Left	<input type="checkbox"/> Jaw, Left	
<input type="checkbox"/> Lower arm, Right	<input type="checkbox"/> Jaw, Right	
<input type="checkbox"/> Hip, Left	<input type="checkbox"/> Chest	
<input type="checkbox"/> Hip, Right	<input type="checkbox"/> Abdomen	

D14. These next questions are about your respiratory health.

	NO	YES
1. Have you had wheezing or whistling in your chest at any time in the last 12 months ?		
<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes, If YES →		
a. Have you been at all breathless when the wheezing noise was present?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
b. Have you had this wheezing or whistling when you did not have a cold?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
2. Have you been woken by an attack of coughing at any time in the last 12 months ?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
3. Do you usually cough first thing in the morning (or getting up if on night shift)?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
4. Do you usually cough during the day or at night?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

If NO to ALL of questions 2, 3 and 4 above, please skip to question 6 on this page.

	NO	YES
5. If YES to ANY of Questions 2, 3 and 4, would you have coughed like this for as much as 3 months in each of the past 2 years?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
6. Do you usually bring up any phlegm from your chest first thing in the morning in winter?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

7. Do you usually bring up any phlegm from your chest during the day, or at night in the winter?	
<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes, If YES →	
a. Have you brought up phlegm like this on most days for as much as 3 months of a year for at least 2 successive years?	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes

8. Have you ever had asthma?	
<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes, If YES →	
a. Was this confirmed by a doctor?	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes
b. At what age did it start?	<input type="text"/> <input type="text"/> years
c. Have you had an attack of asthma in the last 12 months ?	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes
d. Are you currently taking any medicine (including inhalers, aerosols or tablets) for asthma?	
<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes, If YES, please name them	<input type="text"/>

9. Have you ever had chronic bronchitis?	
<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes, If YES →	
a. Was this confirmed by a doctor?	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes
b. At what age did it start?	<input type="text"/> <input type="text"/> years
c. Are you currently taking any medicine (including inhalers, aerosols or tablets) for chronic bronchitis?	
<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes, If YES, please name them	<input type="text"/>

10. Have you **ever** had emphysema?

☐ ₁ No ☐ ₂ Yes, If YES →

a. Was this confirmed by a doctor? ☐ ₁ No ☐ ₂ Yes

b. At what **age** did it start? years

c. Are you currently taking any medicine (including inhalers, aerosols or tablets) for emphysema?

☐ ₁ No ☐ ₂ Yes, If YES, please name them

11. Have you **ever** had Chronic Obstructive Pulmonary Disease (COPD)?

☐ ₁ NO ☐ ₂ YES, If YES →

a. Was this confirmed by a doctor? ☐ ₁ No ☐ ₂ Yes

b. At what **age** did it start? years

c. Are you currently taking any medicine (including inhalers, aerosols or tablets) for COPD?

☐ ₁ No ☐ ₂ Yes, If YES, please name them

We are interested in your sleep patterns, tiredness and experiences of fatigue.

D15. Please rate your current sleeping pattern (i.e. last 2 weeks).

	None	Mild	Moderate	Severe	Very severe
a. Difficulty falling asleep	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
b. Difficulty staying asleep	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
c. Problem waking up early	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

D16. How satisfied /dissatisfied are you with your current sleep pattern?

☐ ₁ Very satisfied ☐ ₂ Satisfied ☐ ₃ Neutral ☐ ₄ Dissatisfied ☐ ₅ Very dissatisfied

D17. We would like to know more about any problems you have had with feeling tired, weak or lacking in energy **in the last month**. Please answer all the questions by selecting the answer which applies to you most closely. If you have been feeling tired for a long while, then compare yourself to how you felt when you were last well.

	Less than usual	No more than usual	More than usual	Much more than usual
a. Do you have problems with tiredness?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
b. Do you need to rest more?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
c. Do you feel sleepy or drowsy?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
d. Do you have problems starting things?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
e. Do you lack energy?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
f. Do you have less strength in your muscles?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
g. Do you feel weak?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
h. Do you have difficulty concentrating?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
i. Do you make slips of the tongue when speaking?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
j. Do you find it more difficult to find the correct word?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
	Better than usual	No worse than usual	Worse than usual	Much worse than usual
k. How is your memory?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

D18. How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired?

	Would never doze	Slight chance of dozing	Moderate chance of dozing	High chance of dozing
a. Sitting and reading	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
b. Watching TV	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
c. Sitting, inactive in a public place (eg. Theatre, meeting)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
d. As a passenger in a car for an hour without a break	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
e. Lying down to rest in the afternoon when circumstances permit	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
f. Sitting and talking to someone	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
g. Sitting quietly after a lunch without alcohol	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
h. In a car, while stopped for a few minutes in the traffic	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

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D19. a. In the past 12 months, have you experienced extreme tiredness or fatigue following your normal activities?

- ☐ 1 **No**, go to D20
☐ 2 **Yes**, answer the next question

b. In the past 12 months, have you felt extremely tired or fatigued following your normal activities every day, or almost every day, for **one month or longer**?

- ☐ 1 **No**, go to D20
☐ 2 **Yes**, answer the questions below

c. When did this feeling of being extremely tired or fatigued **first** begin? *Record month and year*

M	M	Y	Y	Y	Y
---	---	---	---	---	---

d. When did you last experience this feeling of being extremely tired or fatigued? *Record the month and year. If still present, record the current month and year.*

M	M	Y	Y	Y	Y
---	---	---	---	---	---

e. Has this feeling of being extremely tired or fatigued been **present continuously** over this period or has it tended to **relapse and recur**?

- ☐ 1 Present continuously
☐ 2 Relapsed and recurred

f. How many months in total have you experienced this extreme tiredness or fatigue?

M	M	M
---	---	---

g. What was the longest period of time you experienced it for? (*months*)

M	M	M
---	---	---

h. When did this longest period of time begin? *Record month and year*

M	M	Y	Y	Y	Y
---	---	---	---	---	---

i. Have you seen a medical doctor about this extreme tiredness or fatigue?

- ☐ 1 **NO**, go to D20
☐ 2 **YES**, answer the next question

j. In what year did you first see a medical doctor about this extreme tiredness or fatigue?

Y	Y	Y	Y
---	---	---	---

k. Did the doctor find a cause for the extreme tiredness or fatigue?

- ☐ 1 **No** ☐ 2 **Yes**, please specify cause if known

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D20. Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
a. Little interest or pleasure in doing things	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
b. Feeling down, depressed, or hopeless	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
c. Trouble falling or staying asleep, or sleeping too much	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
d. Feeling tired or having little energy	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
e. Poor appetite or overeating	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
f. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
g. Trouble concentrating on things, such as reading the newspaper or watching television	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
h. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
i. Thoughts that you would be better off dead, or of hurting yourself in some way	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

j. If you selected **any** problems in the items a to i above, how **difficult** have these problems made it for you to do your work, take care of things at home, or get along with other people?

☐ 1 Not difficult at all ☐ 2 Somewhat difficult ☐ 3 Very Difficult ☐ 4 Extremely difficult

D21. Listed below are conditions you may or may not have ever experienced. For each condition, please select the reason that corresponds to how you might explain that condition.

