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The Longitudinal Australian Defence Force Study Evaluating Resilience (LASER-Resilience): 2009–2019

A Summary Report of the Research Program

LASER Resilience

THE UNIVERSITY OF MELBOURNE

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The LASER-Resilience study was a collaboration between Phoenix Australia – Centre for Posttraumatic Mental Health at the University of Melbourne, Macquarie University, La Trobe University, and the Mental Health Strategy and Research team within Joint Health Command at the Department of Defence.

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The Longitudinal Australian Defence Force Study Evaluating Resilience (LASER-Resilience) was a study of General Entry personnel (GEs) and Officers over the first three to four years of their military careers. Resilience was considered to be 'the sum total of psychological processes that permit individuals to maintain or return to previous levels of wellbeing and functioning in response to adversity' (The Technical Cooperation Program 2008).

Members were invited to participate at five time points of data collection, and the study ran from 2009 to 2019. Eight reports were produced over the course of the study, ranging from initial reports that focused on the findings from the early time points of data collection to later reports that were able to examine, in depth, specific variables of interest, as well as examining all five time points of data.

This summary report amalgamates the findings from all eight reports, and presents the key variables of importance for wellbeing and resilience in the early years of a military career that emerged from the LASER-Resilience dataset. The word map below highlights the variables that consistently emerged as meaningful after synthesis of the eight LASER-Resilience reports. Larger word sizes represent a greater impact on resilience.

To an extent, the majority of the variables depicted in this map are modifiable and represent an opportunity for Defence to consider, review or refresh current training, education, screening and intervention offerings. This summary report provides some ideas about how this might be undertaken. It also identifies areas for future research that could extend or enhance the findings of the LASER-Resilience research program.

The LASER-Resilience research program

The Longitudinal Australian Defence Force Study Evaluating Resilience (LASER-Resilience) was a longitudinal study of General Entry personnel (GEs) and Officers over the first three to four years of their military careers. The program of research was a Mental Health Lifecycle Package initiative developed by the Australian Government Department of Defence in collaboration with Phoenix Australia – Centre for Posttraumatic Mental Health. The study launched in 2009 and was completed in 2019. The overarching goals of LASER-Resilience were to better understand how military members adjust to the initial stages of their military careers, and to provide the Australian Defence force (ADF) with valuable information about the situational, organisational and individual factors that both promote and erode psychological resilience in ADF members during their time in training and their first three to four years of service (Crane & Kehoe 2012).

The early years of a military career require adjustment to a rigorous new training, work and, in many cases, living environment (Crane et al. 2013a). Furthermore, a career in the military has the potential to expose individuals to stressors and potentially traumatic events through training exercises and military operations (Department of Defence 2017). Despite these stressors, evidence indicates that the majority of military members adjust successfully to their chosen profession (Porter et al. 2017). The LASER-Resilience program of research focused on understanding the individuals who adjust successfully to their military careers and the factors that enable them to do so. Of particular interest was identifying the potentially modifiable factors that promote resilience, with the ultimate aim of informing future policy, program and strategic development to support and build resilience in current and future ADF members.

Research interest in the topic of resilience has increased in recent years. Despite this, resilience remains a broad term that has been conceptualised in a variety of ways (Cosco et al. 2017). For this program of research, resilience was considered to be 'the sum total of psychological processes that permit individuals to maintain or return to previous levels of wellbeing and functioning in response to adversity' (The Technical Cooperation Program 2008). This definition was used because it expresses resilience as a response to significant life events and not just as a response in the context of trauma exposure. It highlights that the LASER-Resilience program identified resilience as an overarching construct, rather than a single measure. In addition, it characterises resilience as the maintenance of wellbeing or a return to wellbeing – allowing the examination of resilience as a dynamic process that can change over time in response to adversity, rather than as a static trait. This was an important distinction for the LASER-Resilience study because it allowed us to examine resilience in terms of changes to wellbeing and functioning in response to life transitions (e.g. commencement of military service, movement from a training group to a work group).

Resilience itself can be measured in a variety of ways, including using resilience scales such as the Connor–Davidson Resilience Scale (CD-RISC), or as a higher-order construct that is represented by a number of factors combined. The two-item CD-RISC-2 was one of the

scales included in the LASER-Resilience study and was analysed in some of the early reports; however, longer-term analysis of this variable revealed that it was too brief a measure to provide detailed information about changes in wellbeing and functioning over time. Therefore, other measures that provided an indication of wellbeing and functioning were predominantly used to explore resilience as a higher-order construct in the early years of an ADF career.

Wellbeing was indicated by the absence of general distress or significant features of psychological disorder, such as post-traumatic stress disorder (PTSD) or depression. *Functioning* was indicated by the number of days an individual was unable to carry out work or normal activities; however, this measure of functioning was not robust enough to be included in the more sophisticated statistical analyses at the time the later reports were written. Therefore, for substantive analysis of the LASER-Resilience dataset (where all five time points were incorporated), resilience was conceptualised as the maintenance of wellbeing or return to levels of wellbeing that were experienced before exposure to a stressor. It is important to note that, although definitions of resilience in the broader literature have changed since the LASER-Resilience study was conceived 12 years ago, the definition used in this study is consistent with current resilience research that conceptualises resilience as an emergent wellbeing outcome post-risk (Kalisch et al. 2017). In the LASER-Resilience study, ‘risk’ is adjustment to the military.

The LASER-Resilience research program was initiated and supported during a period when Defence was actively seeking to significantly increase the number of ADF personnel. Workforce strategies were introduced to increase both the recruitment and retention of personnel. LASER-Resilience complemented the LASER-Retention (Longitudinal ADF Survey Evaluating Retention) project, which was initiated in late 2007 to measure workforce turnover behaviour. Both LASER-Resilience and LASER-Retention formed part of an initiative to tackle mental health and wellbeing throughout the military lifecycle, as a result of the 2007 Australian Government commitment to improving the mental health of the ADF and ex-service communities. Implementing programs to improve the resilience of personnel was one of the strategic workforce themes, and resilience training began to be introduced into all ADF basic training programs. LASER-Resilience was commenced as a component of understanding and supporting resilience building in the workforce (Department of Defence 2009a).

Throughout the data collection period for the LASER-Resilience study, a number of other significant Defence research projects were also collecting data relating to wellbeing and mental health (see Figure 1). Outcomes of these other Defence initiatives may help with interpreting the findings of LASER-Resilience, and vice versa. Commonalities and differences in the findings between these studies are explored in the ‘Key themes’ section of this report.

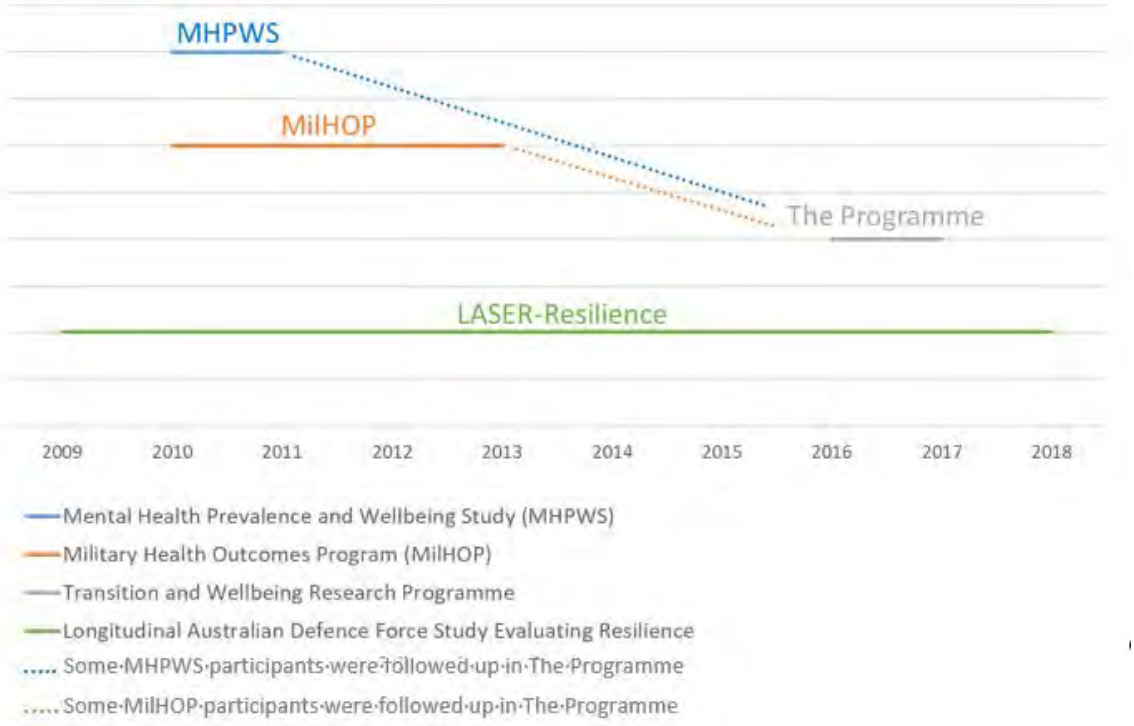


Figure 1. Timeline of data collection in the LASER-Resilience study in the context of other major Defence mental health research projects

Structure of this summary report

This summary report provides an overview of the eight reports that have been produced for the LASER-Resilience study. It draws out some of the key findings from these reports, and explores the consistent themes and messages that emerged from this program of longitudinal research.

The main sections of the report are:

- Methodology – overview of the methods employed for the LASER-Resilience study
- Key findings – brief summary of the key findings from each of the reports
- Key themes – drawing together of the key findings that emerged across time in terms of resilience in the first few years of a career in the ADF
- Future directions – implications for future training, policy and research that have emerged from the research
- Conclusion – brief concluding comments
- Commentary from Defence – snapshot of Defence policy, training and research that are aligned with themes from the LASER-Resilience research program, as well as those that were developed during the course of the research.

Methodology

The LASER-Resilience study was designed with the explicit aim of investigating the resilient adjustment of new military personnel to the demands of military life. The longitudinal design, in particular, was consciously chosen to allow investigation of change over time, and to allow meaningful conclusions to be drawn about the critical time points for psychological change across the first years of military careers.

Longitudinal studies have many advantages – most notably that the same participants are followed over time. This allows the modelling of change over time, and an exploration of individual and environmental factors that influence that change. Longitudinal design is often used in cohort and lifespan research to study long-term change over time, and to identify and explore particular points of stress or risk when it may be most feasible or useful to intervene to maximise positive outcomes. Longitudinal research differs from cross-sectional research, which does not track individuals over time, but rather compares different groups at a single point in time. Importantly, cross-sectional research cannot consider what happens before or after the time when data are collected; as a result, it is limited in providing information about cause and effect compared with longitudinal research. For constructs such as resilience, which is a dynamic construct that can include a variety of indicators, change over time is of particular interest. To study resilience effectively and rigorously, it is appropriate and important to use longitudinal design to allow meaningful interpretations to be made about how resilience, or indicators of resilience, change over time (Chmitorz et al. 2018).

It should be noted that the earlier LASER-Resilience reports – in particular, the technical briefs – only included some of the time points and a subsection of the total sample, because data were still being collected when the reports were written. Some of the earlier reports used cross-sectional data that focused on single time points, whereas others used longitudinal data across two or more time points. Therefore, findings from these earlier reports should be interpreted with caution. Where possible, conclusions drawn from these earlier reports should be considered in the context of findings from the complete longitudinal dataset, which is explored in depth in the *Patterns and Predictors of Wellbeing* report.

Table 1 lists the dates that LASER-Resilience reports were delivered to the Department of Defence.

Table 1. Schedule of LASER-Resilience reports

Report number	Deliverable	Title	Delivery date
1	Technical brief	*Pre-enlistment*	2012
2	Technical brief	*Initial Training*	2012
3	Technical brief	*Contributors to Change*	2013
4	Technical brief	*Early Career Mental Health and Wellbeing*	2013
5	Detailed report 1	*Prior Trauma Exposure and Mental Health*	2015
6	Detailed report 2	*Alcohol and Tobacco Use, Coping and Mental Health*	2016
7	Detailed report 3	*Exploring Social Support in the Initial Years of Military Service*	2016
8	Final report	*Patterns and Predictors of Wellbeing*	2018

LASER-Resilience study procedure

The LASER-Resilience study employed a longitudinal panel design, which commenced at enlistment or appointment of participants and followed the participants through the early years of their military careers for up to four years following enlistment or appointment. Participants were ADF personnel who entered the Australian Navy, Army or Air Force between November 2009 and December 2012. Participants across multiple cohorts were followed over five waves of data collection that ceased in November 2016; the time points were labelled Time 1 (T1), Time 2 (T2), Time 3 (T3), Time 4 (T4) and Time 5 (T5). Cohorts were defined by the month and year of enlistment.

Data collection was timed to capture critical transition points that signify important periods of adjustment to military life. Accordingly, the timing of data collection was different for Officers and GEs. It is important to note that ‘GE’ and ‘Officer’ refer to the type of entry to the ADF, but these terms are referred to as ‘rank’ for the remainder of the report, for simplicity and consistency with previous LASER-Resilience reports.

For GEs, T1 data collection was scheduled at the point of enlistment to enable measurement of the pre-enlistment factors that may affect resilience. LASER-Resilience questionnaires were mailed in paper form to incoming GEs and collected by administrative staff at the Defence Force Recruiting Centre. For Officers, T1 questionnaires were administered by civilian research staff to Officers in training and Australian Defence Force Academy (ADFA) Officer Cadets within the first few weeks of commencing their training.

The scheduling of data collection at T2 differed according to service and rank. These surveys were intended to address experiences of early training and initial adjustment to military life, and thus were not scheduled solely on the basis of when training was completed. Rather, different personnel completed T2 questionnaires at slightly different time points:

- GEs at the end of recruit training (approximately three months post-recruitment)

- Navy and Air Force Officers at the end of their Officer training period (four to six months after joining)
- Royal Military College (RMC) and ADFA Officer Cadets at 12 months after joining (while they were still in training).

Specialist Service Officers (SSOs – who are directly appointed as Officers as a result of their civilian professional qualifications) also completed an online version of the T2 questionnaire at 12 months. SSOs often have a different pathway from other Officers: most go straight to their unit and attend their training some time in the first 12 months, rather than going straight to their initial training like other Officers. This could result in a very different experience of transitions – transition to a unit without training, transition to training and transition back to a unit that would already be a familiar environment. Results presented for SSOs should be interpreted with this in mind.

For ADFA Cadets, the number and timing of transitions through their early career differ by service. For example, Army ADFA Cadets enter directly into ADFA (T1–T3), then complete one year at RMC (T4) before entering a unit (T5). Navy ADFA Cadets complete a six-month Navy training course (T1 and T2), then complete six months at sea, followed by entry into ADFA (T3–T5). Air Force ADFA Cadets complete ADFA training (T1–T3), followed by transition to a base (T4 and T5). The variation in the types of experiences of ADFA Cadets means that caution should be exercised when interpreting their results at each time point. In addition, because Army and Navy move through two training establishments, there is a possibility that they were surveyed twice; however, this was accounted for in preparation of the dataset.

All other participants at T2 completed hard-copy questionnaires in a classroom setting, administered by trained civilian test administrators.

Subsequent time points of data collection occurred annually after the completion of T2 to measure ongoing adaptation to a military career, exposure to potentially traumatic events and responses to stressful life situations. From T3 onwards, the LASER-Resilience questionnaire was administered online using the surveying tool Opinio (version 6.3.3). Participants were sent an email containing a web link to the Opinio survey. Paper surveys were sent to participants at T3 and T4 who requested them or did not have a listed email account.

The timing of the data collection waves and survey administration time points can be seen in Figure 2. As shown, administration of surveys across participants varied, depending on their enlistment and service. It is important to note that this figure is an oversimplified description of when surveys were administered, and is not intended to suggest that training pathways or progression are the same for all members. The authors acknowledge that members can take many different pathways throughout their training.

