ANNEX A: STUDY METHODOLOGY

This annex outlines the study design, measurement instruments, selection protocols, recruitment methods and associated analyses. The specific aims of the study are stated in the introduction. These are revisited to show that the methodology had to integrate two phases with overlapping but distinct goals.

Aims of the study

This study sought to measure the prevalence of mental disorders and psychological distress in a representative sample (50,049) of currently serving ADF personnel. All regular Navy, Army and Air Force personnel were identified using data extracted from the Defence computerised Personnel Management Key Solution (PMKeyS), on 11 December 2009. Trainees and reservists were not included in the study. In order to achieve the overall aim, the study contained two phases.

The first phase of the study was questionnaire based and had two aims:

- to examine the impact of a range of occupational factors on the mental health of ADF members, including:
    - deployment history
    - physical health
    - quality of life
    - dietary supplements
    - mild traumatic brain injury
    - trauma exposure
    - sleep
    - anger
    - stigma
    - barriers to care
    - caffeine and tobacco use
    - social support
    - family issues
    - occupational issues
    - resilience
    - help seeking
- to screen for potential mental health problems. This screening process became the basis for selection of individuals for a more intensive interview-based diagnostic assessment.

Phase 2 was interview based. This phase of the study also had two aims:

- to provide weighted estimates of the prevalence of lifetime and 12-month ICD-10 mental disorders in the ADF
- to examine the performance of the mental health screening instruments administered as part of Phase 1 and which are currently used in the ADF.

Sample

The study sample was made up of two mutually exclusive subpopulations (see Figure A.1). Subpopulation 1 comprised ADF personnel who had been deployed to the Middle East Area of Operations (MEAO). Subpopulation 2 comprised ADF personnel who had never been on operational deployment or personnel who had been deployed to an operation other than the MEAO.

Figure A.1: Data sources for the ADF Mental Health Prevalence and Wellbeing Study
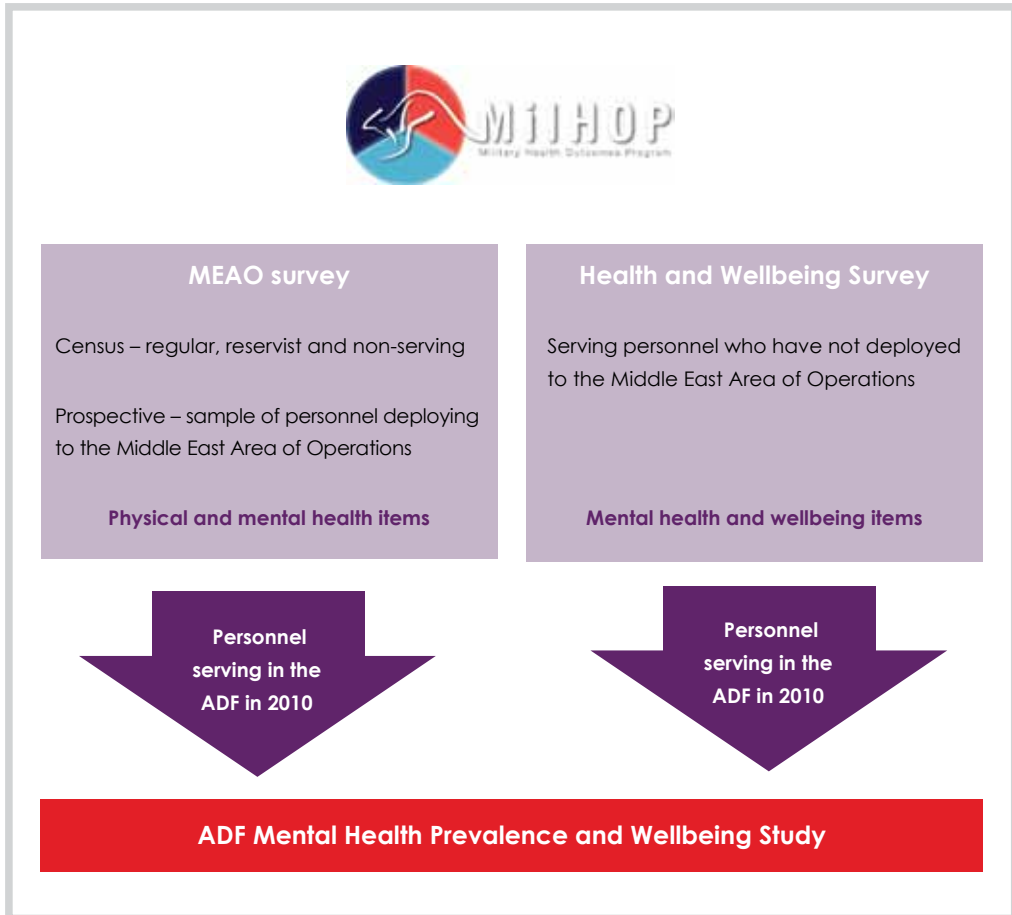
Subpopulation 1 came from a broader MEAO study of both physical and mental health, which was conducted by the Centre for Military and Veterans' Health (University of Queensland and University of Adelaide node). Subpopulation 2 came from the Health and Wellbeing Survey, which focused primarily on the mental health and wellbeing of all ADF members who had not been deployed to the MEAO. The Centre for Traumatic Stress Studies at the University of Adelaide worked in collaboration with the Directorate of Strategic and Operational Mental Health in Joint Health Command to conduct the survey. Subpopulation 1 and subpopulation 2 were combined to create the Mental Health Prevalence and Wellbeing Study dataset.