Please select only one response for each condition

1. If I had a <u>prolonged headache</u> , I would probably think that it is because:	<input type="checkbox"/> 1 I am emotionally upset <input type="checkbox"/> 2 There is something wrong with my muscles, nerves or brain <input type="checkbox"/> 3 A loud noise, bright light or something else has irritated me
2. If I was <u>sweating a lot</u> , I would probably think that it is because:	<input type="checkbox"/> 1 I must have a fever or infection <input type="checkbox"/> 2 I'm anxious or nervous <input type="checkbox"/> 3 The room is too warm, I'm overdressed or working too hard
3. If I got <u>dizzy all of a sudden</u> , I would probably think it is because:	<input type="checkbox"/> 1 There is something wrong with my heart or blood pressure <input type="checkbox"/> 2 I am not eating enough or I got up too quickly <input type="checkbox"/> 3 I must be under a lot of stress
4. If I noticed my <u>mouth was dry</u> , I would probably think that is because:	<input type="checkbox"/> 1 I must be scared or anxious about something <input type="checkbox"/> 2 I need to drink more liquids <input type="checkbox"/> 3 There is something wrong with my salivary glands
5. If I felt my heart <u>pounding in my chest</u> , I would probably think that this is because:	<input type="checkbox"/> 1 I've exerted myself or drunk a lot of coffee <input type="checkbox"/> 2 I must be really excited or afraid <input type="checkbox"/> 3 There must be something wrong with my heart
6. If I felt <u>fatigued</u> , I would probably think that it is because:	<input type="checkbox"/> 1 I'm emotionally exhausted or discouraged <input type="checkbox"/> 2 I've been over exerting myself or not exercising enough <input type="checkbox"/> 3 I'm anaemic or my blood is weak
7. If I noticed my <u>hand trembling</u> , I would probably think that it is because:	<input type="checkbox"/> 1 I might have some sort of neurological problem <input type="checkbox"/> 2 I'm very nervous <input type="checkbox"/> 3 I've tired the muscle in my hand
8. If I had <u>trouble sleeping</u> , I would probably think that it is because:	<input type="checkbox"/> 1 Some kind of pain or physical discomfort is keeping me awake <input type="checkbox"/> 2 I'm not tired or I had too much coffee <input type="checkbox"/> 3 I'm worrying too much or I must be nervous about something

9. If my <u>stomach was upset</u> , I would probably think that it is because:	<input type="checkbox"/> ₁ I've worried myself sick <input type="checkbox"/> ₂ I have the flu or stomach irritation <input type="checkbox"/> ₃ I've had something to eat that did not agree with me
10. If I <u>lost my appetite</u> , I would probably think that it is because:	<input type="checkbox"/> ₁ I have been eating too much or my body doesn't need as much food as before <input type="checkbox"/> ₂ I'm worrying so much that food just doesn't taste good anymore <input type="checkbox"/> ₃ I have some stomach or intestinal problem
11. If I had a <u>hard time catching my breath</u> I would probably think that it is because:	<input type="checkbox"/> ₁ My lungs are congested from infection, irritation or heart trouble <input type="checkbox"/> ₂ The room is stuffy or there is too much pollution in the air <input type="checkbox"/> ₃ I'm over excited or anxious
12. If I noticed <u>numbness or tingling in my hands or feet</u> , I would probably think that it is because:	<input type="checkbox"/> ₁ I'm under emotional stress <input type="checkbox"/> ₂ There is something wrong with my nerves or blood circulation <input type="checkbox"/> ₃ I am cold or my hand or foot went to sleep
13. If I was <u>constipated or irregular</u> , I would probably think that it is because:	<input type="checkbox"/> ₁ There is not enough fruit or fibre in my diet <input type="checkbox"/> ₂ Nervous tension is keeping me from being regular <input type="checkbox"/> ₃ There is something wrong with my bowels or intestine

The purpose of the questions below is to learn more about the health problems that people sometimes have with their stomach and intestines.

D22. 1. In the last 3 months, how often did you have discomfort or pain anywhere in your abdomen?

<input type="checkbox"/> ₁ Never, go to D23 on the next page	<input type="checkbox"/> ₅ One day a week
<input type="checkbox"/> ₂ Less than one day a month	<input type="checkbox"/> ₆ More than one day a week
<input type="checkbox"/> ₃ One day a month	<input type="checkbox"/> ₇ Every day
<input type="checkbox"/> ₄ Two to three days a month	

2. For women: Did this discomfort or pain occur only during your menstrual bleeding and not other times?

<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₃ Does not apply because I have had menopause or I am a male
<input type="checkbox"/> ₂ Yes	

3. Have you had this discomfort or pain 6 months or longer?

<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
--	---

	Never or rarely	Sometimes	Often	Most of the time	Always
--	-----------------	-----------	-------	------------------	--------

4. How often did this discomfort or pain get better or stop after you had a bowel movement?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
5. When this discomfort or pain started, did you have more frequent bowel movements?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
6. When this discomfort or pain started, did you have less frequent bowel movements?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
7. When this discomfort or pain started, were your stool (bowel movements) looser?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
8. When this discomfort or pain started, how often did you have harder stools?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
9. In the last 3 months, how often did you have hard or lumpy stools?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
10. In the last 3 months, how often did you have loose, mushy or watery stools?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

D23. For each statement below, indicate how strongly the statement has applied to you.

Over the <u>past two weeks</u> how often have you felt:	Never	Seldom	Sometimes	Often	All the Time
1. There is a lot of value in what I can offer others.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. My life seems to be pointless.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. There is no purpose to the activities in my life.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. My role in life has been lost.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. I no longer feel emotionally in control.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. I am in good spirits.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. No one can help me.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. I feel that I cannot help myself.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. I feel hopeless.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. I feel guilty.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. I feel irritable.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12. I cope fairly well with life.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13. I have a lot of regret about my life.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14. Life is no longer worth living.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. I tend to feel hurt easily.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16. I am angry about a lot of things.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
17. I am proud of my accomplishments.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
18. I feel distressed about what is happening to me.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
19. I am a worthwhile person.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
20. I would rather not be alive.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
21. I feel sad and miserable.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
22. I feel discouraged about life.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
23. I feel quite isolated or alone.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
24. I feel trapped by what is happening to me.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

D24. For each item, please choose the box that best indicates how much you agree with the following statements as they apply to you over the last month. If a particular situation has not occurred recently, answer according to how you think you would have felt.