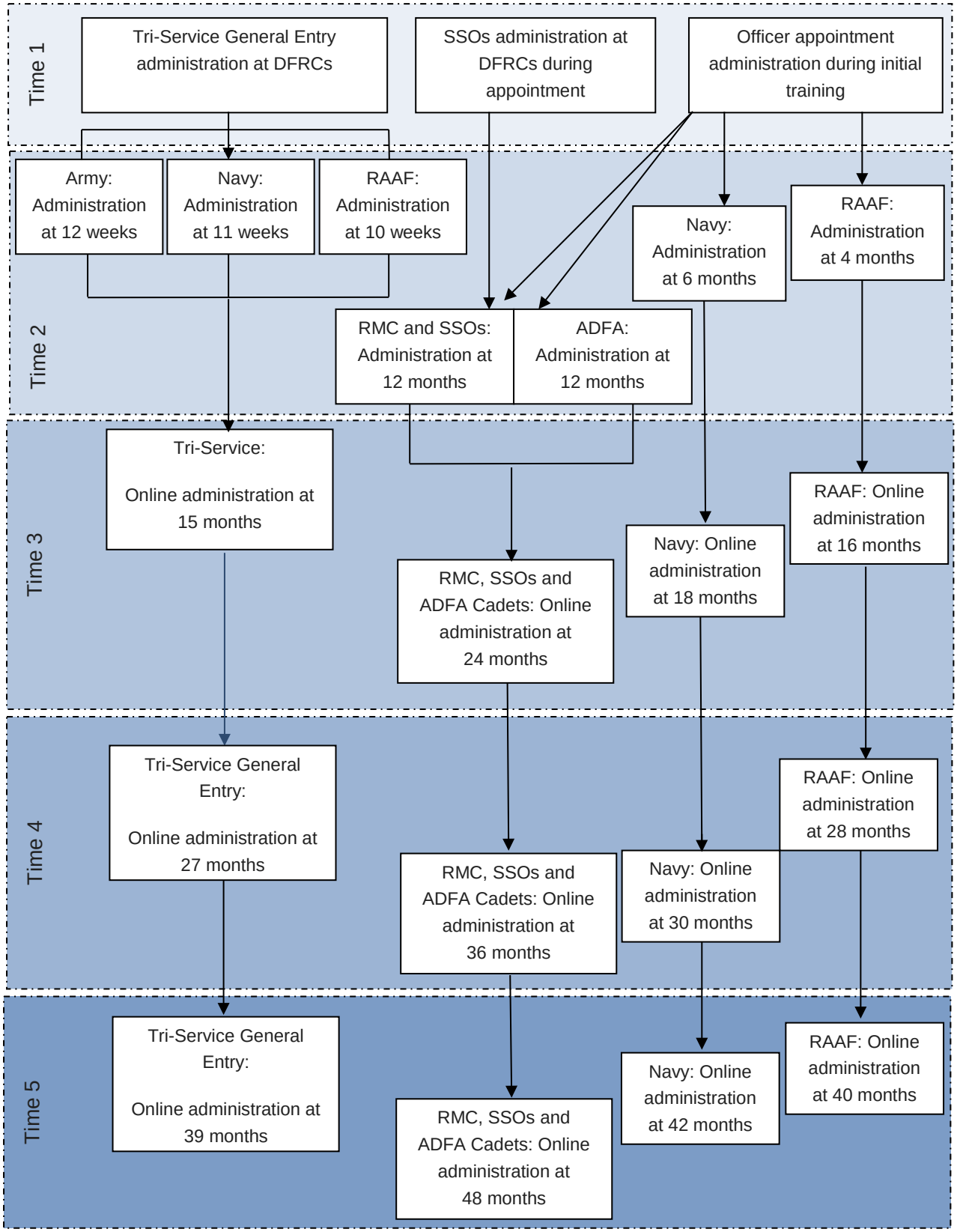
Ethics

The study was approved by the Australian Defence Human Research Ethics Committee (now known as the Departments of Defence and Veterans' Affairs Human Research Ethics Committee). The study was conducted in accordance with the Australian Code for the Responsible Conduct of Research.

LASER-Resilience participants

Participants were recruited via a phased enrolment strategy. All newly enlisted GEs with surnames beginning with the letters L–Z were eligible for inclusion. To avoid over surveying participants, those with surnames began with A–K were recruited into a separate study that was being conducted concurrently (Project LASER-Retention). Previous analyses have confirmed that there were no systematic differences in common baseline measures between the two groups of GEs (A–K and L–Z; Crane et al. 2012a). Given that Officer appointees comprised a much smaller population than GEs, there were concerns about dividing this sample and reducing the capacity to examine Officers as a unique subpopulation. Therefore, all Officer appointees were eligible to participate in the LASER-Resilience study. As the LASER-Resilience study aimed to examine the early years of military service, it is also worth noting that not all Officer appointees were new to the ADF or ADFA – some may have transitioned from being in-service members, and vice versa.

Because this study occurred across the early years of an individual's ADF career, it was not anticipated that a large proportion of the sample would have deployed during this time. Self-reported deployment was recorded at T3, T4 and T5, with the percentage of deployment found to be 7%, 18% and 21%, respectively. These percentages are important in the context of interpreting the findings relating to deployment.



ADFA = Australian Defence Force Academy; DFRC = Defence Force Recruiting Centre; RAAF = Royal Australian Air Force; SSO = Specialist Service Officer

Figure 2. Flowchart of participant survey administration across pathways

Response rates

As is common with longitudinal research, not all participants remained in the study and completed all assessments over the course of the study. As can be seen in Table 2, dropout occurred over the course of the LASER-Resilience study, consistent with other large-scale longitudinal research programs (Hourani et al. 2012). Table 2 shows the total numbers of surveys returned at each time point, including duplicates from participants who completed multiple surveys at a single time point at different locations or training establishments, as well as cases where individuals completed a survey twice (e.g. if they were back-classed – that is, had to repeat training, transferred Services, or transferred from GE to Officer). Where multiple surveys were returned, the survey with the earliest completion date was used in analysis. Table 2 also shows the numbers that could be matched with a unique person identification code at T2 to form the analytic sample. 'Analytic sample' refers to the participants whose surveys could be matched (by SURVEYID) to the available T2 data. The table also shows the response rate at each time point post-training (T3–T5) relative to both T2 and T_{-1} (where T_{-1} refers to the immediately preceding time point at any given time point).

As can be seen from Table 2, 3476 surveys at T1 could be matched with a unique identifying code at T2. This comprised 61.0% of all surveys returned at T1, and 65.2% of surveys returned at T2. From T2 onwards, the number of matched surveys decreased across time, with higher levels of loss to follow-up observed between the second and third time point (33.0% of T2 participants had matched surveys at T3). Although numbers continued to decrease from T3 to T5, the rate of decline was reduced with comparably high return rates – exceeding 70% (relative to T_{-1}). The comparably high response rates from T3 to T5 suggest a stable subgroup of respondents across the latter time points of assessment.

To examine the nature and implications of loss to follow-up in LASER-Resilience, in the *Patterns and Predictors of Wellbeing* report, a series of logistic regression models were run to indicate whether participants who were lost to follow-up for any reason were substantively different from those who were retained in the study. The findings of these analyses suggested that, despite high levels of attrition from the study overall, there were few indications of major differences across participants who were retained versus excluded from the sample, and thus limited evidence of systematic bias from study attrition. Therefore, the findings of LASER-Resilience reports are unlikely to have been substantially affected by the attrition from the study.

Table 2. Survey response numbers and response rates for each time point relative to T2 and the immediately preceding time point (T_{-1})

Numbers of surveys and response rates	T1	T2	T3	T4	T5
Total number of returned surveys	5696	5329	2311	1768	1650
Surveys matched within analytic sample	3476	5329	1759	1271	1194
Response rate relative to T2 for analytic sample (%)	na	na	33.0	23.9	22.4
Response rate relative to T_{-1} for analytic sample (%)	na	na	33.0	72.3	93.9

na = not applicable

Note: T_{-1} refers to the immediately preceding time point (e.g. at T3 compared with T2).

Administrative information and workforce records from the Department of Defence provided information about individuals who had terminated early from ADF service. Response rates across time may have also been affected by those who transitioned out of the ADF across the data collection timeframe. The numbers of participants lost to transition can be seen in Table 3. Note that these numbers are cumulative over time.

Table 3. Number of ADF members in the LASER-Resilience study who transitioned out of service at each time point (cumulative), by rank

Rank	T2	T3	T4	T5
GEs	341	560	726	909
Officers	99	245	335	415
Overall	440	805	1061	1324

Termination reasons were provided for most individuals. The most common reasons for GEs were retention not in service interest, terminated within 90 days of enlistment (a category that includes resignation), and medically unfit for service. The most common reasons for Officers were retention not in service interest, resignation, and medically unfit for service.

It was intended that individuals who had terminated from ADF service would be identified within the analytic sample and explored as a unique subgroup. However, administrative workforce data linking individual SURVEYID codes to termination from the ADF were not available within the timeframe of the LASER-Resilience research program.

LASER-Resilience measures

Measures were included in the LASER-Resilience study based on the following five main criteria (some scales were shortened in the interests of survey brevity):

- quality of measures (empirical research demonstrating scale validity and/or based on expert advice)
- brevity (entire questionnaire could not exceed 30 minutes in duration)
- comparability (scales that allow comparison with other military and civilian populations)

- ease of completion (scales could be self-administered)
- acceptability (face validity to the military population).

In addition to demographic information, the scales included in the LASER-Resilience questionnaires assessed six broad domains:

- resilience (as defined by various measures of mental health and psychological wellbeing)
- physical health
- exposure to potentially traumatic events and stressful life events
- coping and adjustment styles
- psychosocial functioning (as measured through social support and support from leadership)
- access to mental health service providers and barriers to care.

The core measures included in the LASER-Resilience questionnaire were kept consistent across the five time points of data collection; however, not all measures were administered at all time points. This variability was partly due to the fact that certain measures were expected to be of particular relevance at certain time points (e.g. social support from ADF peers and superiors was only relevant post-enlistment), or due to measuring stable constructs that were not expected to change over time (e.g. pre-enlistment exposure to potentially traumatic events). Other variations were due to the method of questionnaire distribution changing from a paper format to online at T3.

Table 4 provides a complete profile of measures and the time points at which they were administered. For a detailed description of all outcome and predictor measures, see Appendix A.

More information regarding the LASER-Resilience study protocol is provided in the published protocol paper for this study (Crane et al. 2012a).

Table 4. Measurement construct, number of items per scale and time points administered

Measure	No. of items	T1	T2	T3	T4	T5
Psychological distress (K10)	10	✓	✓	✓	✓	✓
Impact on functioning	4	✓	✓	✓	✓	✓
Global self-rated health measure	1	✓	✓	✓	✓	✓
Somatic symptoms from Patient Health Questionnaire	11	✓	✓	✓	✓	✓
Sleep Impairment Index	6	✓	✓	✓	✓	✓
Traumatic stress symptoms (PTSD Checklist [Civilian Version] four-item – PCL-4)	4	✓	✓	✓	✓	✓

Measure	No. of items	T1	T2	T3	T4	T5
Self-efficacy	7	✓	✓	✓	✓	✓
Perceived stigma and barriers to care	5	✓	✓	✓	✓	✓
Tobacco smoking	1	✓	✓	✓	✓	✓
Alcohol consumption (AUDIT-C)	3	✓	✓ Officer only	✓	✓	✓
Dimensions of Anger Reactions (DAR)	7	✓	✓	✓	✓	✓
Supportive and negative interactions scale: partner, family, friends	12	✓	✓	✓	✓	✓
Mate support scale	4	✓	✓	✓	✓	✓
Coping strategies	24	✓	✓	✓	✓	✓
Connor–Davidson 2-item resilience measure (CD-RISC-2)	2	✓	✓	✓	✓	✓
Ruminative response scale	5	✓	✓	✓	✓	✓
Flexible coping scale	6	✓	✓	✓	✓	✓
Participant's response to survey completion	3	✓	✓	✓	✓	✓
Social identification with ADF membership	6		✓	✓	✓	✓
Sense of morale in the smallest work/training group membership	1		✓	✓	✓	✓
Mental health literacy items	12		✓	✓	✓	✓
Thought control questionnaire	8		✓	✓	✓	✓
Stressful events checklist (number of events)	8		✓	✓	✓	✓
Potentially traumatic events checklist (number of events)	18		✓	✓	✓	✓
Life satisfaction	1			✓	✓	✓
Community participation	9			✓	✓	✓
Use of social networking sites	7			✓	✓	✓
Location and length of deployment	1			✓	✓	✓
Access to professional support services	2			✓	✓	✓
Supportive and negative interactions scale: instructor, superior staff, peers	16		✓	✓		
Personality index	10	✓				
Mild traumatic brain injury before enlistment	2		✓			

The cut-offs that were used for the main outcome measures were largely consistent across all reports. However, the *Prior Trauma Exposure and Mental Health* report used higher cut-offs for the PTSD Checklist (Civilian Version) four-item (PCL-4) measure for traumatic stress symptoms than other reports, and therefore the rates of participants scoring above cut-offs on this measure should not be directly compared with rates from the other reports (see Appendix B for details on the cut-offs used across the reports).

Statistical analysis

Data analyses across the reports were performed in a range of software, including IBM SPSS (version 24.0), MPlus (version 8) and R (version 3.4.4).

A range of statistical analyses were included throughout the reports, ranging from simple descriptive statistics to more sophisticated data modelling across time. Descriptive analyses were used across all reports to describe each time point and the sample; the technical briefs used this type of analysis exclusively. Descriptive analyses included frequencies for categorical variables, and descriptive statistics (means, ranges, standard deviations) for quasi-continuous variables. Inferential statistics, such as χ^2-analyses, were undertaken across reports to look at group differences on categorical variables. Where applicable, standardised effect sizes were calculated to assess the magnitude of an effect or change.

Psychometric analyses, such as exploratory factor analysis and principle component analysis of some measures (e.g. perceived social support, Brief COPE inventory), were included across early reports to indicate the factorial validity of specific measures in the context of LASER-Resilience. This process of psychometric testing involved examining the reliability of the specific measures in the LASER-Resilience sample, as well as the factor structure, or the underlying constructs assessed by those measures.

Missing data were handled in varying ways across the reports, largely because data collection was ongoing for all reports except for the LASER-Resilience *Patterns and Predictors of Wellbeing* report. All available data were used, where possible (e.g. using full information maximum likelihood estimation in latent trajectory models). Exceptions to this were cases where data were missing by design – for example, data were missing by design on the AUDIT-C measure at T2 for GEs, because only Officers were asked to complete the relevant measure at this time point. In these cases, data were only used from participants who were expected to have information across relevant time points. For data that were anticipated but missing as a result of noncompletion, mean imputation was used to address missing values based on the available responses when at least 80% of the data was available on a scale or subscale. Mean imputation involves replacing missing values with the mean of the available cases.

The three subject-specific detailed reports, as well as the *Patterns and Predictors of Wellbeing* report, included more sophisticated statistical analyses because of the larger sample sizes and the availability of longitudinal data (two or more time points). Repeated

measures ANOVAs/ANCOVAs were used to assess change over time on a range of outcomes, for the sample as a whole but also for specific subgroups (e.g. by Service).

The final LASER-Resilience *Patterns and Predictors of Wellbeing* report, which included data from all time points (T1–T5) used sophisticated modelling techniques. Growth mixture modelling, including latent trajectory models (LTM) and latent class growth analysis (LCGA), was used to assess trajectories of change over time in mental health and wellbeing, and to provide meaningful classes and subgroups of participants that were similar in these trajectories. Specifically, LTM was used to look at how the sample as a whole changed over time on a measure of interest (e.g. distress). LCGA was used to distinguish subgroups in the sample that had distinctively different trajectories over time. Model fit indices, such as confirmatory fit index, root mean square error of approximation (RMSEA) and entropy were considered to assess how well the model fit the data, and a best-fitting model was selected from these indications. Finally, a range of predictive analyses were conducted to identify factors that were associated with mental health and wellbeing over time, and to distinguish subgroups that were characterised by different trajectories over time.

Key findings by report

Reports on the LASER-Resilience study were completed throughout the lifespan of the research program, including when data collection was still in progress. A series of four technical reports were prepared to investigate a range of outcomes in the early stages of enlistment and training, which subsequently informed three detailed reports exploring a particular topic or construct in greater depth over several time points, culminating in a final *Patterns and Predictors of Wellbeing* report at the conclusion of the study. Figure 3 provides a visual representation of the timing of the reports relative to data collection time points. Table 1 details the year each report was produced.

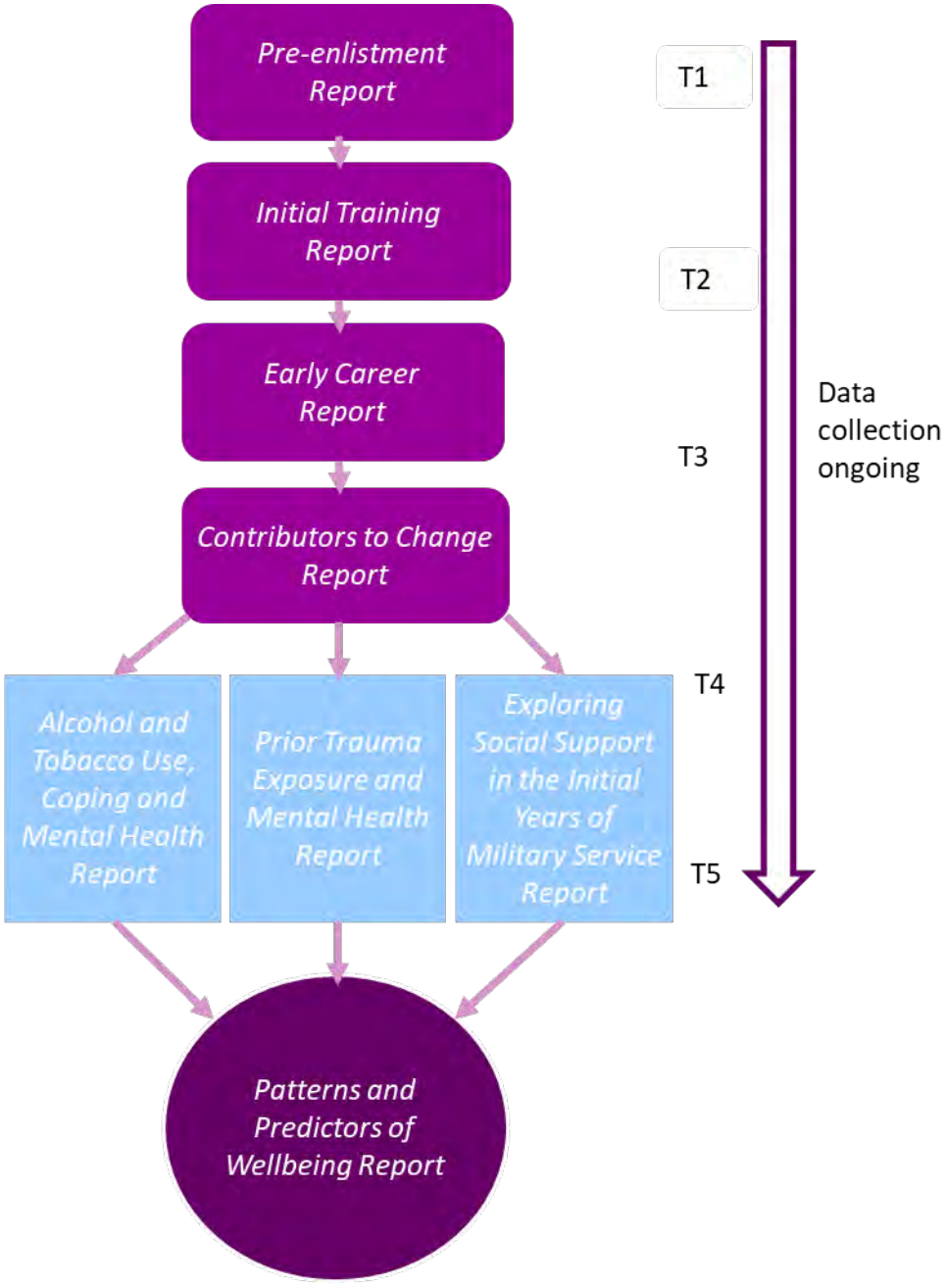


Figure 3. Flowchart of LASER-Resilience reports relative to data collection time points

Rolling data collection meant that many data collection points were happening concurrently, depending on when participants entered the study. The timeline of data collection has therefore been generalised and represents when most time points finished.