Response rates

Phase 1 survey respondents

As at 31 January 2011, 52.5% (26,281) of ADF personnel had consented to participate in the study, 8.6% (4,293) declined to participate, and 38.9% (19,475) did not respond. The breakdown of individuals with enough data to be included in the survey is summarised in Table A.1. As the population characteristics were known (that is, sex, Service, medical employment classification status and deployment history), it was possible to compare personnel who responded to the survey with personnel who did not, allowing weighting of the data to provide estimates of prevalence that are representative of the entire ADF.

Table A.1: *Phase 1 survey response rates by Service for the ADF Mental Health Prevalence and Wellbeing Study*

	Population	Respondents	Rate
Total ADF	50,049	24,481	48.9%
Navy	11,612	5,392	46.4%
Army	25,356	11,429	45.1%
Air Force	13,081	7,660	58.6%

The characteristics of Phase 1 survey respondents included:

- Sex – consistent with the ADF population the sample was predominantly male (84.1%, versus 15.9% for females), although ADF females were more likely to respond than ADF males.

- Service – 22% of survey respondents were Navy, 46.7% were Army and 31.3% were Air Force. When the different Services were compared, Air Force personnel were most likely to respond and Army personnel were least likely.

- Age – the mean age of survey respondents was 35.5 (standard deviation (SD)=9.3), which is slightly higher than the mean age of the ADF (33.2 (SD=9.2)). The response rates were lower in the younger age groups. This was particularly notable among those aged between 18 and 27.

- Marital status – ADF personnel who were married were more likely to respond: 77.1% of the respondents were married in contrast to 62.9% of the overall ADF who were married.

- Medical employment classification (MEC) – ADF personnel who were classified as MEC 1 were slightly under-represented in the respondent group (61.1%) compared to total ADF population (65.6%) classified as MEC 1. ADF personnel who were MEC 2 (27.5%) and MEC 3 (9.4%) were slightly over-represented. Two per cent of survey respondents were MEC 4, which closely matched the proportion of MEC in the ADF (2.1%).

- Rank – Phase 1 questionnaire respondents comprised 29.7% officers, 50.6% non-commissioned officers and 19.7% other ranks. ADF personnel in the other ranks had a significantly lower response rate compared to 31.4% of the ADF who were in this ranking category. In contrast, non-commissioned officers were more likely to respond.

- Deployment and education – neither had much impact on the response rates; 65.2% of respondents had been on operational deployment and 34.8% had not.

Phase 2 CIDI interview respondents

A total of 3,688 participants were invited to participate in the telephone interview. Of those invited, 1,798 completed the interview.

In total, 87.5% of CIDI interviews were completed within 60 days of the self-report booklet, with 35.6% (640) completing the interview within 28 days. The mean number of days between completion of the self-report survey and the CIDI interview was 42.0 (SD=25.3).

The characteristics of Phase 2 CIDI respondents included:

- Sex – consistent with the overall group of ADF personnel who were selected for a CIDI, the sample of CIDI respondents was predominantly male (75.6% versus 24.4% of females). There were no differences between males and females in relation to the rate of response to the CIDI.

- Service – The CIDI respondents comprised 21.4% Navy, 39.8% Army and 38.8% Air Force. Navy and Air Force personnel were less likely to respond and Army personnel were more likely to respond.

- Age – The mean age of the CIDI respondents (38.3, SD=9.4) was higher than the mean age of the group invited to do a CIDI (37.3, SD=9.4). Response rates were lower in the younger age groups. This was particularly notable among the 18–27 and the 28–37 age groups.

- Marital status – ADF personnel who were married were as likely to complete a CIDI interview as those who were not married, with proportions reflecting response rates to the Phase 1 survey.

- Medical employment classification (MEC) – The CIDI respondents comprised 50.4% MEC 1, 34% MEC 2, 12.5% MEC 3 and 3.2% MEC 4. This compares to 65.6% MEC 1, 23.4% MEC 2, 8.9% MEC 3 and 2.1% MEC 4 in the entire ADF. ADF personnel who were MEC 1 were therefore slightly under-represented in the respondent group (50.4%) compared to the total CIDI sample (53.9%) and the entire ADF that were MEC 1. ADF personnel who were MEC 2, MEC 3 and MEC 4 were slightly over-represented.

- Rank – 36.4% of CIDI respondents were officers, 49.4% were non-commissioned officers and 14.1% were from the other ranks. Officers were more likely to complete a CIDI interview than non-commissioned officers. ADF personnel in the other ranks were the least likely to respond.

- Deployment and length of service in the ADF – neither had much impact on the response rates for the CIDI interview; 61.8% of CIDI respondents had been on operational deployment and 38.2% had not.

See Annex B for more details of the demographic characteristics of respondents and non-respondents.

Rationale for the study's design

Prevalence estimates were obtained using a two-phase design (Pickles, Dunn, & Vazquez-Barquero, 1995). This approach to epidemiological research is well accepted in the investigation of the prevalence of mental disorders (Salim & Welsh, 2009). In the first phase, participants completed a screening questionnaire, which

is generally economical in terms of time and resources. Based on the results of this screening and demographic information, certain participants were selected for a more accurate but costly formal diagnostic interview.

The data collected from the individual interviews were then weighted to ensure the representativeness of the prevalence estimates for key subgroups in the total ADF population. The weighting yielded estimates that had a similar accuracy to estimates that would have been obtained from a single-phase study that used formal diagnostic interviews of all participants in the sample.

