Drinking to Cope with Operational Service: A Longitudinal, Prospective Investigation into Alcohol Use and Motivations to Consume Alcohol.

Thesis submitted for the degree of

Doctor of Philosophy

By

Alison Kim Kaine

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The University of Adelaide, Australia

Centre for Traumatic Stress Studies

School of Medicine

Faculty of Health Sciences

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Declaration

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Professor Alexander Cowell McFarlane
Principal Supervisor

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Abstract

Previous research has suggested that the deployment experience can influence alcohol consumption and that characteristic differences can mediate alcohol related behaviours. This study investigated the drivers, predictors and correlates of the course of alcohol use in relation to military operational service. Differences in alcohol consumption behaviours from pre- to post-deployment were assessed for 676 Australian Defence Force (ADF) personnel deployed on operational service within the Middle East Area of Operations (MEAO) using a prospective longitudinal research design. Personality and coping styles, mental health risks trauma exposure and motivations to consume alcohol were also measured.

One of the most prominent findings from this study is the influence that motivation to consume alcohol has on patterns of alcohol use. Interactions between motivations to consume alcohol, inherent personality characteristics and mental health measures were also found. This suggests that as well as being related to inherent characteristics and psychopathology, problematic use of alcohol is also a conscious choice.

This research highlights the complex matrix of factors that contribute to problematic alcohol use following deployment. It highlights the importance of evaluating motivations to consume alcohol as a key contributor in the development and subsequent assessment and identification of post-deployment alcohol misuse. Early identification is vital and interventions that address alcohol consumption motivations in addition to personality and coping factors could play a promising role in the prevention as well as treatment of post-deployment problematic alcohol use.

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Preamble

As a currently serving ADF member, I too have experienced my share of operational exposure having deployed on thirteen occasions to such places as Timor Leste, Pakistan, Cyprus, Iraq, Afghanistan and various other countries within the Middle East Area of Operations (MEAO) on numerous occasions over the course of my PhD candidature. These deployments have ranged in length from two weeks to seven months, often with minimal time in Australia to recuperate between deployments. As a military Psychologist, this extensive deployment experience has provided me with first-hand understanding and insight into the conditions facing our soldiers and with the challenges they may face on initially returning home to their family, friends and Australian way of life. My periods of high-tempo operational service (2006 – 2008 and 2009 – 2012) have been interspersed with employment in the demanding and under-resourced roles within the ADF garrison mental health service delivery, policy, training and command environments. Working with soldiers and commanders within Australia has provided me with greater exposure to the potential impacts of operational service in the periods of service directly following return to Australia and to the ongoing effects long after operational service has been completed. Currently, as the Commanding Officer of the Army School of Health I am gaining a more in-depth understanding of the role of the commander in assisting soldiers cope with the impacts of operational deployment in addition to the more general adjustment issues associated with service life.

Within my clinical role, I have developed a particular interest in the effects of problematic alcohol use within the ADF, particularly in returned service personnel and this led me to develop the ADF Outpatients Alcohol Treatment Program (OATP) which is a four-day intervention designed to address problematic drinking using best-practice treatment and intervention strategies. During the development and subsequent implementation of that program my interest in the effects of deployment on alcohol consumption increased and I questioned whether individual characteristics and motivations effect the course of problematic alcohol behaviours and the subsequent intervention and treatment of those behaviours. Together with my operational experiences and general observations of service life, these questions led to the desire to undertake this body of research and influenced the research questions addressed by my study.

My own extensive deployment history (14 deployments of varying duration and location) has provided a unique insight into the potential impacts of deployment on reintegration and adjustment post-deployment. However, these experiences also closely align me to the cohort under investigation and therefore some may perceive a potential conflict of interest which may give rise to unintended bias in the interpretation of results. However, my experience and role have also aided in progressing the permissions required to gain access to the study population and my intimate knowledge of the operational screening process and measures assisted in developing a study design and method that produced minimal impact on the study participants and their commanders. Furthermore, as an Army Psychologist I have facilitated the conduct of thousands of operational mental health screens including RtAPS, POPS and CIMHS, and I have provided counseling services to numerous returned veterans. This experience not only sparked the initial research concept through the collection of anecdotal evidence but also provided me with a unique insight into the telling of the soldiers' story through applied research.

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Chapter 1: Introduction

1.1 Preamble

Over the past two decades Australian Defence Force (ADF) personnel have participated in an increasing number of warlike, peacekeeping and humanitarian missions in diverse locations including Somalia, Rwanda, Timor Leste, Solomon Islands, Iraq, Pakistan, Sumatra, Afghanistan and Syria. Regardless of the type and purpose of operational deployment, they are physically and psychologically demanding and the Australian soldier has the potential to be exposed to a plethora of operational stressors and traumatic experiences (Rae, 1994). This chapter orients the reader to the psychological support provided to operationally deployed ADF servicemen and women including the ADF operational mental health screening continuum. Finally, this chapter provides an overview of the structure and content of the thesis.

1.2 The Nature of Australian Military Deployments

The Australian Government deploys ADF personnel on operations when the defence of Australia, or the defence of regional stability relevant to Australia's interest, dictates the requirement (Tan, 2005). During these operational deployments soldiers may be required to defend Australia's interests through direct exposure to combat. They also may be required to exercise restraint during operations, particularly peacekeeping and humanitarian missions (Litz, 1996; Shawcross, 2000); maintain law and order post conflict; ensure the delivery of aid and assist in other humanitarian tasks; maintain the safety of non-combatants; and assist in the provision and development of infrastructure (Field & Perito, 2000). At the same time they may also be required to enforce peace through disarmament, or to defend themselves against direct attack (Litz, Orsillo, Friedman, Ehlich, & Batres, 1997).

Research has shown that ADF military deployments can affect psychological health of deployed personnel. These effects have been found in deployments from the relatively benign to those that are more demanding and across the spectrum of operational activities, i.e., war fighting, peace enforcement, peacekeeping and humanitarian relief (Research and Technology Organistion, 2012). A regime of operational psychological screening has been introduced by the ADF in an attempt to identify personnel who may require psychological or other assistance during and post-deployment.

1.3 Developments in Psychological Support for ADF Deployments

Detrimental consequences of poor post-deployment adjustment include fatal accidents and suicides, alcohol misuse, somatic symptomatology and risk taking behaviour amongst personnel returning from deployment (Creamer et al., 2004; Ombudsman, 2004). Few military members, however, seek help for psychological problems of their own accord (Seedat, le Roux, & Stein, 2003). The increased level of risk of psychological injury associated with operational service and the reluctance of many deployed personnel to seek psychological assistance remains the primary impetus for the ADF to develop an effective psychological screening process for personnel returning from operations.

From as early as the late 1980's through to the mid 1990's, psychological briefing and / or mental health screening was administered to ADF personnel deployed on operations to Namibia (1989-1990), Cambodia (1991), Somalia (1993), and Rwanda (1994-1995). The support provided varied according to the initiatives and experience of the psychologist providing the support. By 1999, the need for a more structured and formalized approach to the provision of psychological support to all deployed ADF personnel was recognized including the introduction of pre-, during- and post-operational psychological support, including administering mental health screens and psychological interviews (Steele & Goodman, 2006).

Since that time, the processes have been reviewed, scrutinized, analysed and standardized including an evaluation of the entire ADF Mental Health Screening continuum currently underway. The current routine psychological support is provided to all deployed ADF personnel and comprises five key elements:

- Pre-deployment psychological preparation;
- In country psychological support during the deployment including Special Psychological Screening for personnel identified as being employed in “high-risk” employments;
- Return to Australia Psychological Screening (RtAPS) shortly before or immediately after the end of deployment;
- Post-Operation Psychological Screening (POPS) at 3 – 6 months post-deployment; and
- Follow-up psychological support if required.

The RtAPS process facilitates an individual’s return to non-operational life, helps identify members requiring assistance and provides important information on the psychological health of the deployed force. This information can be used to establish baselines for mental health surveillance of deployed ADF personnel and to identify gaps, review and improve mental health support processes. The primary purpose of the POPS is to enable monitoring of post-deployment adjustment and to provide screening for individuals who have not effectively reintegrated into their work, social and family lives and who may benefit from further assistance (Department of Defence, 2004). This is the system of care that existed at the time data collection for this research began and is the system that is still used in 2016.

This research leveraged off the RtAPS and POPS by using them as the vehicle to administer the surveys to as many soldiers as possible within the deployed setting. Use of the ADF operational screening measures, in conjunction with study specific instruments allowed the author to achieve the study aim to explore the influence of inherent personality and coping variables, psychological risk factors and motivation, on the course of alcohol behaviours across the deployment cycle.

1.4 Overview of Thesis.

This thesis is organized into 11 chapters. Chapter 2 reviews the pertinent literature and begins by outlining the various deployment-related stressors that may impact upon the health and well-being of military members, with a particular emphasis on alcohol-related behaviours. It then explores a plausible model within which to frame the exploration of changes in alcohol use following deployment-related experiences, before going on to investigate a number of possible variables which may moderate the use of alcohol post-deployment including individual coping styles, motivation to consume alcohol and personality factors. Chapter 2 concludes by outlining the study aims and research questions.

Chapter 3 outlines the research design, and gives descriptions of all the methods and procedure used in the research. Chapter 4 explores the issues relating to the screening of the research data and investigates the psychometric validation of the study instruments in order to determine the variables to be used in further analysis of the data.

Chapters 5 through to 10 investigate the research questions outlined in Chapter 2 while the eleventh and final chapter critically discusses limitations of the study before drawing together several key themes that were identified by this research. The concluding chapter also outlines a number of recommendations, addresses implications for any intervention programs and suggests potential areas for future research.

Chapter 2: Literature Review

The initial section of this review focuses on the literature relating to the impact of the deployment experience on service personnel. The literature relating to the Self Medication Hypothesis highlighting it as a plausible model within which to frame the exploration of changes in alcohol use following deployment-related experiences is then explored. Following sections review the literature that suggest possible variables which may moderate the use of alcohol post-deployment including individual coping styles, motivation to consume alcohol and personality factors. Finally, the limitations of existing literature and the subsequent methodological considerations are then explored prior to outlining the aims and research questions pertaining to this study.

2.1 Deployment Related Stress

Over the past two decades Australian Defence Force (ADF) personnel have participated in an increasing number of operational deployments across a range of war-like, peacekeeping and humanitarian missions. They have been tasked to maintain law and order post conflict; ensure the delivery of aid during humanitarian tasks; maintain the safety of non-combatants; and assist in the provision and development of infrastructure (Field & Perito, 2002). At the same time they have been required to operate within strict parameters dictated by the laws of a given armed conflict, particularly in relation to peacekeeping and humanitarian missions (Litz, 1996; Shawcross, 2000); enforce a peace through disarmament; or to defend themselves against direct attack (Litz et al., 1997).

The deployment experience is both complex and deeply individualistic. For instance many deployed personnel may not experience combat, and even those who do will react to these experiences in idiosyncratic ways. Furthermore, a deployment can be a positive experience (i.e., serving one’s country) or highly negative (i.e., losing a friend in combat) (Research and Technology Organistion, 2012).

Many stressors are associated with military life, including those related directly to the military culture and organization and those more specific to deployment (Hosek, Kavanagh, & Miller, 2006). Deployment stressors are both traumatic and non-traumatic in nature. They relate to the pressures, obstacles and challenges that confront military personnel during operations, including threat of death or injury to self or colleagues; fatigue; boredom; enemy fire; uncertainty about the nature of job requirements and individual responsibilities; sustained operational tempo; pressure to perform; physical stressors, such as severe climate, threat of exposure to contagious diseases or substances; leadership and communications concerns; and lack of relevant training (Castro & Adler, 1999; Day & Livingston, 2001; Hoge et al., 2004; Hosek et al., 2006; Kellet, 1982; Marlowe, 2000; Vogellar, Soeters, & Born, 1997).

Some of the most significant stressors reported by personnel on deployment are being away from home, lack of personal privacy, lack of time-off, disruption of educational goals, long work hours, challenging physical conditions, lack of sleep, marital/relationship problems and uncertain return or departure dates (Campbell, Ritzer, Valentine, & Gifford, 1998; Halverson, Bliese, Moore, & Castro, 1995). It has also been suggested that the most stressful periods for deployed personnel may be the pre-deployment and post-deployment stages (MacDonald et al., 1998) as they prepare for separation or readjust to life back home. Military rules and regulations, double standards, military hierarchy, leadership and separation from family (including time away from home), are also commonly reported by deployed personnel (Deans, 2002; Sinclair, 2005; Steele & Twomey, 2006).

While the size of Defence Forces in many developed countries has decreased, their operational tempo has increased (Castro & Adler, 1999) meaning that less personnel are deployed more frequently. Associated prolonged periods of elevated stress can have negative long term psychological and health outcomes. This only adds to the ambiguity associated with the various types of operational activities (such as peace-keeping operations), further increasing stress on military personnel (Litz, 1996; Marlowe, 2000; Wright, Marlowe, Barton, & Gifford, 1999).

From a military perspective, the negative effects of long-term exposure to stress are particularly important, because the experiences associated with deployment can be instrumental in the development of mental health disorders such as Post Traumatic Stress Disorder (PTSD), anxiety disorders and depression; as well as other negative stress reactions, such as extreme anger or mood swings and problematic substance use (Hosek et al., 2006). The next section explores the impact of deployments on mental health outcomes of Service personnel.

2.2 Impact of Deployment on Mental Health Outcomes

Veterans, especially those who have been exposed to combat operations, are at high risk of subsequently developing a mental health disorder post-deployment, such as an anxiety disorder, mood disorder, adjustment disorder, or alcohol use disorders (Bleier et al., 2011; Eisen et al., 2012; Fetzner, Abrams, & Asmundson, 2013; Hoge, Auchterloinie, & Milliken, 2006; Hoge et al., 2004; Jacobson et al., 2008; Lapierre, Schwegler, & Labauve, 2007; M. J. Larson et al., 2013; Milliken, Auchterloinie, & Hoge, 2007; Schultz, Glickman, & Eisen, 2014; Seal, Bertenthal, Miner, Sen, & Marmar, 2007; Seal et al., 2010). The prevalence of mental health disorders in the United States (US) Defence Force veterans is increasing (Milliken et al., 2007; Seal et al., 2011; Seal et al., 2010) with recent research estimating that approximately 13 – 20% of US Forces Iraq and Afghanistan veterans have, or will be diagnosed with PTSD in the future (Institute of Medicine, 2012). Unprecedented rates of depression and suicide are also expected (Harrell & Berglass, 2011; US Army, 2012). This suggestion was further supported by Cohen et al.,(2009) who reported that US personnel who had deployed to Iraq and Afghanistan, met the criteria for a variety of mental health disorders including PTSD (21.5%), depression (18.3%), adjustment disorder (11.1%), anxiety disorder (10.6%) and substance use disorder (8.4%). The US Millennium Cohort Study also found an increase of new onset depression following operational deployment (Wells et al., 2009) to Iraq and Afghanistan, in addition to an increase in alcohol misuse (Jacobson et al., 2008) and an increased risk of new-onset PTSD symptoms (Smith et al., 2008). Similarly, a study of United Kingdom (UK) Iraq and Afghanistan veterans found that approximately 17% of respondents meet the criteria for at least one psychological disorder (Mulligan et al., 2012).

In Australia, the 2010 ADF Mental Health Prevalence and Wellbeing Study (McFarlane, Hodson, Van Hooff, Verhagen, & Davies, 2011) found that military service in general can increase the risk of experiencing psychological distress. The researchers reported that the level of psychological distress as measured by the Kessler 10 (K10) (Kessler et al., 2002) for both deployed and non-deployed ADF members (mean = 15.4) was significantly higher than the mean score in an Australian general population comparison group (mean = 14.1) (Australian Bureau of Statistics, 2008). This was supported by a study of personnel deployed to the Solomon Islands, East Timor and /or Bougainville which demonstrated an increased risk of experiencing psychological distress (as measured by the K10) in comparison to a non-deployed comparison group (Bleier et al., 2011). A recent longitudinal prospective study of ADF personnel deployed to the MEAO also found that there was a statistically significant increase in psychological distress between pre- and post-deployment measurements (Davy et al., 2012; Lorimer, Davy, & Lawrence-Wood, 2012). However, both the pre- and post-deployment mean K10 scores were lower than the mean scores reported in both the 2010 ADF Mental Health Prevalence and Wellbeing Study (McFarlane, Hodson, Van Hooff, Verhagen, et al., 2011) and the Australian Bureau of Statistics 2007 National Survey of Mental Health and Well Being (Australian Bureau of Statistics, 2008).

It has also been suggested that depression is one of the more common mental health disorders reported by ADF personnel with the annual prevalence rate (6.4%) being roughly double that reported in the Australian general population, especially in males (McFarlane, Hodson, Van Hooff, & Davies, 2011; McFarlane, Hodson, Van Hooff, Verhagen, et al., 2011). However, the link between depression and deployment in ADF contemporary veterans is less clear with the Middle East Area of Operations (MEAO) Prospective Study (Davy et al., 2012) not finding an overall effect of deployment on the development of depressive symptoms, with only 15.8% of respondents reporting an increase in depressive symptoms between pre- to post-deployment.

The MEAO Prospective Health Study (Davy et al., 2012) did find an interaction between deployment and PTSD with an increase in PTSD symptom severity in 9.6% of respondents with the increase from pre-post-deployment symptom severity reaching significance. This is consistent with US research findings suggesting that deployments to Afghanistan and Iraq have been shown to be associated with PTSD symptoms (Cohen et al., 2009; Hoge et al., 2004; Kline et al., 2010; Maguen et al., 2009; Seal et al., 2007; Smith et al., 2008).

Even though differing levels of psychological morbidity have been found, research suggests that operational deployment can impact upon the mental health outcomes of veterans. The following section will explore the reported impacts of deployment on the post-deployment alcohol-related behaviours of veterans.

2.3 Impact of Deployment on Alcohol Misuse

One way in which some Defence veterans cope with psychological morbidity is through the use of alcohol. Alcohol misuse is of concern for both deployed and non-deployed military populations, as problematic consumption is insidious in its pervasive negative effects upon an individual’s health, social relationships and work performance. Similarly, it raises consequences of special concern for the ADF as an organization, in particular the hazards to operational efficiency and safety, morale and discipline, and to the standing of the ADF in the general community. While repeated alcohol misuse has been linked to alcohol dependence, not all high-risk drinkers subsequently develop an alcohol use disorder (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001).

Problematic substance use, particularly alcohol, in veteran populations has been well documented (Bremner, Southwick, Darnell, & Charney, 1996; Breslau, Davis, & Schultz, 2003; Davidson, Kudler, Saunders, & Smith, 1990; Department of Veterans Affairs, 2003a; Federman, Bray, & Kroutil, 2000; Jones & Fear, 2011; Kearney, Creamer, Marshall, & Goyne, 2005; Kulka et al., 1990; M. J. Larson et al., 2013; Litz et al., 1997; McFall, Mackay, & Donovan, 1992; McFarlane, 1998a; McFarlane & Papay, 1992; Milliken et al., 2007; Ruzek, 2003; Ward, 1997; Wilk et al., 2010). Studies of Vietnam veterans have revealed that problematic alcohol use is the most commonly reported disorder. Death from cirrhosis of the liver has been found to be three times higher in these Vietnam veterans versus non-veterans, purportedly attributable to excess alcohol consumption (Department of Veterans Affairs, 2003a, 2005b). A 2003 Australian Gulf War Veterans' Health Study (Monash University, 2003) revealed an increased risk of substance use disorder (primarily alcohol) for deployed members of up to one-and-a-half times that of defence personnel who were not deployed to the Gulf. The risk of alcohol disorder was further exacerbated if the veterans had been exposed to a high number of potential psychological stressors during their military service (Mckenzie et al., 2009).