Pre-enlistment report (Crane et al. 2012b)

Aim: Examine psychological wellbeing and resilience, and the factors that contribute to these psychological processes for GEs before starting initial training and for Officer appointees in the first two weeks of initial training.

Time points included: T1 only. Note that there was a difference in the timing of data collection between GEs and Officers at this time point.

Key findings

Most respondents reported high levels of wellbeing, satisfaction with sleep, good social support and positive coping strategies at this first time point. There were some observed differences between GEs and Officers in symptoms of mental health: Officers reported a higher rate of symptoms of poor mental health than GEs. However, this may have been an artefact of the timing of the T1 data collection, as GEs had not commenced initial training at T1, whereas Officers had. Despite these differences in mental health symptoms, differences in terms of resilience (as measured by the two-item CD-RISC) were not readily apparent. Additional analyses found that, at enlistment, GEs tended to report fewer symptoms of distress than the general ADF population. This may suggest that GEs were underreporting such issues at this early time because of a perception that it may affect their early career. Compared with the general ADF population, both GEs and Officers reported lower levels of stigma, barriers to care and harmful alcohol use. Overall, this report started to identify important characteristics of the sample and provided a good baseline for detecting changes in wellbeing over time. At this early stage of data analysis, learning to use positive coping skills emerged as a potentially modifiable factor that could affect resilience.

Initial Training report (Crane et al. 2012c)

The *Initial Training* report built on the *Pre-enlistment* report by examining whether key variables of interest had changed from T1 to T2.

Aim: Examine whether there were changes in key indicators of mental health and psychological resilience between pre-enlistment and the end of initial training for GEs; between the early stages of initial training and the end of the training period for Army, Navy and Air Force Officers; and between the early stages of training and mid-training for ADFA Officer Cadets.

Time points included: T1 and T2

Key findings

This report provided further evidence that entry into training appears to be associated with a period of adjustment that can result in a mild decrease in wellbeing. There was an increase in symptoms of psychological distress, post-traumatic stress symptoms, anger and sleep impairment for GEs between the first and second time points of data collection. Somatic complaints also increased significantly, but only for male GEs. The difference between ranks in sleep quality suggested that the sleep impairment seen for Officers at T1 and GEs at T2 was a reaction to a new environment and a strenuous training process.

Alcohol consumption increased significantly for Officers at T2, which highlighted the need to monitor whether it was a temporary increase during the training period or a longer-term change in behaviour. Although increases in post-traumatic stress symptoms were small for Officers, a higher proportion of Officers than GEs were above cut-offs at T2. Importantly, the increase in symptoms of poor mental health at T2 were not considered to be indicative of future mental health problems; rather they were interpreted as reactions to the early stages of military training. Interestingly, despite some of the changes observed between T1 and T2, there was no change in self-reported psychological resilience and a minimal reduction in self-reported functioning.

Those who recalled attending BattleSMART training demonstrated more confidence in assisting others to cope at T2 than those who did not recall the program (a brief definition of BattleSMART is provided in Appendix A). In general, the uptake of BattleSMART-related skills tended to vary by gender: females found it more useful for managing arousal. With regard to perceived mental health stigma, an increase was observed for Army members, in particular. At the conclusion of this report, it could be surmised that the LASER-Resilience cohort remained resilient and reported high levels of wellbeing at the end of training, or midway through their training for ADFA Cadets.

Contributors to Change report (Crane et al. 2013b)

The changes that emerged over the first two time points in the *Initial Training* report were looked at in more detail in the *Contributors to Change* report, to better understand the factors associated with these changes.

Aim: Explore the way new ADF members experience their initial training periods, including the effect on indicators of mental health and wellbeing.

Time points included: T1–T2

Key findings

This report identified that factors such as coping styles and social support outside the ADF were important in determining how ADF members adjusted in the first year of their ADF training. Negative coping styles, such as avoidant coping and self-blame (the latter for women and Officers, in particular), were predictive of higher levels of psychological distress

and symptoms of post-traumatic stress, as well as greater anger and more days of lowered functioning. Findings also indicated that alcohol consumption should be considered separately from other measures of mental health and was associated with risk taking as a coping style. Risk taking was further related to higher levels of anger for GEs, males and Army members.

Interesting findings relating to social support emerged in this report. Any form of interaction (either positive or negative) with support external to the ADF (i.e. family and friends) was associated with lower levels of distress, particularly at T2 when even negative interactions were associated with less distress. Some nuanced gender differences were observed: more frequent negative interactions with partners were associated with fewer symptoms of post-traumatic stress for women, but more symptoms of post-traumatic stress for men. Concluding the analyses of social support, it was discovered that, when Officers perceived more negative interactions with friends at enlistment, they subsequently showed greater alcohol consumption after initial training.

Poor quality of sleep and the experience of somatic symptoms were associated with higher levels of psychological distress and symptoms of post-traumatic stress, suggesting that providing some basic information and training around sleep hygiene throughout early ADF member training could be beneficial. This report highlighted that coping styles, social support and sleep all play an important role in influencing wellbeing during the training period.

Early Career Mental Health and Wellbeing report (Crane et al. 2013a)

The *Early Career Mental Health and Wellbeing* report built on the *Pre-enlistment* and *Initial Training* reports to examine change in key variables over time, from T1 to T3.

Aim: Provide an initial description of the health and wellbeing status of ADF members following the first year of their service.

Time points included: T1–T3

Key findings

This report found that the proportion of mental health symptomatology was stable between initial training and the end of the first year of service (with around one-quarter of participants still over the cut-off for psychological distress), and that reporting of adverse physical health symptoms remained low. Notably, at the time of this report (after T3 data collection), fewer than 10% of the respondents had been on deployment, and only a small proportion had experienced other potentially traumatic events in their first year of service.

Perceived stigma and barriers to care increased slightly over time. Although reappraisal and acceptance were still being used as coping styles, the use of rumination began to increase as data collection progressed. By the end of initial training, a shift in the reliance on different social supports began to emerge, with more members reporting using sources of support

within the ADF (17%), rather than external sources of support (4%). Overall, respondents reported that they had more positive than negative social interactions, identified strongly with their immediate group and felt confident to support their peers.

With regard to the use of alcohol and smoking, this report found that, for Officers, alcohol consumption was highest for all three Services at initial training; following the first year of service (data from T3), alcohol consumption appeared to decrease somewhat from T2 levels (which were proportionally very high), showing a trend back towards the levels observed at appointment or enlistment. Across all time points, the majority of participants (≥76%) reported they were never a daily smoker; however, there was an almost threefold increase in the proportion of current daily smokers from T1 (5.8%) to T3 (13.6%). It should be noted that Officers (ADFA and RMC) were still in training during T3 data collection, which may have affected these behaviours.

Finally, with regard to sleep impairment, an increase was observed from enlistment to initial training and first year of service, but impairment was generally low among all groups. Despite the low rates, an increasing trend for sleep impairment occurred from one time point to the next.

This report was the first to present the findings of the first three time points of the LASER-Resilience study. It indicated positive trends in terms of social support and mental health symptomology, but potential areas for concern in terms of smoking uptake and sleep impairment. These trends were only indicative of change at this stage, as no statistical analyses were conducted for this report. Many of the observed changes in behaviour and mental symptomatology were explored in more detail in subsequent reports.

Prior Trauma Exposure and Mental Health report (O'Donnell et al. 2015)

The *Early Career Mental Health and Wellbeing* report indicated that some military members had experienced potentially traumatic events before their first year of service, and findings from the 2010 Mental Health Prevalence and Wellbeing Study indicated that trauma exposure was a better predictor of mental health than deployment. In addition, previous LASER-Resilience reports had indicated that coping styles were related to mental health. As a result, this report sought to understand the relationship between prior trauma exposure, mental health and coping.

Aim: Understand the prevalence of prior trauma exposure in the LASER-Resilience sample, the association of prior trauma with mental health outcomes and whether coping styles mediated this relationship.

Time points included: T1 and T2

Key findings

This report provided evidence that prior trauma is relatively common in new ADF members, but did not appear to have an impact on mental health problems at the pre-enlistment and initial training stages of their careers. This is reflected in the overall good levels of wellbeing across the LASER-Resilience sample at these early time points of data collection. Analyses revealed that mental health at T1 was the strongest predictor of mental health at T2, rather than other variables such as coping style. A suggested reason for this finding was that respondents were probably using the same coping style between the two time points, so that the effects on mental health were the same at T1 as at T2. The lack of a relationship between coping styles, trauma exposure and mental health at this stage may reflect that there was a relatively short time between time points, and not enough time had elapsed to notice changes in coping styles.

A substantial subgroup (26%) of the sample emerged in the analyses who had experienced multiple traumas (four or more), which is higher than community norms (8.5%). GEs were more likely to report a mix of both interpersonal and non-interpersonal traumas, whereas Officers were less likely to report prior trauma exposure at all. In general, GEs tended to report higher anxiety symptoms than Officers. In addition, less frequent use of a support-seeking coping style in GEs was found to be related to the experience of anxiety symptoms. In contrast, Officers tended to report higher levels of post-traumatic stress symptoms.

This report highlighted the need to continue monitoring the impact of prior trauma on mental health outcomes. Although the relationship between prior trauma and mental health outcomes was weak for these initial time points, it was highlighted that this report was examining early-career time points, and the relationship between these variables could change over time as service in the military progressed.

Alcohol and Tobacco Use, Coping and Mental Health report (Lewis et al. 2015)

A high proportion of risky drinking was found in the first four reports, and an almost threefold increase in smoking in GEs was reported in the *Early Career Mental Health and Wellbeing* report. The decision was therefore made to investigate alcohol and smoking in this detailed report.

Aims: Describe changes in alcohol and tobacco use in early-career ADF personnel (GEs, ADFA Cadets and other Officers), and consider whether psychological distress symptomatology and coping styles predicted substance use, or influenced the relationship between changes in substance use from enlistment or appointment to one to two years into military service.

Time points included: T1 and T3

Key findings

This report found that most participants were not drinking at harmful levels. However, a substantial subgroup consistently scored above cut-offs across time (from 14% to 38% of the sample). There was also an upwards trend for alcohol use across time for the whole sample. The strongest predictors of alcohol use at T3 were previous alcohol use, being younger and being male. In examining coping styles, greater use of risk-taking coping strategies and less use of support-seeking coping strategies were associated with greater increases in alcohol consumption for both GEs and Officers. Psychological distress at this stage was unrelated to alcohol use, even when the differences in coping styles were accounted for.

Rates of smoking at T1 were very low, but a notable increase in daily smoking was observed for the whole sample from T1 to T3, with an almost threefold increase for GEs. At this stage, no relationship between smoking and mental health emerged; however, avoidant coping was associated with being a first-time or relapsed smoker at T3. Notably, of the 13.4% of the GEs who became daily smokers at T3, more than half were relapsed smokers. The main variables that predicted smoking status were being older (more likely to be a relapsed smoker or ex-smoker than a never regular smoker), having a lower education level (more likely to be a relapsed smoker or continuing smoker than a never regular smoker), and being a GE (more likely to be a new smoker than a never regular smoker).

Overall, this report demonstrated increases in smoking and alcohol use in some subgroups of the ADF during their early careers. These behavioural changes were not associated with mental health difficulties, suggesting that strategies to influence these behaviours could focus on other drivers, such as cultural or environmental factors.

Exploring Social Support in the Initial Years of Military Service report (Crane et al. 2016)

The *Early Career Mental Health and Wellbeing* report indicated that social support changed over the first two years of a military career, and the *Contributors to Change* report demonstrated that good social support was associated with the presence of fewer mental health symptoms. This indicated the need to further investigate how social support changed in the early years of a military career and whether this was associated with changes in mental health.

Aims: Understand more about the social support military members received from family, friends, colleagues and leadership in the early years of their careers. Also, examine how different types of social support affect mental health outcomes.

Time points included: T1–T3

Key findings

This report emphasised that most of the participants in the LASER-Resilience study maintained good social support or built stronger support networks during the first two years

of their military careers. At T1, statistical analysis revealed three distinct profiles in relation to positive interactions with social support: those with consistently high levels of positive interactions, those with consistently medium levels, and those with consistently lower levels. Participants in all three categories reported that the amount of positive interactions they were experiencing tended to be consistent across the different support sources available (i.e. friends, family and colleagues). These categories were maintained at T2, but by T3 a new profile emerged: one where participants reported frequent positive interactions with family but low levels of positive interactions with colleagues. Across all three time points, psychological distress and post-traumatic stress symptoms were associated with lower social support. A deeper examination revealed that positive colleague interactions appeared to have a protective effect, in that reporting more of these interactions was related to having fewer symptoms of psychological distress.

An examination into the impact of leadership revealed that leader interactions were very important for relationships among colleagues – participants who reported more positive interactions with their leader also reported more positive interactions with their colleagues (this relationship also worked in the reverse). Leadership interactions were also found to influence an individual's movement from one support profile to the other: more frequent positive leadership behaviours were related to later reports of more positive support from colleagues, and negative leadership behaviours were associated with reports of lower support from colleagues. This pattern emerged in those who previously had demonstrated positive support profiles, which may indicate that reported differences in feeling positive support between colleagues can be influenced by leaders who foster a supportive culture within their team. Overall, this report highlighted the importance of social support and leadership within the ADF, as well as support from family and friends, in influencing mental health outcomes.

Patterns and Predictors of Wellbeing report (Dell et al. 2019)

The earlier LASER-Resilience reports indicated that certain factors required further exploration across the entirety of the study to allow meaningful conclusions to be drawn about the trajectories of mental health and resilience in the first years of military service. This report examined these factors over the full study period.

Aims: Better understand the situational factors and individual characteristics that promote and erode resilience over the first three to four years of a military career.

Time points included: T1–T5

Key findings

The main outcome of this report was that the majority of participants (70–85%) in the LASER-Resilience research project had consistently high levels of wellbeing across the five time points of the study, and generally demonstrated consistently low levels of mental health problems, distress and physical symptoms. This group of participants was classified as

belonging to a resilient profile. A second, smaller group of individuals (2–10%) reported decreasing levels of symptoms of mental disorder from the end of their training onwards, indicating that the elevated distress observed at the conclusion of training (or at the end of the first year of training for those in longer courses) does not necessarily predict ongoing levels of distress throughout the next stages of a military career. This group of participants was classified as belonging to a recovering profile.

A third group of participants (5–10%) emerged from the data who reported experiencing increasing levels of distress and mental health symptomatology from the end of their initial training period into their first two to three years in service. This group appeared to demonstrate symptoms akin to subsyndromal disorder, which worsened over time. This group was classified as belonging to a deteriorating profile.

Importantly, the report also examined the factors that determined membership of the three different profiles. Factors such as adaptive coping, adequate sleep, good social support and good morale within the unit or team were consistently associated with maintaining wellbeing. Other factors, such as negative coping styles (self-blame, avoidance and risk taking), lifetime trauma exposure and anger, were associated with greater risk for developing mental health problems over time. These factors represent modifiable factors associated with resilience that could be targeted with early intervention or training efforts to support the wellbeing of military members in the early stages of their career.