	Not true at all	Rarely true	Sometimes true	Often true	True nearly all the time
a. I am able to adapt when changes occur.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
b. I can deal with whatever comes my way.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
c. I try to see the humorous side of things when I am faced with problems.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
d. Having to cope with stress can make me stronger.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
e. I tend to bounce back after illness, injury or other hardships.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
f. I believe I can achieve my goals, even if there are obstacles.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
g. Under pressure, I stay focused and think clearly.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
h. I am not easily discouraged by failure.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
i. I think of myself as a strong person when dealing with life's challenges and difficulties.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
j. I am able to handle unpleasant or painful feelings like sadness, fear and anger.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

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- D25.** In the past 12 months, have you ever felt that life is not worth living? ☐ ₁ No ☐ ₂ Yes
- D26.** In the past 12 months, have you ever felt so low that you thought about committing suicide? ☐ ₁ No ☐ ₂ Yes
- D27.** In the past 12 months, have you made a suicide plan? ☐ ₁ No ☐ ₂ Yes
- D28.** In the past 12 months, have you attempted suicide? ☐ ₁ No ☐ ₂ Yes

If you require support in relation to any issues you have identified in this questionnaire, we encourage you to refer to the support services listed on the inside cover.

D29. We would like to know whether a medical doctor has diagnosed you with, or treated you for, any of the following medical problems or conditions since January 2001. If YES, please indicate the year you were first diagnosed, whether you have been treated by a medical doctor for this condition in the past year, and whether you have taken any medications for the condition in the past month. This could include medications requiring a prescription or other medications brought 'over the counter' such as Ventolin, Aspirin, and Voltaren.

	Has a medical doctor diagnosed you with, or treated you for, any of the following medical problems or conditions since January 2001?	No <input type="checkbox"/> ₁	Yes <input type="checkbox"/> ₂	If YES			Name of medication(s)
				Year diagnosed	Treated by a doctor in the past year	Medication taken in past month	
1.	High blood pressure	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
2.	Heart attack / Myocardial infarction	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
3.	Angina	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
4.	High cholesterol	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
5.	Stroke	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
6.	Heart failure / Cardiac failure	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
7.	Epilepsy	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
8.	Migraines	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄ <input type="checkbox"/> ₅ <input type="checkbox"/> ₆ <input type="checkbox"/> ₇ <input type="checkbox"/> ₈ <input type="checkbox"/> ₉ <input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	

Has a medical doctor diagnosed you with, or treated you for, any of the following medical problems or conditions since January 2001?	No	Yes	If YES			Name of medication(s)
			Year diagnosed	Treated by a doctor in the past year	Medication taken in past month	
9. Motor neurone disease	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
10. Multiple sclerosis	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
11. Pneumonia	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
12. Stomach or duodenal ulcers	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
13. Colitis / Crohn's disease	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
14. Functional dyspepsia	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
15. Hepatitis	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
16. Cirrhosis of the liver	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
17. Polyp/s in the bowel	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
18. Kidney disease e.g. stones, infection, bleeding	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
19. Bladder disease e.g. infection, bleeding	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
20. Diabetes	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
21. Temporomandibular Joint (TMJ) Dysfunction	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
22. Traumatic Brain Injury	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	
23. Fibrositis or fibromyalgia	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	

Has a medical doctor diagnosed you with, or treated you for, any of the following medical problems or conditions since January 2001?	No	Yes	If YES			Name of medication(s)
			Year diagnosed	Treated by a doctor in the past year	Medication taken in past month	
24. Eye or vision problems e.g. glaucoma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
25. Sinus problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
26. Hearing loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
27. Dermatitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
28. Eczema	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
29. Psoriasis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
30. Malignant melanoma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
31. Other skin cancer e.g. squamous cell or basal cell skin cancers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
32. Other kind of cancer, tumour or malignancy (please specify type)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
33. Chronic Fatigue Syndrome	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
34. Impotence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
35. Alcohol abuse or dependency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
36. Drug abuse or dependency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	
37. Anxiety or stress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	

Has a medical doctor diagnosed you with, or treated you for, any of the following medical problems or conditions since January 2001?	No	Yes	IF YES			Name of medication(s)
			Year diagnosed	Treated by a doctor in the past year	Medication taken in past month	
38. Depression	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
39. Post Traumatic Stress Disorder	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
40. Other psychiatric or psychological condition needing treatment or counselling (please specify) <input type="text"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
41. Sleep apnoea	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
42. Multiple chemical sensitivity	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
43. Carpal tunnel syndrome	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
44. Osteoporosis	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
45. Osteoarthritis	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
If YES to doctor diagnosed or treated osteoarthritis, please indicate main body site/s that this has been a problem at:						
<input type="checkbox"/> Neck <input type="checkbox"/> Shoulder <input type="checkbox"/> Elbow	<input type="checkbox"/> Hand	<input type="checkbox"/> Lower back	<input type="checkbox"/> Hip	<input type="checkbox"/> Knee	<input type="checkbox"/> Ankle	<input type="checkbox"/> Feet <input type="checkbox"/> Other <input type="text"/>
46. Rheumatoid arthritis	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
If YES to doctor diagnosed or treated rheumatoid arthritis, indicate main body site/s that this has been a problem at:						
<input type="checkbox"/> Neck <input type="checkbox"/> Shoulder <input type="checkbox"/> Elbow	<input type="checkbox"/> Hand	<input type="checkbox"/> Lower back	<input type="checkbox"/> Hip	<input type="checkbox"/> Knee	<input type="checkbox"/> Ankle	<input type="checkbox"/> Feet <input type="checkbox"/> Other <input type="text"/>
47. Other inflammatory arthritis e.g. ankylosing spondylitis, psoriatic, Reiter's	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y <input type="checkbox"/> Y	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No <input type="checkbox"/> 2 Yes	
If YES to doctor diagnosed or treated inflammatory arthritis, indicate main body site/s that this has been a problem at:						
<input type="checkbox"/> Neck <input type="checkbox"/> Shoulder <input type="checkbox"/> Elbow	<input type="checkbox"/> Hand	<input type="checkbox"/> Lower back	<input type="checkbox"/> Hip	<input type="checkbox"/> Knee	<input type="checkbox"/> Ankle	<input type="checkbox"/> Feet <input type="checkbox"/> Other <input type="text"/>

Has a medical doctor diagnosed you with, or treated you for, any of the following medical problems or conditions since January 2001?	No	Yes	If YES				Name of medication(s)
			Year diagnosed	Treated by a doctor in the past year	Medication taken in past month		
48. Gout	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes		
If YES to doctor diagnosed or treated gout, indicate main body site/s this has been a problem at: <input type="checkbox"/> Neck <input type="checkbox"/> Shoulder <input type="checkbox"/> Elbow <input type="checkbox"/> Hand <input type="checkbox"/> Lower back <input type="checkbox"/> Hip <input type="checkbox"/> Knee <input type="checkbox"/> Ankle <input type="checkbox"/> Feet <input type="checkbox"/> Other							
49. Other musculoskeletal condition, specify <input type="text"/>	<input type="checkbox"/> ₁ <input type="checkbox"/> ₂		<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes		
If YES to doctor diagnosed or treated musculoskeletal condition, indicate main body site/s this has been a problem at: <input type="checkbox"/> Neck <input type="checkbox"/> Shoulder <input type="checkbox"/> Elbow <input type="checkbox"/> Hand <input type="checkbox"/> Lower back <input type="checkbox"/> Hip <input type="checkbox"/> Knee <input type="checkbox"/> Ankle <input type="checkbox"/> Feet <input type="checkbox"/> Other							
Please list any other medical problems or conditions which a medical doctor has diagnosed you with, or treated you for, since January 2001?							
<input type="text"/>			<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes		
<input type="text"/>			<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes		
<input type="text"/>			<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes		
<input type="text"/>			<input type="checkbox"/> ₁ <input type="checkbox"/> ₂ <input type="checkbox"/> ₃ <input type="checkbox"/> ₄	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes	<input type="checkbox"/> ₁ No <input type="checkbox"/> ₂ Yes		

D30. During the past twelve months have you been hospitalised overnight or longer because of illness or injury?