A total of 50,049 ADF members received a questionnaire that combined a range of self-report measures, including those that examined common symptoms of psychological distress, post-traumatic symptomatology and alcohol use. Approximately half (49%, N=24,481) of the surveyed members completed the questionnaire. Based on the results of the completed questionnaires, the second phase of selected interviews was conducted to provide a time- and cost-efficient means of establishing ADF prevalence estimates. Instead of offering all respondents an interview, priority was given to respondents who were identified as being more likely to have a mental disorder based on their screening questionnaire. This process increased the efficiency of Phase 2 by limiting the number of ADF members without disorder that required an interview. Fifteen per cent of the respondents (N=3,733) were offered an interview and approximately half of them (N=1,798) accepted the offer.

The results of these interviews were then weighted to represent the entire ADF, based on the stratification process used to select the sample for the World Mental Health Composite International Diagnostic Interview (CIDI) (Kessler & Üstün, 2004). This stratification strategy, in which a larger proportion of high scorers were selected for interview, reduced the possibility of error in making prevalence estimates by focusing the diagnostic assessment on the respondents most likely to have a disorder. At the same time, because the interviewees were drawn from the large proportion of the ADF population who provided responses to the Phase 1 questionnaire, the potential for sampling error was further reduced. Moreover, the demographic and health status of the ADF members who did not respond at each phase was known and therefore could be taken into account in weighting the data from the interviews. The resulting ADF prevalence estimates could be confidently compared to those from the 2007 Australian Bureau of Statistics National Mental Health and Wellbeing Study (Slade, Johnston, Oakley Browne, Andrews, & Whiteford, 2009) and the prevalence estimates reported in the study of the Canadian Forces (Sareen et al., 2007).

Measures

Phase 1 questionnaire content

In Phase 1, ADF members were screened for mental health problems, psychological distress and occupational stressors using a 30- to 60-minute self-report questionnaire that was completed by the participant either online or on hard copy. The self-report questionnaire (see Annex C) included the Kessler Psychological Distress Scale (K10), the Posttraumatic Stress Disorder Checklist (PCL) and the Alcohol Use Disorders Identification Test (AUDIT), as well as a number of questions to examine help seeking, stigma and barriers to care in ADF members. Anonymity was preserved through the allocation of a unique study number to each participant. A brief description of each of the measures and outcome variables used in this report follows.

PCL

The PCL (Weathers, Litz, Herman, Huska, & Keane, 1993) has been designed to incorporate all of the symptomatic criteria for DSM-IV post-traumatic stress disorder. The 17 questions of the PCL are scored from 1 to 5 and are summed to give a total score from 17 to 85. For comparison purposes with ADF post-deployment reports (RtAPS and POPS), PCL scores were categorised into four risk levels: low (17–29), moderate (30-39), high (40–49) and very high (50–85), which provide an indication of the risk of post-traumatic stress disorder.

K10

The K10 is a short 10-item screening questionnaire for psychological distress that was developed in the context of the US national co-morbidity study (Kessler et al., 2002). The 10 questions of the K10 are scored from 1 to 5 and are summed to give a total score of between 10 and 50. Various methods have been used to stratify the scores of the K10. The categories of low (10–15), moderate (16–21), high (22–29) and very high (30–50) that are used in this report are derived from the cut-offs of the K10 that were used in the 2007 ABS Australian National Mental Health and Wellbeing Survey. In addition, K10 scores were categorised into two levels of psychological distress – low (10–19) and high (20–50) – for comparison purposes with RtAPS and POPS.

AUDIT

Alcohol consumption and problem drinking was examined using the AUDIT (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), a brief self-report screening instrument developed by the World Health Organization. This instrument consists of 10 questions to examine the quantity and frequency of alcohol consumption (questions 1 to 3), possible symptoms of dependence (questions 4–6), and the reactions or problems related to alcohol (questions 7–10). The AUDIT is an instrument that is widely used in epidemiological and clinical practice for defining at-risk patterns of drinking. Babor, Higgins-Biddle, Saunders and Monteiro (2001), in describing the significance of the different zones of risk, suggested that 0–7 (Zone I) represents those who would benefit from alcohol education, 8–15 (Zone II) represents those who are likely to require simple advice, 16–19 (Zone III) represents those for whom counselling and continued monitoring are required, and 20–40 (Zone IV) represents those who require diagnostic evaluation and treatment.

Help seeking, stigma and barriers to care

Issues about help seeking, stigma and barriers to care were only examined in the non-MEAO subpopulation.

Help seeking was assessed in the self-report questionnaire using the following question: 'Have you sought help for a stress, emotional, mental health or family problem in the last 12 months?'

Stigma was addressed with the following items:

• It would harm my career or career prospects.

• People would treat me differently.

• I would be seen as weak.

Barriers to care were examined using the following items:

- I wouldn't know where to get help.
- I would have difficulty getting time off work.
- It would stop me from being deployed.

The non-MEAO subpopulation were asked to rate on a five-point scale (strongly disagree, disagree, uncertain, agree, strongly agree) how much each of these concerns might affect their decision to seek help. The response categories of 'strongly agree' and 'agree' were then combined to produce the prevalence estimates for each of the six barriers to care.

Number of deployments

The total numbers of major operations that ADF members had been deployed on was obtained from the self-report questionnaire. These operations were defined according to the following criteria: warlike, peacekeeping, peace-monitoring or humanitarian support. The lifetime number of deployments was categorised as follows: 0, 1, 2, 3, 4, 5, 6 or more.