Key themes

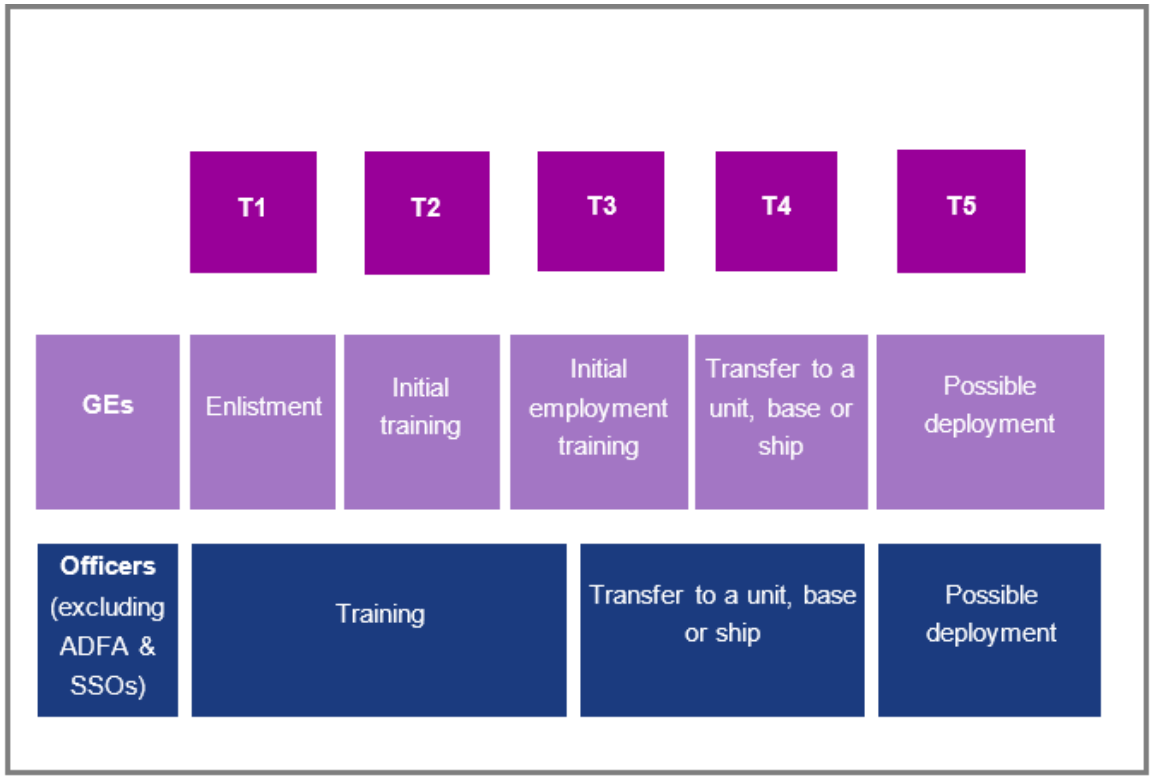
This section highlights the key themes that emerged from the LASER-Resilience research program. It is important to acknowledge that many other variables were included in the overall research program than are detailed below. The themes detailed below were chosen for further elaboration and exploration because they emerged consistently as areas of interest across time, or told a novel story about wellbeing in the early years of a military career. The themes explored in this section are intended to provide a deeper exploration of the areas of interest to Defence, or could inform changes to Defence policies or practices in the future.

Findings in relation to rank, Service and gender were identified as being of particular interest to Defence, and have been detailed wherever possible. Although the stratification of data meant that some of these groups had small sample sizes – meaning that some results must be interpreted with caution – the findings are still worth highlighting because they have the potential to provide useful insights about these groups.

Wellbeing and resilience over time

Military personnel are vulnerable to particular psychological stressors and are at risk of developing mental health issues at several transition points in a military career, including pre-enlistment, post-enlistment, deployment and post-deployment (Ursano et al. 2014). For the purposes of this report, the term ‘transition’ is used to describe the key points of change or movement in a military career, including moving from civilian life into initial training; completing initial training; and transferring into a ship, unit or base. The timing of the LASER-Resilience data collection intentionally crossed a number of these transition points because the response to these changes was of particular interest. Inherent in each of these transitions are a number of adjustments for the individual, which generally included changing environments, colleagues, expectations, roles, physical demands and schedules. Figure 4 provides a graphical depiction of the various transition points that ADF members moved through during the LASER-Resilience study period.

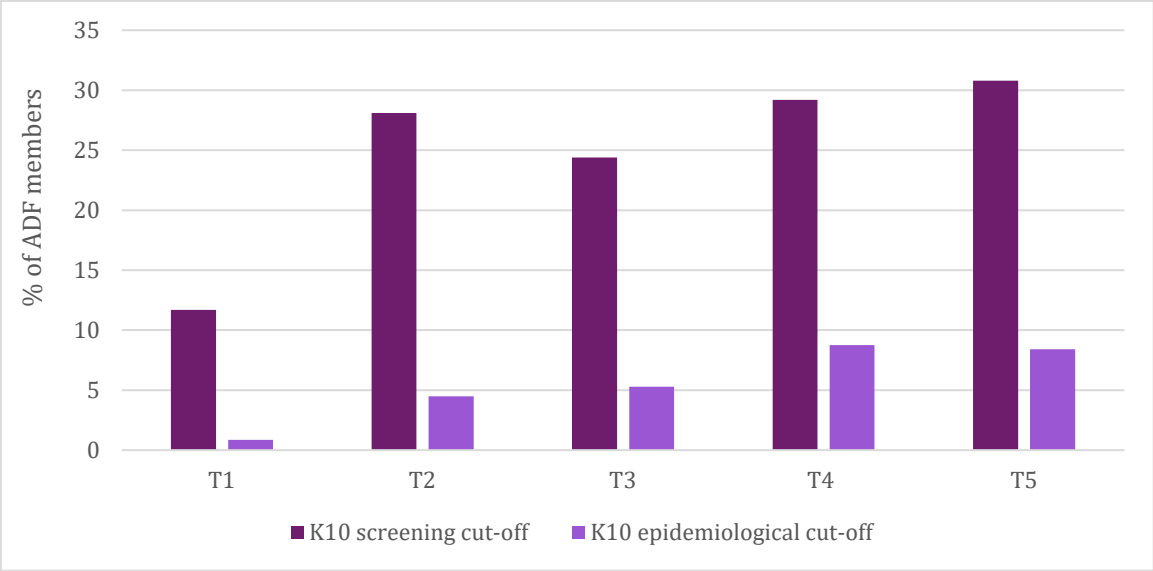
A key finding that was consistent across all reports was that the majority of participants displayed very few symptoms of psychological disorders. This indicates that most individuals entered the military with high levels of wellbeing and tended to maintain their level of wellbeing in the early stages of their military careers. This occurred despite the many points of change and potential periods of increased stress in the early years of a military career.



ADFA = Australian Defence Force Academy; GE = General Entry; SSO = Specialist Service Officer
Note: These transition points are only indicative of what the majority experienced at these time points.

Figure 4.Transition points that ADF members move through in their early career and the corresponding LASER-Resilience time point

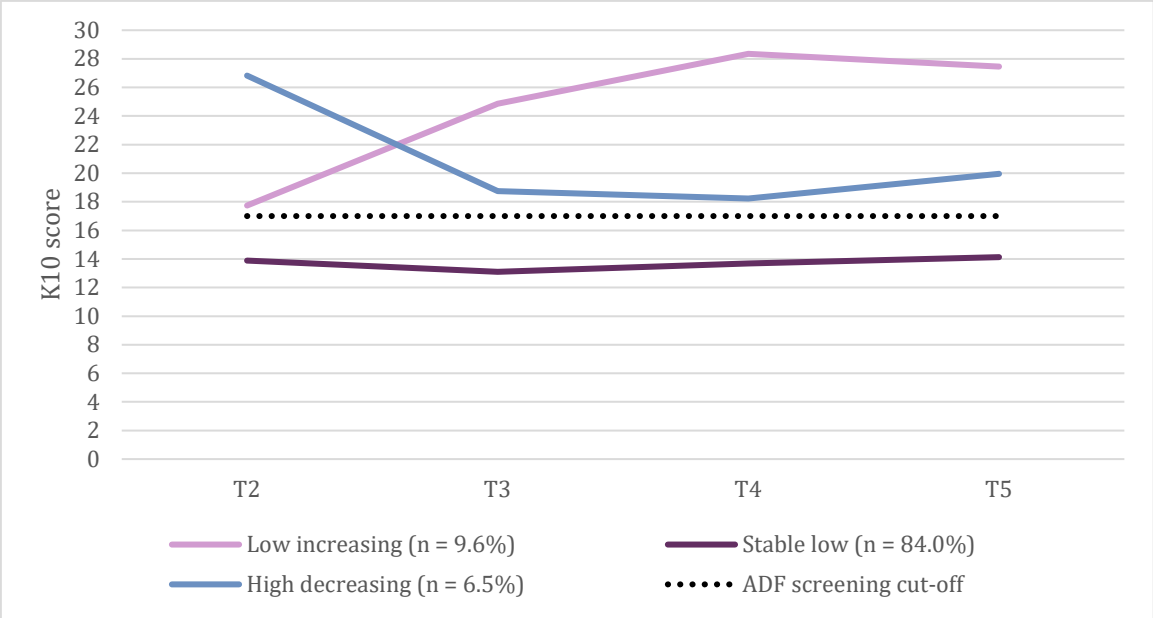
The K10 is a measure of psychological distress that provides a very good indication of overall wellbeing. Examination of this measure over time indicated that there were small to moderate increases in psychological distress across initial time points of the LASER-Resilience research program. Furthermore, data collected at later stages of the project demonstrated that most individuals who met cut-offs for psychological distress during training or immediately post-training tended to stabilise in their symptomatology at later time points (see Figure 5). It is worth noting that the LASER-Resilience findings investigated to date are only relevant for those who remained in military service. Early service leavers are at a higher risk of mental health problems (Van Hooff et al. 2018b); it may be that those who transitioned out have different levels of psychological distress from those who remained in the ADF.



ADF = Australian Defence Force
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

Figure 5. Proportion of ADF members meeting cut-offs for K10 at each time point, by screening (17+) and epidemiological (25+) cut-off

For a more meaningful analysis than examining the wellbeing of the sample as a homogeneous group, the LASER-Resilience research program sought to identify individuals who were adjusting more successfully to their military careers and then sought the common factors that enabled them to do so. The final report of the LASER-Resilience research program, *Patterns and Predictors of Wellbeing*, aimed to identify resilient groups by examining patterns (trajectories) of mental health symptoms over time. This involved separating individuals into groups based on their scores on the measures of psychological disorder over time. Modelling on the K10 (and other measures, which are explored in more depth later in this report) indicated that most ADF members fell into a group that reported consistently low levels of psychological distress across time (see Figure 6). This is consistent with other longitudinal studies of military members, most of which show a pattern of resilience characterised by consistently low symptoms of psychological disorder (Porter et al. 2017). Whether the groups with consistently low levels of symptoms of disorder can be defined as resilient is an ongoing matter of debate within the literature. Some studies have defined resilience as a pattern of low and stable symptoms during a period of increased stress (Bonanno et al. 2012). Others have distinguished resilience as the presence of mild symptoms followed by a return to normal functioning, and argue that those who display no distress in response to a stressor are resistant, rather than resilient (Layne et al. 2007). Regardless of how resilience is defined, the results in Figure 6 indicate that, despite small increases in the proportion of participants reporting elevated psychological distress following initial training and in the initial years of their military careers, the majority of individuals maintained their wellbeing throughout these years (stable low). In this report, the group that demonstrated consistently low levels of mental health symptoms across time (despite ongoing transition stressors) was defined as the resilient group.



ADF = Australian Defence Force
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

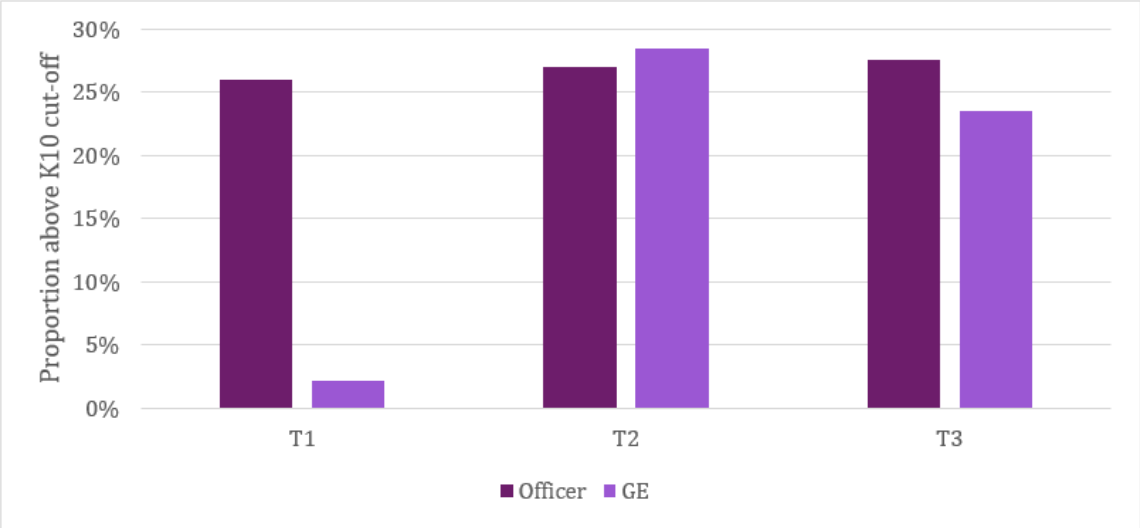
Figure 6. Groups of ADF members based on K10 scores across time

Major transitions and changes in psychological stress

The LASER-Resilience research program was designed to capture the mental health of participants at key points of their military career (see Figure 4). Because there are differences between ranks in terms of when key transitions and milestones occurred, the data collection time points were designed to be different between the ranks to capture potential change associated with these transitions. These differences in time points provided insight into the shifts in wellbeing that occur at different points early in a military career. The variation in how ADF members move through training and early career stages, particularly among Officers, means that time points in the LASER-Resilience research program did not precisely capture the time of transition for all participants. However, for the purposes of this report, we will discuss the transition that the majority of participants would have experienced at a given time point.

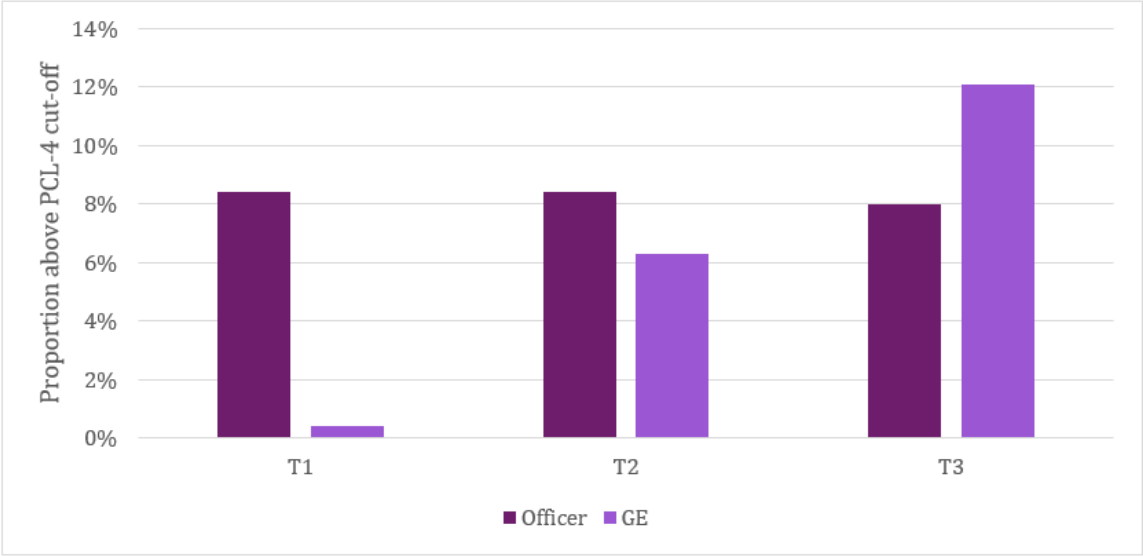
Broadly, the timing of T1 allowed comparison between the pre-enlistment phase (when GEs were surveyed) and the first two weeks of initial training (when Officers were surveyed). Initially, there were clear differences between Officers and GEs in terms of psychological wellbeing and resilience, with Officers reporting higher rates of symptoms of poor mental health than GEs (see Figures 7 and 8). There are several possible explanations for this finding. It is possible that GEs were experiencing a period of elevated wellbeing at enlistment due to having successfully gained entry to the ADF. They also may have been affected by social desirability bias and, as such, reported their mental health and wellbeing as favourably as possible before starting training. However, it is likely that the comparatively higher symptomatology of mental health disorder among Officers is indicative of the stress caused by the initial adjustment to the military training environment (since Officers were two weeks into training and GEs had not yet started training). Commencing training would have required

most individuals to change sleeping patterns, integrate with new colleagues and leadership, and adapt to a new schedule and work culture. It is therefore unsurprising that an increase in psychological stress was observed at this stage.