The association between military deployment and alcohol use has also been investigated in the more contemporary deployment cohorts. For example, a large-scale cohort study investigating US service personnel pre- and post-deployment (Jacobson et al., 2008), found that 8.8% of the cohort reported a new-onset of heavy weekly drinking post-deployment. Other longitudinal studies have also reported the onset or increased rates of alcohol consumption post-deployment in a UK sample (Hooper et al., 2008). An investigation into the impact of various aspects of deployment on problematic alcohol use in US Air Force personnel by Spera, Thomas, Barlas, Szoc, and Cambridge (2011) found that a higher frequency of deployment and a greater total cumulative length of time deployed were both associated with an increased likelihood of problem drinking. The odds of consuming alcohol at problematic levels increased by 14% with each additional deployment and by 23% for each additional year spent deployed (Spera et al., 2011).

Yet comparisons between deployed personnel and general populations produce mixed results. While rates of alcohol use disorder for both US and UK contemporary veterans deployed to Iraq and Afghanistan were higher than in their respective general populations (Bray & Hourani, 2007; Bray et al., 2010; M. J. Larson, Wooten, Adams, & Merrick, 2012), the 2010 Australian Defence Force Mental Health Prevalence and Wellbeing study found that rates of any alcohol disorders in the ADF were lower than the general Australian population (12 month prevalence: males 5.6%, females 2.2% vs. males 8.8%, females 5.1% (McFarlane, Hodson, Van Hooff, & Davies, 2011). A 2006 overview of findings from the RtAPS and POPS data for ADF personnel deployed to Operation Catalyst in the Middle East Area of Operations (MEAO) over the period Jan 03 – Jul 05 (Steele & Twomey, 2006) highlighted that although the majority of personnel consumed alcohol within the low-risk levels, there was a high proportion of Australian Regular Army personnel who reported AUDIT scores in excess of low risk guidelines, with many of these consuming alcohol at hazardous and harmful levels. This study did not measure pre-deployment alcohol use and was therefore unable to assess whether the deployment experience influenced post-deployment alcohol use.

The MEAO Prospective Health study (Davy et al., 2012) did assess pre-deployment drinking behaviours and found that the overall change in mean scores from pre- (M = 6.7) to post-deployment (M = 6.8) was not statistically significant. The number of personnel falling within the low-risk drinking range at post-deployment may have diluted these results tempering the significance of those who did report increased alcohol use. However, the study did find that 14.4% of respondents reported an increase in the level of alcohol consumption between pre- and post-deployment. A number of significant associations between a range of deployment related factors and increased alcohol use at post-deployment including deployment length, combat role, and type and number of deployment related traumatic experiences, were also identified (Davy et al., 2012). Additional demographic and military characteristics which have been found to moderate the association between deployment and increased alcohol misuse following deployment include age, marital status, lower rank and adverse childhood experiences (Clarke-Walper, Riviere, & Wilk, 2014; Fear et al., 2007; Lande, Marin, Chang, & Lande, 2008).

Relatively few studies have investigated the effect of deployment on binge-drinking behaviours; however, those that have, found that binge-drinking may be a better discriminator of possible deployment related problem drinking than measures of frequency of alcohol consumption (Mills, Tesson, Ross, & Peters, 2006). In military studies, rates of binge drinking appear to increase both prior to (Duma, Reger, Canning, McNeil, & Gahm, 2010) and immediately after deployment (Ames, Cunradi, Moore, & Stern, 2007). A retrospective study of approximately 16% of the US veterans who deployed to Afghanistan between 2008 – 2011 reported binge-drinking (6+ drinks on one occasion) prior to deployment, while 25.6% of the respondents returning from a combat deployment in the past year reported binge drinking at least weekly (Adams, Larson, Corrigan, Horgan, & Williams, 2012; M. J. Larson et al., 2013).

Researchers have also become more aware of the relationships between exposure to deployment related stressors (including trauma events), mental health outcomes and problematic alcohol use (Bremner et al., 1996; Davidson et al., 1990; McFall et al., 1992; Ouimette & Brown, 2003; Ouimette, Moos, & Brown, 2003; Ruzek, 2003). Much of this research has focused on the associations between problematic alcohol use and trauma symptoms; however, it is also well recognised that problematic alcohol use is highly comorbid with other psychiatric disorders (Chilcoat & Breslau, 1998a; Mills et al., 2006; Wessely et al., 2007). For example, veterans who are suffering a deployment- related mental health disorder have been found to be more likely to misuse alcohol than those who are psychologically well (Bremner et al., 1996; Wessely et al., 2007).

Comorbid disorders have also been found in a number of studies investigating civilian populations who have experienced stressful life events including exposure to traumatic incidents (Cottler, Compton, Mager, Spitznagel, & Janca, 1992; Dansky, Byrne, & Brady, 1999; Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997). Ouimette et al. (2003) reported that approximately one third of patients with a substance use disorder have a comorbid PTSD diagnosis and an Australian national survey of mental health and well-being found a substance use disorder in 24% of individuals reporting a PTSD diagnosis (Mills et al., 2006). Similarly, the US Epidemiological Catchment Area (ECA) study (Helzer, Robins, & McEvoy, 1987) found individuals reporting experiencing trauma symptoms were more likely to participate in problematic alcohol use. Furthermore, substance users were also more likely to report exposure to traumatic events than non-users. However, respondents who reported using alcohol in problematic ways were not found to be significantly more likely than non-users to report a trauma. It was suggested that the results demonstrated that the onset of problematic alcohol use preceded the onset of trauma related symptoms, suggesting that problematic alcohol related behaviours may predispose people to trauma exposure or increase vulnerability to PTSD after such exposure (Cottler et al., 1992; Davidson et al., 1990). Problematic substance use was also found to be significantly associated with reports of trauma symptoms in a cohort of Australian Fire Fighters following a bush-fire disaster response (McFarlane, 1998b; McFarlane & Papay, 1992). The authors noted that respondents who developed trauma symptoms reported that they were likely to either increase or decrease their drinking in the 6-month period prior to a diagnosis of PTSD; however, this was not statistically significant (McFarlane, 1998b).

Several studies of Vietnam veterans have demonstrated high rates of comorbidity between trauma symptoms and problematic alcohol use (Mellman, Randolph, Brawman-Mintzer, Flores, & Milanes, 1992). Roszell, McFall, and Malas (1991) found that problematic alcohol use was the second most prevalent comorbid disorder with PTSD occurring in 33% of cases. The Vietnam Veterans Adjustment Study also revealed 73% of veterans reporting a PTSD diagnosis also reported problematic alcohol use (Kulka et al., 1990).

A number of studies examining more contemporary veterans (Iraq / Afghanistan) have found evidence to suggest that symptoms of PTSD and depression that exist pre- or post-deployment may be associated with post-deployment alcohol use patterns and dependence (Kline et al., 2014; Marshall et al., 2012). While Kline et al. (2014) found no effect of pre-deployment alcohol use on subsequent post-deployment trauma symptom severity, they did find that baseline trauma symptom severity significantly increased the risk of problematic alcohol use post-deployment. Furthermore, the risk of developing an alcohol use disorder post-deployment increased as the number of exposures to combat increased after controlling for pre-deployment trauma symptom severity. Conversely, Marshall et al. (2012) found that pre-deployment reports of depression and / or PTSD symptoms were not found to be predictive of post-deployment alcohol misuse. Soldiers who reported post-deployment depression and / or PTSD, however, were more likely to screen positive for an increased risk of alcohol-related problems.

2.3.1 Section summary. In summary, the literature has shown that there is some evidence to suggest an association between deployment experienced and post-deployment alcohol use. However, there is significant variability in relation to the strength of this association. Findings are, however, restricted by both the study design and types of variables considered. Most studies, for example, have focused on variables that were measured following deployment and there has been no comprehensive assessment of the many aspects of operational service that might moderate the relationship between operational exposure and increases in alcohol consumption. Understanding these relationships could be important for the development of targeted interventions in the future (Federman et al., 2000; Trautmann et al., 2015).

Although the drivers of alcohol misuse and alcohol-related behaviours among service personnel in general and ADF veterans in particular are not well defined or understood (Bray, Brown, & Williams, 2013), a review of the research revealed that deployment related factors such as trauma exposure may increase the incidence of mental health disorders including PTSD, depression, anxiety and alcohol misuse (Jacobson et al., 2008). Research has also established a statistical relationship between the presence of problematic alcohol use and varying mental health symptoms including trauma symptoms (Stewart, 1996). Nevertheless, there are mixed findings about the temporality of disorder primacy and little is known about the causal pathways that might explain these associations (Breslau et al., 2003; Conrod, Castellanos-Rya, & Mackie, 2011; Conrod & Stewart, 2003; Rachman, 1991). The available studies do support the assumption that aspects of the deployment experience impact the level and frequency of alcohol use in some way.

While the literature shows that there is a change in alcohol use following military deployment, what is not known is whether this can be expected in this ADF sample. However, given that this population is representative of populations used in prior research (Jacobson et al., 2008; Stewart, 1996), it is anticipated that this study will show an increase in alcohol use following deployment. Hence research question one will investigate whether alcohol use changes over the course of a deployment from pre-deployment to six months post-deployment.

Research Question One. *Does alcohol use change over time following operational deployment (from pre-deployment to six months post-deployment)?*

The next section explores the Self-Medication Hypothesis as a potential explanatory framework within which to understand the associations between the deployment experience and problematic alcohol use.

2.4 Self-Medication Hypothesis

A number of potential causal relationships and their functional associations may underlie comorbid mental health disorders and alcohol misuse (Stewart, Pihl, Conrad, & Dongier, 1998). One such explanation advocates a ‘Susceptibility Hypothesis’ whereby substance users become more susceptible to experiencing mental health symptoms following a significant stressor or trauma exposure. For example, the development of an alcohol use disorder could be causally related to the development of PTSD, in that PTSD may be more likely to arise from trauma as a consequence of heightened physiological arousal from repeated alcohol / drug withdrawal (Conrod & Stewart, 2003). A second explanation purports a ‘High Risk Hypothesis’ relating specifically to trauma exposure, where alcohol misuse supports high risk behaviours (i.e., behaviours related to drug access) that increase an individual’s possible exposure to trauma by increasing the likelihood of exposure to certain types of trauma (McFarlane, 1998a). By far the most research and generalized theory, however, is the Self-Medication Hypothesis (SMH) or Stress-Reduction model of alcohol misuse (Chilcoat & Breslau, 1998a). In this theory, alcohol or other psycho-active substances may be used by individuals in an attempt to relieve psychological distress (Khantzian, 1985, 1997; Stewart, 1996) ultimately culminating in associated substance dependence (Brown & Wolfe, 1994).

Whilst it is recognised that there are possibly multiple causal pathways associated with problematic alcohol use, the SMH provides a plausible explanation for substance use being used as a maladaptive coping strategy (Chilcoat & Breslau, 1998b). The model has received strong support in the literature in a variety of populations and in relation to a broad spectrum of mental health disorders. Studies have found that participation in problematic alcohol use significantly increased for participants with a history of mental health diagnoses such as depression, anxiety and PTSD (Bremner et al., 1996; Chilcoat & Breslau, 1998a; Crum et al., 2013; Stewart et al., 1998; Tomlinson, Tate, Anderson, McCarthy, & Brown, 2006; Weiss, Griffin, & Mirin, 1992). Support for the SMH has also been found in studies of combat veterans which have found that the level of alcohol impairment was positively associated with the severity of trauma symptoms (Bremner et al., 1996; McFall et al., 1992).

According to the SMH, substance misuse begins as a partially successful attempt to alleviate painful feelings and states of distress. It is thought that the altering of mental state through self-medication may provide some cognitive respite for a distressed individual (McFarlane, 1998a). This response to the symptoms of substance use depends on the underlying assumption that the substances chosen for self-medication are not randomly chosen; but are instead selected based on the specific effects on differing negative mood states (Mueser, Goodman, Trumbetta, & Rosenberg, 1998). In trauma sufferers, the self-gratifying aspects of a particular substance may play a part in the development of comorbidity as the euphoriant effects of alcohol or other drugs may partially counter the emotional numbing experienced by many individuals who have experienced trauma (Kosten & Krystal, 1988). Within the SMH there is some controversy as to whether the positive impact of drug-induced euphoria is critical to the development of comorbidity, or whether the relief from distress plays the central role in the reinforcement of the substance use (McFarlane, 1998a).

In the case of many types of anxiety disorders, sufferers have reported a variety of reasons for abusing or misusing drugs and alcohol such as: 1) a way to ‘block out’ intrusive thoughts and images of a traumatic experience or anxiety provoking event (Forbes & Creamer, 2003); 2) a coping mechanism to regulate negative mood states and affect (Kilpatrick et al., 1997), including anger, depression and anxiety (Frank, Turner, Stewart, Jacob, & West, 1981); or 3) a way to reduce arousal and to improve sleep (Keane & Wolfe, 1990; Nishith, Resick, & Mueser, 2001). Consistent with the SMH, many comorbid patients receiving treatment for a substance misuse reported feeling that their substance misuse worsened when their trauma and anxiety symptoms increased in severity and that the onset and severity of the substance misuse paralleled the onset and escalation of trauma or anxiety symptoms.

Brown, Stout and Gannon-Rowley (1998) studied patients who reported experiencing both PTSD and problematic alcohol use, and who were receiving treatment for their alcohol use. They found that patients perceived their two disorders as functionally related; that is, they felt that when one condition was more or less severe, so was the other, which is consistent with idea of ‘Gradient of Effect’ (Chilcoat & Breslau, 1998a, 1998b). This criterion contends that if a causal relationship exists, the effect on the causal outcome should be greater as the level of exposure to a causal agent increases. If a secondary mental health disorder and alcohol use disorder are causally related, then as levels of symptoms of one disorder increase, so should levels of symptoms of the second disorder (Conrod & Stewart, 2003).

Another interpretation of the SMH focuses on the dampening of intrusive memories rather than symptoms related to hyper-arousal. A variety of substances exert significant impairments on human memory (Lister, Gorenstein, Risher-Flowers, Weingartner, & Eckardt, 1991) and, therefore memory impairments might prove rewarding for sufferers if the impairment results in dampening of anxiety provoking or distressing memories. Evidence suggests that people who report “drinking to forget” exhibit significant forgetting of emotionally charged material if the initial coding of a memory is followed by the consumption of alcohol (Stewart, 1996; Stewart, Morris, Mellings, & Komar, 2006).

This said, the relationship between a comorbid mental health disorder and substance misuse may not necessarily involve causality in terms of one disorder leading to the initial development of the other (Conrod & Stewart, 2003). They could, instead, relate purely to symptom maintenance. For instance, once comorbidity is developed via the process of self-medication (mental health disorder preceding substance use), the substance use could maintain or prolong the symptoms by interfering with habituation to the trauma in the case of

PTSD. Another possibility is that both of these processes are operating in a cyclic manner (see Stewart, 1996). In this hypothesis, substances are initially used to alter distressing symptoms which can lead to dependence. This in turn creates unpleasant physiological arousal resulting from substance withdrawal which may exacerbate the disordered symptoms, contributing to a relapse of substance use. Attempts to reduce alcohol or other drug use may temporarily increase the distressing mental health symptoms, leading to a cyclic process that encourages relapse and continued substance use (Conrod & Stewart, 2003; Kushner, Abrams, & Borchardt, 2000a, 2000b; Stewart & Conrod, 2003).

Overall, a fairly consistent relationship has been shown between the experience of psychological distress (e.g., hyper-arousal symptoms) and the severity of substance misuse. Reported findings support the SMH model, suggesting that distressing symptoms may motivate sufferers to misuse alcohol in an attempt to self-medicate. It has been suggested that self-medication could involve attempts to aid sleep, reduce irritability, reduce concentration difficulties, reduce hyper-vigilance, or to control an excessive startle response (LaCoursiere, Godfrey, & Ruby, 1980; Stewart, 1996). However, findings are also consistent with suggestions that the association instead might reflect chronic heavy use of alcohol, or other drugs that ultimately exacerbates symptom severity over the longer term (Kolb, 1985; LaCoursiere et al., 1980). A further suggestion is that self-medication may also serve to maintain high levels of emotional numbing symptoms by preventing or delaying a processing of stressful or traumatic experiences (Stewart, 1996).

2.4.1 Section summary. The stress-reduction or self-medication model remains the prevailing view explaining alcohol related behaviours post-deployment, in that stressful events may trigger an increase in alcohol consumption as a means of coping with stress (self-medicating) and may subsequently manifest into an alcohol use disorder (Cooper, Russell, & Frone, 1990; Crum et al., 2013; Hasking, Lyvers, & Carlopio, 2011; North, Ringwalt, Downs, Derzon, & Galvin, 2011). Although research suggests that military veterans use alcohol to help cope with stress and trauma symptoms (Marshall et al., 2012), the self-medication explanation is not undisputed. Some research has suggested that there are in fact three other possible courses of alcohol related behaviour post-deployment: an increase in alcohol consumption, a decrease in alcohol consumption and a return to pre-deployment alcohol consumption (stay the same) (Russell et al., 2014; Trautmann et al., 2015).

Aspects of the deployment experience or an individual's reaction or perception of these experiences, may impact the level and frequency of substance use in some way. Just what these factors may be are still under investigation and not as yet empirically or definitively defined. Consequently, there has been significant interest in examining vulnerability and protective factors that are associated with mental health concerns and problematic alcohol use post-deployment. The following section investigates a number of possible variables which may moderate the use of alcohol post-deployment including individual coping styles, motivation to consume alcohol and personality factors.

2.5 Individual Differences Moderating Alcohol Use

While there is evidence to suggest that deployment can influence alcohol consumption, it is also evident that individual differences can mediate alcohol related behaviours. However, the mediators of alcohol misuse and alcohol-related risk behaviours in ADF member post-deployment are not yet well understood (Bray et al., 2013). One factor that may provide a moderating effect on alcohol use post-deployment is an individual's defensive coping style.

2.5.1 Coping and the use of Defensive coping styles. Coping has been described as the behavioural and cognitive methods used to balance and manage demands and resources and is acknowledged to be a dynamic process (Norwood & Ulrsano, 1997). Coping has also been defined as the set of skills or defense mechanisms that are used to manage demands which challenge an individual's perceived capacity to cope (Folkman & Lazarus, 1986).