☐ ₁ No ☐ ₂ Yes →

If YES, please specify why and for how many days:

1 st hospitalisation in past 12 months	<input type="text"/> days	Why?	<input type="text"/>
2 nd hospitalisation in past 12 months	<input type="text"/> days	Why?	<input type="text"/>
3 rd hospitalisation in past 12 months	<input type="text"/> days	Why?	<input type="text"/>
4 th hospitalisation in past 12 months	<input type="text"/> days	Why?	<input type="text"/>

D31. Excluding any time spent in hospital, have you visited any of the following or consulted any of these health professionals for your **own health** in the **past 12 months**?

a. Outpatients section of a hospital	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
b. Casualty or emergency ward	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
c. Day clinic for minor surgery or diagnostic tests other than X ray	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
d. General practitioner	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
e. Specialist doctor	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
f. Dentist or dental professional	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
g. Accredited counsellor	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
h. Alcohol and drug worker	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
i. Psychologist	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
j. Social worker/welfare officer	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
k. Physiotherapist/hydrotherapist	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
l. Chiropractor	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
m. Osteopath	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
n. Diabetes educator	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
o. Dietician/Nutritionist	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
p. Naturopath	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
q. Audiologist/Audiometrist	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
r. Other, <i>please specify type of health professional</i>	<input type="checkbox"/> ₁ No	<input type="checkbox"/> ₂ Yes
<div></div>		

D32. In the past **two weeks**, how many times have you consulted the following health professionals?
Write "0" (zero) if you have not consulted one of these health professionals in the past two weeks.

a. General Practitioner	<div></div> times
b. Specialist doctor	<div></div> times

D33. Thinking back over the past **two weeks**, did you stay in bed or at home all or part of any day because you did not feel well or as a result of illnesses or injury?

☐ ₁ No ☐ ₂ Yes

D34. We would now like to ask you some questions about your pregnancy history (if you are female) or that of your spouse/partner/s (if you are male). You may need to refer to your spouse/partner/s, or to your Child Health Record, to assist you in answering these questions.

- Have you been pregnant or fathered a pregnancy (including miscarriages, ectopic pregnancies or terminations) since January 2000?
☐ ₁ **No**, please go to **question 2** on the next page.
☐ ₂ **Yes**, please complete the following table for each of your pregnancies that have occurred since January 2000. For pregnancies involving twins, triplets or more, use a column for each baby.

		1 st pregnancy	2 nd pregnancy	3 rd pregnancy	4 th pregnancy
What was the outcome of this pregnancy?	Live birth	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> 1
	Live birth but baby died within 28 days of birth	<input type="checkbox"/> 2	<input type="checkbox"/> 2	<input type="checkbox"/> 2	<input type="checkbox"/> 2
	Still birth	<input type="checkbox"/> 3	<input type="checkbox"/> 3	<input type="checkbox"/> 3	<input type="checkbox"/> 3
	Ectopic pregnancy	<input type="checkbox"/> 4	<input type="checkbox"/> 4	<input type="checkbox"/> 4	<input type="checkbox"/> 4
	Miscarriage	<input type="checkbox"/> 5	<input type="checkbox"/> 5	<input type="checkbox"/> 5	<input type="checkbox"/> 5
	Termination	<input type="checkbox"/> 6	<input type="checkbox"/> 6	<input type="checkbox"/> 6	<input type="checkbox"/> 6
	Currently pregnant	<input type="checkbox"/> 7	<input type="checkbox"/> 7	<input type="checkbox"/> 7	<input type="checkbox"/> 7
Month / Year of pregnancy outcome?	<div><div>M</div><div>M</div></div> <div><div>Y</div><div>Y</div><div>Y</div><div>Y</div></div>	<div><div>M</div><div>M</div></div> <div><div>Y</div><div>Y</div><div>Y</div><div>Y</div></div>	<div><div>M</div><div>M</div></div> <div><div>Y</div><div>Y</div><div>Y</div><div>Y</div></div>	<div><div>M</div><div>M</div></div> <div><div>Y</div><div>Y</div><div>Y</div><div>Y</div></div>	
How many weeks was the pregnancy?	<div><div></div><div></div></div> weeks <input type="checkbox"/> 1 Not known	<div><div></div><div></div></div> weeks <input type="checkbox"/> 1 Not known	<div><div></div><div></div></div> weeks <input type="checkbox"/> 1 Not known	<div><div></div><div></div></div> weeks <input type="checkbox"/> 1 Not known	
Baby's sex	<input type="checkbox"/> 1 Male <input type="checkbox"/> 2 Female <input type="checkbox"/> 3 Unknown	<input type="checkbox"/> 1 Male <input type="checkbox"/> 2 Female <input type="checkbox"/> 3 Unknown	<input type="checkbox"/> 1 Male <input type="checkbox"/> 2 Female <input type="checkbox"/> 3 Unknown	<input type="checkbox"/> 1 Male <input type="checkbox"/> 2 Female <input type="checkbox"/> 3 Unknown	
If this pregnancy resulted in a live birth, what was the birth weight?	<div><div></div><div></div><div></div><div></div></div> grams <input type="checkbox"/> 1 Not known	<div><div></div><div></div><div></div><div></div></div> grams <input type="checkbox"/> 1 Not known	<div><div></div><div></div><div></div><div></div></div> grams <input type="checkbox"/> 1 Not known	<div><div></div><div></div><div></div><div></div></div> grams <input type="checkbox"/> 1 Not known	

2. Since January 2000, have you and your partner experienced difficulties getting pregnant despite trying for at least 12 months?

☐ 1 No, please go to **Section E** on the next page.

☐ 2 Yes, If YES →

a. What year did those difficulties getting pregnant begin?

Y

Y

Y

Y

 year

b. Have you sought or undertaken infertility treatment? ☐ 1 No ☐ 2 Yes

c. If YES, were any causes for your infertility found? ☐ 1 No ☐ 2 Yes, please specify

d. Have you managed to get pregnant or father a pregnancy since then?

☐ 1 No

☐ 2 Yes

→ Which year?

Y

Y

Y

Y

SECTION E - INJURY

The following questions ask you about **injuries** you have had in the **past 12 months** such as sprains, broken bones, burns, cuts, heavy knocks etc that were bad enough to interfere with your daily activities.

E1. How many times **in the past 12 months** have you had any injury that was bad enough to interfere with your daily activities?