GE = general entry

Figure 7. Proportion of GE and Officer participants reporting a K10 score above the cut-off (≥17)



GE = general entry

Figure 8. Proportion of GE and Officer participants reporting a PCL-4 score above the cut-off (≥8)

Further evidence of the elevated stress caused by adjustment was seen in the increases in symptoms of poor mental health that were observed in GEs at the next time point (T2), when they were completing their initial training. At this time point, the proportion of GEs who met cut-offs for psychological distress and post-traumatic stress was elevated and similar to the proportions seen in Officers (see Figures 7 and 8). These changes indicated that GEs were experiencing increased levels of stress associated with psychological adjustment. This also provided further evidence that the elevated levels of distress seen in Officers at T1 was not

due to that cohort being inherently more psychologically vulnerable; rather, they were subject to different pressures at T1 from GEs, given that they had already started their training. It is also interesting to note that Officers' levels of distress did not necessarily subside at T2. Some Officers (Navy and Air Force Officers who did not attend ADFA, and SSOs) were completing their initial training at T2, and would have been transitioning into their first ship, unit or base. This in itself may have been experienced as a stressful time as they separated from training environments. Other Officers (ADFA Officer Cadets and Army Cadets at RMC) would still have been experiencing the demands associated with being in military training environments.

By T3, Officers and GEs were similar in terms of the proportions who reported scores above cut-offs for psychological distress and post-traumatic stress symptoms (see Figures 7 and 8). In addition, examination of trajectories of psychological distress (Figure 6) and post-traumatic stress (Figure 11) indicates that mental health at T3 is most indicative of medium-term psychological health (as reported at T4–T5). At this time point, most GEs and Officers had transitioned to a new ship, unit or base, with the exception of ADFA Officer Cadets, who were still undergoing training at this time point. This indicates that mental health changes that occur as ADF members transition from training environments to a ship, unit or base are particularly important because they may set the trajectory for the person's wellbeing in the medium and possibly longer term.

The *Patterns and Predictors of Wellbeing* report indicated that Officers were more likely than GEs to be in the resilient group from T2 to T5 in terms of post-traumatic stress symptoms. There are a number of possible explanations for this finding. One is that Officers tend to have a higher level of autonomy and control over their work environment – this is favourable for mental health, according to the job demands–resources model (Fink et al. 2017). However, it is also worth noting that many of the Officer cohort would have had fewer transitions than GEs during these time points because they have a longer period of training. Therefore, differences between GEs and Officers may reflect that Officers had experienced less stress caused by having to adjust to new work environments within the initial years of their military careers.

Overall, the evidence from the LASER-Resilience study indicates that the differences in wellbeing between Officers and GEs at different time points were at least partially attributable to the number of transitions that different ranks experienced in their early military careers. In contrast to Officers, GEs were assessed at pre-enlistment and across a number of significant milestones across the first four years of their careers. Accordingly, among GEs we observed reductions in wellbeing from pre-enlistment to initial training, and psychological adjustments related to the post-training period. These brief alterations in wellbeing are to be expected given the substantial adjustment required to a military career. It is also important to note that trajectories of mental health disorder (Figures 6 and 11) indicated that many of those who experienced elevated symptomatology in the period immediately post-training demonstrated improvements in wellbeing at later time points.

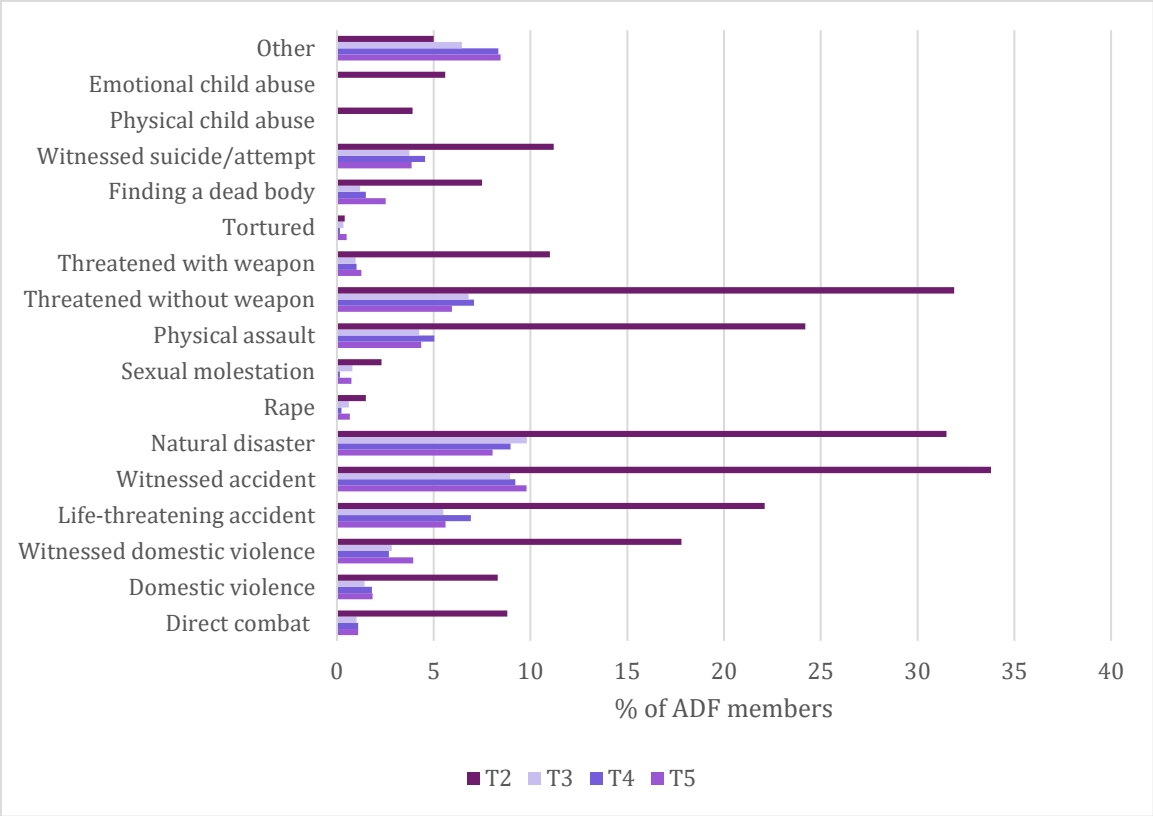
Differences in wellbeing seen across ranks as they transitioned into different stages of their careers highlight the value of longitudinal research. By following personnel over these initial stages of their careers, we could detect changes that occurred alongside major career adjustments. Examining the data cross-sectionally would not have provided as much information on the changes that occurred at times of career transitions, and elevated symptoms seen in individuals may have been attributed to differences between individuals rather than differences in their environments. Although some potentially confounding variables were introduced by the timing of the collection of data – which meant Officers and GEs were having very different experiences at each time point – this limitation in the data collection also allowed greater exploration of the changes in wellbeing that were associated with transition points.

Trauma exposure and post-traumatic stress symptoms

It has reliably been shown that exposure to potentially traumatic life events increases the risk of psychological disorder (Lee et al. 2016) and may decrease the ability to bounce back from adversity (Campbell-Sills et al. 2017). Childhood adversity and prior exposure to potentially traumatic events are demonstrated risk factors for the development of mental health problems (particularly PTSD) in adulthood (Brewin et al. 2000) The 2010 ADF Mental Health Prevalence and Wellbeing Study found that higher total lifetime exposure to traumatic events was a better predictor of psychopathology than deployment (McFarlane et al. 2011). In addition, risk increased with the number of childhood traumas (McFarlane et al. 2011). The prevalence of lifetime exposure to potentially traumatic events in the LASER-Resilience sample was comparable to the rates seen in the general Australian population (Creamer et al. 2001; Mills et al. 2011).

At T2, approximately two-thirds of the LASER-Resilience sample reported lifetime exposure to at least one potentially traumatic event. Those who had a higher prevalence of lifetime exposure to potentially traumatic events at T2 were more likely to report higher levels of psychological distress and post-traumatic stress at each time point, and were less likely to belong to the resilient group in terms of both psychological distress and post-traumatic stress symptoms across time.

Figure 9 shows lifetime exposure to potentially traumatic events (reported at the post-training time point) and past 12-month exposure (reported from T3 onwards). This figure indicates that, at each time point from T3 to T5, fewer than 10% of members reported exposure to potentially traumatic events in the preceding 12 months. The most commonly endorsed events were witnessing an accident or experiencing a natural disaster.

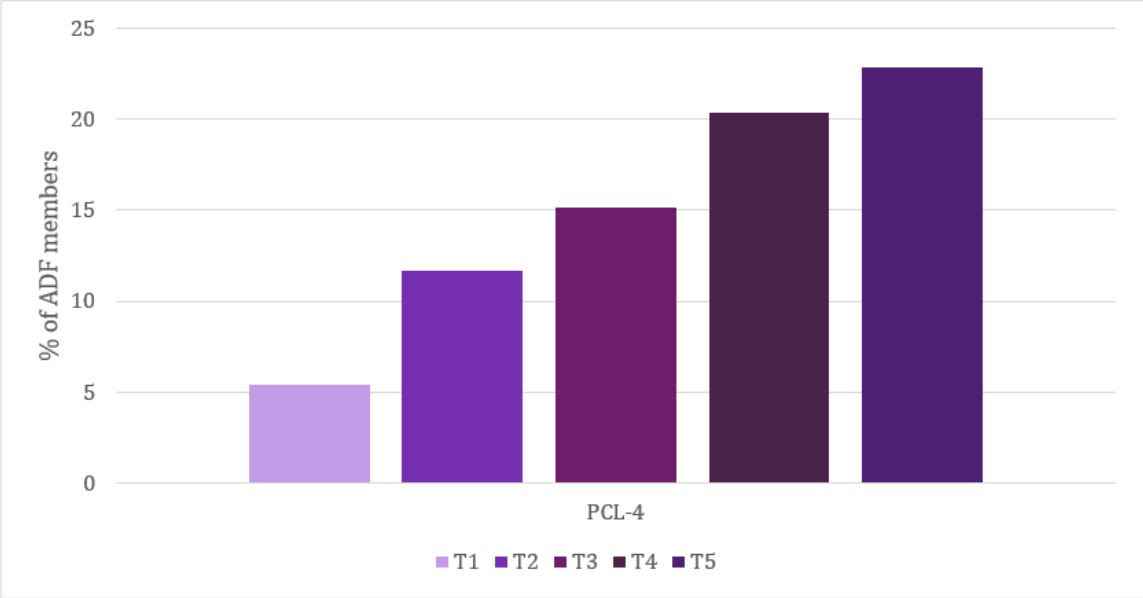


ADF = Australian Defence Force
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

Figure 9. Proportions of ADF members reporting lifetime exposure to potentially traumatic events (T2 – lifetime) and past 12-month exposure to traumatic events (T3–T5 – 12 months)

Arguably, operational deployment is the point in a military career when individuals are most likely to be exposed to potentially traumatic events. Research indicates that military members are more likely to report elevated levels of post-traumatic stress symptoms following a deployment (Bonanno et al. 2012), and the risk of elevated post-traumatic stress symptoms can be both short and long term (Eekhout et al. 2016). Overall, in the LASER-Resilience study, a relatively low proportion of the sample (7–20%) had deployed at each time point, and, as demonstrated in Figure 9, an even smaller proportion of the sample had experienced direct combat. However, although only a small number of participants in the study had deployed, deployment was not a predictor of mental health status at any time point in the LASER-Resilience study. Rather, the number of traumatic events experienced in the past year was related to higher levels of psychological distress and post-traumatic stress at each time point. This supports the notion that exposure to potentially traumatic events, rather than deployment itself, predicts poor mental health outcomes (Kanesarajah et al. 2016). Although some of the potentially traumatic events reported in the past year may have occurred while military members were deployed, most are likely to have occurred independently of deployment. Overall, these findings extend the findings of the 2010 ADF Mental Health Prevalence and Wellbeing Study because of the longitudinal nature of the LASER-Resilience study. This suggests that cumulative trauma experienced in members' military careers and/or in their personal lives over their lifetimes is a risk factor for developing mental health disorder during their military careers, rather than deployment itself.

Figure 10 shows the proportion of respondents meeting the general epidemiological cut-off for post-traumatic stress over time. Despite the relatively high levels of lifetime trauma exposure, the LASER-Resilience sample reported lower prevalence of post-traumatic stress symptoms at enlistment or appointment (5%) than general ADF personnel (16%) (Crane et al. 2012d). Over time, however, rates of post-traumatic stress symptoms gradually increased, to approximately 22% at T5.



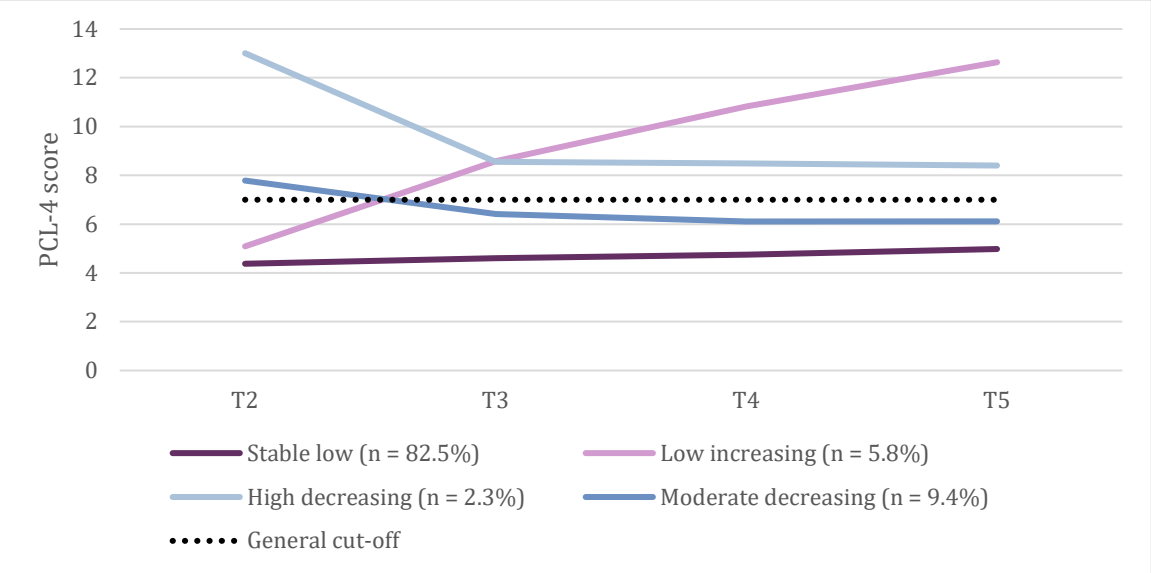
ADF = Australian Defence Force
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

Figure 10. Proportion of ADF members above cut-off on PCL-4 over time

This finding suggests that being in the military may be a risk factor for developing post-traumatic stress symptoms. As seen in Figure 10, the largest increase in the proportion of individuals reporting scores above cut-off for post-traumatic stress symptoms was from T1 to T2. Earlier LASER-Resilience technical reports indicated that this increase was largely driven by increases among GEs (Crane et al. 2012c, 2013a). This again indicates that the stress caused by significant life changes experienced in an early military career may have led to elevated post-traumatic stress symptoms across these early data collection time points. It is also consistent with the 2010 Mental Health Prevalence and Wellbeing Study (McFarlane et al. 2011), which reported higher rates of anxiety disorders in younger ADF members (under 35 years of age) than in the Australian community, suggesting that this early career group is particularly vulnerable to developing disorder.

Despite the increase in symptoms of post-traumatic stress over time, modelling completed at the end of all data collection indicated that most individuals in the LASER-Resilience sample belonged to the group that was characterised by low symptoms (below cut-off) over time (see Figure 11). Officers were more likely to belong to this resilient group and were more likely to report no prior trauma exposure than GEs. In relation to gender differences, women

were more likely to belong to the nonresilient groups and reported higher levels of post-traumatic symptoms across all time points than men.



Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

Figure 11. Class-specific mean trajectories for 4-class model of the PCL-4

The longitudinal modelling brings a nice clarity to the cross-sectional prevalence rates of post-traumatic stress symptoms. It has long been recognised that PTSD symptoms often fluctuate. As a result, it is challenging to distinguish those who have a temporary escalation of symptoms (which will return to baseline without intervention) from those who have ongoing symptoms (and will require intervention). The longitudinal modelling indicates that, at each time point, a small group would be identified as having probable PTSD, but the majority have fluctuating symptoms (i.e. they may meet criteria for PTSD at a given time point, but their symptoms do not persist over time). Those in the low increasing group should be targeted with interventions because the longitudinal data show that their symptoms are persistent over time.

Although vulnerabilities may exist in some individuals, the majority of the sample did not develop symptoms of post-traumatic stress in the initial years of their military careers. However, given that higher rates of self-reported mental health problems are observed in people who have transitioned out of the military, and particularly in those who are discharged nonvoluntarily (e.g. for medical or administrative reasons) (Van Hooff et al. 2018b), it is also possible that those who were most affected by post-traumatic stress symptoms had transitioned out of the military and were lost to the LASER-Resilience research program.

Social support

Previous research has demonstrated that social support networks change during major life transitions (Haslam et al. 2008). When individuals undergo major life transitions, such as starting a military career, they are often separated from their existing social support networks (Haslam et al. 2008), which can have implications for the ability to cope with the transition to

military life. The LASER-Resilience study demonstrated that sources of social support tend to shift during the early years of military careers and that this may have implications for mental health. When examining support from a range of sources, including from family, friends and colleagues, interesting patterns emerged. Although family support remained essential for maintaining wellbeing over time, interactions with colleagues became increasingly important over time. Most notably, positive interactions with colleagues were most crucial for ADF members' mental health, irrespective of the type of support that was received from family and friends. These shifts are expected, given that ADF members are beginning to spend more time during this period with their colleagues than with friends or family, such that these day-to-day interactions become important for overall wellbeing. It is also consistent with the broader literature on military personnel that indicates that having positive experiences with colleagues is important for wellbeing. For example, having good relationships with colleagues has been associated with fewer PTSD symptoms (Maguen et al. 2008) and fewer symptoms of depression (Bryan & Heron 2015) post-deployment. This suggests that support from other military members may buffer the effects of stressful environments and allow people to function effectively.