Defense mechanisms are a psychoanalytic concept that are seen as an indicator of how an individual will deal with conflict and anxiety, whether the anxiety arises from internal or external conflicts or stressors (Andrews, Pollock, & Stewart, 1989; Blaya et al., 2004; Vaillant, 1994). They are generally perceived as being involuntary cognitive operations that serve to modify the conscious experience of thought, feeling and emotion following changes in the internal and external environments (Andrews et al., 1989; Cramer, 2003; Evren, Ozcetinkaya, et al., 2012). In other words, habitually used unconscious defense mechanisms are designed to maintain homeostasis and will impact on the strategies used to defend against stress (Bond, 1986; Brennan, Andrews, Morris-Yates, & Pollock, 1990; Cramer, 2003; Evren, Cagil, et al., 2012; Evren, Ozcetinkaya, et al., 2012; Laaksonen, Sirkia, Knekt, & Lindfors, 2014). The improper use of these defense mechanisms may cause disorder in the conscious experience and prevent suitable / adaptive coping responses (Dakhili, Manavipour, & Golshani, 2013). Conversely, adaptive defense mechanisms may provide a protective capacity (Corruble, Bronnec, Falissard, & Hardy, 2004). Overall, this suggests that differences in defensive coping styles may ameliorate the impact of stressors on an individual's psychological well-being and adjustment.

Research has investigated numerous defense mechanisms which have been categorised into three defense styles (Andrews, Singh, & Bond, 1993). The three styles are the mature, immature and neurotic defensive coping styles. The mature style mechanisms are those normal, efficient and collaborative methods of coping and can include humour and suppression. The immature style mechanisms are unreasonable and inefficient methods of coping and include projection, denial, distortion, dissociation, passive aggression behaviours and isolation. The neurotic style mechanisms are similar to those of the immature style and can include idealization and intellectualization (Andrews et al., 1993; Dakhili et al., 2013). In support of this delineation of styles, relationships between adaptive coping strategies and mature defenses, as well as relationships between maladaptive coping strategies and immature defenses have been found (Evren, Ozcetinkaya, et al., 2012).

For example, coping behaviours, such as denial or disengagement and venting of emotions have been found to be associated with an increase in self-reported mental health problems (Day & Livingston, 2001). Scores on a mature style coping measure (including humour and sublimation) have been shown to be negatively correlated to depression intensity (Corruble et al., 2004) with the researchers suggesting that psychotherapeutic techniques may be developed to manage depressed patients through the reinforcement of those defense mechanisms which are negatively correlated with depression. Support for the influence of defensive coping style has also been found in research which has found that depressed patients with recent suicide attempts scored higher on immature coping style (Apter et al., 1989; Corruble et al., 2004; Corruble et al., 2003). Similar results have also been found for individuals with personality (Isometsa, Henriksson, & Heikkinen, 1996; Mulder, Joyce, Sullivan, Bulik, & Carter, 1999).

Defensive coping style has also been found to be correlated with maladaptive substance use (Evren, Ozcetinkaya, et al., 2012). For example, substance dependent individuals have been found to use immature defense mechanisms such as acting out and denial more often than non-substance abusers with the use of immature defenses being positively correlated with dependence severity, increased alcohol use, dissociative experiences and childhood trauma experiences (Evren, Cagil, et al., 2012; Moussas, Dandouti, Botsis, & Lykouras, 2006; Taskent, Karadag, Topcuoglu, Akduman, & Evren, 2011). Consistent with the SMH, these results suggest that individuals who are unable to achieve adaptive outcomes following a stressful situation may consume alcohol as a predominant way of coping.

Some coping behaviours, such as denial or disengagement and venting of emotions were found to be associated with an increase in self-reported mental health problems (Day &

Livingston, 2001). Day and Livingston (2001) suggested that people are able to adapt to acute or potentially traumatic stress and continue to function effectively, provided they do not use maladaptive coping strategies. Avoidant type and self-control strategies did not improve coping but rather significantly increased distress (Violanti, 1992). The perception of control is also likely to be important in determining long-term outcomes. Perceived locus of control can mediate the effects of stressors (Brown, Mulhern, & Joseph, 2003). Consequently, changing the perception of control (perhaps by changing the individual's definition of control), could influence long term outcomes.

A number of studies have highlighted a gap in the literature pertaining to specific investigations of the interrelations between coping styles and co-morbid disorders or symptoms such as problematic alcohol use, in relation to operational stress and trauma related symptoms (Bray, Fairbank, & Marsden, 1999; Breslau, Chilcoat, Kessler, & Davis, 1999; Breslau et al., 2003; Breslau, Lucia, & Davis, 2004; Federman et al., 2000). However, the investigations outlined within this section have, however, confirmed the importance of defensive coping in the genesis of neurotic symptoms, in the general population (Andrews et al., 1989).

2.5.2 Personality and alcohol consumption behaviour. There is also some evidence that suggests that personality variables may play an important role in the development, course and severity of a range of mental health presentations including substance use disorders (Grana, Munoz, & Navas, 2009; Jackson & Sher, 2003; Kornor & Nordvik, 2007; Martin & Sher, 1994; McCormick, Dowd, Quirk, & Zegarra, 1998; Sher, Bartholow, & Wood, 2000). One model that is used to assess these personality variables is the Five-Factor (or Big-Five) model of personality and posits that these five factors explain a significant portion of the variance in individual personality (McCrae & Costa, 1997). The five personality factors central to the model are extraversion, agreeableness, conscientiousness, neuroticism (also referred to as emotional stability) and openness to experience. Some of the descriptors that have been used to characterise these factors include: 1) extraversion: talkative, assertive, energetic, 2) agreeableness: good-natured, cooperative, trustful, 3) conscientiousness: orderly, responsible, dependable; 4) neuroticism: excitable, easily upset, anxious and 5) openness to experience: intellectual, imaginative, independent-minded (John & Srivastava, 1999). Personality constructs explored in other personality models and research usually correlate highly with one or more of these five factors. For example, sensation seeking and impulsivity have been found to correlate negatively with conscientiousness (Hair & Hampson, 2006; Zuckerman, Kuhlman, Joireman, Taeta, & Kraft, 1993). Researchers have developed various scales to measure the five personality factors, including the short-form versions such as the Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003).

Several studies have shown the adverse influence of low conscientiousness on alcohol and other substance related behaviours, suggesting a lack of behavioural control, increased impulsiveness and engagement in risky behaviours (Bogg & Roberts, 2004; Turiano, Whiteman, Hampson, Roberts, & Mroczek, 2012). Further to this, there is a growing body of research investigating the association between the Big Five personality domains and health related behaviours that have found links between neuroticism / emotional stability, conscientiousness and agreeableness and problematic alcohol use. For example, Booth-Kewley and Vickers (1994) found that conscientiousness was a strong predictor of health behaviour and low agreeableness was linked to risk taking behaviour. Similarly, Lemos-Giraldez and Fidalgo-Aliste (1998) found a significant relationship between conscientiousness, agreeableness and current alcohol consumption in a university population and Martin and Sher (1994) showed that neuroticism, low conscientiousness and low agreeableness were also associated with problematic alcohol use.

Extraversion has been shown to be one of the most relevant personality characteristic in adolescent alcohol use (Lac & Donaldson, 2016; Pilatti, Godoy, Brussino, & Pautassi, 2013); however, a further study has found that different personality characteristics are associated with different types of alcohol consumption behaviours (Ibanez et al., 2015). For example, in a study investigating the direct, mediated and moderated effects of personality on the development of adolescent alcohol use, Ibanez et al. (2015) found that increased extraversion, low conscientiousness and low openness were associated with weekend alcohol use (binge); low agreeableness was related to weekday use; with low agreeableness, and extraversion being directly associated with the development of alcohol-related problems.

Lending further support, meta-analyses attempting to quantify the relationship between the Five-factor model of personality and alcohol use have established the relevance of low conscientiousness on the use and misuse of alcohol, and have also found that low agreeableness and high neuroticism are related to alcohol related problems and pathological alcohol use, with the effect more profound in a clinical substance use disordered population(Malouff, Thorsteinsson, Rooke, & Schutte, 2007). More recently, Kotov, Gamez, Schmidt, and Watson (2010) conducted a meta-analyses of 175 studies published from 1980 – 2007 that investigated the associations between the Big Five personality traits and specific depressive, anxiety and substance use disorders in adults. This meta-analysis demonstrated a particularly distinct profile with strong links between problematic substance use and high neuroticism and low conscientiousness. It has also been suggested that personality factors may partially account for the relationship between known alcohol consumption risk factors (e.g. internalizing and externalizing symptoms) and problematic alcohol use (Davis, Cohen, Davids, & Rabindranath, 2015; Kotov et al., 2010). Some studies have even indicated that personality factors may mediate the relationship between genetic factors and substance misuse (Laucht, Becker, Blomeyer, & Schmidt, 2007).

There is not universal agreement in the literature as to the influence and direction of influence of personality variables on alcohol consumption. For example in a recent study which evaluated associations and the predictive value of personality traits among alcohol-dependent individuals, Donadon and Osorio (2016) found that extraversion emerged as a negative predictor of alcohol dependence. The authors conjectured that individuals with lower indicators of extraversion may be more introspective or shy, which may lead to high-risk behaviours including alcohol misuse. They also found that neuroticism (emotional stability) was negatively associated with alcohol use which is inconsistent with other research which indicate that behaviours typically associated with neuroticism such as impulsivity, anger and negative emotions would be positively correlated with increased alcohol use (Donadon & Osorio, 2016). This study also found a positive correlation between openness and the length of time that alcohol was consumed.

Personality traits have also been suggested to interact with the development and experience of mental health concerns in general and problematic alcohol use in military veterans (Borja, Callahan, & Rambo, 2009; Caska & Renshaw, 2013; Miller, Vogt, Mozley, Kaloupek, & Keane, 2006). A longitudinal study utilizing a veteran population found strong associations between neuroticism, PTSD severity and alcohol misuse (Kehle et al., 2012). In contrast, a similar study using a similar Iraq War veteran population found that while neuroticism predicted PTSD and depressive symptoms at the pre- and post-deployment time-points, alcohol misuse was not significantly predicted by any of the Big-Five personality variables (James, Van Kampen, Miller, & Engdahl, 2013).

The importance of understanding the influence of personality traits on alcohol consumption behaviours has been discussed in relation to alcohol prevention and treatment approaches (O'Leary-Barrett, Castellanos-Ryan, Pihl, & Conrod, 2016). Personality-targeted interventions have been demonstrated to be efficacious in a number of studies (Conrod et al., 2011; Conrod et al., 2013; Newton et al., 2016; O'Leary-Barrett et al., 2016). Whilst it is evident from the literature that personality is associated with alcohol consumption behaviours, there is inconsistency in the findings leading to confusion as to the influence of specific personality characteristics on the subsequent development of alcohol misuse.

2.5.3 Summary. While the literature has shown that a range of characteristics such as personality, psychological distress, trauma exposure and defensive coping style are important as explanatory variables for the patterns of alcohol use, it is not known whether these characteristics are important predictors in determining post-deployment alcohol use behaviours. Furthermore, a range of events that occur during the course of deployment may have a variable outcome on individuals in terms of resilience, traumatic growth or the development of psychopathology. What is not known is how deployment related factors interact with the above variables in the determination of the course of alcohol use. The literature also shows that individuals can recover from adversity when provided with mental health support and that the success of post-deployment reintegration can be measures by changes in mental health status (as measured by the Kessler 10, Post-Traumatic Stress Disorder Check List-Civilian and the Traumatic Stress Exposure Scale-Revised) across time. What is not known is whether success in reintegration impacts on the patterns of post-deployment alcohol consumption.

According to the SMH (Chilcoat & Breslau, 1998a) and prior research findings (Conrod & Stewart, 2003; Bremner et al., 1996, Crum et al., 2013) it would be anticipated that this research should show that individuals who have experienced stressful or traumatic within deployment events that impact on mental health outcomes may experience poorer post-deployment reintegration outcomes resulting in an increase in alcohol consumption following deployment. The use of immature coping styles, lower levels of conscientiousness, emotional stability and agreeableness are anticipated to be associated with poorer mental health outcomes and increased use of maladaptive coping including alcohol use following deployment (Booth-Kewley & Vickers, 1994; James et al., 2013 Kehle et al., 2012). Hence the next three research questions investigated the effect and interactions of pre-, during- and post-deployment events, mental health correlates (K10, PCL-C, TSES-R) and individual characteristics (personality, coping style) on the course of alcohol consumption behaviours from pre-to post-deployment.

Research Question Two. *Can pre-deployment characteristics be used to predict the course of alcohol consumption from pre- to post-deployment?*

Research Question Three. *Can within deployment events and mental health outcomes be used to predict the patterns of alcohol consumption from pre- to post-deployment?*

Research Question Four. *Can post-deployment reintegration as measured by changes in mental health outcomes and trauma reaction be used to predict the patterns of alcohol consumption pre- to post-deployment?*

2.6 Motivation to consume alcohol.

Substance use behaviours look very different across individuals. Some people may differ in the frequency of their alcohol use whilst others may differ in the amount of alcohol that they consume on any given situation (severity). From a biodispositional perspective, personality traits are considered a distal, non-specific variables that would influence alcohol use through more proximal and specific variables, such as motivation to consume alcohol (Ibanez et al., 2015; Ibanez et al., 2010). Therefore, individuals can also differ regarding their motivations to consume alcohol. Alcohol consumption (drinking) motives have been identified as important components in understanding why individuals chose to consume alcohol (Carey & Correia, 1997; Cooper, 1994; Cooper, Russell, Skinner, & Windle, 1992; Cox & Klinger, 1988; Kuntsche, Knibbe, Gmel, & Engels, 2005, 2006a).

2.6.1 Models of alcohol consumption motivation. Motivational models of alcohol consumption have hypothesized that individuals choose to consume alcohol in order to achieve a desired outcome (Cox & Klinger, 1988). These models posit that an individual chooses to drink as a function of the subsequent impact on affect, and whether this impact outweighs the consequences of not consuming alcohol (Piasecki et al., 2014). Two related but distinguishable psychological pathways have been postured to explain the process (Molnar, Sadava, DeCourville, & Perrier, 2010). The first of these pathways relates to obtaining an external social outcome: drinking to socialize or to avoid social rejection (Celantino & McQueen, 1978; Cox & Klinger, 1988; Read, Wood, Kahler, Maddock, & Palfai, 2003). The second pathway focuses on internal states or affective factors: drinking to enhance positive affect and drinking to cope by numbing negative emotional states (Cooper, Frone, Russell, & Mudar, 1995; Crutzen, Kuntsche, & Schelleman-Offermans, 2013; Doyle, Donovan, & Simpson, 2011).

Two dimensions may underlie the classification of drinking motives: valence (positive or negative reinforcement) and the source (internal or external) (Cooper, 1994). Crossing these two dimensions results in four drinking motive categories: enhancement (internal, positive), social (external, positive), coping (internal, negative) and conformity (external, negative).

2.6.2 Drinking to cope and mental health issues. It is generally assumed that drinking to cope is associated with negative emotional states including social anxiety and depression and is distinct from social drinking motivations (Gratzer et al., 2004; Jackson & Sher, 2003; Stewart et al., 2006). Drinking to cope as a way to manage negative affect is concerning as it is likely to exacerbate the contributing problems because the cognitive discrepancies which foster negative affect have not been adequately addressed which in turn may lead to alcohol dependence and habitual misuse in the long-term. This premise has been supported in longitudinal studies using adult samples that have shown that coping motives predispose alcohol dependence and misuse (Beseler, Aharonovich, Keyes, & Hasin, 2008; Doyle et al., 2011; Holahan, Moos, Holahan, Cronkite, & Randall, 2001).

Crutzen et al. (2013) also investigated the relationship between drinking motives and drinking behaviour over time. They found that coping motives at Time 1 were positively associated with the number of drinks consumed on the heaviest drinking day during the last week at Time 2. Enhancement motives were also positively associated with the number of drinking days in the past week at Time 2. Enhancement motives and coping motives were found to be interlinked, in that enhancement motives at Time 1, were positively associated with coping motives at Time 2 and vice versa. The authors posited that an individual may drink to cope in order to change their emotional state from negative to neutral. Similarly, in the same drinking session they may also be internally motivated to enhance positive affect from neutral to positive (Crutzen et al., 2013).

One of the most frequently researched mental health diagnoses with respect to drinking motive is social anxiety disorder. Lewis et al. (2008) investigated the relationships among social anxiety, alcohol consumption and negative-reinforcement drinking motives among college students. They found that both coping motives and conformity motives mediated the relationship between social anxiety disorder and negative consequences of drinking (Lewis et al., 2008). Similar results were found in other studies investigating the mediating effects of coping motives in the relationship between symptoms of social anxiety and problems associated with drinking in emerging adults (college students) (Ham, Bonin, & Hope, 2007; Ham, Zamboanga, Bacon, & Garcia, 2009; Stewart et al., 2006). In a recent study, Clerkin, Magee, Werntz, Lindgren, and Teachman (2014) investigated whether these coping motives would also mediate the social anxiety-alcohol problem relationship in older populations. As expected, they found that coping motives mediated the relationship when collapsing across age groups and the size of the effects were largely consistent across the emerging and middle-aged groups. Villarosa, Madson, Zeigler-Hill, and Noble (2014) who investigated the mediating effects of drinking motives on social anxiety symptoms and drinking behaviours found that participants who favoured the enhancement as opposed to the coping motives, were participating in more problematic drinking patterns compared with those reporting fewer social anxiety symptoms.

The longitudinal relationship between drinking to cope with distress and drinking behaviour was investigated by Holahan, Moos, Holahan, Cronkite, and Randall (2003). They found that the baseline drinking to cope motive, served as a prospective risk factor for increased alcohol consumption at the one, four and ten year data collection points. The findings elucidated that drinking to cope strengthened the link between depressive symptoms and drinking behaviour in a clinical population (Holahan et al., 2003).

Researchers have also hypothesised that alcohol may be used to avoid or reduce the symptoms of PTSD and that this behaviour is, in itself, negatively reinforcing and subsequently maintains the alcohol related behaviour (Kushner et al., 2000a; Stewart, 1996). Excessive alcohol consumption has been found to be associated with a range of PTSD symptoms including negative affect, hyper-arousal and re-experiencing symptoms (McFall et al., 1992; Miranda, Meyerson, Long, Marx, & Simpson, 2002; Read, Brown, & Kahler, 2004; Stewart, Conrod, Samoluk, Pihl, & Dongier, 2000). A few studies have gone beyond this to investigate the mediating effects of motivation on alcohol consumption in relation to post-traumatic stress symptoms. Consistently, research has found that individuals experiencing comorbid PTSD and alcohol use disorders reported that they were motivated to drink in an attempt to cope with negative affect (Dixon, Leen-Feldner, Ham, Felder, & Lewis, 2009; Kaysen et al., 2006; Lehavot, Luterek, Stappenbeck, & Kaysen, 2014; Miranda et al., 2002; Simpson, 2003; Ullman, Filipas, Townsend, & Starzynski, 2005). In a recent study, Simpson, Stappenbeck, Luterek, Lehavot, and Kaysen (2014) investigated whether drinking motives moderate the association between PTSD symptoms and alcohol use. The study also assessed the viability of the SMH in explaining the association between PTSD and problematic alcohol use. The authors found that the results generally supported a self-medication model explanation of alcohol use as more severe PTSD symptoms were predictive of increased alcohol use. Furthermore, significant interactions were found between PTSD symptom severity and both the coping and enhancement motives. Coping motives showed a positive relationship between alcohol use and PTSD symptom severity, whereas enhancement motives showed a negative relationship with those with low enhancement motives, showing significant increases in alcohol consumption with increasing PTSD symptom severity (Simpson et al., 2014).