Phase 2 diagnostic interview

The World Mental Health Survey Initiative version of the World Health Organization's Composite International Diagnostic Interview, version 3 (CIDI) provides an assessment of mental disorders based on the definitions and criteria of two classification systems: the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV) and the World Health Organization International Classification of Diseases, 10th revision (ICD-10) (World Health Organization, 1994). This instrument was chosen because it is widely used in epidemiological surveys worldwide, is fully structured, and was used in the 2007 ABS National Survey of Mental Health and Wellbeing.

12-month and lifetime ICD-10 mental disorders

Twelve-month and lifetime ICD-10 rates of the following 10 mental disorders were established: depressive episode, dysthymia, bipolar affective disorder, panic attack, panic disorder, agoraphobia, social phobia, specific phobia, generalised anxiety disorder, obsessive-compulsive disorder, post-traumatic stress disorder, alcohol harmful use, and alcohol dependence. Clinical calibration studies report that the CIDI has good validity (Haro et al., 2006). Throughout this report, the ICD-10 prevalence rates are presented with hierarchy rules applied in order to directly compare them with the Australian national rates (Slade et al., 2009). For all ICD-10 disorders, the standard CIDI algorithms were applied, which means that in order for a 12-month diagnosis to be given, an individual would be required to meet lifetime criteria initially and then have reported symptoms in the 12 months prior to the interview. Data on lifetime trauma were obtained from the post-traumatic stress disorder module of the CIDI.

Lifetime trauma exposure

Lifetime exposure to trauma was examined as part of the post-traumatic stress disorder module of the CIDI. The events examined were combat (military or organised non-military group); being a peacekeeper in a war zone or place of ongoing terror; being an unarmed civilian in a place of war, revolution, military coup or invasion; living as a civilian in a place of ongoing terror for political, ethnic, religious or other reasons; being

a refugee; being kidnapped or held captive; being exposed to a toxic chemical that could cause serious harm; being in a life-threatening automobile accident; being in any other life-threatening accident; being in a major natural disaster; being in a man-made disaster; having a life-threatening illness; being beaten by a parent or guardian as a child; being beaten by a spouse or romantic partner; being badly beaten by anyone else; being mugged, held up, or threatened with a weapon; being raped; being sexually assaulted; being stalked; having someone close to you die; having a child with a life-threatening illness or injury; witnessing serious physical fights at home as a child; having someone close experience a traumatic event; witnessing someone badly injured or killed or unexpectedly seeing a dead body; accidentally injuring or killing someone; purposefully injuring, torturing or killing someone; seeing atrocities or carnage such as mutilated bodies or mass killings; experiencing any other traumatic event; and experiencing any other event that the participant did not want to talk about.

The number of total lifetime events experienced by each individual was initially categorised in the same way as deployments. In addition, the number of traumatic events was treated as a continuous variable.

The interview was administered by a trained group of interviewers with a minimum qualification of an honours degree in psychology. Their diagnostic inter-rater reliability was monitored and supervised at the Centre for Traumatic Stress Studies throughout the study. While Defence provided the centre with the contact details for all ADF personnel, the responses to the survey and interview were de-identified and therefore any personal details provided by participants was not provided to Defence or the Department of Veterans' Affairs.

Stratification procedure

The first step in the stratification was to define the measures and demographic characteristics to be used as the basis for selection of participants for Phase 2. The variables used to stratify participants were AUDIT, PCL, sex and Service.

Selection procedure 1: self-report measures

The decision to use the AUDIT and the PCL was based on an examination of PCL, K10 and AUDIT scores collected in previous surveys of ADF members who had been deployed to the Near North Area of Influence versus comparable non-deployed members (McGuire et al., 2009a, 2009b).

These results were used because the participants were considered to be sufficiently representative of the entire ADF for the purpose of estimating the likely performance of these self-report questionnaires in the study. The analysis revealed that the K10 and the PCL were highly correlated with each other, but not with the AUDIT. Consequently, only the scores from the PCL and the AUDIT were used in the stratification.

The 60th and 80th percentiles of the PCL and AUDIT distributions from the previous surveys were used as cut-offs for each measure to form three bands to stratify the sample for subsequent interview, as shown in Figure A.2. The 80th percentile was suitable as a cut-off for 'high scorers' as it was deemed a conservative diagnostic boundary for the detection of caseness. The 60th percentile was chosen as a secondary cut-off to represent those who displayed significant symptoms in their responses to

the Phase 1 questionnaire and thus could include a number of 'false negatives', specifically, individuals with mental health problems who would have otherwise been missed by the 80th percentile cut-offs. The lowest scorers (band 1) were individuals who had a lower probability of false negative diagnoses. The specific scores on the PCL and AUDIT represented within each of these bands are as follows:

- Band 3: PCL > 33 or AUDIT > 10
- Band 2: (25 < PCL ≤ 33 and AUDIT ≤ 10) or (PCL ≤ 33 and 7 < AUDIT ≤ 10)
- Band 1: PCL ≤ 25 and AUDIT ≤ 7.

These bands are represented in Figure A.2.