Another key finding to emerge midway through data collection (up to T3) was that leadership is very important in fostering positive interactions between colleagues. Individuals who reported that they had less supportive leadership also reported less supportive colleagues. If good leadership is able to foster positive interactions between colleagues (and create a cohesive unit), this may serve as protection against mental health problems in vulnerable individuals. It is important to recognise the bidirectional relationship between social support and mental health. Although social support is protective, other research shows that PTSD or other disorders may weaken social support networks as an individual's ability to manage interpersonal relationships deteriorates (Kaniasty & Norris 2008; Shallcross et al. 2016). However, the presence of a subgroup who reported good social support from family, but not from colleagues or leadership, indicates that concerns with social interaction may not solely be attributable to the individual capacity to develop supportive relationships. These findings indicate that leadership is important in creating a team culture early in the military career that is characterised by team members forming strong bonds and supporting each other.

Further evidence that colleagues and leadership within the military are particularly important to military mental health was the finding that higher levels of morale at the later data collection time points (up to T5) were associated with lower levels of psychological distress. This is consistent with previous findings that the provision of positive leadership behaviours (e.g. being fair and consistent, fostering trust) promotes morale in soldiers (Britt et al. 2007). Furthermore, perceived supportive leadership is consistently associated with good mental health in military personnel (McKibben et al. 2009; Jones et al. 2012; Whybrow et al. 2015).Taken together, these findings indicate that support from leadership and morale are very important to wellbeing. It may be that high morale buffers some of the stressors that might be encountered in the initial years in the military. In the LASER-Resilience sample, those reporting consistently high social support were most stable in terms of mental health, whereas those with mixed social support from different sources reported more change in

mental health over time. This may indicate that individuals with existing vulnerabilities in terms of social support or mental health problems are more sensitive to changes in (or a lack of) leadership support.

The impact of social support from sources within the ADF on mental health outcomes highlights the unique nature of social bonds within the military. Military traditions and rituals tend to bond individuals together and encourage internal group cohesion (Hatch et al. 2013). There is a strong collectivist culture, as well as strong in-group identification, which means that military members tend to seek help from within the military while in that environment (Bryan et al. 2012). This can create an environment of strong support during service; however, if external social support networks are not maintained, it can leave military members vulnerable when they start to transition out of service. This underscores an opportunity to encourage and check in on the maintenance of external social networks throughout members' careers.

Overall, the social support findings highlighted that most of the LASER-Resilience sample had good social support in their initial years in the military. Given the protective nature of social support, this finding is consistent with the majority of the sample maintaining their wellbeing during the same period.

Functioning and physical health

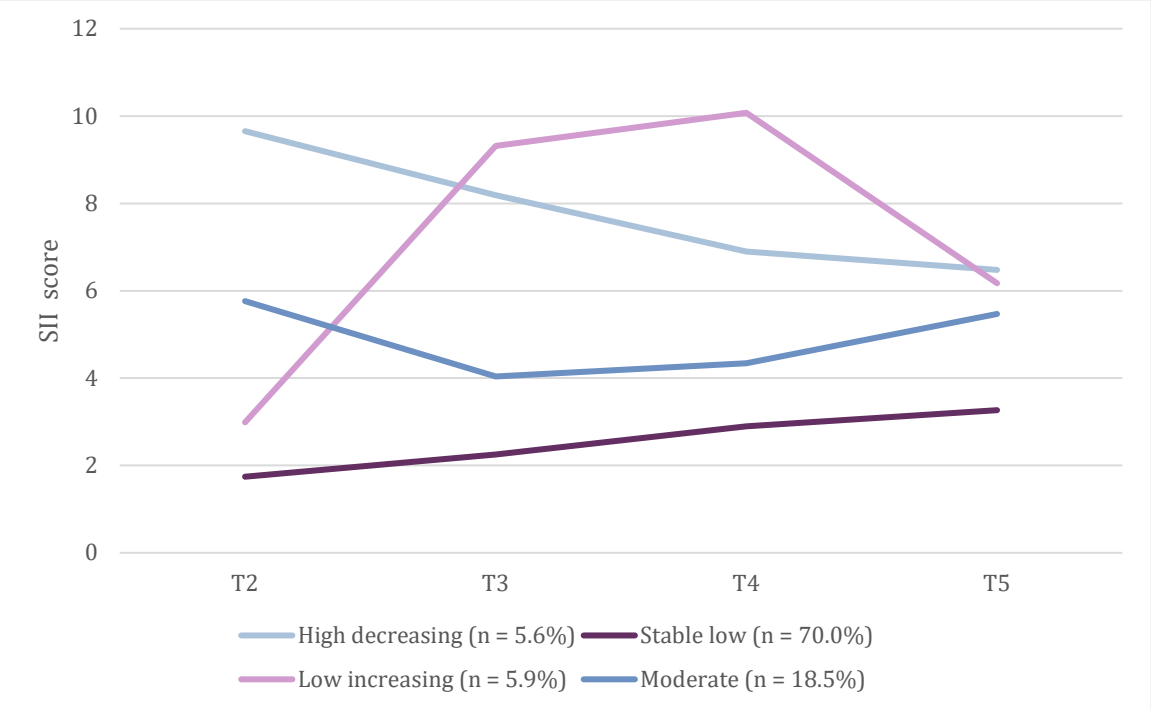
Functioning

Functioning in the LASER-Resilience dataset was measured in terms of the number of days that ADF members were unable to work because of impairment caused by psychological distress. Although functioning was not a large component of the LASER-Resilience analysis and reporting, earlier reports indicated that those who reported elevated levels of psychological distress did not report a concurrent decrease in functioning. At the post-training time point (T2), when there was an increase in psychological distress overall, there was minimal impact on functioning. Specifically, there was no change in the number of full days that ADF members were unable to work as a result of psychological issues, but there was a significant increase in the number of half days that they were unable to work. This may indicate that this cohort had the ability to keep up with daily activities, perhaps because their psychological distress was not sufficiently elevated to completely impair their functioning. Alternatively, the early stage of their career may have provided extra motivation to continue performing, despite mental health difficulties. During these very early stages, it is likely that members would be wanting to work and make a positive impression on colleagues and leadership to solidify their careers in the military, considering that T2 is just after the completion of initial training for GEs. However, given the levels of impairment seen in transitioned ADF members (Van Hooff et al. 2018b), it is also possible that those who were unable to continue functioning at this stage transitioned out of the military and were lost to follow-up from the study.

Sleep

The LASER-Resilience sample reported mild increases in sleep disruption over time. Difficulties with sleep increased for GEs from pre-enlistment to post-initial training, which is consistent with other research suggesting that sleep can be disrupted by the need to adopt new sleeping patterns during the early years of a military career (Crane et al. 2013b). In contrast, Officers reported a significant decrease in disruption to their sleep from the initial weeks of training to the second LASER-Resilience time point. As the majority of Officers were still in training at this time point, this indicates that they may have adjusted to the training schedule, and possibly developed some good strategies to maintain their sleep during this period.

Examination of trajectories of sleep impairment from T2 to T5 (Figure 12) indicated that the majority of individuals (70%) fell into a group that was characterised by consistently low levels of sleep impairment over that period. The remaining groups had trajectories that indicated elevated sleep impairment at T2, T3 or T4; by T5, all groups were characterised by moderate sleep difficulties. It is concerning that the training period can be associated with sleeping problems and that some military members reported increases in sleep impairment during their early careers.



SII = Sleep Impairment Index
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

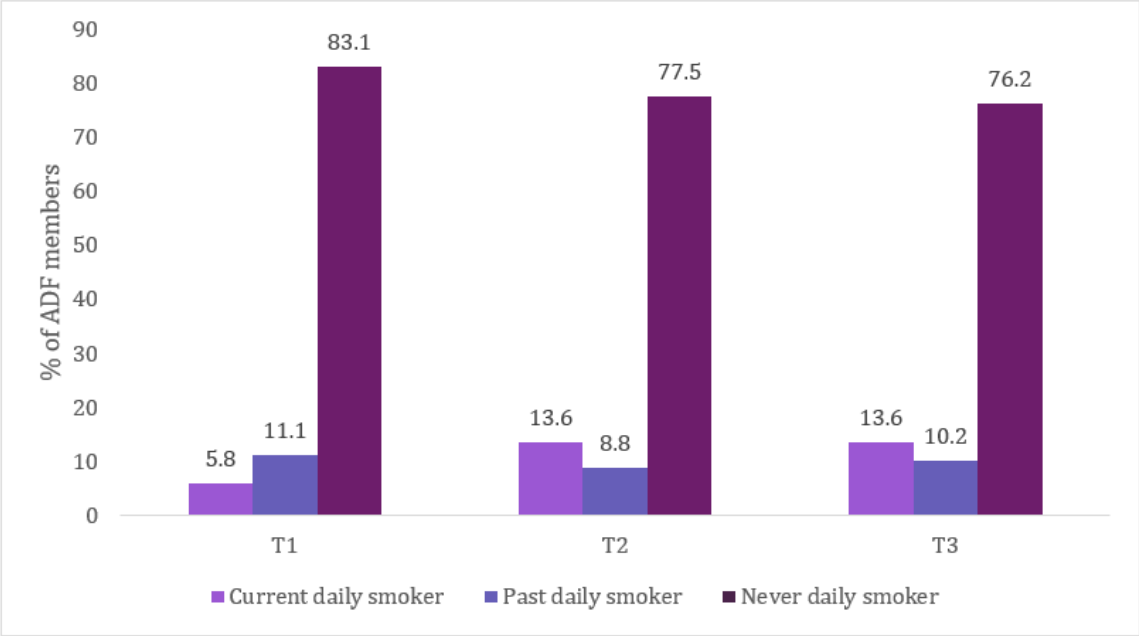
Figure 12. Class-specific mean trajectories for 4-class model of the Sleep Impairment Index

Compromises in the quality and quantity of sleep have a marked impact on mental health and functioning (Jenkins et al. 2015; Seelig et al. 2016), and the ability to cope with stress (Taylor et al. 2016). The LASER-Resilience study also found that sleep problems were

strongly associated with psychological distress and post-traumatic stress symptoms at each time point. It is difficult to determine the nature of this relationship, as there are two equally plausible explanations for this finding. Individuals who experience difficulty adjusting to new routines may experience sleep problems that affect their mental health, but pre-existing distress and mental health disorder could also impair sleep over time (Seelig et al. 2016; Vyas et al. 2016). However, the patterns of sleep impairment and the association with mental health seen in the LASER-Resilience study suggest that investigation of, and improvements in, sleep during initial training and early career are warranted. Previous studies of military members in the United States have found that sleep is an important factor in whether individuals graduate from basic training (Williams et al. 2016) or discharge early from the military (Seelig et al. 2016). In addition, the Transition and Wellbeing Research Programme found higher rates of moderate to severe insomnia in those who had transitioned from full-time ADF service compared with those still serving in the regular ADF (Van Hooff et al. 2018b). This may indicate that those who experienced more serious and longstanding sleep impairment in the LASER-Resilience sample transitioned out of the military and were lost to the study.

Smoking

Rates of smoking within the LASER-Resilience sample were low at the pre-enlistment time point (T1; Figure 13). For both GEs (men 7.3%; women 3.1%) and Officers (men 3.3%; women 1.9%), rates of smoking were well below smoking rates in the general population in the 18–24 year age group (men 22%; women 17%). However, examination of the change in smoking rates from T1 to T3 indicated that there was a nearly threefold increase in smoking among GEs during that period (men 20.1%; women 14.2%). The reasons for this increase in smoking are not entirely clear. It is possible that some individuals quit smoking to get fitter and boost their chances of gaining entry to the military, and then relapsed once they had completed their rigorous initial training course. It is also possible that smoking was driven by social factors – that is, individuals took up smoking to fit in with their cohort. Notably, more than half of the GEs who became daily smokers at T3 were relapsed smokers. This indicates that some ADF members had success quitting initially, but found themselves smoking again once they were through the initial training period.



ADF = Australian Defence Force
Source: Adapted from the LASER-Resilience *Early Career Mental Health and Wellbeing* report

Figure 13. Proportion of ADF members indicating tobacco use behaviours

Importantly, there was no evidence of an association between smoking and mental health at T1, T2 or T3. This indicates that smoking was not a coping strategy used in response to increasing stress; rather, the increase in smoking may be a social, cultural or organisational issue. The situational factors associated with early years in the military, such as spending long periods of time waiting, may have also encouraged an uptake in smoking.

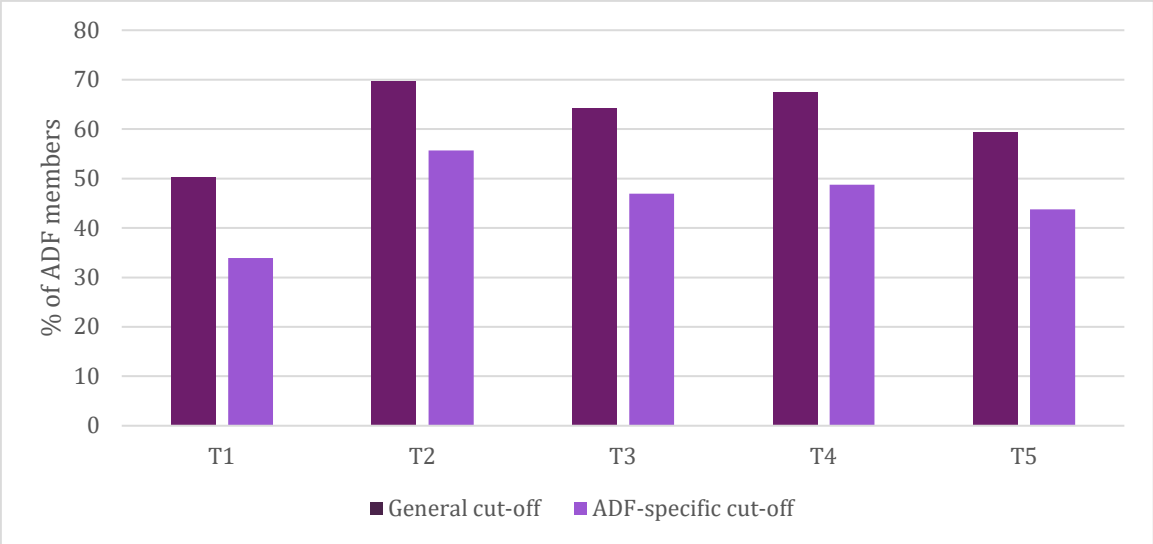
Other studies of the ADF provide an indication of the situations and environments that may encourage smoking. The Middle East Area of Operations Census study (Dobson et al. 2012) indicated that deployment was associated with increased smoking. The Transition and Wellbeing Research Programme found that transitioned ADF members had lower rates of current smoking but higher rates of being former smokers than the general Australian population. In addition, rates of current smoking were similar between those who were still serving in the full-time ADF in 2015 and those who had transitioned out of full-time ADF service (Kelsall et al. 2018). This indicates that smoking is not prevalent in the later stages of a military career or following a military career. However, the LASER-Resilience study indicated that the early military career environment is conducive to smoking, particularly for GEs. Despite the lack of association with mental health problems, smoking is an important factor to focus on because of the potential long-term impacts on physical health.

Alcohol use

In general, there was a relatively high degree of harmful alcohol use in the LASER-Resilience sample (Figure 14), with just under half of all respondents scoring above the cut-off for risky alcohol consumption at most time points. These proportions were higher than

those found in the 2010 ADF Mental Health Prevalence and Wellbeing Study (McFarlane et al. 2011) and the 2015 Mental Health Prevalence, Mental Health and Wellbeing Transition Study (Van Hooff et al. 2018a). The numbers are not directly comparable, because both the 2010 and the 2015 studies used the full AUDIT measure rather than the abbreviated AUDIT-C measure. The abbreviated AUDIT-C provides a measure of consumption, rather than alcohol abuse or dependence. To our knowledge, there are no Australian population studies using the abbreviated AUDIT-C that would enable a direct comparison with the LASER-Resilience study. However, Australian population data provide some indication of comparative alcohol consumption in a similar age group. In the 18–24 age group, 29% of males and 8% of females consumed more than two standard drinks per day on average, and 69% of males and 61% of females consumed more than four standard drinks at least once in the past year (ABS 2015). These data indicate high levels of potentially harmful drinking in the Australian population as well as within the younger members of the ADF.