2.6.3 Drinking motives and personality. A number of studies have linked drinking motives to personality variables. For example, Stewart and Devine (2000) examined the applicability of the Five-Factors model of personality to the four drinking motives model (Cooper, 1994) and found links between the internally focused drinking motives with personality dimensions. Drinking to cope was associated with high neuroticism, whereas enhancement motives were associated with high extraversion and low conscientiousness. In a later study, Stewart, Loughlin, and Rhyno (2001) partially replicated the findings of the earlier study discovering that while the relationship between high neuroticism and coping motives was replicated, the Enhancement relevant results showed only partial support. While low conscientiousness remained a significant predictor, low neuroticism emerged as the second relevant predict in place of high extraversion.

Theakston, Stewart, Dawson, Knowlden-Loewen, and Lehman (2004) also examined the relations between the Big-Five personality domains and motivations for drinking alcohol among young adult drinkers and found that the personality domains predicted both external (conformity and social) and particularly internal (coping and enhancement) drinking motives. In support of previous literature (Stewart & Devine, 2000; Stewart et al., 2001) coping motives were found to be associated with low emotional stability. High extraversion and low conscientiousness were predictive of enhancement motives for alcohol consumption. However, in contrast with previous findings, low extraversion predicted coping motives and low agreeableness was associated with enhancement motives. The authors concluded that their findings were evidence for the presence of personality factors that leave individuals vulnerable to risky internal motives for consuming alcohol. Overall, these findings suggest that neuroticism and low conscientiousness are predictive of developing alcohol-related problems and extraversion may be more directly related to binge-drinking (Mezquita, Stewart, & Ruiperez, 2010).

Knowing the motivation behind why someone drinks is highly relevant from a prevention perspective. More detailed insight into changes related to drinking motives (e.g., due to certain events or experiences) could serve as a starting point for future interventions aimed at provoking motive change (Crutzen et al., 2013). If an individual drinks excessively but does so to enhance positive emotions, it is reasonable to suggest that they would respond differently to a particular intervention than an individual who drinks to reduce negative affect.

2.6.4 Section summary. While there is evidence to suggest that deployment can influence alcohol consumption, it is also evident that individual differences can mediate alcohol related behaviours. Research, suggests that differences in coping styles may ameliorate the impact of stressors on an individual’s psychological well-being and adjustment, both during and post-deployment. Likewise, alcohol consumption (drinking) motives have been identified as important components in understanding why individuals chose to consume alcohol and it is generally assumed that coping motives are associated with negative emotional states, including social anxiety and depression and is distinct from enhancement drinking motivations. There is also a growing body of evidence that suggests that personality variables may play an important role in the development, course and severity of a range of mental health presentations including problematic alcohol consumption behaviours. Furthermore, a number of studies have linked drinking motives to personality variables.

Research shows that motivations for alcohol use are important determinants of the level and patterns of alcohol use and it is anticipated motivation will be shown to be a determinant in the pattern of alcohol use across the deployment cycle particularly for those who have experienced deployment related stressors or trauma (Dixon et al., 2009, Lehavot et al., 2014). Similarly, baseline drinking to cope motives are anticipated to serve as a prospective risk factor for increased alcohol consumption post-deployment (Holahan et al., 2003) Hence, research question five will investigate whether motivation for alcohol use changes following deployment. If so, does that change impact on or explain the course of alcohol consumption from pre- to post-deployment.

Research Question Five. *Can motivation for alcohol use change following deployment? If so, does that change predict the course of alcohol consumption from pre- to post-deployment?*

The literature also reveals very little about what determines an individual's motivation to use alcohol. However, current literature does suggest that individual characteristics such as mental health status, trauma exposure, personality and coping style may be important contributors (Mezquita, Stewart, & Ruiperez, 2010; Theakston et al, 2004). Therefore, research question six will assess what individual characteristics are influential in predicting alcohol motivation (coping or enhancement) with coping alcohol motivations being anticipated to be associated with low conscientiousness and emotional stability, and enhancement motives expected to be associated with higher levels of extraversion (Mezquita, Stewart, & Ruiperez, 2010; Theakston et al, 2004).

Research Question Six. *What individual characteristics are influential in explaining motivation to consume alcohol across the deployment cycle*?

The next section outlines many of the limitations of the reviewed literature and the implications of these limitations on the methodological considerations of the current research.

2.7 Limitations and Methodological Considerations

A review of the relevant literature has highlighted a number of limitations and methodological considerations that have the potential to impact on the generalisability and integrity of previous research findings. Firstly, much of the research has focused on a clinical population. This not only limits the generalisability of findings but also has the potential to bias or inflate estimates of a given disorder. Additionally, a focus on a clinical population does not take into consideration issues relating to barriers to care. For example, anecdotal evidence suggests that currently serving military personnel may be loath to attend clinical counseling, or may not appreciate the severity of their condition. This may skew data and impact on the validity of research findings. Furthermore, a military population generally has fundamentally different life stressors experience than a general population sample, in that military trauma exposure historically occurs over a prolonged period, in a highly structured social environment and incorporates a number of sustained stressors and potentially traumatic incidents. Therefore, applying a clinical or civilian population finding to a military setting will fundamentally miss important aspects of the military experience.

Secondly, the relationship between pre- and post-deployment psychological health is not clearly understood, primarily because many of the studies which investigate risk factors for post-deployment mental health have employed retrospective methods, making it extremely difficult to accurately ascertain the mental health of personnel before they deploy. It is also difficult to ascertain the extent to which retrospective reports of experiences are biased by an individual’s response to those experiences. The accuracy of retrospective self-report for estimating the time of onset of a set of symptoms is also difficult to determine. The use of a prospective design on the other hand overcomes some of the limitations of cross-sectional studies, helping to understand causal relationships between disorders.

Thirdly, prospective studies can offer many advantages over cross-sectional studies in that they can allow greater degree of control over the investigation of the temporal sequencing of events and can also provide direct estimates of risk as they measure the incidence of a particular variable. Additionally, prospectively gathered data can also provide further clues about the mechanism of a particular measured variable such as alcohol use.

A further limitation of many of the reviewed studies is that the research findings are dependent on a diagnosis of a particular mental health disorder. Prevalence estimates are extremely useful for understanding the extent of disease and the need for services in a population. However, they should be considered with caution as the estimates can vary across studies due to factors such as the use of different instruments to measure disorders and case definitions, which have varied over time. Definitive diagnoses limit comparability of findings due to the different criteria used for diagnosis. Additionally, defining a polarized diagnosis (PTSD vs. non PTSD) limits the scope of investigation into the complex nature of the interactions between levels and frequency of deployment variables and levels and frequency of substance use.

There are a number of deployment-related studies that include measures of alcohol consumption; however, there is a dearth of prospective and longitudinal studies on military health behaviour across the deployment cycle (i.e., pre-, during and post-deployment) when compared to the number of epidemiological, cross-sectional, and retrospective research that is primarily used for informing general health surveillance. Additionally the limited longitudinal studies of military cohorts did not collect data prior to and immediately after deployment. Therefore, a lag between deployment and data collection may increase the risk of recall bias and reduce the ability of the research to relate findings directly to the impact of deployment. Others focused on a particular mental health outcome (i.e. PTSD) or on diagnosable mental health disorders.

Overall, findings on factors related to changes in alcohol consumption over the course of the deployment cycle stem from a limited number of studies, with a restricted range of predictors. Moreover, most studies focus on variables that were either measured before or following deployment and were therefore cross-sectional in nature, not longitudinal. A comprehensive assessment of relevant predictors is an important step toward the recognition of aspects that might be involved in the relationship between stress exposure and increases in alcohol consumption. This could be important for targeted interventions in the long run.

2.8 Study Aims and Research Questions

There is evidence to suggest an association between deployment experience and post-deployment alcohol use. However, there is significant variability in relation to the strength of this association. Although the drivers of alcohol misuse and alcohol-related behaviours among service personnel in general and ADF veterans in particular, are not well defined or understood, deployment related factors such as trauma exposure may increase the incidence of alcohol misuse. The stress-reduction or self-medication model remains the prevailing view explaining alcohol related behaviours post-deployment, in that stressful events may trigger an increase in alcohol consumption as a means of coping with stress (self-medicating) and may subsequently manifest in problematic drinking behaviours. However, the self-medication explanation is not undisputed.

Alcohol consumption (drinking) motives have also been identified as important components in understanding why individuals chose to consume alcohol. While there is evidence linking coping, personality and motivations to alcohol consumption risk, these mediators are not yet well understood. There is also evidence to suggest these that factors may also partially mediate the impact of deployment related factors on the alcohol use of ADF personnel; however, these theories are yet to be tested.

This current body of research aims to add to the existing literature by exploring the drivers, predictors and correlates of the course of alcohol use in the aftermath of military deployment. The research builds upon previous research by utilizing a prospective longitudinal research design to assess the difference in alcohol consumption behaviours over time from pre- to post-deployment in an ADF population. This research also explores the impact of characteristic personality and coping styles, deployment experiences, mental health correlates, trauma exposure and motivation on the course of alcohol consumption behaviours. The six research questions articulated throughout this review and repeated below are posed in an attempt to explore these aims.

Research Question One. Does alcohol use change over time following the operational deployment experience (from pre-deployment to six months post-deployment)?

Research Question Two. Can pre-deployment characteristics be used to predict the course of alcohol consumption from pre- to post-deployment?

Research Question Three. Can within deployment events and mental health outcomes be used to predict the patterns of alcohol consumption from pre- to post-deployment?

Research Question Four. Can post-deployment reintegration as measured by changes in mental health outcomes and trauma reaction be used to predict the patterns of alcohol consumption pre- to post-deployment?

Research Question Five. Can motivation for alcohol use change following deployment? If so, does that change predict the course of alcohol consumption from pre- to post-deployment?

Research Question Six. What individual characteristics are influential in explaining motivation to consume alcohol across the deployment cycle?

The following chapter (Chapter 3) outlines the research design, methodology and matters of procedure and sampling for the current body of research. It also discusses the challenges inherent in the sampling of the study cohort and details the measures used to assess the outcomes of the research.

Chapter 3: Methodology and Methods

3.1 Chapter Overview

This chapter describes the research design, methodology and matters of procedure and sampling for the current research. It investigates the course of coping, alcohol consumption behaviour and psychological distress symptoms across the deployment cycle and the impact of personality, defensive coping style and trauma exposure on these variables.

3.2 Research Design

The current research was longitudinal in nature, with data being collected at three separate time points: pre-deployment (Time 1), at the end of the deployment (Time 2) and 3 – 6 months post-deployment (Time 3). The Time 1 data collection phase was aimed at establishing a base-line to ensure that any changes noted on the psychological distress or alcohol measures over-time could be directly attributable to the deployment experience, rather than prior life experiences. The research was designed to control for a range of personality and stress coping styles, whilst measuring individual levels of trauma exposure, psychological distress and alcohol related consumption behaviours following deployment. The longitudinal nature of the study allowed for a prospective (within subjects) investigation for those participants for who data was collected at the three time points, but also allowed for cross-sectional / between subjects analyses at the various time points.

3.3 Overview of Methods

The research consisted of administering a series of self-report measures at three time points across the deployment cycle, with approximately 14 – 18 months between the first and last data collection points. Where possible the administration of the measures coincided with pre-existing Australian Defence Force (ADF) operational mental health screening regime in order to minimize the impact of the research on the study population.

3.3.1 Pilot. The study measures were piloted with 20 Army Psychology personnel. Piloting of the survey measures allowed approximate response times to be determined for each point of the data collection continuum, with each of the research measure packages designed to take 90% of respondents between 15 and 20 minutes to complete. The majority of response scales were continuous in nature with the Alcohol Motivations Questionnaire allowing for dichotomous Yes / No responses. Due to the constraints in regards to duration of access to participants, short versions of measures were used where available.

3.3.2 Ethics approval. The research procedure was approved by two separate ethics committees. Approvals for conducting research using ADF personnel were sought through the Australian Defence Human Research Ethics Committee (ADHREC – Approval Number – 001/08) according to the governance structure and ethical oversight contained in policy documentation (Defence Health Services Branch, 2003). University ethics approval was also obtained through the University of Adelaide Human Research Ethics Committee (Project Number H-084-2007).

3.3.3 Command approval. Command approvals to conduct the study with their respective populations were obtained through liaison and written correspondence. Research proceeded only after the Higher Level Command and Commanding Officer approval was gained.

3.3.4 Survey pack. In accordance with the requirements of the Australian Defence Human Research Ethics Committee and the Adelaide University Committee on Ethics in Research Involving Humans, each survey package included a covering letter that invited the personnel to participate in the research and provided a brief explanation of the purpose of the study (Appendix A). An information sheet provided a detailed description of the research, limits of privacy and confidentiality and the voluntary nature of the research (Appendix B). It also included a list of mental health resources and the processes to raise concerns about the research. A detailed consent form was attached outlining the manner in which the data would be utilized and the potential impact on participants (Appendix C). All consent paperwork clearly stated to participants that involvement in the study was voluntary and that failure to participate would not be communicated to the chain of command, or result in a negative impact on their career. Clear guidance around the complaints process was also provided (Appendix D). Each package contained a cover sheet which outlined the measures included in each package and outlined the manner in which each participant was to record their unique research participant code (Appendix E). The participants were asked to generate their own code using a consistent set of rules so that their de-identified data could be matched across data collection points.

3.4 Research Measures

The materials used in this research described below measure three broad domains 1) mental health outcomes and trauma exposure, 2) alcohol consumption behaviour and 3) personality and coping style predictors.

The outcome variables in the form of the presence or absence of mental health symptoms were evaluated with the use of the Post-Traumatic Stress Disorder Check List - Civilian (Weathers, Litz, Herman, Huska, & Keane, 1993) and the Kessler 10 (Kessler et al., 2002). The Traumatic Stress Exposure Scale – Revised (Hodson, 2001) was used to assess trauma exposure. These three measures are integral elements of the ADF Operational Mental Health Screening regime and have been extensively evaluated. The Alcohol Use Disorder Identification Test (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) and the Alcohol Motivations Questionnaire (AMQ) evaluated alcohol consumption behaviour, with the AMQ being specifically developed for this research. Personality and coping styles were assessed with the use of the Defense Styles Questionnaire – Short Form (DSQ) (Andrews et al., 1989) and the Ten-Item Personality Inventory (TIPI) (Gosling et al., 2003). The DSQ and TIPI were specifically chosen as the short form nature of the measures would decrease the volume of nil or insufficient responses, due to survey fatigue.

A list of psychometric measures contained in this research and their administration schedule is provided in Table 3.1. A number of the measures used in this research are integral components of the ADF operational mental-health screening continuum and are marked with an asterisk (*) in Table 3.1.

Table 3.1

Survey measures administration schedule.

Measure	Time 1	Time 2	Time 3
DSQ	√		
TIPI	√		
K10	√	√*	√*
PCL-C	√	√*	√*
TSES-R	√	√*	√*
AUDIT	√		√*
AMQ	√		√

* Measures Integral to the ADF operational mental health screening continuum.

Apart from the measures developed specifically for this research (refer 3.4.6), all measures are freely available and do not require any specialist training to administer or score. The measures used in the study are discussed in detail below.

3.4.1 Demographics. Information regarding rank, age, gender, morale, current deployment and prior operational experience with respect to number of prior deployments, were obtained as part of the normal ADF operational mental health screening process.

3.4.2 Kessler 10 (K10). The K10 (Appendix E) is a short 10-item self-report measure of non-specific psychological distress in the anxiety-depression spectrum (Kessler et al., 2002; Kessler & Mroczec, 1994). It is utilized in the ADF to measure levels of current anxiety and depressive symptoms and to identify the need for further psychological assistance (Department of Defence, 2009). The K10 is an integral component of the ADF Psychological

Screening process appearing in both the Return to Australia Psychological Screen (RtAPS) and the Post-Operational Psychological Screen (POPS) (Department of Defence, 2004).

The K10 is widely recognized as a valid and reliable short measure of psychological distress (Furukawa, Kessler, Slade, & Andrews, 2003; Swann, Steele, & Onorato, 2006) and has been included in a number of population health surveys in Australia (University of NSW, 2000). It utilises a heterogeneous set of questions that investigate the behavioural, emotional, cognitive and psycho-physiological symptoms of psychological distress, while de-emphasising the requirement for a specific diagnosis, focusing instead on the severity of symptoms and functional impairment. The benefit of this approach is that individuals with even mild symptoms of psychological distress can be identified before the condition worsens. Normative data were developed using the National Survey of Mental Health and Well-Being survey data (Andrews & Slade, 2001) which found the K10 to measure similar constructs as a number of mental health instruments, including the General Health Questionnaire and the Quality of Life Instrument. It was also found to be predictive of current diagnosis of anxiety and affective disorder and other mental disorder categories as diagnosed by the Composite International Diagnostic Instrument (Andrews & Slade, 2001). Reliability tests were conducted on the K10 using the 2000 Collaborative Health and Wellbeing Survey data. It was revealed that the K10 is a moderately reliable instrument with kappa and weighted kappa scores ranging from 0.42 to 0.74 (Dal Grande, Taylor, & Wilson, 2002).

The K10 items employ a five-point Likert scale ranging from 1 (None of the time) to 5 (All of the time). The scores for each item are added to calculate an overall score which can range from 10 – 50 (Andrews & Slade, 2001) and is therefore a continuous measure of symptom severity. Within the ADF, scores of 10-14 are unlikely to require significant intervention; 15 – 19 are considered to be at medium risk; and a score of 20 or above is associated with an increased risk of anxiety and affective disorders (Department of Defence, 2009).

3.4.3 Post-Traumatic Stress Disorder Check List - Civilian (PCL-C). The PCL-C (Appendix E) (Weathers et al., 1993) is a 17-item self-report checklist, based on the 17 DSM-IV-TR (American Psychiatric Association, 2000) key diagnostic criteria for post-traumatic stress disorder used to screen for trauma symptomatology. It is an integral part of the ADF psychological screening process, appearing in both the RtAPS and POPS (Department of Defence, 2004; Nicholson, 2007). The instrument has been used in general psychiatric (Sampson, Kinderman, Watts, & Sembi, 2003), as well as military (Barrett et al., 2002; McKenzie et al., 2004; Sutker, Corrigan, Sundgaard-Riise, Uddo, & Allain, 2002; Weathers et al., 1993) research. The PCL-C demonstrates adequate validity and reliability (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Forbes, Creamer, & Biddle, 2001; Weathers et al., 1993) and has been reported as having good test-retest (.92 - .96) and internal (alpha's of .94 - .97) reliability, in addition to concurrent validity when compared against clinical diagnosis in war veterans (Weathers et al., 1993). Sound convergent validity has been shown by high correlations with the Mississippi Scale (.85 - .93), Impact of Event Scale (.77 - .90), and the Minnesota Multiphasic Personality Inventory (.77) (Weathers et al., 1993). Weathers, et al. (1993) also reported three symptom clusters conforming to the DSM-IV-TR (2000) diagnostic criterion of intrusion, avoidance and arousal, citing internal consistency (alpha coefficients) values ranging from .89 - .92. The PCL-C has also demonstrated internal reliability for both the total scale and well as the three subscales (Cordova et al., 1995; Weathers, Litz, Huska, & Keane, 1994). However, factorial studies have found between two and four factors encompassing various combinations of the three subscales (Cordova et al., 1995; Weathers et al., 1993). Furthermore, several other studies have found individual items and the symptoms sub-scores of less value, particularly the hyper-arousal items (Blanchard et al., 1996).