Figure A.2: *Bands used to stratify participants for CIDI selection*
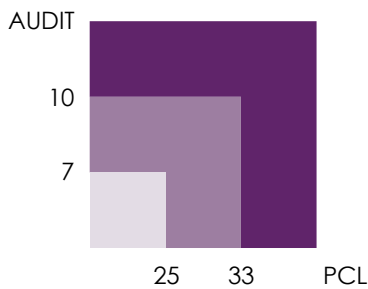
To ensure that high scorers on the K10 were not being excluded by this stratification process, possibly creating a systematic underestimate of the prevalence estimates of mental disorders, the distribution (see Figure A.3) of high K10 scores (above 25) was compared for those participants who were selected for interview (white) and those not selected (red).

Figure A.3: *K10 scores for eligible CIDI participants by CIDI selection*
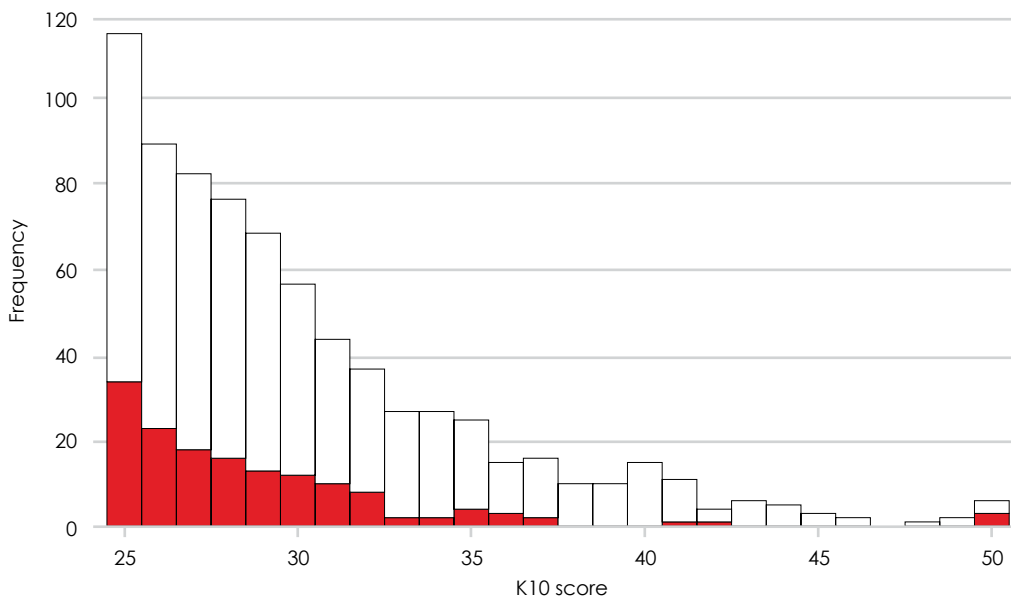
Figure A.3 shows that only a very small proportion of high K10 scorers were not selected. Hence, the decision to use the PCL and AUDIT to select the Phase 1 respondents for interview did not create any substantial error by consistently missing individuals with a diagnosable mental disorder.

Selection procedure 2: demographic characteristics

In addition to the PCL and AUDIT, sex and Service were used to select participants in Phase 2. This step was taken because of the greater number of males and Army personnel in the ADF. Females were oversampled to ensure sufficient numbers from each Service.

Strata

Table A.2 shows the distribution who were selected for interview based on their Phase 1 band, sex and Service. Each cell shows the number of individuals in each strata grouping and the percentage they represented of the total number of respondents in each strata. Thus, for individuals who met the band 3 criteria, 100% of the female and 100% of the male respondents in all three Services were selected to be offered an interview, while for band 2 among males, 50% of the Navy respondents, 20% of the Army respondents, and 30% of the Air Force respondents were selected to be offered an interview. Because females constitute a small percentage of ADF members, they were oversampled in order to obtain a sample that, where possible, was similar to the total number of males within each band. In total, there was a high probability that most personnel with high PCL or AUDIT scores and most females who completed a questionnaire were interviewed.

The numbers of participants selected for a CIDI in each stratum are presented in Table A.2. In total, 3,688 of the 16,184 eligible participants were selected to be offered an interview.

Table A.2: *CIDI strata sampling number and percentages*

	Female N (%)	Male Navy N (%)	Male Army N (%)	Male Air Force N (%)
Band 3 (high scorers)	192 (100%)	260 (100%)	690 (100%)	297 (100%)
Band 2	263 (100%)	155 (50%)	174 (20%)	313 (30%)
Band 1 (low scorers)	452 (50%)	195 (20%)	139 (5%)	558 (10%)

Weighting

Weighting refers to the process of adjusting the results for the participants who were interviewed to infer results for the total ADF population. Weighting involves the allocation of a representative value or weight to the data for each interviewee based on the stratification variables of interest. The weight can be considered an indication of how many individuals in the ADF population are represented by each study participant.

The ADF Mental Health Prevalence and Wellbeing Study was designed to provide prevalence estimates at the ADF population level; therefore, weights were applied to the data from both the questionnaire and CIDI, to provide ADF prevalence estimates using the method outlined below.

Estimates from CIDI

The CIDI participants were selected from eligible survey respondents through a stratified sampling design based on sex, Service and band. These strata were used to weight the CIDI responses to the entire population. Within each stratum the weight was calculated as the population size divided by the number of CIDI respondents from the stratum. As band was not available for non-respondents, the population size within each stratum was estimated by multiplying the known sex by Service population total by the observed proportion belonging to the band of interest from within the corresponding stratum. A finite population correction was also applied to adjust the variance estimates for the reasonably large sampling fraction within each stratum.