- ☐ None, skip to **E3** on the next page.
 ☐ 1 One
 ☐ 2 Two
 ☐ 3 Three
 ☐ 4 Four
 ☐ 5 Five
 ☐ 6 Six
 ☐ 7 Seven
 ☐ 8 Eight
 ☐ 9 Nine
 ☐ 10 Ten or more

E2. Please complete the table below in relation to the **two most recent injuries** in the past 12 months.

a. What was the <u>main</u> cause of your injury?	Most recent (choose <u>one</u> cause)	Second most recent (choose <u>one</u> cause)
Motor vehicle – you as driver	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Motor vehicle – you as passenger	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Motor cycle – you as driver	<input type="checkbox"/> 3	<input type="checkbox"/> 3
Motor cycle – you as passenger	<input type="checkbox"/> 4	<input type="checkbox"/> 4
Cycling	<input type="checkbox"/> 5	<input type="checkbox"/> 5
As a pedestrian	<input type="checkbox"/> 6	<input type="checkbox"/> 6
Other transport related	<input type="checkbox"/> 7	<input type="checkbox"/> 7
Struck by or collision with a person	<input type="checkbox"/> 8	<input type="checkbox"/> 8
Struck by or collision with an object	<input type="checkbox"/> 9	<input type="checkbox"/> 9
Firearm	<input type="checkbox"/> 10	<input type="checkbox"/> 10
Cut or pierced by an object, e.g. knife/tool/other implement	<input type="checkbox"/> 11	<input type="checkbox"/> 11
Machinery in operation	<input type="checkbox"/> 12	<input type="checkbox"/> 12
Falling over (on the same level or less than 1 metre)	<input type="checkbox"/> 13	<input type="checkbox"/> 13
Falling over (drop of 1 metre or more)	<input type="checkbox"/> 14	<input type="checkbox"/> 14
Near drowning	<input type="checkbox"/> 15	<input type="checkbox"/> 15
Fire, flames, or smoke	<input type="checkbox"/> 16	<input type="checkbox"/> 16
Hot liquid, steam, gas, object or solid substance	<input type="checkbox"/> 17	<input type="checkbox"/> 17
Poisoning - accidental or intentional overdose of medication	<input type="checkbox"/> 18	<input type="checkbox"/> 18
Poisoning - accidental or intentional swallowing poisonous substances	<input type="checkbox"/> 19	<input type="checkbox"/> 19
Electricity	<input type="checkbox"/> 20	<input type="checkbox"/> 20
Bite or sting	<input type="checkbox"/> 21	<input type="checkbox"/> 21
Other injury cause, <i>please specify</i>	<input type="checkbox"/> 22	<input type="checkbox"/> 22
	<input type="text"/>	<input type="text"/>

Good job – you are well past half way

b. What best describes the type of activity you were doing when you were injured?

	Most recent (choose <u>one</u> activity)	Second most recent (choose <u>one</u> activity)
Working for an income - while in the ADF (incl. travel to/from work)	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Working for an income - not in the ADF (incl. travel to/from work)	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Other type of work, e.g. volunteer work, housework	<input type="checkbox"/> 3	<input type="checkbox"/> 3
Sports activity	<input type="checkbox"/> 4	<input type="checkbox"/> 4
Leisure activity	<input type="checkbox"/> 5	<input type="checkbox"/> 5
Formal educational activity (student, incl. travel to and from)	<input type="checkbox"/> 6	<input type="checkbox"/> 6
Other injury cause, please specify	<input type="checkbox"/> 7	<input type="checkbox"/> 7

c. Did you attend the following for the injury you received?

	Most recent injury		Second most recent injury	
Hospital as an inpatient	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes
Emergency/casualty department	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes
Outpatient clinic at hospital	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes
General practitioner or specialist	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes
Other health professional	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes	<input type="checkbox"/> 1 No	<input type="checkbox"/> 2 Yes

d. Did you have time off work or study due to the injury?

☐ 1 No ☐ 2 Yes

If YES, how many days did you have off work or study?

days

e. On any other days did you cut down on anything you usually do because of the injury?

☐ 1 No ☐ 2 Yes ☐ 3 Don't know

f. Were you under the influence of alcohol, or any other substance, when you were injured?

☐ 1 No ☐ 2 Yes ☐ 3 Don't know

E3. Did any injury you received in the past 3 years involve the following?

a. Being dazed, confused or "seeing stars"? ☐ 1 No ☐ 2 Yes

b. Not remembering the injury? ☐ 1 No ☐ 2 Yes

c. Losing consciousness (knocked out)? ☐ 1 No ☐ 2 Yes

If YES to E3.c, approximately how long were you unconscious (knocked out) for?

☐ 1 less than 1 minute ☐ 2 1-4 minutes ☐ 3 5-30 minutes ☐ 4 more than 30 minutes

E4. How often do you have five or more 'standard' drinks (see Guide page 33) containing alcohol on one occasion?

☐ 1 Never ☐ 2 Less than once a month ☐ 3 Monthly ☐ 4 Weekly ☐ 5 Daily or almost daily

SECTION F - RISK TAKING

F1. Read each of the following statements, and along the scale of boxes shown between two ways you might feel, mark the box that best describes your feelings RIGHT NOW.

not at all	I feel like gambling	very much
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

stopping	I am driving and the lights turn yellow, I feel like	accelerating
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

I don't move	The lights suddenly go out in an unfamiliar stairwell	I proceed immediately
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

avoiding everyone	I feel like	taking on the world
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

very high	I feel like diving from a diving board, which is	very low
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

routine	I like	adventure
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

the thrill of danger	I seek	tranquility
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

I take a dangerous short-cut	If I am in a hurry	I take a safe detour
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

negotiation	I am open to	confrontation
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

direct	I prefer to	be supervised
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

reason	I give priority to	action
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

at loud volume	I like to listen to music	very softly
<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25		

not at all

I am sure of myself

completely

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

animated

I prefer discussions, which are

calm

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

weakens me

A hostile situation

reinforces me

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

I confront it

A menacing dog approaches

I run away

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

I take my time

Faced with a potentially dangerous event

I instantly react

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

dive in

Seeing a person who is drowning, I first

call for help

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

well planned

I prefer work that is

not planned

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

all of the time

I am right

never

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

precision

I emphasise

speed

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

very fast

I like to drive

very slow

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

very slow

I like to listen to music with a tempo that is

very fast

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

not at all

I tend to take risks

a lot

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25

SECTION G - LIFE EVENTS

G1. Over the past 12 months, have any of the following happened to you/your household because of a shortage of money?

- ☐ could not pay electricity, gas or telephone bills on time
- ☐ could not pay for car registration or insurance on time
- ☐ pawned or sold something
- ☐ unable to heat my home
- ☐ sought financial help from friends or family
- ☐ went without meals
- ☐ sought assistance from welfare/community organizations
- ☐ no/none of the above

G2. Since 1st January 2001 have you stayed one or more nights in a homeless shelter, on the street, in a park, or in an abandoned building?

- ☐ ₁ No ☐ ₂ Yes a. If YES, for how long in total since January 2001?

how long

G3. Have you ever been convicted of a crime in a court of law (including civil court, criminal court or military court)?

- ☐ ₁ No ☐ ₂ Yes a. If YES, when was this (select all that apply)

- ☐ prior to August 1990
- ☐ between August 1990 and December 2000
- ☐ since January 2001

G4. Have you ever been sent to jail by a judge in a court (or spent time on remand awaiting a court hearing)?