The PCL-C items employ a five-point Likert scale ranging from 1 (Not at all) to 5 (Extremely). It is a continuous measure of trauma symptoms with possible scores ranging from 17-85. A clinical cut-off of 50 was originally recommended by Weathers, et al. (1993) which has been endorsed by the Australian Centre for Posttraumatic Mental Health (ACPMH, 2007). The cutoff was employed in a US Gulf War veterans study (Barrett et al., 2002). A study of Australian Vietnam War veterans (Forbes et al., 2001) found little difference in screening and diagnostic performance between three cut-offs (45,50,55); however, other research suggests a lower cut-off may be more useful from a preventative standpoint (Bliese et al., 2008; Nicholson, 2007). Within the ADF, scores from 17-29 are considered to be in the low-risk category, 30-39 are in the medium-risk category, and 40 and above in the high-risk category (Department of Defence, 2009).

3.4.4 Traumatic Stress Exposure Scale - Revised (TSES-R). The TSES-R (Appendix E) is a scale designed to measure the frequency and severity of exposure to traumatic events (Hodson, 2001; Hodson, Ward, & Rapee, 2003; Swann & Hodson, 2004), and is an integral feature of the RtAPS process (Department of Defence, 2004). The TSES was originally developed as part of a six-year study of the psychological impact of peacekeeping duties for Australian Rwandan veterans in an attempt to measure the frequency of traumatic exposure experienced across a wide range of generic trauma scenarios (Hodson, 2001; Hodson et al., 2003). The initial version of the TSES was a 13-item scale and contained items based on eight generic categories of traumatic stressors, identified by Green (1990), that carry across all traumatic situations. The scale was used in Hodson’s (2002) study and was correlated significantly ($r = .25$) with post-traumatic symptomatology as measured by the Impact of Events Scale (Horowitz, Wilner, & Alvarez, 1979) and the PCL (Weathers et al., 1993). While the TSES proved to be predictive of PTSD symptomatology (Hodson, 2002), concern was raised about the consistency of the items. Whilst some events were allocated two items to separately measure both the witnessing and experiencing of potentially traumatizing events, others were only represented by one item. As a result, the instrument was updated and four additional items were included to correct this discrepancy. Further research suggested that the severity of the trauma exposure is a stronger risk factor for the development of PTSD than frequency and that an individual's initial response is integral to a PTSD diagnosis. As a result, a second revision of the TSES occurred in 2002.

The current version of the TSES-R uses a multiple column format which includes not only the frequency and severity of the event but whether the individual felt fear or horror at the time of the event and at the time of administration of the scale. The revised scale has generally high test-retest reliability (ranging from $r = .49$ to $r = .86$) and sound internal reliability with all alpha coefficients well within an acceptable range ($\alpha > .70$) (Hodson et al., 2003). An exploratory principal components analysis conducted by Swan and Hodson (2004) found evidence for three factors corresponding to Trauma to Self, Trauma to Others (not caused by self), and Trauma to Others (caused by self).

The TSES-R is an integral part of the RtAPS process and comprises a 12-item scale that has three columns titled "How often did you experience the event?", "How did it affect you at the time?" and "How does it affect you now?" The responses are scored from left to right and employ Likert-type responses as shown in Table 3.2. The scores from each column are added separately yielding three scores. Currently there are no specified cut-offs.

Table 3.2

TSES-R scale.

How often did you experience the event?	How did it affect you at the time?	How does it affect you now?
0 for Never	0 for Not at all	0 for Not at all
1 for *Rarely*	1 for *A little*	1 for *A little*
2 for *On occasion*	2 for *A moderate amount*	2 for *A moderate amount*
3 for *Often*	3 for *A great deal*	3 for *A great deal*
4 for *Very often*		

3.4.5 Alcohol Use Disorders Identification Test (AUDIT). The AUDIT (Appendix E) questionnaire was developed by World Health Organisation affiliated investigators for the identification of hazardous and harmful alcohol consumption in primary care settings (Saunders, Aasland, Amundsen, & Grant, 1993; Saunders, Aasland, Babor, et al., 1993). It has been utilized in studies of veteran, psychiatric and general populations (Allen, Litten, Fertig, & Babor, 1997; Bohn, Babor, & Kranzler, 1995; Bradley, Maynard, Kivlahan, McDonell, & Fihn, 2001; Dawe, Seinen, & Kavanagh, 2000) and is an integral part of the ADF POPS process (Department of Defence, 2004). The 10 items measure alcohol consumption, drinking behaviour, adverse reactions and alcohol-related problems; however, they do not investigate the motivations behind alcohol consumption. Among those diagnosed as having hazardous or harmful alcohol use, 92% had an AUDIT score of 8 or more and 94% of those with nonhazardous consumption had a score of less than 8 (Saunders, Aasland, Babor, et al., 1993). Both test-retest and internal consistency measures have shown satisfactory reliability with alpha coefficient mean values of .93 and .81 being found among the drinking behavior and adverse psychological reactions domains (Fleming, Barry, & MacDonald, 1991; Saunders, Aasland, Babor, et al., 1993). Significant concurrent validities were found against other alcohol disorders measures such as the Michigan Alcohol Screening Test and the MacAndrews scales ($r = .31$ to $r = .89$) and similarly construct validities for five risk factors, four drinking consequences and the three drinking attitudes items also showed significant correlations ($r = .27$ to $r = .88$) (Allen et al., 1997; Bohn et al., 1995; Reinert & Allen, 2002).

The AUDIT employs a five-point Likert scale; however, the responses differ across the questions. Responses for question 1 (“How often do you have a drink containing alcohol?) range from 0 (Never) to 4 (4 or more times a week). Responses to question 2 (How many ‘standard’ drinks containing alcohol do you have on a typical day when you are drinking?) range from 0 (1 or 2) to 4 (10 or more). Questions 3 through 8 are scored on the same rating scale and range from 0 (Never) to 4 (Daily or almost daily). Questions 9 and 10 allow for one of three responses scored 0 (No), 2 (Yes, but not in the last 12 months) and 4 (Yes, during the last 12 months). The AUDIT also asks two non-scored questions pertaining to the individuals perceptions of the level of their own problematic drinking (0 = ‘No’ to 4 = ‘Definitely’), and their belief in their efficacy to moderate their drinking behaviours (0 = ‘Very easy’ to 4 = ‘Very difficult’).

The scale encompasses a range of possible scores on a continuous scale between 0 – 40. The commonly used cut-off score of 8 has been shown to possess an overall sensitivity of 92% for hazardous and harmful alcohol consumption, as measured by clinical interview and biological indices (Saunders, Aasland, Babor, et al., 1993). The guidelines provided by the Australian Department of Veterans Affairs (DVA) “The Right Mix” website (Australian Government - Department of Veterans' Affairs) in relation to alcohol consumption risk levels indicates that scores between 0-7 on the AUDIT indicate low-risk alcohol consumption; scores of 8 – 15 indicate that an individual is participating in risky drinking behaviour; scores of 16 – 19 is considered harmful alcohol use and scores of 20 and upwards on the AUDIT indicate high-risk alcohol consumption.

3.4.6 Alcohol Motivations Questionnaire (AMQ). As an adjunct to the AUDIT, participants were provided with 21 common motivations for consuming alcohol and were asked to indicate by checking a tick-box, which options applied to them. The motivations used in the research were developed by compiling anecdotal reports gained through the author’s experience of screening ADF deployed personnel in combination with anecdotal reports from other ADF Psychology members. The scale explores an individual’s motivations for consuming alcohol, with the motivations falling within a number of broad categories including: 1) coping, 2) enhancement, 3) psychosocial and 4) conformity (Appendix E), which are consistent with the classification of drinking motives posited by Cooper (1994).

3.4.7 Defense Styles Questionnaire (DSQ) – short form. The DSQ is a self-report measure designed to assess how individuals habitually cope with stressors. The DSQ-25 (Bond, Gardner, Christian, & Siegal, 1983) was initially developed to allow for relatively easy, reliable, and standardized evaluation of individual defensive styles and originally consisted of 88 items, which assessed 25 mutually exclusive defenses comprising three factors reflecting mature, neurotic, and immature defensive styles. A later version of the DSQ (DSQ-20) used 82 items to assess 20 psychological defenses (Andrews et al., 1989). A 36-item version of the DSQ (Short-form) was also developed (Andrews et al., 1989) that would be suitable for repeated administration or inclusion within a larger test battery. The items for the short-form version of the DSQ were chosen to emphasise the mature and immature factors at the expense of the neurotic factor as prior investigation had found that there was little differentiation between the immature and neurotic factors (Andrews et al., 1989). This 36-item scale has been found to correlate well with the two previous longer versions (with the correlations for the three pairs of factors being .93, .78 and .98 respectively) and to also discriminate between criterion groups in a satisfactory manner (Andrews et al., 1989).

Given the length of the test battery and the relatively short periods of time that the researcher would have access to the target populations, the DSQ Short-Form was chosen for this project (Appendix E). Table 3.3 shows the DSQ Short-Form items by defense factor and defense style as outlined by Andrews et al. (1989). The DSQ Short-Form is rated on a 9-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

3.4.8 Ten Item Personality Inventory (TIPI). As the name suggests, the TIPI (Appendix E) is a ten-item inventory and it was originally developed in response to the need for very brief measures of the Big Five Personality factors (Gosling et al., 2003). An analysis of several very brief Big Five measures suggested that the TIPI's five-factor model achieves slightly better validity than the other measures, including the Big Five Instrument (Furnham, 2008).

Table 3.3

DSQ short-form item number by defense and sub-defense.

Defense Factor	Defense Style	Item Number (Full DSQ item no. in brackets)
Mature	Sublimation	4 (5), 31 (74), 35 (84)
	Humour	6 (8), 24 (61)
	Anticipation	28 (68), 33 (81)
	Suppression	2 (3), 22 (59)
Neurotic	Undoing	30 (71), 32 (78), 36 (88)
	Idealization	19 (51)
	Reaction formation	27 (65)
Immature	Projection	3 (4), 8 (12), 10 (19), 12 (25), 21 (55), 23 (60)
	Passive aggression	1 (2)
	Acting Out	5 (7), 7 (9)
	Isolation	29 (70), 34 (83)
	Devaluation	11 (24), 14 (29), 17 (41)
	Fantasy	16 (40)
	Denial	9 (16), 18 (42)
	Splitting	20 (53), 26 (64)
	Rationalization	15 (34)
	Somatization	13 (28), 25 (62)

Additionally, the TIPI's developers have found that the inventory reached adequate levels of convergent and discriminant validity, test-retest reliability and patterns of external correlates (Gosling et al., 2003). With only two items per scale the TIPI naturally shows relatively low inter-item correlation and low internal consistency estimates (Cronbach alphas

= .68, .40, .50, .73, and .45 for the extraversion, agreeableness, conscientiousness, emotional stability and openness to experience scales respectively). However, the TIPI has been found to correlate strongly with the five Big-Five Inventory (BFI) across the five scales (.87, .70, .75, .81, & .65 respectively) and test-retest correlations for the TIPI are sound with the mean *r* = .72 (Gosling et al., 2003). Column-vector correlations (external correlates) for each of the five dimensions of the TIPI are almost identical to those of the BFI and exceed .90 (Gosling et al., 2003).

The TIPI is rated on a 7-point Likert-type scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*). Each item consists of two descriptors, separated by a comma, using the common stem, “I see myself as:” with two items representing the poles of each of the five Big Five dimensions: extraversion, agreeableness, conscientiousness, emotional stability and openness to experiences (Gosling et al., 2003). The negatively worded items (2, 4, 6, 8, & 10) are reversed scored. The TIPI takes about one minute to complete. Given the length of the test battery and the relatively short periods of time that the researcher would have access to the target populations, the TIPI was chosen for this project.

A psychometric validation of the above measures is investigated in Chapter 4 in terms of their respective factor structures in order to determine the variables to be used in the subsequent analysis of these data.

3.5 Data Collection

Three units deploying on 6 – 8 month operations to the MEAO in 2007 were identified to participate in this research and command approvals were provided. The study participants were N = 1035 and were deployed with either the Security Detachment (SECDET) for the Australian Embassy staff in Baghdad, Iraq (n = 120); the Reconstruction Task Force (RTF) based in Tarin Kowt, Afghanistan (n = 388); or the Overwatch Battle Group – Western Iraq (OBG-W) (n= 527). In order to be eligible to participate in this research, individuals needed to be ADF uniformed personnel of any service, rank, gender or role and deployed to the MEAO with any of the three units outlined above during 2007. Participation in the research was voluntary and each of the three target groups comprised personnel taken from up to 42 separate ADF specialist units across Australia, with the large majority of personnel employed in Brisbane and Townsville based units.

3.5.1 Recruitment strategies and recruitment challenges. Command approval was sought in writing to access participants at three points during the deployment cycle. Time 1 data collection occurred at pre-deployment during the respective units Mission Rehearsal Exercise (MRE). The second data collection was conducted in conjunction with the mandatory RtAPS process just prior to the participants return to Australia post-deployment. The third data collection point was conducted in conjunction with the POPS 3 – 6 months post-deployment.

3.5.1.1* Time *1 data collection. All Time 1 recruitment was conducted pre-deployment via face to face briefings during each groups individual MRE’s. There was only one opportunity provided per group to collect the pre-deployment data. The high tempo nature and limited time available during the pre-deployment MRE period restricted the number of participants and time available to the researcher during the pre-deployment phase; particularly for the RTF and OBG-W groups (see Figure 3.1). Furthermore, due to training and operational commitments, the time provided by some command elements for completion of the surveys was insufficient to allow for completion of the entire package. A number of participants may have become fatigued with the number of questions in the survey package, further depleting the sample due to a decreased rate of survey completion.

Understandably, scientific research is rarely awarded a high priority by commanders on operations or when preparing troops for operations, as time is usually at a premium and operational tasking takes precedence (Langholtz, 2003). It is also possible that some participants lacked confidence in their responses remaining anonymous and therefore were wary of completing aspects of the survey package which may potentially impact their deployability, particularly items relating to current mental health and symptoms.

***3.5.1.2 Time 2 data* collection**. Data collection at the second time-point proved a relatively easy process as nearly all deployed personnel concentrated in the one location prior to returning to Australia and were required to complete their mandatory RtAPS during this time. As a result, a large proportion of the participants across the three groups completed the survey packages. All participants received a face-to-face verbal brief outlining the study requirements in addition to a written information sheet.

3.5.1.3 Time 3* data *collection. The Time 3 data was collected at each individual respondent's routine post-deployment psychological screen (POPS). Each participant was provided with a written instruction sheet attached to the study measures in addition to the normal POPS measures. The post-deployment data collection phase held inherent challenges as disbandment of the augmented units (established specifically for each operational mission); extended leave periods, posting cycles, courses and discharges resulted in participants being dispersed throughout Australia with no centralized screening location or time period. Given the resource intensity required to survey all personnel at post-deployment and the limited resources available to collect data, data collection at post-deployment (POPS) was focused in the two regional centres (Brisbane and Townsville) with the largest number of research participants. This resulted in a depleted sample size at the final data-collection phase.

3.5.2 Survey administration. Surveys were administered by Australian Army Psychology Corps personnel. As each of the three target groups (OBG-W, RTF & SECDET) deployed at different times, the collection of data at each data collection phase was staggered to coincide with the respective deployment schedules. All efforts were made to minimise the burden on participants by utilising the current ADF operational mental health screening process and by communication with other groups conducting research with ADF personnel such as the Psychology Research and Technology Group (PRTG) and the Mental Health

Surveillance, Research and Advisory Group (MHSRAG) to ensure that these groups were not subject to concurrent and competing research efforts.

While the author carried out the administration of surveys at Time 1, the psychology personnel who were operationally deployed with the study population administered the surveys at Time 2 during the RtAPS. Although the Time 3 administration was conducted in Australia during their POPS, the participants were dispersed across the country and it was more efficient to use the deployed psychology staff to conduct the administration. All psychology personnel who supported this research were provided with a written brief on the research and specific instructions for administering the relevant surveys.

Prior to administration of surveys, verbal briefs to participants at Force Preparation Training, RtAPS and POPS (given in conjunction with the Psych-education brief) were used to inform and recruit participants. All briefs covered the main points of the study including aim, rationale, basic methodology, data-points and anticipated outcomes. No form of coercion or payment was used; however, participants were advised of the importance of the study and that by participating they would be helping to improve the mental health services to all personnel and veterans within the ADF.

At Time 1 and Time 2 the surveys were administered to groups ranging in size from approximately 20 to 250 personnel, with the administrator supervising the group throughout the administration session. At Time 3, the surveys were administered individually. Study questionnaires were embedded into the normal RtAPS and POPS screening measures package, whilst a specific package was developed for pre-deployment.

Time 1 surveys were administered during each respective Battle Group Mission Rehearsal Training, approximately one-month prior to deployment. This phase involved the collection of pre-deployment data and the retrospective review of prior trauma history. The research measures were also administered at the completion of their respective deployments during the mandatory RtAPS process and also at three-months and no later than six-months post their return to Australia as part of the POPS process. The schedule of survey measure administration for each phase of the research is depicted in the Materials section via Table 3.1.

3.5.3 Representativeness of the sample. As outlined in Figure 3.1, the original sample size was 1035 personnel; however, the operational and resourcing limitations outlined above prevented the distribution of surveys to the entire 1035 participants at each data-point and / or the completion of the survey package at any one data-point. Of the 1035 participants in the original sample, 65 percent of the soldiers from the selected groups provided a valid response across the research paradigm, with participants only included in the analyses if they had completed a significant proportion of the questionnaire package at a minimum of two of the three data collection points. A valid response for inclusion in the final sample was defined as completion of approximately 80 percent of the questionnaire package at a minimum of two of the three data collection points.

A total of 359 participants were excluded from the study leaving the final population sample size as N = 676 ADF land-based (Army) personnel from SECDET (n = 103), RTF (n = 226), and OBG-W (n = 347). Of the final sample, 552 participants were included at Time 1, 676 at Time 2 and 520 at Time 3. The final sample consisted 88 percent of original SECDET data set, 58 percent of RTF original respondents and 66 percent of the OBG-W personnel. Figure 3.1 depicts a summary of sampling and response rates for each of the three research groups across the three data collection points.

No participants refused consent to take part in the research at any time point; however, some participants did not complete the entire survey. As indicated previously, this may have been due to survey fatigue, failure to complete both sides of the questionnaire, a desire to complete the survey quickly, or concern that the information may impact on deployability or employability (particularly alcohol and psychological distress measures).