As outputs by sex, Service and rank were required, post-stratification by these variables was used to adjust the weights so that their known population totals were reproduced by the estimates. This also accounts for the known differential non-response by rank to the survey.

All CIDIs completed under protocol 1 were included in the CIDI sample for ADF mental health prevalence estimates. However, for examining the performance of the mental health screening instruments administered as part of Phase 1, the interview needed to be completed within 70 days of completing the questionnaire. As a result of these different criteria for use of CIDI responses, two separate weights were calculated.

Estimates from survey

In order to correct for differential non-response the results were weighted based on strata formed from sex, Service, rank and MEC status. Within each stratum the weight was calculated as the population size divided by the number of respondents from the stratum. In each section of the questionnaire, responses were only used if the participant responded to all of the questions from that section. As a result, a separate weight was calculated for each section of the questionnaire. A finite population correction was also applied to adjust the variance estimates for the reasonably large sampling fraction within each stratum.

Figure A.4 outlines the two-phase design, incorporating both weighting and post-stratification.

Figure A.4: *ADF Mental Health Prevalence and Wellbeing Study – two-phase design and weighting process*
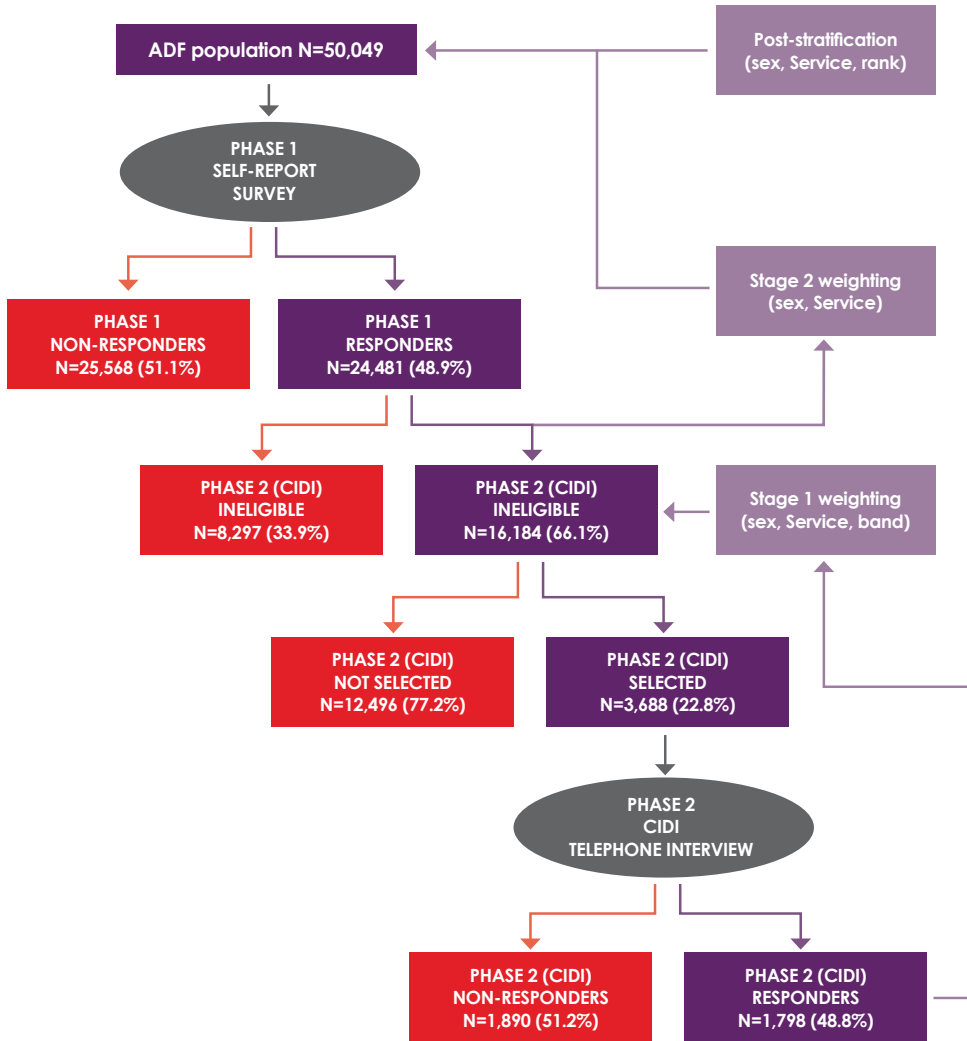
Phase 1 procedure

Before the initial contact by the investigators, a series of strategies were used to promote the studies. A warm-up letter was sent to potential participants advising them that they had been selected to participate and inviting them to do so. There were media releases, and promotional posters were placed in the Service newspapers, websites and relevant ADF bases. Finally, commanders were briefed on the study in a range of forums. All ADF members were informed that their participation in the study was confidential and that their responses would be de-identified prior to the information being released to Defence.

Initial contact

Contact details were obtained through the Defence telephone directory and PMKeyS on 11 December 2009 and routinely updated throughout the study.

For ADF personnel with a Defence mailing address, initial contact was made by mail distribution of a hard-copy warm-up letter and information brochure describing the significance of the project.

On 23 April 2010, a personalised email invitation was sent to all ADF personnel with a Defence email address.

Follow-up of non-respondents

A multi-faceted approach to following up survey non-respondents was undertaken in order to maximise participation:

- Email reminders were sent out at regular intervals to all ADF personnel who had not responded to the survey.

- Personnel who requested paper surveys, or who did not have email addresses, were posted hard copies.