- ☐ ₁ No ☐ ₂ Yes →

a. If YES, when was this (select all that apply) and for how long in total were you in jail during the times shown below?

- ☐ prior to August 1990 for

how long

- ☐ between August 1990 and December 2000 for

how long

- ☐ since January 2001 for

how long

G5. Please answer the following questions about other very stressful events that might have happened in your life since January 2001.

Since January 2001

- | | No | Yes |
|---|---------------------------------------|---------------------------------------|
| 1. Did you participate in <u>combat</u> , either as a member of a military, or as a member of an organised non-military group? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
| 2. Did you serve as a <u>peacekeeper</u> or <u>relief worker</u> in a <u>war zone</u> or in a place where there was ongoing <u>terror</u> of people because of political, ethnic, religious or other conflicts? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
| 3. Were you an unarmed civilian in a place where there was a war, revolution, military coup or invasion? (By this we mean a civilian not directly involved in the armed conflict) | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |

Since January 2001

	No	Yes
4. Did you live as a civilian in a place where there was ongoing terror of civilians for political, ethnic, religious or other reasons?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
5. Were you a refugee – that is, did you flee from your home to a foreign country or place to escape danger or persecution?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
6. Were you kidnapped or held captive?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
7. Were you exposed to a toxic chemical or substance that could cause you serious harm?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
8. Were you involved in a life threatening automobile accident?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
9. Did you have any other life- threatening accident, including on your job?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
10. Were you involved in a major natural disaster, like a devastating flood, hurricane or earthquake?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
11. Were you in a man-made disaster, like a fire started by a cigarette, or a bomb explosion?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
12. Did you have a life threatening illness?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
13. Were you badly beaten up by a spouse or romantic partner?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
14. Were you badly beaten up by anyone <u>else</u> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
15. Were you mugged, held up, or threatened with a weapon?	<input type="checkbox"/> 1	<input type="checkbox"/> 2

The next two questions are about sexual assault. The first is about rape. We define this as someone either having sexual intercourse with you or penetrating your body with a finger or object when you did not want them to, either by threatening you or by using force.

	No	Yes
16. Since January 2001, did this happen to you?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
17. Other than rape, were you sexually assaulted or molested?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
18. Has someone stalked you – that is, followed you or kept track of your activities in a way that made you feel you were in serious danger?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
19. Did someone very close to you die unexpectedly; for example, they were killed in an accident, murdered, committed suicide, or had a fatal heart attack at a young age?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
20. Did you have a son or daughter who had a life threatening illness or injury?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
21. Did anyone very close to you have an extremely traumatic experience, like being kidnapped, tortured or raped?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
22. Did you see someone being badly injured or killed, or unexpectedly see a dead body?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
23. Did you <u>do</u> something that <u>accidentally</u> led to the serious injury or death of another person?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
24. Did you <u>on purpose</u> either seriously injure, torture or kill another person?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
25. Did you see atrocities or carnage such as mutilated bodies or mass killings?	<input type="checkbox"/> 1	<input type="checkbox"/> 2
26. Did you experience any <u>other</u> extremely traumatic or life-threatening event that we haven't asked about yet?	<input type="checkbox"/> 1	<input type="checkbox"/> 2

If you require support in relation to any issues you have identified in this questionnaire, we encourage you to refer to the support services listed on the inside cover.

G6. Below is a list of problems that people sometimes have in response to stressful life experiences. Please read each one carefully, then select one of the responses to the right to indicate how much you have been bothered by that problem in the past month.

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing memories, thoughts or images of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. Repeated, disturbing dreams of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. Feeling very upset when something reminded you of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. Having physical reactions (eg heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. Avoiding thinking about or talking about a stressful experience from the past or avoiding having feelings related to it?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. Avoiding activities or situations because they reminded you of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. Trouble remembering important parts of a stressful experience from the past?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. Loss of interest in activities that you used to enjoy?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. Feeling distant or cut off from other people?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. Feeling emotionally numb or being unable to have loving feelings for those close to you?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12. Feeling as if your future somehow will be cut short?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13. Trouble falling or staying asleep?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14. Feeling irritable or having angry outbursts?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. Having difficulty concentrating?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16. Being "super alert" or watchful or on guard?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
17. Feeling jumpy or easily startled?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
18. Having strong negative beliefs about yourself, other people, or the world? (e.g. having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
19. Blaming yourself or somebody else strongly for a stressful experience from the past or for what happened after it?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
20. Having strong negative feelings such as fear, horror, anger, guilt or shame?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
21. Taking too many risks or doing things that cause you harm?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

SECTION H - LIFE STYLE

H1. Are you a current smoker, former smoker or have you never been a smoker?

☐ ₁ Current ☐ ₂ Former ☐ ₃ Never, if NEVER skip to H2

If you are a **current** or **former** smoker:

a. What is the average number of cigarettes you smoke/d per day?

b. At what age did you start smoking?

c. If former smoker, at what age did you stop?

d. How many **years in total** have you smoked, not counting periods of time when you quit smoking?

H2. a. How often do you have a drink containing alcohol?

☐ ₁ Never ☐ ₂ Once a month or less ☐ ₃ 2 to 4 times a month ☐ ₄ 2 to 3 times a week ☐ ₅ 4 or more times a week

If Never, skip to question H3 on the next page.

Standard Drinks Guide

									
1.5	1	0.8	1.5	1	0.8	1	0.7	0.5	1.5
375ml Full Strength Beer 4.9% Alc/Vol	375ml Mid Strength Beer 3.5% Alc/Vol	375ml Light Beer 2.7% Alc/Vol	375ml Full Strength Beer 4.9% Alc/Vol	375ml Mid Strength Beer 3.5% Alc/Vol	375ml Light Beer 2.7% Alc/Vol	285ml MiddyPot* Full Strength Beer 4.9% Alc/Vol	285ml MiddyPot* Mid Strength Beer 3.5% Alc/Vol	285ml MiddyPot* Light Beer 2.7% Alc/Vol	170ml Standard Serve of Sparkling Wine/Champagne 11.5% Alc/Vol
									
1.5	1.5	1	22	0.9	1	1.8	7	38	
375ml Pre-mix Spirits 5% Alc/Vol	340ml Alcoholic Soda 5.5% Alc/Vol	30ml Spirit Nip 40% Alc/Vol	700ml Bottle of Spirits 40% Alc/Vol	60ml Port/Sherry Glass 18% Alc/Vol	100ml Standard Serve of Wine 12% Alc/Vol	180ml Average Restaurant Serve of Wine 12% Alc/Vol	750ml Bottle of Wine 12% Alc/Vol	4 Litres Cask Wine 12% Alc/Vol	

* Middy, WA, ACT = Middy; VIC, QLD, TAS = Pot; NT = Handic; SA = Schooner

b. How many 'standard' drinks (see Guide above) containing alcohol do you have on a typical day when you are drinking?

☐ ₁ 1 or 2 ☐ ₂ 3 or 4 ☐ ₃ 5 or 6 ☐ ₄ 7 or 9 ☐ ₅ 10 or more

c. How often do you have six or more drinks on one occasion?