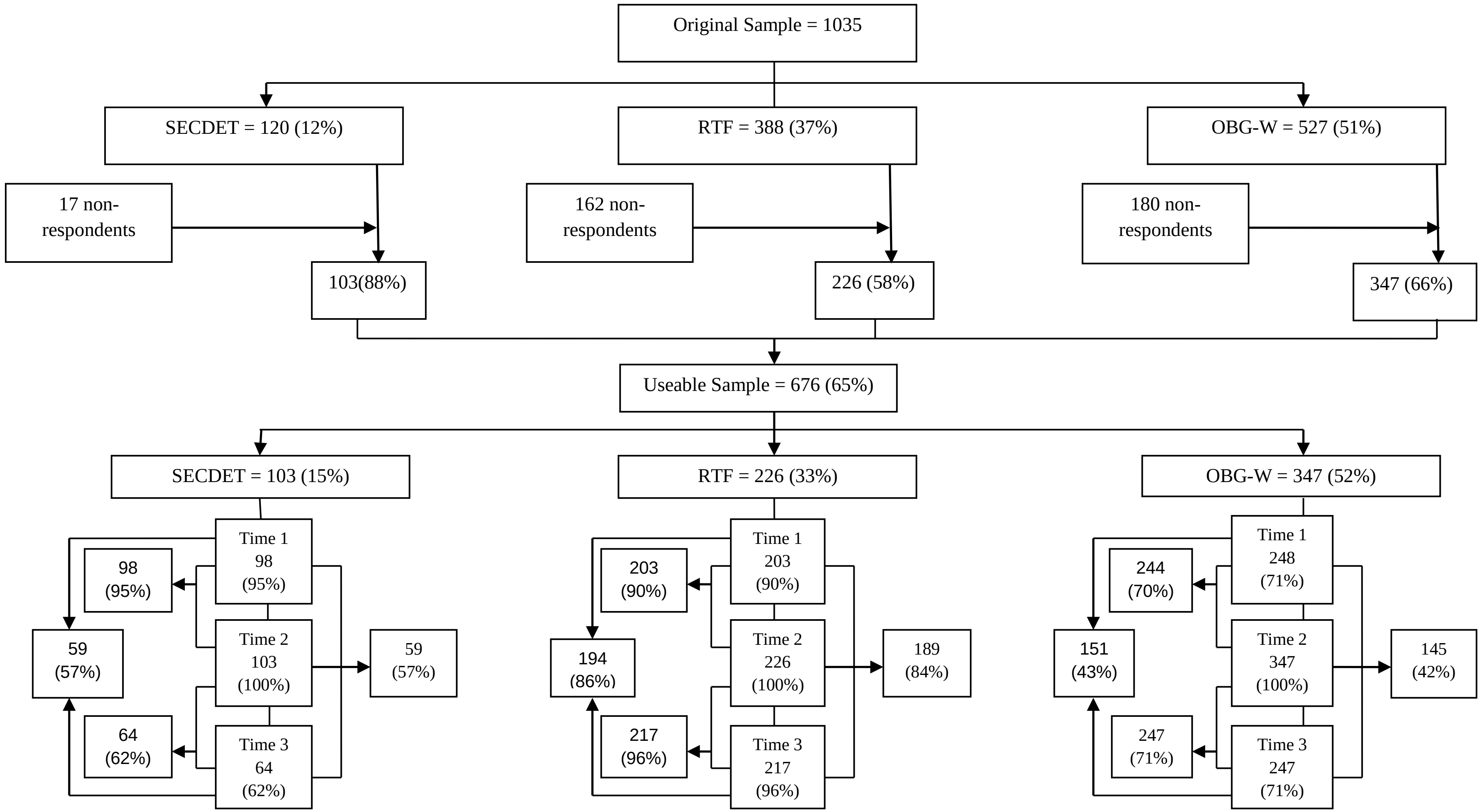

Figure 3.1 *Summary of sampling and response.*

The issues with sampling have been described in previous sections outlining recruitment strategies and challenges (section 3.5.1) and survey administration (section 3.5.2).

3.5.4 Sample descriptive data. The sample was predominantly male with only 1.9% (n = 13) of the sample being female. Given the small percentage of females in the sample, the effects of gender were not explored. The sample ranged between 19 – 56 years of age, with the mean age being 28.98 years. As can be seen from Table 3.4, approximately 50% of the sample were private soldiers (PTE), 25.6% junior non-commissioned officers (JNCO's), 14.8% senior non-commissioned officers (SNCO's) and 9.3% in the officer (OFFR) ranks. The vast majority of personnel had either not previously deployed (31.7%) or had deployed on one prior occasion (37.9%). A small number of personnel had deployed on 2 (15%), 3 (9.6%), 4 (3.8%), and greater than 5 (1%) prior occasions (see Table 3.5.) with the average number of prior deployments being 1.2.

Table 3.4

Frequency and percentage of personnel by rank.

Rank	Frequency	Percent	Cumulative
PTE	338	50.0	50.0
JNCO	173	25.6	75.6
SNCO	100	14.8	90.4
Officer	63	9.3	99.7
Missing	2	0.3	100.0
TOTAL	676	100.0	100.0

Pearson product-moment correlations were run between the AUDIT pre- and post-deployment scores for the demographic variables, age, rank, number of deployments and morale.

Table 3.5

Frequency and percentage of the number of prior deployments

No. Of Prior Deployments	Frequency	Valid Percent	Cumulative Percent
0	215	31.9	31.9
1	257	38.2	70.1
2	102	15.2	85.3
3	65	9.7	94.9
4	26	3.9	98.8
>5	8	1.0	100.0
Missing	3		

Age and rank both demonstrated small (Cohen, 1988, 1992) but significant negative relationships with alcohol consumption risk and binge-drinking frequency across time points (Table 3.6), suggesting that as age and rank increased the tendency to participate in problematic drinking behaviours decreases. Predictably, in the absence of alcohol, age and rank showed a strong positive relationship ($r = .49$, p(two-tailed) $<.01$), as higher rank is bestowed as experience increases. Similarly, as age and rank increased so did the opportunity to gain more operational experience (Number of deployments). No correlations of note were found for the impact of morale. Simultaneous regression was also used to determine the contribution of the demographic variables to the pre- and post-deployment AUDIT and binge drinking scores (Table 3.7). Whilst the model accounted for between 4 – 6 % of the variance for AUDIT scores across the two time periods (Table 3.7), age was the only variable that contributed a unique variance in the regression analyses.

Table 3.6

Pearson product-moment correlations between AUDIT and binge-drinking pre- & post-deployment scores and sample demographics.

	AUDIT Pre	AUDIT Post	Binge Pre	Binge Post	Age	Rank	No. of Deps	Morale
Age	-.23**	-.18**	-.23**	-.25**	1			
Rank	-.16**	-.14**	-.17**	-.17**	.49**	1		
No. Of Deps	-.08	-.07	-.04	-.06	.30**	.17**	1	
Morale	-.09*	-.04	-.09	-.02	.05	.10**	.07	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3.7

Simultaneous regression analyses for demographics predicting AUDIT total at pre- and post-deployment.

Factor		Pre-deployment					Post-deployment				
		B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
AUDIT	Constant	10.52	1.06		9.95	.000	9.47	1.03		9.23	.000
	Age	-.11	.03	-.21	-3.61	.000	-.09	.03	-.15	-2.91	.004
	Rank	-.07	.08	-.04	-.79	.429	-.10	.08	-.07	-1.30	.195
	No. Deps	.04	.16	.01	.26	.795	-.02	.16	-.01	-.10	.922
	Morale	-.26	.21	-.06	-1.25	.211	-.09	.20	-.02	-.44	.664
		R^2 = .06, F(4,407) = 6.17, p < .001					R^2 = .04, F(4,500) = 4.98, p = .001				

3.6 Statistical Analyses.

Statistical analyses and data transformations were predominantly performed using the Statistical Package for the Social Sciences (SPSS) Statistics Graduate Package Version 18 software package for Windows. A database was established and data screened for errors, outliers and missing data (see Chapter 4 for details). A range of statistical procedures were used throughout this research with significance set at .05 (2-tailed). In general, parametric methods were used. Exploratory Factor Analyses (EFA) were used to test whether the expected factor structures for a number of the continuous variable measures used in the research emerged with these data and polychoric factor analyses were conducted on the AMQ which required dichotomous responses.

The relationships between variables were analysed using bivariate correlations (Pearson product-moment correlations) and paired t-tests. Simultaneous and hierarchical regressions were used to determine the predictive utility and unique contribution of the various characteristics and variables. Finally, discriminant function analyses were used to explore the dimensions of the variables that differentiated group membership determining the direction of change in alcohol consumption over time. A detailed description of the statistical methods used to analyse the data for each research question are outlined separately in Chapters 5 – 10.

3.7 Chapter Summary

This chapter has outlined the research design, methodology and matters of procedure for this research. Furthermore, it has discussed the challenges inherent in the sampling of the studies population and has detailed the measures used to assess the outcomes of the research. The following chapter will explore the issues relating to the screening of the research data and will investigate the psychometric validation of the study instruments in order to determine the variables to be used in the further analysis of the data.

Chapter 4: Instrument Validation

4.1 Chapter Overview

Chapter 4 is divided into two main sections covering (1) issues relating to data screening and (2) the factorial validation of the variables. The measures used in this research were described in the previous chapter (Chapter 3); however, before using these scales to test hypotheses, it was necessary to test whether the expected factor structures emerged in these data. To this end, this chapter will explore the psychometric validation of symptom outcome measures and the personality, coping and motivation instruments in order to determine the variables to be used in the further analysis of the data.

4.2 Data Screening

4.2.1 Survey checking. Prior to coding survey responses into a database, each survey was examined for accuracy by visually scanning for missing data, free-text responses suggesting invalid responses, obvious response patterns and extreme cases.

4.2.2 Data screening. Statistical data screening for each scale was conducted in accordance with advice from statistical reference texts (Pallant, 2005; Tabachnick & Fidell, 2001). Data screening procedures were aimed at detecting invalid responses and compliance with parametric assumptions. Statistical analyses and data transformations were predominantly performed using the Statistical Package for the Social Sciences (SPSS) Statistics Graduate Package Version 18 software package.

Data were then checked for missing values. A valid response for inclusion in the final sample was defined as completion of 80% of the questionnaire package at a minimum of two of the three data collection points. The individual items for each survey instrument for the final sample were checked for missing values against the total score of the relevant instrument with no anomalies noted. Table 4.1 presents the number and percentage of missing data for each scale at the three data collection points as for the final sample of N = 676 (section 3.5.3). As can be seen in Table 4.1, the range of missing data at the individual time-points was much smaller than when compared to the complete data set, particularly at pre- and post-deployment.

Table 4.1

Number and percentage of missing values at each data point and total (N = 676).

Data Point	Scale	Cases			
		Missing at Data Point		Missing Total	
		n	Percent	N	Percent
Time 1 (n = 552)	DSQ	2	0.4	128	18.9
	TIPI	9	1.7	135	19.9
	AUDIT	114	20.7	240	35.4
	AMQ	93	16.9	219	32.3
	K10	170	30.8	296	43.7
	PCL-C	172	30.2	298	44.0
	TSES-R	100	18.1	226	33.3
Time 2 (n = 676)	K10	20	3.0	20	3.0
	PCL-C		2.7	20	2.9
	TSES-R	24	3.5	24	3.5
Time 3 (n = 520)	AUDIT	2	0.4	160	23.6
	AMQ	0	0	158	23.3
	K10	2	0.4	160	23.6
	PCL-C	2	0.4	160	23.6
	TSES-R	5	1.0	163	24.0

The accuracy of the data file was cross-checked against a random sample of 100 of the original surveys against the SPSS data set. In addition, the frequencies were explored to detect any out-of-range values. Only minor and infrequent errors were detected and rectified by referring to the relevant original survey. Minimum and maximum values were also checked with no abnormalities identified.

The Kolmogorov-Smirnov Statistic indicated that normality could not be assumed for any of the scales. Further investigation was conducted using box plots and histograms, and the skewness and kurtosis statistics in SPSS. All scales apart from the Mature Scale of the

DSQ were found to violate normality, with the majority of scales being significantly positively skewed. The result is to be expected, as ADF military personnel are selected for their psychological robustness and will, therefore, tend to score in the non-clinical (low scores) ranges on the majority of scales. Although transformations were considered, they were not applied as the impact of skewness and kurtosis is diminished in large sample sizes of more than 200 cases (Tabachnik & Fidell, 2001) and, as indicated above, these variables would not be expected to be normally distributed in this population.

The scale totals were then tested for outliers. Box plots indicated a number of univariate outliers on the majority of scales; however, although transformations were carried out, the untransformed data were used for analyses for the reasons outlined in section 4.2.2. Furthermore, no significant impacts of the outliers were found when comparing the trimmed means with the true means for the identified scales (Field, 2009; Pallant, 2005; Tabachnick & Fidell, 2001). Multivariate normality was assessed by examining Mahalanobis distances and values above .70 were considered to indicate multicollinearity.

4.3 Factorial Validation of Variables

The scales used in this research to test hypotheses where then checked to ensure their expected factor structures emerged in these data. Exploratory factor analytic procedures were used to check the dimensionality of the scales. Principal Axis Factor (PAF) programs from SPSS were employed for this purpose. Root One Criterion, scree-plots, and previous validation studies were used in combination to explore the dimensionality of the scales.

4.3.1 Kessler 10 (K10). The 10 items of the K10 were subjected to exploratory factor analyses to determine whether a common factor structure could be determined across the three administrations. The presence of two factors with initial eigenvalues exceeding one was revealed at Time 1 explaining 50.81% and 11.75% of the variance respectively. Two factors were also found at Time 2 explaining 46.73% and 13.33% of the variance; however, only one factor was revealed at Time 3 explaining 59.44% of the variance. The inconsistency in item loadings and percent of variance explained by each of these factors across the three administrations can be clearly seen in Table 4.4. An inspection of the scree-plots at each administration revealed a clear break after the first principal component in each case. This clear break, coupled with the large proportion of variance accounted for by the first factor suggests that a one-factor solution is appropriate. Loadings on this single factor are also shown in Table 4.2.

Table 4.2

Factor loadings and percent of variance for PAF on the 10-item Kessler 10 across the three data collection phases.

Item[a]		General Factor Solution			Two Factor Solution[b]			
					1		2	
No.	Description	T1	T2	T3	T1	T2	T1	T2
1	Tired for no good reason	.61	.53	.67			.41	.42
2	Felt nervous	.59	.55	.73	.34			.41
3	So nervous could not calm	.69	.67	.78	.55	.50		
4	Felt hopeless	.76	.71	.79	.76*	.73	.32*	
5	Felt restless or fidgety	.61	.60	.71			.96	.97
6	So restless could not sit still	.64	.57	.72			.77	.74
7	Feel depressed	.76	.74	.75	.78	.75		
8	Everything was an effort	.66	.62	.77	.48	.35*		.34*
9	Felt sad	.71	.69	.76	.82	.81		
10	Felt worthless	.69	.69	.74	.82	.82		
% of explained variance		50.81	46.73	59.44	50.81	46.73	11.75	13.33

* identifies items which loaded on two factors
Note: [a]Some item content has been summarised for brevity
[b]Only a one factor solution was found at T3

In relation to the two-factors, it was apparent that they were not consistent in their item inclusion across the three administrations. Furthermore, large (Cohen, 1988, 1992), positive factor inter-correlations found between the two factors at Time 1 (r = .61, p < .001) and Time 3 (r = .55, p < .001), reinforce the view that a common factor underlies the K10 construct. Given this lack of consistency, and given that the K10 was designed as a continuous measure along a single dimension and is generally treated as a uni-dimensional measure, all subsequent analyses were conducted at the K10 total-score level. Consistent with previous literature, the K10 total-score showed good internal consistency at each administration with the Cronbach alpha coefficient’s being .87 (pre-deployment), .85 (RtAPS), and .91 (post-deployment) respectively.

4.3.2 Post-Traumatic Stress Disorder Check List – Civilian (PCL-C). The 17 items of the PCL were subjected to exploratory factor analyses to determine whether a common factor structure could be determined across the three administrations. Analyses revealed three-factors with eigenvalues exceeding one emerging across the three administrations of the checklist with the Time 1eigenvalues explaining 43.32%, 11.37%, and 6.17% of the variance respectively; Time 2 eigenvalues explaining 37.48%, 9.94%, and 7.57%; and Time 3 eigenvalues explaining 47.15%, 9.68%, and 5.81% of the variance. The item loadings and percent variance explained by each of these factors across the three administrations is shown in Table 4.3.

It was apparent that the three factors did not load as would be predicted by Weathers et al. (1993) or the DSM-IV diagnostic criterion into intrusion (Items 1-5), avoidance and numbing (Items 6 – 12) and arousal (13 – 17). The factors which emerged in this study were labeled intrusion & avoidance’ (Items 1 – 8), numbing & arousal (9 – 15), and hyper-vigilance (16 & 17). Whilst there appeared to be some consistency in the items indicating re-experiencing and emotional numbing symptoms, there was substantial inconsistency in item loadings across the three administrations for the symptoms generally associated with heightened arousal (items 13 – 17). This result accords with Blanchard et al. (1996) and Smith et al. (1999) who found symptoms sub-scale scores, particularly those associated with

Table 4.3

Factor loadings and percent of variance explained for PAF analysis on the PCL-C across the three data collection phases.

Item[a]		General Factor Solution			Three Factor Solution								
					Intrusion & Avoidance			Numbing & Arousal			Hyper-vigilance		
No.	Description	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
1	Memories	.71	.78	.70	.80	.64	.52						
2	Dreams	.73	.66	.68	.56	.46**	.50**					.44**	.37**
3	Reliving	.71	.69	.65	.69	.82	.68						
4	Upset	.74	.68	.74	.84	.74	.73						
5	Physical reaction	.63	.60	.75	.81	.54	.72						
6	Avoid thinking	.65	.65	.69	.81	.74	.57						
7	Avoid activities	.68	.61	.66	.61	.61	.86						
8	Remembering	.61	.49	.41	.64	.35	.32						
9	Loss of interest	.66	.47	.62				.60	.49	.72			
10	Distant / Cut-off	.67	.54	.72				.79	.69	.79			
11	Emotionally numb	.58	.50	.68				.60	.60	.78			
12	Shortened Future	.62	.46	.61				.34		.34			
13	Sleep difficulties	.53	.50	.61					.60	.44**	.44		.46**
14	Irritability	.58	.54	.68					.63	.55**	.53		.34**
15	Concentration	.58	.56	.66					.62	.53	1.03		
16	Super-alert	.61	.49	.66				.58				.66	.53
17	Jumpy	.36	.55	.66				.65				.72	.60
% of explained variance		43.32	37.48	47.16	43.32	37.48	47.15	11.37	9.94	9.68	6.17	7.57	5.81

** identifies items which loaded on more than one factor

Note: [a]Some item content has been summarised for brevity the hyper-arousal items, to be inconsistent and of little value. Total variance accounted for by each of the proposed factors was 52.84% (Time 1), 46.00% (Time 2) and 55.06% (Time 3).

A notable feature of the unrotated solutions was the large proportion of variance accounted for by the first principal component suggesting that a one-factor solution is also appropriate. This view was supported by an inspection of the scree-plots at each administration which revealed a clear break after the first principal component in each case. Loadings on this single factor are also shown in Table 4.3.

Factor inter-correlations across the three data collection phases are shown in Table 4.4. There were strong (Cohen, 1988, 1992), positive correlations ranging from $r = .44$ to $r = .69$, found between all factors at each administration, reinforcing the view that a common factor underlies all three constructs. Given that the PCL-C is often treated as a one-dimensional measure and that an overall post-traumatic stress score was all that was required for the purposes of this research, all subsequent analyses were conducted at the total score level. Consistent with previous literature, Table 4.4 illustrates that the general PCL-C factor showed good internal consistency at each administration with the Cronbach alpha coefficient's being .91 (Time 1), .88 (Time 2), and .92 (Time 3) respectively.

Table 4.4

Factor inter-correlations for PAF analysis on the 17-item PCL-C across the three data collection phases.