- Personnel who had not responded to the email invitation were sent a hard-copy invitation pack via Australia Post.

- A coordinated series of Defence base visits were organised to provide hard copies to ADF members (mostly other ranks) who did not have regular access to a computer at work. Hard-copy packs were numbered consecutively and, on confirmation of personal details, a pack was given to a participant and the pack number was recorded on stand-alone laptop computers. Consent forms and questionnaires were then returned in separate envelopes and placed in boxes. Paperwork collected during the visit (each approximately one week) was returned by courier in Defence-level secured boxes for processing after the base visit was completed. Other forms were returned in the reply-paid envelope provided as per the approved protocol.

- Finally, an intensive period of telephone follow-up was conducted in the final four months of the data collection period. Non-respondents were called on their business number, their mobile number, or their home phone number.

Phase 2 procedure

In Phase 2, each participant in the stratified sample who had completed one of the self-report questionnaires was invited to participate in a one-hour clinical telephone interview with a research psychologist trained in the use the CIDI. Participants were interviewed, on average, four weeks after completing their online or hard-copy survey and, as previously described, were selected for interview based on their scores on the PCL and AUDIT.

Selection

To be eligible for selection for a CIDI, participants were required to:

- have been a regular serving member of the ADF on 11 December 2009
- have completed the AUDIT, PCL and K10 scales in their self-report questionnaire
- have completed their survey fewer than 60 days before the interview. Participants contacted during the 60-day window were still interviewed even if the interview itself was conducted outside the 60-day window
- have consented to be contacted for a follow-up interview
- not be imminently due to be deployed to the MEAO.

Recruitment

Potential CIDI participants were contacted by telephone using contact details obtained in one of three ways:

- using the contact details and alternative contact details provided by the participant either online or in hard copy as part of Phase 1
- using information obtained from the Defence telephone directory
- using information available from PMKeyS.

To ensure that the most recent contact details were obtained, a download of current listed addresses and phone numbers for these participants was obtained from the Defence telephone directory and PMKeyS immediately before commencement of the interview period (30 April 2010) and intermittently throughout the interview period.

Initial contact was conducted by telephone. Trained research staff from the Centre for Traumatic Stress Studies with the appropriate security clearances made the recruitment calls. Research staff were blind to the scores of each participant on the self-report measures.

The first telephone call was made using the primary phone number provided in the contact information sheet completed in Phase 1. In the absence of this information, a phone number obtained from the alternative contact information sheet, PMKeyS or the Defence telephone directory was used. Telephone calls were made at a variety of times during the day and evening in order to maximise contact opportunities.

A maximum of 10 attempts was made to speak to a participant before that participant was removed from the participant pool. When no contact was made, and a telephone message service was available, a reminder message was left on two of the 10 occasions only, along with the study's free-call number and email address.

When telephone contact was made, the research officer explained the aims, purpose and requirements of the interview. The participant was then asked if they would like to book in for a telephone interview and a time for the telephone interview was arranged. Prior to the interview, each participant was sent the CIDI information brochure by email or post, or directed to view the information on the Military Health Outcomes Program website. Personnel who declined to participate were removed from the contact list.

Informed oral consent was obtained over the telephone prior to commencement of the interview and was recorded using a digital recorder. The participant was informed that consent was being recorded, a consent statement was read to them, and they were asked whether they agreed.

Participants were given opportunities to opt out of Phase 2 by:

- calling the research team on the toll-free number (1800 232 904) provided in the information sheet
- sending an email to cmvh@adelaide.edu.au to register their refusal
- waiting for the research staff member to call them for their interview and register their refusal over the telephone.

Statistical analysis

Analyses were conducted in Stata version 11.2 or SAS version 9.2. All analyses were conducted using weighted estimates of totals, means and proportions, except where specified otherwise. Standard errors were estimated using linearisation, except where specified otherwise.

Subgroup analyses were conducted on each of the ICD-10 disorders using the following demographic and deployment history predictors: sex, rank, Service and deployment status (never deployed, warlike deployment and non-warlike deployment). The levels of impairment and associated rates of the uptake for treatment are reported for the individual ICD-10 disorders.

To compare the ADF rates against the Australian population, direct standardisation was applied to data from the National Survey of Mental Health and Wellbeing (Australian Bureau of Statistics, 2007). The data were restricted to employed people between the ages of 18 and 67, to match the ADF population. For the standardisation, age was grouped into 10-year age groups (18–27, 28–37, ... , 58–67) with the following exceptions:

- Ages 38–67 were grouped for the estimation of suicide attempts.
- Ages 48–67 were grouped for the estimation of suicide plans.
- Ages 18–37 were grouped for the estimation of dysthymia in males.
- Ages 48–67 were grouped for the estimation of bipolar affective disorder in males.
- Ages 48–67 for males were grouped for the estimation of total and partial days out of role among those with an alcohol disorder.

Standard errors were estimated using the replication weights provided in the Australian Bureau of Statistics confidentialised unit record file.

Comparisons between the prevalence of 12-month ICD-10 disorders among subgroups were analysed using weighted logistic regressions. All regressions involved the variables sex, Service, rank and deployment status. The interaction between sex and Service was initially included, but was removed if found to be non-significant. No other interactions were included. The effect of warlike/non-warlike deployment was tested for the disorder groups: any affective disorder, any anxiety disorder, any alcohol disorder and any disorder.