☐ ₁ Never ☐ ₂ Less than once a month ☐ ₃ Monthly ☐ ₄ Weekly ☐ ₅ Daily or almost daily

d. How often during the last year have you found that you were not able to stop drinking once you had started?

☐ ₁ Never ☐ ₂ Less than once a month ☐ ₃ Monthly ☐ ₄ Weekly ☐ ₅ Daily or almost daily

e. How often during the last year have you failed to do what was normally expected from you because of drinking?

- ☐ ₁ Never ☐ ₂ Less than once a month ☐ ₃ Monthly ☐ ₄ Weekly ☐ ₅ Daily or almost daily

f. How often during the last year have you needed a drink in the morning to get yourself going after a heavy drinking session?

- ☐ ₁ Never ☐ ₂ Less than once a month ☐ ₃ Monthly ☐ ₄ Weekly ☐ ₅ Daily or almost daily

g. How often during the last year have you had a feeling of guilt or remorse after drinking?

- ☐ ₁ Never ☐ ₂ Less than once a month ☐ ₃ Monthly ☐ ₄ Weekly ☐ ₅ Daily or almost daily

h. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

- ☐ ₁ Never ☐ ₂ Less than once a month ☐ ₃ Monthly ☐ ₄ Weekly ☐ ₅ Daily or almost daily

i. Have you or someone else been injured as a result of your drinking?

- ☐ ₁ No ☐ ₂ Yes, but not in the last year ☐ ₃ Yes, during the last year

j. Has a relative, a friend, a doctor or other health professional been concerned about your drinking or suggested you cut down?

- ☐ ₁ No ☐ ₂ Yes, but not in the last year ☐ ₃ Yes, during the last year

H3. This question is about your usual consumption of vegetables including fresh, frozen and tinned vegetables. *Please note that one serving size of vegetables is equal to ½ cup of cooked vegetables or cooked legumes, one medium potato or one cup of lettuce or salad vegetables.*

How many serves of vegetables do you usually eat each day?

- ☐ ₀ Don't eat vegetables
☐ ₁ 1 serve or less ☐ ₂ 2 serves ☐ ₃ 3 serves ☐ ₄ 4 serves ☐ ₅ 5 serves ☐ ₆ 6 serves or more

H4. This question is about your usual consumption of fruit including fresh, frozen and tinned fruit. *Please note that one serving size of fruit is equal to one medium sized fruit (e.g. apple or orange), two smaller fruits (e.g. apricots or plums), about 20 grapes or cherries, 1 ½ tablespoons of sultanas or ½ cup of fruit juice.*

How many serves of fruit do you usually eat each day?

- ☐ ₀ Don't eat fruit
☐ ₁ 1 serve or less ☐ ₂ 2 serves ☐ ₃ 3 serves ☐ ₄ 4 serves ☐ ₅ 5 serves ☐ ₆ 6 serves or more

H5. The next few questions are about walking for fitness, recreation and sport. Please do not include any other walking that you may have done for other reasons.

a. In the last 2 weeks, have you walked for fitness, recreation or sport?

- ☐ 1. Yes  ☐ 2. No, go to **H6** below ☐ 3. Permanently unable to walk, go to **H6** below

b. How many times did you walk for fitness, recreation or sport in the last 2 weeks?

--	--

 times

c. What was the total amount of time you spent walking for fitness, recreation or sport in the last 2 weeks?

--	--

 hrs and

--	--

 minutes

H6. The next few questions are about moderate and vigorous exercise. Please exclude walking that you may have done for fitness, recreation or sport and household chores, gardening or yard work.

a. In the last 2 weeks did you do any exercise which caused a moderate (but not large) increase in heart rate or breathing, that is, moderate exercise?

- ☐ 1. Yes  ☐ 2. No, go to **question d** below.

b. How many times did you do any moderate exercise in the last 2 weeks?

--	--

 times

c. What was the total amount of time you spent doing moderate exercise in the last 2 weeks?

--	--

 hrs and

--	--

 minutes

d. In the last 2 weeks did you do any other exercise which caused a large increase in heart rate or breathing, that is, vigorous exercise?

- ☐ 1. Yes  ☐ 2. No, go to **Section I**.

e. How many times did you do any vigorous exercise in the last 2 weeks?

--	--

 times

f. What was the total amount of time you spent doing vigorous exercise in the last 2 weeks?

--	--

 hrs and

--	--

 minutes

SECTION I - SOCIAL NETWORKS AND SUPPORT

- I1.** About how many close friends and close relatives do you have (people you feel at ease with and can talk to about what is on your mind)?

Write in the number of close friends and relatives; if none, write "0":

- I2.** People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
a. Someone to help you if you were confined to bed	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
b. Someone you can count on to listen to you when you need to talk	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
c. Someone to give you good advice about a crisis	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
d. Someone to take you to the doctor if you needed it	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
e. Someone who shows you love and affection	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
f. Someone to have a good time with	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
g. Someone to give you information to help you understand a situation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
h. Someone to confide in or talk to about yourself or your problems	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
i. Someone who hugs you	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
j. Someone to get together with for relaxation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
k. Someone to prepare your meals if you were unable to do it yourself	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
l. Someone whose advice you really want	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
m. Someone to do things with to help you get your mind off things	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
n. Someone to help with daily chores if you were sick	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
o. Someone to share your most private worries and fears with	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
p. Someone to turn to for suggestions about how to deal with a personal problem	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
q. Someone to do something enjoyable with	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
r. Someone who understands your problems	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
s. Someone to love and make you feel wanted	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

- I3.** About how many voluntary groups or organisations do you belong to – like parent groups, clubs or lodges, church groups, etc ("*voluntary*" means because you want to).

Write in the number, if none, write "0"

14. How active are you in the affairs of these groups or clubs you belong to? *(if you belong to a great many, just count those you feel closest to.)*

- ☐₁ Very active, attend most meetings ☐₃ Not active, belong but hardly ever go
☐₂ Fairly active, attend fairly often ☐₄ Do not belong to any groups or clubs

15. Are you involved with any ex-service organisations? ☐₁ No ☐₂ Yes

16. Do you commemorate significant military related occasions such as attend ANZAC Day services, participate in marches or attend dawn services? ☐₁ No ☐₂ Yes

Well done – you are almost finished.

SECTION J - QUALITY OF LIFE

The following questions ask how you feel about your quality of life, health and other areas of your life. If unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response. Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the ***last two weeks***.

J1. How would you rate your quality of life?

- ☐₁ Very poor ☐₂ Poor ☐₃ Neither poor nor good ☐₄ Good ☐₅ Very good

J2. How satisfied are you with your health?

- ☐₁ Very dissatisfied ☐₄ Satisfied
☐₂ Fairly dissatisfied ☐₅ Very satisfied
☐₃ Neither satisfied nor dissatisfied

The following questions ask about how much you have experienced certain things in the ***last two weeks***.