	Time 1		Time 2		Time 3	
Factor	Intrusion	Numbing	Intrusion	Numbing	Intrusion	Numbing
Numbing	.61		.54		.55	
Alert	.51	.69	.56	.44	.63	.56

4.3.3 Traumatic Stress Experiences Scale – Revised (TSES-R). The TSES-R uses a multiple column format which includes a measure of trauma exposure frequency (column

1), perceived trauma severity (column 2) and current trauma reaction (column 3). The scale developers (Swan & Hodson, 2004) suggest that there is evidence that the scale can be further divided into a three-factor solution corresponding to trauma to self, trauma to others (not caused by self) and trauma to others (caused by self). Only data from Column 1 which measures trauma exposure frequency were collected at pre-deployment to provide a baseline of prior trauma exposure. Data from all three columns were collected at the remaining two time periods.

Exploratory factor analyses of the 12-item TSES-R were conducted at each of the three administrations of the TSES-R for column 1 (trauma exposure) in order to determine firstly, whether it maintained the three factor structure suggested by Swan and Hodson (2004) with this population and, secondly, to determine if the scale maintained the suggested factor structure across the administrations. Analyses revealed the presence of three factors with eigenvalues exceeding one for the pre-deployment administration, four factors at RtAPS, and a five-factor solution at post-deployment. These results did not accord with the Swan and Hodson (2004) findings and showed considerable variability across the administrations.

Two notable features of the column 1 analyses were the large proportion of variance accounted for by the first eigenvalue and the correlations among the factors, which together suggested that a one-factor solution may be preferable. An inspection of the scree-plots at each administration revealed a clear break after the first principal component in each case and supported the use of a one-factor solution. A one-factor solution was therefore requested. This decision also accords with the literature (Hodson, 2002; Hodson et al., 2003; Swann & Hodson, 2004), which indicates that single scores are usually extracted from the TSES-R to represent the categories of trauma exposure, severity, and current effect. The item loadings and percent of variance explained by a general factor for each column across the administrations are shown in Table 4.5.

Table 4.5

General factor loadings and percent of variance for PAF analysis on the 12-item TSES-R across columns and data collection phases.

Item[a]		Column 1 Trauma Exposure			Column 2 Severity		Column 3 Current	
No.	Description	T1	T2	T3	T2	T3	T2	T3
1	Danger of being killed	.72	.83	.72	.84	.56	.72	.68
2	Danger of being injured	.69	.84	.71	.82	.59	.73	.64
3	Handle dead bodies	.70	.20	.31	.27	.41	.23	.44
4	Saw dead bodies	.74	.26	.40	.32	.51	.39	.55
5	Heard of friend injured/killed	.65	.30	.40	.30	.55	.38	.67
6	Saw friend injured/killed	.56	.30	.46	.38	.53	.47	.46
7	Exposed to contagion or toxin	.47	.34	.30	.37	.41	.39	.43
8	Witness to human degradation	.54	.38	.40	.30	.45	.38	.52
9	Heard of loved one injured/killed	.42	.21	.20	.29	.30	.33	.20
10	Saw loved one injured/killed	.36	.19	.26	.26	.35	.11	.17
11	Your inaction caused injury	.45	.30	.51	.28	.47	.39	.46
12	Your inaction caused death	.44	.30	.49	.13	.44	.31	.37
% of explained variance		38.16	23.15	26.80	23.70	28.54	24.81	29.86

Note: [a]Some item content has been summarised for brevity

It can be seen from Table 4.5 that not all items achieved the cut-off loading of .30. This outcome is probably due to the fact that TSER-R has more of the characteristics of an index than a scale (Diamantopoulos & Winklhofer, 2001), lending further weight to the decision to sum the items within each category (exposure, severity and current). The TSES-R columns showed good internal consistency at each administration with the Cronbach alpha coefficient's ranging from .68 to .84. When applied to indexes, internal consistency estimates of reliability are not always high (Diamantopoulos & Winklhofer, 2001), so these estimates were judged to be satisfactory.

4.3.4 Alcohol Motivations Questionnaire (AMQ). Psychometric analyses of the AMQ revealed that the item distributions were asymmetric and, in some cases, displayed excessive kurtosis. In such situations, Muthen and Kaplan (1985) recommend that factor analyses be conducted on polychoric, rather than Pearson product moment correlations. SPSS does not provide this option so Lorenzo-Seva and Ferrando's (2006) FACTOR program was used to analyse the AMQ data for both pre-deployment and post-deployment. Horn's (1965) parallel analysis method was used to determine the number of components to extract. For both data sets, parallel analysis suggested that four components was the optimum number. These four components were clearly recognizable as the four hypothesized dimensions described in Chapter 3, but many of the items displayed factorial complexity.

In response to this concern, further analyses revealed that a two-factor solution consistently emerged across the two administrations with the two factors being interpreted as coping (to reduce internal negative affective states) and enhancement (To increase internal positive states). Item component loadings and percent variance explained by these two factors across the two administrations are shown in Table 4.6. These two items are consistent with those commonly found in the literature that has explored models of alcohol consumption motivation (Cooper, 1994; Cooper et al., 1995; Crutzen et al., 2013).

When items that displayed factorial complexity were omitted, two clear dimensions emerged. Firstly, a coping dimension defined by the items: stressed, upset, angry, frustrated, depressed, de-stress, help with sleep, to feel better, reduce physical pain, reduce emotional pain, fear and escape. Secondly, an enhancement component defined by the items: reward, pleasure, relaxing, and social interaction. These two dimensions formed the basis of two scales that were then used in later statistical modeling work.

Table 4.6

Factor loadings and percent of variance for PAF analysis on the 20-item AMQ across the two data collection phases.

Item[a]		Component			
		Coping		Enhancement	
No	Description	T1	T3	T1	T3
1	Stressed	.64	.88		
2	Upset	.85	.90		
3	Angry	.87	.86		
4	Frustrated	.81	.94		
5	Depressed	.94	.95		
6	De Stress	.49	.56		
7	Sleep	.68	.74		
12	Feel Better	.84	.69		
13	Physical Pain	.93	.86		
14	Emotional Pain	.91	.96		
16	Fear	.91	.78		
20	Escape	.65	.69		
8	Reward			.73	.76
9	Pleasure			.66	.67
17	Relaxing			.58	.42
18	Social Interaction			.73	.53
10	Social Pressure	.40		.43	.31
11	Habit	.69	.39		.55
15	Boredom	.52	.42		.40
19	Confidence	.46		.32	.49
% of explained variance		45.8	45.4	12.9	14.4

Note: [a] some item content has been summarised for brevity

Small to moderate (Cohen, 1988, 1992) correlations between the two factors were found at Time 1 ($r = .23$) and Time 3 ($r = .40$). The total response scores were computed for the AMQ two-factor solution by summing the item-level scores and dividing by the number of items in the factor. The coping factor inclusive of items 1 – 7, 12 – 14 and items 16 and 20 showed good internal consistency with satisfactory Cronbach alpha coefficients at each administration (.80 & .82 respectively). The internal consistency for the enhancement factor was low with Cronbach alpha coefficients reaching .50 and .40 respectively.

4.3.5 Defense Styles Questionnaire (DSQ). Prior research into the DSQ found a two-factor solution consisting of a mature and immature defensive style at the expense of a third Neurotic factor (Andrews et al., 1989). Exploratory factor analysis of the DSQ were conducted in order to allow for comparisons with previous factor analyses of this instrument with the current population, adopting similar statistical procedures as used Andrews, et al., (1989). Analyses revealed the presence of two factors with eigenvalues exceeding one explaining 17.58% and 8.52% of the variance. The analyses further demonstrated that the factors corresponded to the proposed mature and immature factors with the neurotic items contributing to the immature factor. The item loadings and percent variance explained by each of these factors is shown in Table 4.7.

Total variance accounted for by the two-factor solution was 26.02% with six items not achieving the .30 loading cut-off. All items noted in Andrews, et al., (1989) as loading onto a neurotic factor were found in this research to load onto the immature factor apart from item 27 (reaction formation), which did not reach the required loading cut off on either factor. Similarly, the majority of items the literature places in the immature factor loaded onto the immature factor in the current analysis apart from item 11 (devaluation), item 18 (denial), items 20 & 26 (splitting) and item 15 (rationalization). Again, these items failed to reach the

Table 4.7

Factor loadings and percent of variance for the 36-item DSQ.

Item[a]	Factors	
	Immature	Mature
Work things out in my daydreams (16)	.66	
People tell me I have a persecution complex (12)	.63	
Someone is emotionally robbing me (10)	.62	
Everyone is against me (21)	.62	
Physically ill when things don't go well (13)	.58	
Keep getting into the same frustrating situations (5)	.55	
Get a headache when have to do things I don't like (25)	.54	
I'm a very inhibited person (14)	.54	
I'm very shy about approaching people (17)	.53	
People say I ignore unpleasant facts (9)	.51	
People often call me a sulker (1)	.50	
Habits or rituals which I feel compelled to do (32)	.49	
I act like a child when frustrated (7)	.45	
People tend to mistreat me (8)	.41	
I'm always treated unfairly (3)	.38	
Need to compensate for aggressive thoughts (36)	.35	
Don't feel strong emotions when I should (34)	.35	.34
I apologise for my assertiveness (30)	.33	
When someone close to me dies, I don't feel upset (29)	.31	
Someone I know is a guardian angel (19)	.30	
Some people are plotting to kill me (23)	.30	
My friends see me as a clown (15)	.29	
I pride my ability to cut people down to size (11)	.29	
If you're bad, you're all bad (26)	.29	
I fear nothing (18)	.24	
People are either good or bad (20)	.23	
I plan ways to cope with difficult situations (28)		.55
I'm usually able to see the funny side (24)		.55
I work out my anxiety by doing something (4)		.53
Doing tasks stops me feeling anxious / depressed (35)		.47
I'm able to keep problems out of my mind (2)		.44
I am able to laugh at myself easily (6)		.43
I can keep the lid on my feelings (22)		.43
Hard work makes me feel better (31)		.35
I can cope better if I can predict I will be sad (33)		.32
We should not get angry at people we don't like (27)		.19
Percent of explained variance	17.58	8.52

Note: [a]Some item content has been summarised for brevity required loading cut-off for either factor. Items which loaded onto the mature scale accord with those advised in Andrews, et al. (1989).

Allowing a greater number of factors to emerge did not result in the appearance of a factor defined by the neurotic items. Such a factor could not be recovered from these data. This result concurs with the Andrews, et al., (1989) findings. The two factors were uncorrelated ($r = .09$, $p > .05$), reinforcing the view that these are separate constructs. Given this outcome, all subsequent analyses were conducted utilizing the two factors, mature and immature. Mean response scores were computed for the two DSQ factors by summing the scores and dividing by the number of items in the factor. Both scales showed acceptable internal consistency with the Cronbach alpha coefficient's being .84 (immature) and .70 (mature).

4.3.6 Ten Item Personality Inventory (TIPI). The TIPI was developed as a very brief measure of the Big Five personality factors and with only two items per scale the TIPI has been found to have relatively low inter-item correlation and low internal consistency estimates (Gosling et al., 2003). The negatively worded items (2, 4, 6, 8, & 10) were reversed scored. Exploratory factor analyses were conducted on the TIPI items to investigate the potential factor structure. The Root One criterion revealed a three-factor solution which did not fit any of the three models for the Big Five Personality characteristics noted in the literature: a five-factor model (Gosling et al., 2003), a two-factor model (DeYoung, 2006; Digman, 1997), or a one-factor model (Erdle, Irwing, Rushton, & Park, 2010; Rushton, Bons, & Hur, 2008; Rushton & Irwing, 2009). A one-factor model akin to the one-factor model proposed by Erdle, et al., (2010) accounted for a reasonable 25.65% of the variance. The item loadings and percent variance explained by the one-factor model is shown in Table 4.8.

Table 4.8

Factor loadings and percent of variance explained for the PAF analysis on the TIPI.

Item[a]		General Factor of Personality
No.	Description	
1	Extraverted, enthusiastic	.40
2[a]	Critical, quarrelsome	.18
3	Dependable, self-disciplined	.48
4	Anxious, easily upset	.54
5	Open to new experiences, complex	.42
6	Reserved, quiet	.28
7	Sympathetic, warm	.22
8	Disorganized, careless	.53
9	Calm, emotionally stable	.60
10	Conventional, uncreative	.39
% of explained variance		25.65

Note: [a]Even-numbered items were reverse-scored.

Given the support in the literature for the validity of the 10-item TIPI as a measure of the Big Five (Gosling et al., 2003), separate trait scores were calculated by averaging items into the Big-Five categories.

4.4 Chapter Summary

This chapter has reported the issues relating to data screening and the psychometric validation of the scales administered in this research. The factorial validations of the component measures to be used as variables for further data analysis showed a number of inconsistencies in item loadings across administrations for the psychological distress outcome measures (K10 and PCL-C) and for trauma experience measure (TSES-R). Inspection of the scree-plots revealed a clear break after the first principal component in each case and the strong, positive inter-correlations found between the factors for the K10 at each administration, provided evidence that a common factor underlies the K10 scale. These findings supported the decision to use the general factor model (K10 total score) as the outcome variable for the K10 in all further analyses. Similar results were also found for the PCL-C and the TSES-R providing justification for the decision to use the total score, as the PCL-C outcome variable and the individual column totals for the TSES-R outcome variables in all further analyses investigating the outcomes of these measures.

Exploratory factor analysis conducted on polychoric correlations of the AMQ data using Horn's parallel analysis (Horn, 1965) revealed a two-factor solution consistently emerging across the two administrations, with the two factors being interpreted as coping and enhancement. Small to moderate correlations (Cohen, 1988, 1992) between the two factors supported the two-factor solution. Exploratory factor analysis of the DSQ data confirmed the two-factor structure found in previous research (Andrews et al., 1989), which consisted of a mature and immature defensive coping style at the expense of a third neurotic factor. The two factors were uncorrelated, reinforcing the decision to interpret these factors as two separate constructs. As expected, inconsistent and uninterpretable data was found for a proposed five-factor TIPI solution; however, given the support in the literature for the validity of the TIPI as a measure of the Big Five (Gosling et al., 2003), separate trait scores were calculated.

As a result of the factorial analyses it was concluded that the following variables would be used for future analyses (a) K10 total score, (b) PCL-C total score, (c) TSES-R column total scores, (d) AMQ two-factor solution (coping, enhancement), (e) DSQ two-factor solution (immature and mature), and (f) TIPI five factor solution (openness, conscientiousness, extraversion, agreeableness, and emotional stability).

The following chapter investigates the first of the research questions which examines whether alcohol use changes in an ADF sample over time following the deployment experience from pre-deployment to six-months post-deployment.

Chapter 5: Results - Association Between Alcohol Use Behaviours and Deployment.

5.1 Chapter Overview

The purpose of this chapter was to explore Research Question One "*Does alcohol use change over time following operational deployment (from pre-deployment to three – six months post-deployment)?*" The chapter begins by briefly discussing the relevant literature and then reviews the aspects of the Method that are pertinent to this specific research question. The results that explore relationships between the Time 1 (pre-deployment) and Time 3 (post-deployment) AUDIT variables (total, frequency, severity) and AUDIT risk groups (low, medium, high) are presented before summarising the key findings and conclusions.

5.2 Introduction

Problematic alcohol use in veteran populations has been well documented (Bray et al., 2013; Clarke-Walper et al., 2014; Davy et al., 2012; Jones & Fear, 2011; Wilk et al., 2010). For example, studies of Australian Vietnam and Korean veterans have revealed that problematic alcohol use is the most commonly reported disorder (Department of Veterans Affairs, 2003b, 2005a) and Australian Gulf War veterans have been found to be at increased risk of developing an alcohol use disorder (Department of Veterans Affairs, 2003a; Mckenzie et al., 2009; Monash University, 2003).

While rates of alcohol use disorder for US and UK contemporary veterans of the Iraq and Afghanistan conflicts have been found to be higher than in the general population (Bray & Hourani, 2007; Bray et al., 2010; Jacobson et al., 2008; M. J. Larson et al., 2012), results of the 2010 Australian Defence Force Mental Health Prevalence and Wellbeing study found that rates of any alcohol disorders in the ADF were lower than the general Australian population

(12 month prevalence: males 5.6%, females 2.2% vs. males 8.8%, females 5.1% (McFarlane, Hodson, Van Hooff, & Davies, 2011).

A 2006 review of findings from the RtAPS and POPS data for ADF personnel deployed to OP Catalyst in the MEAO over the period Jan 03 – Jul 05 (Steele & Twomey, 2006) highlighted that although the majority of personnel consumed alcohol within the low-risk levels, there was a high percentage of personnel reporting AUDIT scores in excess of low-risk guidelines with a notable number consuming alcohol at hazardous and harmful levels. This study did not measure pre-deployment alcohol use and was therefore unable to assess whether the deployment experience influenced post-deployment alcohol use.

The MEAO Prospective Health study (Davy et al., 2012) did assess pre-deployment drinking behaviours and found that although the overall change in mean from pre- (M = 6.7) to post-deployment (M = 6.8) was not statistically significant, 14.4% of respondents reported an increase in the level of alcohol consumption pre- to post-deployment. Approximately, 67.7% of respondents scored within the low-risk drinking ranges on the AUDIT at post-deployment and this high percentage of low-risk drinkers may have diluted the results tempering the significance of those who did report increased alcohol use.

Relatively few other studies have investigated the effect of deployment on binge-drinking behaviours; however, those that have, found that binge-drinking may be a better discriminator of possible deployment related problem drinking than measures of frequency of alcohol consumption (Mills et al., 2006). In military studies, rates of binge drinking appear to increase both prior to (Duma et al., 2010) and immediately after deployment (Ames et al., 2007). In one study, 16% of the US veteran sample who deployed between 2008 – 2011 retrospectively reported binge-drinking (6+ drinks on one occasion) prior to deployment; however, one-month post-deployment 25.6% of the respondents returning from a combat deployment in the past year reported binge drinking at least weekly (Adams et al., 2012; M. J. Larson et al., 2013).

In summary, there is evidence to suggest an association between deployment and post-deployment alcohol use. However, there is significant variability in relation to the strength of this association. Given this variability, this chapter aims to investigate the association between deployment and alcohol utilising a longitudinal design to assess changes in alcohol use behaviour from pre- to post-deployment.

5.3 Review of Method

5.3.1 Measures. The AUDIT (Saunders, Aasland, Amundsen, et al., 1993; Saunders, Aasland, Babor, et al., 1993) was administered at two time points: pre-deployment (Time 1) and post-deployment (Time 3). Although internal consistency is not a requirement of indexes (Diamantopoulos & Winklhofer, 2001), the AUDIT showed reasonable internal consistency at each administration with the Cronbach alpha coefficient reaching .74 at both administrations.

The AUDIT responses were categorised in four different ways for the purposes of analyses. Firstly, an overall score indicating relative risk of drinking behaviour (AUDIT total). Secondly, Question 1 of the AUDIT asks the respondents to indicate “How often do you have a drink containing alcohol?” providing an indication of ‘f*requency’* of alcohol consumption. Question 3 asks respondents to indicate “How often do you have six or more drinks on one occasion?” providing an indicator of ‘*severity’* of binge-drinking behaviours. Finally, in accordance with the ADF specifications outlined in the Defence Health Bulletin 9/2003 (Department of Defence, 2003), the data were categorized in relation to level of risk with scores 0 – 7 indicating low risk, 8 – 15 indicating medium risk, and 16 – 40 indicating a high level of risk.