Comparisons between the prevalence of 12-month ICD-10 disorder classes (affective disorders, anxiety disorders and alcohol disorders) among subgroups were analysed using a weighted multinomial logistic regression, with number of disorder classes as the outcome. The regression involved the covariates sex, Service, rank and deployment status. The interaction between sex and Service was initially included, but was removed if found to be non-significant. No other interactions were included.

To estimate the effect of the disorder groups (any affective disorder, any anxiety disorder and any alcohol disorder) on the number of days out of role in the previous four weeks due to psychological distress, a weighted zero-inflated negative binomial regression model was used. This model was chosen over the alternatives (poisson, negative binomial and zero-inflated poisson) using the Akaike information criterion, and also through likelihood ratio tests and the Vuong test. A plot of the differences between the observed and predicted probabilities was also inspected, as suggested by Long (1997). These model comparisons were conducted using the unweighted CIDI sample. All interactions between the three disorder groups were initially included in both the zero-inflation model and the count model, with only the significant effects retained. The same process was used to estimate the effect of the disorder groups on the number of partial days out of role and doctor visits due to psychological distress. This process was also applied to determine the effect of co-morbidity (one, two or three disorder classes) on total and partial days out of role, and doctor visits due to psychological distress.

For each disorder the severity of the impact on total and partial days out of role and doctor visits due to psychological distress were also calculated. These analyses therefore took into account both the prevalence of the disorders and the rate of partial/total days out of role and doctor visits for those with disorders. To calculate the severity of the impact of a particular disorder, on days out of role for example, the percentage of the weighted total number of days out of role in the previous four weeks accounted for by those with that particular disorder was used.

Comparisons between the prevalence of self-reported suicidal behaviour among subgroups were analysed using weighted logistic regressions. All regressions involved the covariates sex, Service, rank and deployment status. The interaction between sex and Service was initially included, but was removed if found to be non-significant. No other interactions were included. For the question relating to thoughts that they would be better off dead or of hurting themselves in some way, a proportional odds model (also known as a cumulative logit model) was considered for analysis. However, since the main assumption of this approach was violated, an alternative approach was considered whereby the ordinal response was dichotomised by means of several cut-offs and modelled using separate weighted logistic regressions.

For the PCL, K10 and AUDIT, the proportion (N (%)) of ADF personnel in each subgroup is presented. Comparisons between the average total scores for the AUDIT, PCL and K10 among subgroups were analysed using weighted multiple linear regressions. All regressions involved the covariates sex, Service, rank and deployment status. The interaction between sex and Service was initially included, but was removed if found to be non-significant. No other interactions were included.

Comparisons between the prevalence of self-reported alcohol consumption and problems with drinking were analysed using weighted logistic regressions. A proportional odds model was considered for analysis; however, since the main assumption of this approach was violated, the ordinal response was dichotomised by means of several cut-offs. All regressions involved the covariates sex, Service, rank and deployment status. The interaction between sex and Service was initially included, but was removed if found to be non-significant. No other interactions were included.

Comparisons between the prevalence of self-reported psychological distress and the rate of help seeking due to psychological distress (total and partial days out of role, and doctor visits) among subgroups were analysed with weighted zero-inflated negative binomial regression models. This model was chosen over the alternatives (poisson, negative binomial and zero-inflated poisson) using the Akaike information criterion, and also through likelihood ratio tests and the Vuong test. A plot of the differences between the observed and predicted probabilities was also inspected. These model comparisons were conducted using the unweighted self-report sample.

To estimate the sensitivity, specificity, positive predictive value and negative predictive value of the self-report scales, weighted estimates of proportions were used. The areas under the curve and standard error were estimated using the Stata macro developed by Bisoffi, Mazzi and Dunn (2000). Jackknife sampling was used for the estimation of the areas under the curve and standard error.

Two cut-offs are presented for each self-report measure. The first cut-off, recommended for consideration in screening protocols, is the value that maximises the sum of the sensitivity and specificity (the proportion of those with and without the disease that are correctly classified). The second cut-off, recommended for making epidemiological estimates, is the value that brings the number of false positives and false negatives closest together, counterbalancing these sources of error most accurately. This optimal cut-off would give the closest estimate of the true prevalence of 30-day ICD-10 mental disorder as measured by the CIDI.

Comparisons between the prevalence of help seeking, stigma and barriers to care among subgroups were analysed using weighted logistic regressions. All regressions involved the variables sex, Service, rank, K10 category and deployment status. The interaction between sex and Service was initially included, but was removed if found to be non-significant. No other interactions were included.

To determine whether the number of deployments and the number of traumatic exposures were associated with poor mental health outcomes, a proportional odds model was considered for analysis. However, since the main assumption of this approach was violated, the ordinal response was dichotomised by means of several cut-offs and modelled using separate weighted logistic regressions. For example for the K10, three cut-offs (or three dichotomous outcomes) were modelled corresponding to very high (=1) versus high, moderate, low (=0); very high, high (=1) versus moderate, low (=0); and very high, high, moderate (=1) versus low (=0).

Ethics approvals

All study protocols were approved by the Australian Defence Human Research Ethics Committee (574-09, 588-07, 488-07), the University of Queensland Behavioural and Social Sciences Ethical Review Committee (200900441), the Department of Veterans' Affairs Human Research Ethics Committee (E008-026) and the University of Adelaide Human Research Ethics Committee (H-183-2009, H065-2008, H064-2008). Specific information pertaining to study materials is enclosed in these documents and can be accessed from the Australian Defence Human Research Ethics Committee.

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