The degree to which LASER-Resilience respondents reported harmful alcohol use changed over time. Relatively lower levels of harmful consumption were observed at entry to the ADF. Data reported in the pre-enlistment report (T1) suggested that the prevalence of harmful consumption was lower than in the general ADF population. However, rates of harmful drinking increased significantly for Officers at T2 (when the AUDIT-C was administered to Officers only). The *Initial Training* report found that this increase in alcohol consumption differed by gender, with men reporting higher alcohol consumption than women, which was a consistent finding across the reports. A possible reason for the increase from T1 to T2 is that some respondents were aged under 18 at T1 (11.3% of GEs and 15.1% of Officers). This could account for some of the increase in alcohol consumption at later time points, when most would have reached legal drinking age. However, this is unlikely to fully account for the increase in consumption, as the majority of the sample were above legal drinking age at all time points. Another possible reason for the increased alcohol consumption after T1 is that participants were engaging in positive impression management at that initial time point. As such, alcohol consumption may have been underreported initially. Alternatively, for many of the Officers, the level of access to alcohol would have been controlled during the early stages of their training, which may have affected usage levels between T1 and T2.



ADF = Australian Defence Force
Note: T2 data were collected for Officers only.
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

Figure 14. Proportion of ADF members meeting cut-offs for AUDIT-C at each time point, by general (5+) and ADF-specific cut-off (6+)

The proportion of individuals reporting harmful alcohol use decreased mildly over time from T2 to T5, when GEs' alcohol consumption was also assessed. This may suggest that the environment immediately after training was conducive to alcohol consumption for Officers. The strongest predictors of alcohol use at T3 were alcohol use at entry to the ADF, being younger and being male. Taken together, these results suggest that males in the early stages of their military career are at particular risk at consuming alcohol at harmful levels.

The *Alcohol and Tobacco Use, Coping and Mental Health* report (Lewis et al. 2015) found that there was no relationship between psychological distress and alcohol use, even when controlling for coping styles. However, subsequent cross-sectional analysis using all LASER-Resilience time points indicated that there was a moderate to weak association of alcohol consumption with post-traumatic stress and psychological distress. In addition, there was evidence to suggest that use of alcohol was a maladaptive coping strategy for some military members, because alcohol consumption was associated with risk taking and lower utilisation of support-seeking strategies one year post-training (Lewis et al. 2015).

For Officers, perceived frequency of negative interactions with friends at the time of appointment to the ADF was predictive of greater alcohol consumption at T2. This suggests that individuals who do not have robust coping mechanisms or good social supports may be at increased risk of using alcohol as a way of managing change or fitting in with the social group. The association with risk taking is also concerning, although the *Initial Training* report found that the apparent relationship between alcohol consumption and risk-taking behaviour was weak. The links between alcohol consumption and risk taking are well documented, particularly among young men (Cherpitel 1993). Despite the weak associations with psychological distress and risk taking, the levels of potentially harmful drinking found in the LASER-Resilience sample are cause for concern and represent an opportunity for preventive

interventions to reduce alcohol consumption, particularly among younger and male entrants to the military.

Coping strategies

An individual's ability to adjust to the demands of a military career is influenced by their coping style. Positive coping styles include acceptance of their situation and reappraisal, characterised by trying to see problems from a more positive or realistic perspective. These positive coping styles were consistently associated with fewer symptoms of psychological distress and post-traumatic stress across multiple LASER-Resilience study time points. The ability to be flexible in use of coping styles – that is, choosing the most appropriate coping style depending on the situation – is also thought to be important during military training (Overdale & Gardner 2012).

Maladaptive coping styles include avoidance, characterised by orienting attention away from unpleasant experiences or choosing not to engage with problems; risk taking (e.g. drug or alcohol abuse, or speeding); and self-blame. Maladaptive coping styles were consistently associated with elevated symptoms of poor mental health, such as symptoms of post-traumatic stress, anger and alcohol consumption. This highlights the importance of coping styles in maintaining good mental health, which is consistent with research in other military samples (Britt et al. 2016; Nakkas et al. 2016).

In line with the overall finding from the LASER-Resilience study that most respondents maintained their wellbeing over the early years of their military careers, there is evidence that most individuals used positive coping styles throughout their early military careers. The *Early Career Mental Health and Wellbeing* report demonstrated that positive coping styles such as reappraisal and acceptance were the most commonly used coping styles. The stability in most respondents' wellbeing was also an indication that the use of positive coping styles was relatively stable across time. The *Prior Trauma Exposure and Mental Health* report found that coping styles did not mediate the relationship between prior trauma and mental health problems. A possible explanation for this is that respondents were using the same coping styles across the two time points; as a result, the impact that coping had on their mental health would also be consistent across time.

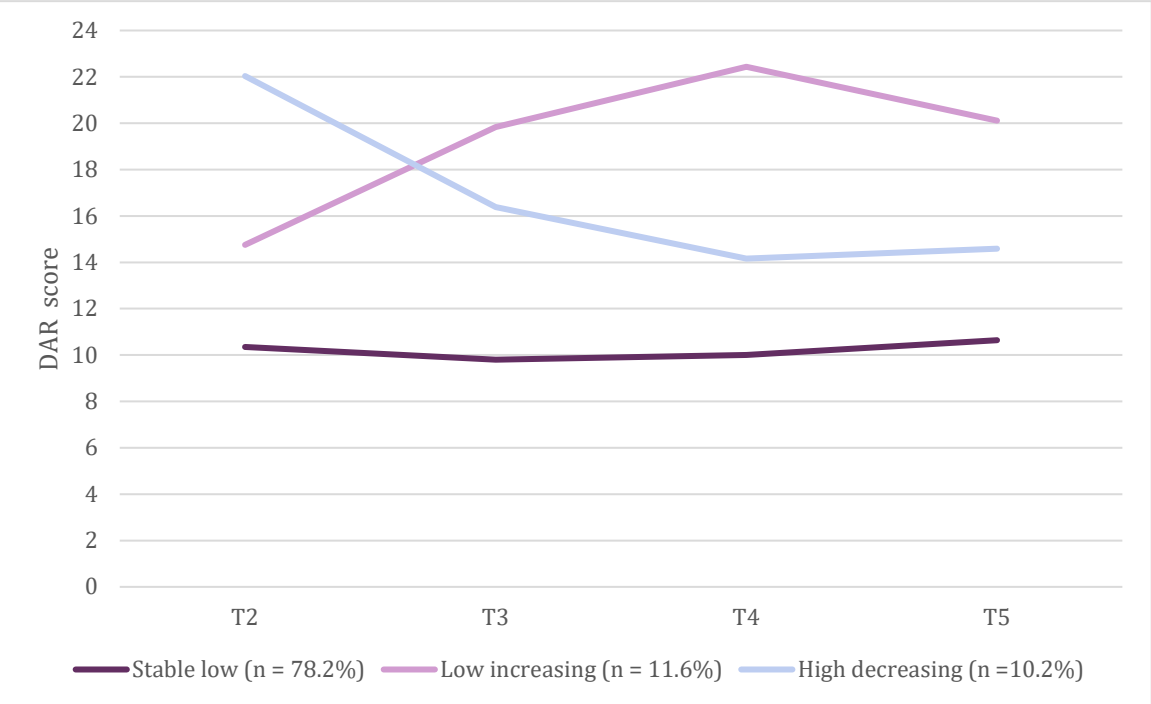
In the *Contributors to Change* report, maladaptive coping styles were linked with psychological distress during military training (Crane et al. 2013b). Analysis in the *Patterns and Predictors of Wellbeing report* (Dell et al. 2019) indicated that, of all the coping styles, frequency of self-blame was the strongest predictor of increasing post-traumatic stress scores during initial training.

Another concerning finding was that the use of rumination increased in the first year of service. This suggests that individuals who engage in rumination and self-blame may be particularly vulnerable to developing mental health problems. Training new entrants to the ADF to use more adaptive coping skills may be a useful way to reduce future mental health difficulties.

Anger

Anger was not as strong a focus across the LASER-Resilience reports as the themes already discussed, but should be considered an emerging theme. Modelling of trajectories of anger symptoms from T2 to T5 indicated that the majority (78%) of LASER-Resilience participants were in a group characterised by low and stable levels of anger (Figure 15). However, a subgroup (11.6%) reported increasing symptoms of anger over time. This is of concern because higher levels of reported anger were strongly associated with symptoms of post-traumatic stress and psychological distress. In the *Contributors to Change* report, anger was also associated with negative coping styles such as avoidance and risk taking. This may indicate that individuals with higher levels of anger are less able to cope with the demands of a military career, because anger interferes with the ability to adaptively respond to more challenging situations.

However, as anger is commonly reported among those experiencing symptoms of post-traumatic stress (Forbes et al. 2004), scoring higher on measures of anger may also indicate the presence of pre-existing disorder. A comprehensive assessment would be needed to determine appropriate interventions.



DAR = Dimensions of Anger Reactions
Source: Adapted from the LASER-Resilience *Patterns and Predictors of Wellbeing* report

Figure 15. Class-specific mean trajectories for 3-class model of the DAR

Future directions

Implications and recommendations

The LASER-Resilience research program has implications for the overall wellbeing and functioning of early-career ADF members, and potentially also for retention and for effective transition back into the civilian community for those who voluntarily or involuntarily discharge after a short period of service. These findings can inform current and future Defence training, policies and procedures, including initiatives outlined in the 2018–2023 Defence Mental Health and Wellbeing Strategy (Department of Defence 2017).

Drawing together the findings across the entire LASER-Resilience research program, a number of implications for Defence have emerged. First and most importantly, it needs to be recognised that the large majority of members who participated in this study were doing well during the early years of their careers. In general, this provides support for the way that Defence is currently using training and early intervention to aid adjustment to the military. As noted in the key themes above, the research project was able to identify factors that emerge consistently as problematic for the small proportion of participants who were not reporting high levels of mental health and wellbeing. These factors include sleep, anger, coping styles and poor social support. Implications relating to these factors and for individuals who have more difficulties with the early-career transitions are provided for consideration below.

Mental health screening

- Some individuals may be vulnerable to the impact of deteriorations in mental health in the early years of their military careers, including individuals who have prior exposure to trauma, poor social support, problems sleeping or elevated levels of anger. It is important to use routine screening, or (where practical) screening events anchored to the key transition points identified in this study (post-training and as the person transitions into a new ship, unit or base), to monitor changes in wellbeing over time. Reviewing screening outcomes to identify subsyndromal concerns (not just disorder) during the early stages of a military career provides opportunities to deliver more prevention or early intervention strategies before individuals develop mental disorders. Secondarily, it would provide early opportunities for discussions around mental health and self-care, and may serve to focus early-career members on mental fitness, as well as physical fitness.
- The association of frequency of prior exposure to traumatic events with poor mental health emphasises the need to continue to screen for prior trauma before entry to the ADF, and to use this as an opportunity to identify those who may require additional support and monitoring of their wellbeing over time.
- The combined findings of the LASER-Resilience reports could be incorporated into initial and refresher training for Defence health and mental health care providers who are administering ADF mental health screens, including the ADF Periodic Mental

Health Screen. An understanding of the different trajectories and the factors that influence membership of those trajectories would be useful. The possibility of mapping real-time patient data to normative trajectories would be worth exploring further.

- A comprehensive mental health screen should be conducted before discharge, regardless of the length of service or the type of discharge (i.e. even for those with a short career).

Training and education

- The patterns of wellbeing that emerged in the final LASER-Resilience report indicated that training or appropriate interventions could be delivered at a number of points. For example, changes in psychological health between T2 and T3 (post-training for most participants) were indicative of medium-term psychological health. This indicates that resilience training and interventions could be implemented to support the medium- and possibly longer-term wellbeing of all ADF members. Overall, the results suggest that such programs should occur across all stages of a military career.
- Morale and team identity were shown by LASER-Resilience findings to play a protective role for resilience, both directly and indirectly (by encouraging adaptive coping styles). Leaders have a role to play in building morale within their teams and encouraging individuals to form supportive work relationships. Activities to encourage team morale should be conducted for all teams, including techniques empowering team members, bringing team members into discussions about team-related challenges and goals, and creating a shared identity. In addition, emphasising this at an organisational level may facilitate a culture of support.
- Junior leadership training should provide information about the impact of transition periods, and the impacts of leadership behaviours on morale, unit/group social support and mental health.
- Alternatives and adjuncts to leadership (e.g. mentoring) should be considered to support transition and bolster social support.
- Professional development opportunities should be created and maintained for clinicians, to provide insights from the results of LASER-Resilience (and other major research programs), with a focus on the clinical implications of findings (e.g. the key factors associated with wellbeing trajectories). This could be in the form of webinars, or workshops at relevant conferences.
- Skills that are learnt in initial years of a military career (e.g. adaptive coping styles) should be reinforced regularly and should be actively practised by all members of the ADF.
- Learnings from this study should inform not only Joint Health Command policy and practice but also the resilience enhancement plans of the single service branches.
- Strong bonds outside the military are important for transition from the military – a time of known vulnerability. However, some individuals experience a shift away from

their external social support networks during their time in the military. This highlights an opportunity to support and encourage connections with external social supports throughout ADF members' careers.

Interventions

- Earlier interventions are required to identify and address hazardous drinking in the early stages of a military career. In particular, there is a need for more targeted alcohol strategies aimed at Officers in training.
- Given the increase in smoking in the early years of a military career, there is a need for health promotion activities for smoking cessation at critical career stages (entry, deployment, transition), with promotion of access to evidence-based Quit programs.
- Attention should be paid to the early identification of anger and sleep problems, and providing early intervention through command and evidence-based interventions through mental health services (e.g. SHUTi, CBTi Coach).
- The modifiable factors that have emerged in this report, such as adaptive coping styles, sleep, anger and social support, could be targeted through early intervention programs within Defence. Next-Generation BattleSMART provides an opportunity for this information to be delivered organisation-wide. It is critical that programs such as this are delivered as an ongoing skills-based assessment intervention to reinforce learning and to demonstrate application of skill (i.e. not just one-off training events).
- ADF members' sleep quality and quantity could be improved and maintained through organisation-wide interventions that recognise the role of leadership in modelling and promoting good sleeping patterns and sleep conditions for members under leaders' command.

Future research

Within each of the LASER-Resilience reports, areas of future research were identified. As the reports progressed, more time points became available for analysis, and more complex statistics were undertaken on the dataset; some of these suggestions were implemented in the later reports. Provided below are some considerations for future research that have been drawn from considering this body of research as a whole.

- Gender differences suggest the need for further exploration of the factors that affect resilience and vulnerability for women, in particular, during their early military careers. For example, it is possible that women experience differences in peer social support, as they represent a much smaller proportion of the ADF demographic than men. Having a more detailed understanding of the factors that affect women's wellbeing may provide more information about why women reported higher rates of psychological distress and provide possible solutions to mitigate distress.
- A subgroup that may also warrant further investigation is individuals who have experienced previous trauma. For example, more in-depth analyses could be conducted on the effects on resilience trajectories of interpersonal versus non-interpersonal trauma,

and childhood trauma exposure versus trauma exposure in adulthood. These analyses would help target screening both before entry and during a military career, and help identify those at particular risk of mental health problems because of their past trauma vulnerability.

- Further research should be conducted to examine those who experience subsyndromal or subclinical levels of psychological distress. Following these individuals over multiple time points may help to parse out those who are likely to develop psychological disorder in the future and those who are experiencing just temporarily elevated levels of psychological distress.
- Future research could expand on the findings of this report by examining patterns of wellbeing over longer periods, and the predictors of these patterns. For example, follow-up with the recovering group over time may indicate whether members of that group experience a long-term improvement in their ability to cope with stressors – if they experience increases in mental health symptomology, this could indicate that they are simply reactive to periods of increased stress. Follow-up with the deteriorating group may reveal whether they return to their previous levels of wellbeing or whether there are other vulnerability points in their military careers that contribute to ongoing increases in their distress.
- Greater exploration of the deployed sample (e.g. examining the type of deployment experienced and whether they experience direct combat) could provide more information on whether these factors affect mental health and wellbeing.
- The LASER-Resilience dataset was limited in not having a robust measure of functioning. Future research that links other Defence datasets with LASER-Resilience measures of functioning or performance (e.g. performance data) could explore this component of resilience.
- Participants in the study who discharged early from the military were grouped with those lost to follow-up. It was outside the scope of the LASER-Resilience study to examine those who discharged from the military early, so this study did not provide an understanding of the factors that were linked to early discharge. Examining this group could provide more information about the link between mental health and continued military service.
- The link between alcohol misuse and sleep impairment in the LASER-Resilience sample warrants further exploration. The relationship is likely to be complex, because poor sleep is a side effect of alcohol misuse, but both issues may be indicative or broader mental health problems.

Conclusion

It is well understood that there is inherent complexity in measuring and defining resilience. Stress can play a multidirectional role in the development of resilience, and some level of exposure to stress may help individuals build the capacity to cope with stress in the future (Seery et al. 2010, 2013; Seery 2011). However, too much stress for some individuals can start to erode their feelings of wellbeing and good mental health. The difficult question of course is – where is the tipping point for each individual? What are the factors that might contribute to this tipping point for a given individual? To add further complexity, the relationship between exposure to stressful life events and resilience is nuanced and is influenced by the type of event, as well as the frequency of exposure to trauma or stress. Because of this complex relationship, debate continues around how to characterise patterns of resilience. Resilience has been characterised as both a maintenance of wellbeing despite the presence of a stressor, and the presence of mild symptoms followed by a return to no distress in response to a stressor. In all likelihood, the distinction between these definitions is semantic, as both represent minimal impact of a stressor on wellbeing and functioning (Bonanno & Mancini 2012; Hart & Lancaster 2016).