	Not at all	A small amount	A moderate amount	A great deal	An extreme amount
J3. To what extent do you feel that physical pain prevents you from doing what you need to do?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
J4. How much do you need any medical treatment to function in your daily life?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
J5. How much do you enjoy life?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
J6. To what extent do you feel your life to be meaningful?	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

	Not at all	Slightly	Moderately	Very	Extremely
J7. How well are you able to concentrate?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J8. How safe do you feel in your daily life?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J9. How healthy is your physical environment?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

	Not at all	Slightly	Somewhat	To a great extent	Completely
J10. Do you have enough energy for everyday life?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J11. Are you able to accept your bodily appearance?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J12. Have you enough money to meet your needs?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J13. How available to you is the information that you need in your daily life?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J14. To what extent do you have the opportunity for leisure activities?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

J15. How well are you able to get around physically?

☐ 1 Not at all ☐ 2 Slightly ☐ 3 Moderately ☐ 4 Very ☐ 5 Extremely

The following questions ask you to say how good or satisfied you have felt about various aspects of your life over the **last two weeks**.

	Very dissatisfied	Fairly dissatisfied	Neither satisfied or dissatisfied	Satisfied	Very satisfied
J16. How satisfied are you with your sleep?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J17. How satisfied are you with your ability to perform your daily living activities?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J18. How satisfied are you with your capacity for work?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J19. How satisfied are you with yourself?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J20. How satisfied are you with your personal relationships?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J21. How satisfied are you with your sex life?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J22. How satisfied are you with the support you get from your friends?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J23. How satisfied are you with the conditions of your living place?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J24. How satisfied are you with your access to health services?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
J25. How satisfied are you with your transport?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

J26. How often do you have negative feelings such as blue mood, despair, anxiety, depression?

- ☐ ₁ Never ☐ ₂ Infrequently ☐ ₃ Sometimes ☐ ₄ Frequently ☐ ₅ Always

J27. How do you feel about your life as a whole, taking into account what has happened in the last year and what you expect to happen in the future?

*Please choose **ONE** response.*

- | | |
|--|---|
| <input type="checkbox"/> ₁ Delighted | <input type="checkbox"/> ₅ Mostly dissatisfied |
| <input type="checkbox"/> ₂ Pleased | <input type="checkbox"/> ₆ Unhappy |
| <input type="checkbox"/> ₃ Mostly satisfied | <input type="checkbox"/> ₇ Terrible |
| <input type="checkbox"/> ₄ Mixed | |

SECTION K - WEIGHT, WAIST AND HIP CIRCUMFERENCE

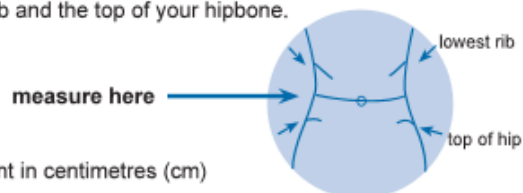
We would now like you to measure your weight using scales and to measure your waist and hip circumference using the tape measure supplied. So that measurements are collected in a standard way for all study participants, please follow the given instructions.

Please weigh yourself using scales.

How much do you weigh in light clothing without shoes, to the nearest kg? kg

For an accurate waist measurement:

- Stand comfortably straight up, weight evenly distributed across both legs, feet 25-30 cm apart.
- Measure directly over your skin or no more than one item of light clothing.
- Have the tape measure fitting snug, but not compressing the skin.
- Take the measurement after breathing out normally.
- Measure at the halfway point between your lowest rib and the top of your hipbone. This will be roughly in-line with your belly button.



- At "Reading 1" below, record your waist measurement in centimetres (cm) to one decimal place (nearest millimetre).

- Repeat and record your waist measurement at Reading 2.

For example, if your waist measurement is 95cm and 6mm, record it as

95 . **6** cm

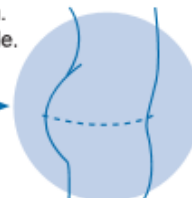
Waist Reading 1 . cm

Waist Reading 2 . cm

For an accurate hip measurement:

- Stand comfortably straight up, feet together, with your muscles relaxed.
- Measure directly over your skin or no more than one item of light clothing.
- Hold the tape horizontally, have the tape measure snug, but not compressing the skin.
- Measure at the point where your buttocks extend the maximum when viewed from the side. Any fatty aprons should be excluded from the measurement.

measure here →



- Record your hip measurement in centimetres (cm) to one decimal place (nearest millimetre) at Reading 1 below.
- Repeat and record your hip measurement at Reading 2.

Hip Reading 1

cm

Hip Reading 2

cm

SECTION L - TELEPHONE INTERVIEW

This study includes an important over-the-phone interview about your psychological health.

- L1.** Please provide the most appropriate phone number/s to contact you on to arrange that interview.

Please provide STD code if not a mobile phone number

Please provide STD code if not a mobile phone number

- L2.** Please indicate the best days and times to call you about the interview appointment.

- ☐ week days, in the ☐ morning ☐ afternoon ☐ evening
☐ weekends, in the ☐ morning ☐ afternoon ☐ evening

Other:

please provide more information if necessary

SECTION M - OTHER HEALTH INFORMATION OR COMMENTS

In addition to the information you have provided in this questionnaire already, are there **other important** health or well-being concerns or additional comments you have?

- ☐ ₁ NO ☐ ₂ YES

If YES, please give details in the space provided here.

SECTION N - CONTACT DETAILS

Note: to ensure confidentiality of your stored health information, this page will be removed and filed separately from the rest of the questionnaire.

It is important that we be able to contact you in the future. We may need to ask you about the information you have provided in this questionnaire, or contact you about important study findings or follow-up investigations. To ensure that we have the most up-do-date contact details, please provide the following information:

Surname:

All given names:

Your preferred given name:

If you changed your surname or given names since January 2001, please write your previous name in full here.

Please give your current address, telephone contact numbers and email addresses

Street address:

Suburb/Town:

State: Postcode:

Phone number/s: H.

W.

M.

Email address/es: H.

W.

ALTERNATIVE CONTACT DETAILS

INSTRUCTIONS: In case you move and we lose contact with you, please give us the names of up to two relatives or friends who may be able to tell us where you are. These should be people who are at long-term addresses but who are not living with you. We would only use these alternative contacts in the event that we could not contact you at the address you have provided on the previous page.

FIRST ALTERNATIVE CONTACT

Surname:	<input type="text"/>
Given names:	<input type="text"/>
Street address:	<input type="text"/> <input type="text"/>
Suburb/Town:	<input type="text"/>
State:	<input type="text"/> Postcode: <input type="text"/>
Phone number:	<input type="text"/>
Email address:	<input type="text"/>

SECOND ALTERNATIVE CONTACT

Surname:	<input type="text"/>
Given names:	<input type="text"/>
Street number:	<input type="text"/>
Street:	<input type="text"/>
Suburb/Town:	<input type="text"/>
State:	<input type="text"/> Postcode: <input type="text"/>
Phone number:	<input type="text"/>
Email address:	<input type="text"/>

THANK YOU FOR PARTICIPATING IN THE STUDY
PLEASE RETURN THIS QUESTIONNAIRE WITH THE SIGNED CONSENT
FORM IN THE REPLY PAID ENVELOPE PROVIDED.

barcode