Regardless of how resilience is defined, by examining the group that maintained wellbeing in the early years of their military careers, the LASER-Resilience research program was able to identify consistent variables that had an impact on wellbeing during potential periods of stress. These variables are social support, leadership, coping styles, sleep, alcohol use and anger. To some degree, each of these variables is modifiable and therefore presents opportunities to enhance training and interventions within the ADF. This is particularly relevant to the subgroups that were found to be less resilient to the challenges of an early military career. Previous studies have found higher rates of disorder in younger ADF members (McFarlane et al. 2011; Van Hooff et al. 2018b), suggesting that they are a vulnerable group and would benefit from being supported to focus on the factors that strengthen resilience and protect against poor health in the early stages of their careers.

Defence approach to resilience – by Joint Health Command

A resilient defence force is one that has the capability to respond, survive and thrive in changing and challenging situations, and win the fight. Resilience is a valued protective factor when serving in the ADF. Yet we know it is not a static trait, and for some people can change over time as they progress through their military careers and life events, including transition from the ADF to civilian life. Many Defence members and their families are exposed to challenges, stressful events and even traumatic experiences – not only as part of their military experience, but in their everyday lives.

The LASER-Resilience research program has been a key collaborative research project that was launched in 2009. Reports have been periodically released since 2013. Because of the passage of time of longitudinal research, it is important to recognise that Defence has progressed extensively within the area of resilience in parallel with the LASER-Resilience research. Key milestones in developing our approach to resilience in the ADF include those listed in Table 5.

Table 5. Key milestones in the approach to resilience in the ADF

Year	Key milestone
2006	The first module of BattleSMART (Self-Management and Resilience Training) was rolled out at the Army Recruitment Training Centre in July, and was later included in the basic training program for Navy and Air Force recruits, as well as in Officer training for all three Services.
2010	Pre-deployment BattleSMART was implemented, as well as a version for ADF members transitioning out of Defence (LifeSMART).
2011	FamilySMART (a version of BattleSMART for families) was implemented. Post-deployment BattleSMART was developed and administered in a trial in May–July in a trial in the Middle East Area of Operations. An evaluation of the pre-deployment BattleSMART module was conducted in September, with participation from Mentoring Task Force – 4 (MTF-4) personnel (*n* = 511). In general, this evaluation indicated that the pre-deployment BattleSMART module was very well received by MTF-4 personnel, who responded favourably on all measures of training. This was demonstrated further, post-deployment, with 65% of personnel reporting that the content of the training was useful to them on deployment.

Year	Key milestone
2013	A Pre-deployment Guide, distributed at pre-deployment briefings, and a Homecoming Guide, distributed at Return to Australia Psychological Screenings (RtAPS), were updated to incorporate BattleSMART language and concepts. 'Train the Trainer' BattleSMART program for mental health professionals and providers was designed, developed and implemented. Since 2013, all personnel who have participated in Mission Rehearsal Training as part of preparation to deploy on operations have completed pre-deployment BattleSMART training as part of the certification process.
2014–15	Programs such as the Adaptive Sport Program – Invictus Games (first held in September 2014) and the Arts for Recovery, Resilience, Teamwork and Skills Program (ARRTS; introduced in May 2015) have their place in promoting, building and demonstrating resilience of our people. These programs have helped us to reflect and realise not just that resilience is something that may keep people well, but that resilient characteristics and behaviours have a place in the journey of people through injury, illness and recovery.
2016	The inaugural ADF Resilience Forum was conducted in April. This was the first time that representatives from across Defence convened to begin developing a harmonised approach to resilience in the ADF. The second Resilience Forum in September addressed the issue of how we evaluate resilience training programs. The keynote speaker was Dr Amy Adler, a US Army clinical research psychologist at the Walter Reed Army Institute of Research, and co-chair of the US Army's Psychological and Resilience research program. Since 2016, each of the Services has been developing and implementing resilience plans and initiatives that incorporate joint programs such as BattleSMART, but are adapted to meet their individual Service needs.
2017–18	Approximately 7500 ADF ab initio Officer and other rank recruits participated in BattleSMART or BattleSMART refresher training.
2018	The third Resilience Forum in June put the spotlight on 'Being Real About Resilience'. This focus helped inform a whole-of-Defence resilience framework for how we can deliver resilience training that is practical, relevant, realistic and effective. The approach Defence has to resilience is reflected in our vision under the Defence Mental Health and Wellbeing Strategy 2018–2023, in that we support our people to be 'fit to fight, fit to work and fit for life'.

Building resilience at the individual level with our health and behavioural services has had primacy in the delivery of resilience training. Although this individual focus undoubtedly contributes to a resilient defence force, it does not fully optimise capability.

It is clear to us that resilience at the individual level should be complemented by a ‘top down’ approach that directly sets a culture of resilience. Such a concept ensures that resilience building is a shared responsibility between leaders, commanders, managers, supervisors, teams, health providers, individuals, families and the Defence community. The ADF focus is now expanding beyond the individual to include team and organisational resilience. Resilience must be built and sustained, and this requires targeted education for our junior leaders (Officers and other ranks) that focuses on coaching, communication and leadership approaches, to facilitate the necessary cultural shift towards resilience and performance enhancement.

Additionally, in the future, the ADF will apply various innovative methods of training, consistent with contemporary research in the area of resilience and human performance, including application of virtual reality, biofeedback and immersive training. While this approach is in its infancy within the ADF, findings from the LASER-Resilience study will support our efforts to more effectively develop and reinforce individual resilience skills, and inform the development of a culture of resilience in Defence: a culture where it is the norm for resilience development to be integrated within unit training plans; where it is the norm to openly discuss, at the team level, optimal coping strategies before and after challenges; and where continual improvement and early help seeking for health problems that may affect capability at the individual level is the expectation.

A final acknowledgment

The LASER-Resilience study was the result of a collaborative effort by chief investigators from Phoenix Australia – Centre for Posttraumatic Mental Health at the University of Melbourne, Macquarie University, La Trobe University, and the Mental Health Strategy and Research team within Joint Health Command at the Department of Defence. The chief investigators worked together to design, implement and advocate for the study over the 10-year duration of the LASER-Resilience program.

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Appendixes

Appendix A – Detailed description of measures

The measures detailed below are the main outcome measures and predictor variables that were used in the analyses across the reports.

Psychological distress

Psychological distress was measured via the K10 (Kessler et al. 2002). The K10 is a brief measure of psychological distress consisting of 10 questions about emotional states (namely anxiety and depression). The timeframe of reference for the K10 was the past four weeks. Responses on the K10 are measured on a five-point Likert scale (1 = none of the time; 5 = all of the time). Total scores range from 10 to 50, with higher scores indicating higher levels of psychological distress.

Impact on functioning

Impact on functioning was measured via a single item from the K10+ ('How many days of the past 4 weeks were you totally unable to work or carry out your normal activities because of these feelings?'; Kessler et al. 2002). This K10+ item is measured on a continuous scale.

Perceived resilience

The Connor–Davidson Resilience Scale 2 (CD-RISC-2; Vaishnavi et al. 2007) was used to measure perceived resilience. The CD-RISC-2 is an abbreviated version of the original 25-item CD-RISC (Connor & Davidson 2003), consisting of two items: 'I am able to adapt to change' and 'I tend to bounce back after illness or hardship'. Respondents are asked to rate items based on how they felt 'during the past 30 days'. Responses are measured on a five-point Likert scale (0 = not true at all; 4 = true nearly all the time). The CD-RISC-2 is strongly correlated with the full CD-RISC ($r = 0.78$, $P < 0.001$; Vaishnavi et al. 2007). The full CD-RISC was not included because of a need to control the length of the survey, and reports from United States colleagues who were using the two-item version and reported good psychometric properties at the time of the design of this study.

Examination of the CD-RISC-2 measure over time revealed that, given the brevity of the measure (two items only), there was not sufficient variability in responses, and that other composite measures of mental health, distress and wellbeing provided a much more nuanced picture of overall resilience and adjustment. Therefore, the CD-RISC-2 was not used in substantive analysis of the LASER-Resilience dataset.

Somatic symptoms

Somatic symptoms were measured via the somatic symptom scale from the Patient Health Questionnaire (PHQ-S; Spitzer et al. 1999). The scale was modified for this study with four

items omitted that were related to menstrual pain, pain during sexual intercourse, feeling tired and trouble sleeping. The former two items were omitted because they were not relevant to the study, and the latter two were omitted because perceived sleep impairment was covered by a separate outcome measure (described below). The PHQ-S asks respondents to rate how much they had been bothered by a somatic symptom (e.g. stomach pain) 'during the past four weeks'. Responses are measured on a three-point Likert scale (0 = not bothered at all; 2 = bothered a lot). Total scores range from 0 to 22, with higher scores indicating more severe somatic problems.

Perceived sleep impairment

Sleep impairment refers to changes in the quantity or quality of sleep (e.g. not sleeping enough or not feeling rested after sleep). Perceived sleep impairment was measured via a modified version of the Sleep Impairment Index (SII; Forbes et al. 2014). The SII assesses the subjective symptoms and consequences of poor sleep, as well as the degree of distress caused by those difficulties. The version of the SII included in the LASER-Resilience questionnaire omitted one item from the index, specifically; 'How noticeable to others do you think your sleep problem is in terms of impairing the quality of your life?' This item was omitted in the interests of brevity, because it was not as relevant in the context of training (i.e. people who know them well – family and friends – would not notice their sleep problems during this time). Responses are measured on a five-point Likert scale from 0 (none) to 4 (very severe). Total scores range from 0 to 24, with higher scores indicating more perceived sleep impairment.

Alcohol consumption

The AUDIT-C (Bush et al. 1998) was used to assess alcohol intake. Using questions from the full AUDIT, the AUDIT-C is a three-item self-report survey that measures the frequency and volume of alcohol consumption over the previous three months. Responses are measured on a five-point Likert scale. Total scores range from 0 to 12, with higher scores indicating a higher level of alcohol consumption. The AUDIT-C has been shown to perform well relative to the standard 10-item AUDIT, demonstrating sensitivities and specificities greater than 0.80 when used to identify past-year hazardous and harmful drinking (Bush et al. 1998; Bradley et al. 2003). The AUDIT-C was administered to Officers but not GEs at T2, because GEs are not expected to have access to alcohol during their recruit training.

Tobacco use

Tobacco use or smoking behaviour was measured using a single categorical item asking participants to describe their tobacco smoking in terms of (i) being a current daily smoker, (ii) being a past daily smoker, or (iii) never having been a smoker.

Post-traumatic stress symptomology

Post-traumatic stress symptomology was measured via the PTSD Checklist (Civilian Version) four-item (PCL-4), which is a shortened version of the original PCL-C (Weathers et al. 1993). The PCL-4 comprises four items that are measured on a five-point Likert scale. Total scores range from 4 to 20, with higher scores indicating more PTSD symptoms. The PCL-4 is strongly correlated with the original PCL-C ($r = 0.943$, $P < 0.05$; Lang & Stein 2005). The four questions in the PCL-4 refer to the past 30 days, and how often the individual has had problems with: 'repeated disturbing memories, thoughts or images of a stressful experience', 'physical reactions (like heart pounding, trouble breathing, sweating) when something reminded you of a stressful event', 'avoiding activities or situations because they reminded you of the stressful experience', and 'having difficulty concentrating'.

Social support

The Family and Friend Social Support, ADF Peer Social Support, and ADF Superior Social Support scales included in the LASER-Resilience questionnaire were modified versions of the 'supportive and negative social interactions' scale (Schuster et al. 1990). This scale measures the frequency of positive and negative social interactions from different sources. Responses are scored on a four-point Likert scale ranging from 1 (often) to 4 (never). The scale is intended to provide two subscale scores: one that indicates the frequency of positive interactions, and one that indicates the frequency of negative interactions.

Items regarding ADF peers/colleagues and ADF superiors/leadership were based on questions about positive and negative interactions from family and friends, which were modified to be appropriate for the military context. Although the term 'colleagues' is not commonly used by military members to describe their peers, it is used throughout the report for simplicity. The manner of administration of these items varied across time points. At T2, there was a single version of each item that referenced support and interest received from 'your most immediate training groups (e.g. course/section) or work team (e.g. work group/section)'. From T3 to T5, paper-based surveys also included items with an equivalent format. It is important to note that the manner in which the electronic survey was set up resulted in only a proportion of participants (those who indicated they were still in training) receiving the relevant social support questions regarding peers and leaders at T3, T4 and T5. As a result, there was significantly more missing data at the later time points, because only a small proportion of participants reported that they were in training (and subsequently completed the social support questions regarding peers and leaders).

Morale

Surveys from T2 to T5 included a single item relating to morale: 'In the last four weeks, the morale (i.e. sense of enthusiasm and dedication) within my team has been good'. This was taken from the 2008 Australian Defence Attitudes Survey (Department of Defence 2009b). The item is rated from 1 (strongly disagree) to 5 (strongly agree).

BattleSMART training

BattleSMART (Self-Management and Resilience Training) is the ADF self-management and resilience training program. The program has a cognitive behavioural basis and aims to train individuals in arousal reduction techniques and adaptive cognitive coping strategies. Personnel are taught how to identify adaptive from maladaptive responses to stressful situations, and how to adjust their responses accordingly.

A single question was asked across T2–T5 surveys about whether the ADF member had completed BattleSMART training in the past 12 months. The item was rated as either 1 (yes) or 0 (no). Examination of the BattleSMART item revealed a very high level of erroneous endorsement by respondents. It appeared that many participants could not recall the training as 'BattleSMART' and incorrectly reported that they had not completed the training. Further, some participants incorrectly appeared to have stated that they had done the training in the past 12 months at later time points, when this could not have been the case. It was therefore decided to not include data from this item in the substantive analysis of the LASER-Resilience dataset.

Potentially traumatic events

Surveys examined exposure to potentially traumatic events from T2 onwards. At the ADF's request, the potentially traumatic events questions were not asked at T1 because staff at recruitment centres were administrative and not trained to respond to mental health issues, whereas at later time points members of the project team administered questionnaires and were trained to respond to any disclosures of distress. At T2, respondents were asked to indicate the number of times they had experienced any of the listed potentially traumatic events or any other potentially traumatic event over their lifetime before enlistment. Similar items from T3 to T5 asked about events in the past year. A single aggregate score representing the total number of events was used in analyses.

Coping styles

The 24-item coping strategies scale included in the LASER-Resilience questionnaire was an adapted version of the 28-item Brief COPE inventory (Carver 1997). Based on previous analysis of the LASER-Resilience sample (Crane et al. 2012d), 17 items from the full scale were grouped to form six coping style variables: acceptance (two items), reappraisal (three items), self-blame (two items), avoidance (three items), risk taking (three items) and support seeking (four items). Responses are measured on a four-point Likert scale describing frequency of using each style (1 = not at all; 4 = a lot). References to coping styles in this report are to the frequency of their use (how often).

Anger

Anger frequency, intensity and duration, and impact on social functioning were measured via the Dimensions of Anger Reactions (DAR). The original seven-item version of the DAR included in the LASER-Resilience questionnaire was a version of the DAR that was in use at

the time (Forbes et al. 2004; Hawthorne et al. 2006). It includes two additional items compared with the currently favoured DAR-5 (‘My anger interfered with my ability to get my work, study or other productive activity done’ and ‘I became angry at myself when I did not perform as well or achieve what I wanted’). Responses are measured on five-point Likert scale (1 = none of the time; 5 = all of the time). Higher scores indicate worse symptomatology.

Appendix B – Determination of cut-off scores

Table 6. Cut-offs for key outcome measures used across LASER-Resilience reports

Report	K10	PCL-4	AUDIT-C
Pre-enlistment	≥17[a]	≥8[b]	≥6[b]
Initial Training	–	≥7[c]	≥6[b]
Contributors to Change	–	–	–
Early Career Mental Health and Wellbeing	≥17[a]	≥8[b]	≥6[b]
Prior Trauma Exposure and Mental Health	≥25[d]	≥12[c]	–
Alcohol and Tobacco Use, Coping and Mental Health	≥17[a]	–	≥6[b]
Exploring Social Support in the Initial Years of Military Service	≥17[a]	≥7[c]	–
Patterns and Predictors of Wellbeing	≥17[a] & ≥25[d]	≥7[c]	≥5[c] and ≥6[b]

a ADF-specific screening cut-off
b ADF-specific cut-off
c General/epidemiological cut-off
d ADF-specific epidemiological cut-off

As demonstrated in Table 6, the cut-offs used across reports were largely consistent. This is particularly true for the AUDIT-C, with 6 used as the cut-off across all reports. For the PCL-4, most reports used a cut-off of 7 or 8 (with the exception of the *Prior Trauma Exposure and Mental Health* report, which used a general community, and relatively higher, cut-off score). For the K10, all reports used a cut-off of 17 or 25.

Given the different cut-offs, it is important to understand their respective purposes. ADF-specific screening cut-offs are intended to maximise the sum of the sensitivity and specificity (the proportion of those with and without the disorder who are correctly classified). A screening cut-off can therefore be used to identify individuals who might need care; it is designed to be more inclusive and should be used in screening settings. In contrast, epidemiological or general cut-offs are intended to most accurately represent the value that brings the number of false positives (mistaken identifications of disorders) and false negatives (missed identifications of disorders) closest together, thereby counterbalancing these sources of error most accurately. These cut-offs are often used to track prevalence of disorder over time.

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