The AUDIT is described in more detail in Chapter 3 (Methodology) and validated in Chapter 4 (Instrument Validation).

5.3.2 Sample sizes. Figure 5.1 shows that of the 676 participants whose data were used in this study (See Chapter 3, Figure 1), 438 participants completed the AUDIT at the pre-deployment time point (Time 1) and 518 participants completed the AUDIT at post-deployment (Time 3). The analyses investigating the influence of the Time 1 alcohol use on Time 3 alcohol related behaviour used only those Time 1 AUDIT scores that also had a corresponding Time 3 AUDIT score (n = 292). As discussed in Chapter 3 (Method), Time 2 AUDIT scores were not collected as Australian Servicemen and women are not permitted to consume alcohol while operationally deployed.

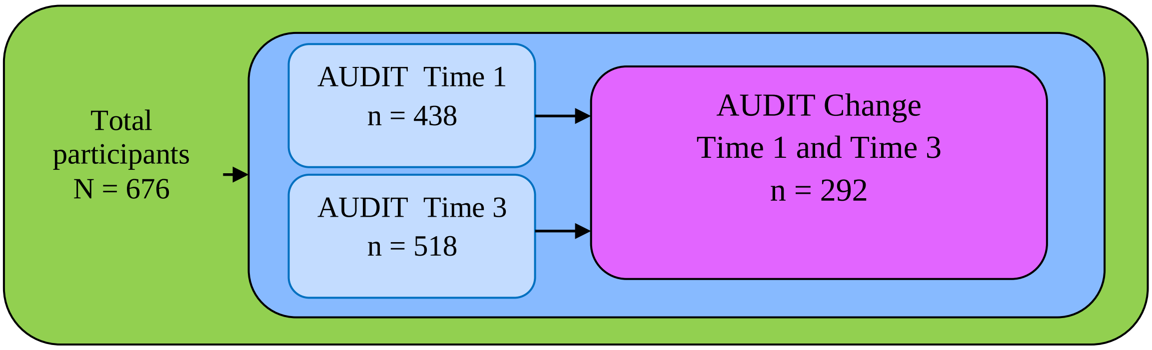

Figure 5.1 Summary of sampling and response for the AUDIT

5.3.3 Data analysis. The analyses began by examining the relationship between Time 1 (pre-deployment) and Time 3 (post-deployment) AUDIT variables (AUDIT total, frequency and severity) through the exploration of the descriptive statistics (means, standard deviations, and percentage) for the entire sample. Those respondents who completed the AUDIT at both Time 1 and Time 3 were separated out in order to examine the paired-sample through the use of Pearson product moment correlations and paired samples t-tests. Cross-tabulation analyses were used to explore the associations between Time 1 and Time 3 alcohol consumption risk when the sample was divided into consumption risk groups (low, medium, high). Consumption risk groups were calculated by allocating those participants with an AUDIT score of 0 – 7 to Group 1 (low risk); scores of 8 – 15 to Group 2 (medium risk); and the remainder (16 – 40) to Group 3 (high risk). A 'change' score for each participant was calculated by detracting the Time 1 AUDIT score from the Time 3 AUDIT score.

5.4 Relationship Between Time 1 and Time 3 AUDIT Variables

Table 5.1 shows that 438 respondents completed the AUDIT at Time 1, with the majority reporting participating in low-risk drinking behaviours with the average total alcohol consumption behaviour rating being 6.38. Similarly, the majority of the 518 respondents who completed the AUDIT at post-deployment also reported consuming alcohol in the low-risk range with an average AUDIT total score of 6.42. An independent-samples t-test found that the change between the overall scores for the entire population was not significant at $t(954) = -.12$, p (2-tailed) = .90, 95% *CI* [-.53, .47]. Overall, the results showed that the sample tended to consume alcohol in fairly consistent patterns regardless of deployment experience.

Table 5.1

Means and standard deviations for Time 1 and Time 3 AUDIT total, frequency and severity.

	Time 1 AUDIT Scores			Time 3 AUDIT Scores		
	Total	Frequency	Severity	Total	Frequency	Severity
Mean	6.38	2.21	1.54	6.42	2.35	1.67
SD	3.93	0.93	1.00	3.96	0.93	0.98
N	438	438	438	518	518	518

Participants reported consuming alcohol on average, one to two occasions per month (M = 2.21) at Time 1 which is comparable to their overall reported frequency of alcohol consumption at Time 3 (M = 2.35). Although, the respondents reported generally consuming on average, one to two occasions per month at both time points, an independent samples t-test found that change in the mean scores was significant $t(954) = -2.24$, p (2-tailed) < .05, 95%

CI [-.25, -.02] signaling an increase in the frequency of alcohol consumption following deployment.

The overall sample reported consuming six or more drinks on one occasion less than monthly (M = 1.54) at Time 1 and also at Time 3 (M = 1.67). Although, the respondents reported generally consuming six or more drinks on one occasion less than monthly at both time points, an independent samples t-test found that change in the mean scores was significant $t(954) = -1.97$, p (2-tailed) < .05, 95% *CI* [-.25, -.01], signaling an increase in the severity of alcohol consumption following deployment.

In relation to the samples frequency of pre-deployment drinking behaviour (Time 1), Table 5.2 show that of the 438 respondents, just over a third (34.7%) reported consuming alcohol on more than two occasions per week with this number increasing by approximately 8% at post-deployment (Time 2). Approximately 5% of the sample reported being non-drinkers at Time 1; however this number reduced to approximately 3% Time 3.

Table 5.2

Overall AUDIT frequency percentage scores at Time 1 and Time 3.

	Time 1		Time 3	
	n	%	n	%
Never	22	5.0	17	3.3
Once a month	50	11.4	59	11.4
2-4 times/month	214	48.9	221	42.7
2-3 times/week	116	26.5	168	32.4
>4 times/week	36	8.2	53	10.2
Total	438		518	

In relation to the samples severity of binge-drinking behaviour, Table 5.3 shows that of the 438 respondents, 20.3% reported participating in binge-drinking behaviour at least once a week prior to deployment (Time 1); with this number showing a slight increase to 24.9% post-deployment (Time 3). A small reduction in the number of respondents reporting never participating in binge-drinking behaviour pre- (14.6%) to post-deployment (10.2%) was noted.

Table 5.3

Overall AUDIT severity percentage scores at Time 1 and Time 3.

	Time 1		Time 3	
	n	%	n	%
Never	64	14.6	53	10.2
<1/month	168	38.4	200	38.6
Monthly	117	26.7	136	26.3
Weekly	83	18.9	124	23.9
Daily	6	1.4	5	1.0
Total	438		518	

As indicated previously, 292 participants completed the AUDIT at both the Time 1 and Time 3 data collection points. As such, only the data from these 292 participants were used in the next series of analysis.

Table 5.4 shows that for respondents who completed the AUDIT at both Time 1 and Time 2 (n = 292), the average total AUDIT scores were 6.39 and 6.20 respectively, indicating on average participants are consuming alcohol within low-risk levels. Similar results were found for the severity and frequency of alcohol consumption. Overall, the reported level of alcohol consumption appears to be within the low-risk ranges and remains relatively steady across the two administrations; although, the frequency of alcohol use showed a tendency to increase over time.

Table 5.4

Means and standard deviations for Time 1 and Time 3 AUDIT total, frequency and severity by paired group (N = 292).

	Time 1 AUDIT Scores			Time 3 AUDIT Scores		
	Total	Frequency	Severity	Total	Frequency	Severity
Mean	6.39	2.21	1.53	6.20	2.31	1.60
SD	3.83	0.90	1.00	3.95	0.91	0.97

Table 5.5 shows the results of Pearson product-moment correlations calculated between Time 1 and Time 3 AUDIT total, frequency and severity scores for the matched sample (n = 292). The analyses revealed a large (Cohen, 1988, 1992) positive relationship between the Time 1 and Time 3 AUDIT total scores (r = .54); large positive correlations for Time 1 / Time 3 frequency (r = .61) scores; and large positive correlations for Time 1 / Time 3 severity (r = .55) scores.

Table 5.5

Pearson product-moment correlations between Time 1 and Time 3 AUDIT total, frequency and severity scores (n = 292).

		Time 3 AUDIT Scores		
		Total	Frequency	Severity
Time 1 AUDIT	Total	.54**	.34**	.56**
	Frequency	.36**	.61**	.40**
	Severity	.49**	.36**	.55**

Results of paired-samples t-tests (Table 5.6) on the matched groups AUDIT total scores found no significant differences between the Time 1 (M = 6.38) and Time 3 (M = 6.42) administrations, $t(291) = .86$, p (2-tailed) = .39, 95%, CI [-.24, .62]. Similarly, no significant differences between the Time 1 (M = 1.53) and Time 3 (M = 1.60) administrations for severity, $t(291) = -1.31$, p (2-tailed) = .192, 95% CI [-.18, .04]. A significant difference was found between the mean Time 1 frequency (M = 2.21) and Time 3 (M = 2.31) administrations, ($t(291)$ = -.2.13, p (2-tailed) = .03, 95% CI [-1.91, .-.01]). Overall, the reported level of alcohol consumption appears to be within the low-risk ranges and remains relatively steady across the two administrations; although, the frequency of alcohol use showed a tendency to increase over time.

Table 5.6

Paired samples t-test comparisons between Time 1 and Time 3 AUDIT total, frequency and severity scores (n = 292).

	Mean	SD	SEM (CI)	t	df	Sig (2-tailed)
T1*T3 Total	0.19	3.72	.22 (-.24, .62)	.86	291	.388
T1*T3 Frequency	-.10	.79	.05 (-.19, -.01)	-2.13	291	.034
T1*T3 Severity	-.07	.94	.06 (-.18, -.04)	-1.31	291	.192

Cross-tabulation analyses (Table 5.7) show that when divided into the gross measures of alcohol consumption risk groups (low, medium, high) there was a significant association between the pre- (Time 1) and post-deployment (Time 3) alcohol consumption risk, $x^2(4)$ =

49.22, $p < .001$. As the variables each contained more than two categories, Cramer's V was used to measure the strength of the association between the Time 1 and Time 3 variables (Field, 2009). The Cramer's V statistic was also significant (.29) and represented a medium correlation (Cohen, 1988, 1992) between the Time 1 and Time 3 alcohol consumption risk.

Table 5.7

Contingency table for Time 1 to Time 3 AUDIT risk groups.

Risk		Time 3 AUDIT Scores			Total
		Low Risk	Medium Risk	High Risk	
Time 1 AUDIT Scores	Low Risk	169	30	3	202
	Medium Risk	38	37	5	80
	High Risk	5	2	2	9
Total		212	69	10	291
		$x^2(4) = 49.22$, $p < .001$; Cramer's V = .29, $p < .001$			

Table 5.7 describes significant intra-individual variation; however, while there is movement of individuals between risk groups, the vast majority of respondents did not appear to change their alcohol consumption risk and those that did, tended only to shift to an adjacent risk group. As can be seen from Table 5.7, a total of 45 people moved to a lower risk category and 38 people moved to a higher risk category; however, the majority of respondents (n = 208) retained their pre-deployment alcohol consumption risk category at post-deployment.

Although Table 5.7 revealed that 38 respondents (approx 13%) moved into a higher risk category, Table 5.8 shows that when taking into consideration smaller increments of change, approximately 24% (36.6% overall) more of the population reported an increase in overall AUDIT total from Time 1 to Time 3. A slightly larger number of respondents (40.4%) reported a decrease in AUDIT total and approximately 23% remain stable over from Time 1 to Time 2. Frequency and severity of alcohol consumption showed a different pattern from the AUDIT total, with approximately over half of the respondents reporting nil change in frequency (57.2%) and severity (51.0%) of alcohol consumption from Time 1 to Time 3. Consistency was also shown in the number of respondents reporting a decrease in the frequency (26.0%) and severity (27.7%) of alcohol consumption. Similar results were seen in the number of respondent reporting an increase in the frequency (16.8%) and severity (21.2%) of alcohol consumption over time.

Table 5.8

Time 1 to Time 3 change group percentage scores for AUDIT total, frequency and severity (n = 292).

	Total		Frequency		Severity	
	n	%	n	%	n	%
Decrease	118	40.4	76	26.0	81	27.7
Stable	67	22.9	167	57.2	149	51.0
Increase	107	36.6	49	16.8	62	21.2

5.5 Chapter Summary

Overall, the reported level of alcohol consumption appears to be within the low-risk ranges and remains relatively steady across the two administrations. This result is generally consistent with the MEAO Prospective Study (Davy et al., 2012) at pre-deployment. However, it is lower than the post-deployment average found for a roughly equivalent ADF sample (mean = 7.40) (Steele & Twomey, 2006). Nevertheless, the results also demonstrate that although the majority of the sample tended to consume alcohol at low-risk levels, irrespective of deployment experience, there is a propensity for the group to increase their frequency and severity of alcohol consumption across time. Similar results were found when the sample was matched; however, only the frequency of alcohol use showed a tendency to increase following deployment.

These analyses also found that although there is little change for the majority of the group from pre- to post-deployment, there were groups of participants whose drinking behaviour did change over time. One group of people was found to be at increased risk of alcohol misuse following deployment. Another group of participants demonstrated a decreased risk of alcohol consumption post-deployment.

Finally, these results suggest that the overall AUDIT score does not tell us the whole story in relation to the influence of deployment on alcohol-consumption risk, and as a consequence it is important to assess the measures of frequency and severity of alcohol use. These results also do not provide insight into the complex matrix of factors that influence an individual's alcohol consumption risk. They do not identify the factors that will influence one group of people to decrease alcohol use following deployment while another group will increase alcohol use when exposed to similar experiences. Given these gaps in understandings, the next chapter (Chapter 6) will address Research Question Two which asks "*Can pre-deployment characteristics be used to predict the course of alcohol consumption from pre- to post-deployment?"*

Chapter 6: Results - Impact of Pre-Deployment Characteristics on the Course of Alcohol Consumption

6.1 Chapter Overview

The purpose of this chapter is to examine Research Question Two "*Can pre-deployment characteristics be used to predict the course of alcohol consumption from pre- to post-deployment?*" The chapter beings by briefly discussing the relevant literature and then reviews the aspects of the Method that are pertinent to Research Question Two. The results that explore the associations between Time 1 (pre-deployment) characteristics and patterns of alcohol use (AUDIT total, frequency, severity) across time (Time 1, Time 3, Time 1/Time 3 change) are then presented before summarising the key findings and conclusions.

6.2 Introduction

Problematic alcohol use in veteran populations has been well documented (Bray et al., 2013; Clarke-Walper et al., 2014; Davy et al., 2012; Jones & Fear, 2011; Wilk et al., 2010). As reported in Chapter 5, the reported level of alcohol consumption for this population appears to be within the low-risk ranges and remains relatively steady across the two administrations. However, there was a demonstrated propensity for the group to increase their frequency and severity of alcohol consumption over time. The results presented in Chapter 5 also indicated that although there was little change for the majority of the participants from pre- (Time1) to post-deployment (Time 3), there was a group who demonstrated an association between an increased risk of alcohol misuse and deployment. What these results do not provide, is an insight into the complex matrix of factors that influence an individual's alcohol consumption risk.

There have been no studies that have examined the association between individual characteristics and the course of alcohol use across the deployment cycle using the gold standard prospective longitudinal design (see Chapter 3). Despite this, there is evidence to suggest that personality variables may play an important role in the development, course and severity of a range of mental health presentations including alcohol use disorders (Grana et al., 2009; Jackson & Sher, 2003; Kornor & Nordvik, 2007; Martin & Sher, 1994; McCormick et al., 1998; Sher et al., 2000). Personality traits have also been shown to interact with the development and experience of mental health concerns in general and problematic alcohol use in military veterans (Borja et al., 2009; Caska & Renshaw, 2013; Miller et al., 2006). A longitudinal study utilizing a veteran population found strong associations between the personality trait of neuroticism, PTSD severity and alcohol misuse (Kehle et al., 2012). In contrast, another study using a similar Iraq War veteran population found that while neuroticism predicted PTSD and depressive symptoms at the pre- and post-deployment time-points, alcohol misuse was not significantly predicted by any of the Big-Five personality variables investigated in that study (James et al., 2013).

A further factor that has been posited to provide a moderating effect on alcohol use post-deployment, is an individual's defensive coping style. A few studies have specifically investigated the interrelations between coping styles and co-morbid disorders or symptoms, such as problematic alcohol use, in relation to deployment stressors and trauma related symptoms (Bray et al., 1999; Breslau et al., 1999; Breslau et al., 2003; Breslau et al., 2004; Federman et al., 2000). Investigations have, for example, shown that habitually used unconscious defensive / coping styles will impact on the strategies used to defend against stressors (Bond, 1986; Brennan et al., 1990). This suggests that differences in defensive coping styles could ameliorate the impact of stressors on an individual's psychological well-being and adjustment post-deployment, which in turn impact on the use of maladaptive coping strategies such as alcohol misuse to manage stress reactions.

Additionally, studies examining contemporary veterans (Iraq / Afghanistan) have also found evidence to support the association between symptoms of trauma and depression that exist prior to deployment and post-deployment alcohol use patterns and dependence, however, the evidence is conflicting. For example, Kline et al. (2014) suggested that pre-deployment trauma symptom severity significantly increased the risk of problematic alcohol use post-deployment. Conversely, Marshall et al. (2012) found that pre-deployment reports of depression and / or PTSD symptoms were not found to be predictive of post-deployment alcohol misuse. There are also mixed findings about the temporal order of disorder primacy. For example, do substance disorders increase the risk of another mental health disorder, or does the presence of a pre-existing mental health disorder make an individual more susceptible to substance misuse? Furthermore, little is known about the causal pathways that may explain these associations (Breslau et al., 2003; Conrod et al., 2011; Conrod & Stewart, 2003; Rachman, 1991).

In summary, while there is evidence to suggest that pre-deployment psychological distress and trauma experience can influence alcohol consumption, it is also evident that individual differences can mediate alcohol related behaviours. Research, suggests that differences in coping styles may ameliorate the impact of stressors on an individual's psychological well-being and alcohol consumption post-deployment. There is also a growing body of evidence that suggests that personality variables may play an important role in the development, course and severity of a range of mental health presentations including problematic alcohol consumption behaviours. What is unclear, is whether these characteristics and pre-deployment levels of mental health risk and trauma exposure are important predictors in the post-deployment alcohol behaviours. Hence, this chapter will review the results related to the association between characteristics (psychological distress, trauma experiences, coping styles and personality traits) and the course of alcohol consumption over time from pre-deployment (Time 1) to post-deployment (Time 3).

6.3 Review of Method

6.3.1 Measures. Two measures were administered during pre-deployment (Time 1) baseline data collection to assess broad personality traits and coping styles. First, the TIPI (Gosling et al., 2003) was administered to assess the participants' personality traits along five-dimensions; openness to experience, conscientiousness, extraversion, agreeableness and emotional stability. Second, two of the three dimensions (mature and immature – see Chapter 4) in the DSQ (Andrews et al., 1989) were used to assess individual habitual coping styles.

Three measures were administered during pre-deployment to capture trauma exposure and levels of mental health risk. Firstly, Column 1 of TSES-R (Hodson, 2002) was administered to assess the level of trauma exposure pre-deployment (base-line). The column total was used in the data analysis. The PCL-C (Andrews et al., 1989; Weathers et al., 1993) which was designed to screen for trauma symptomatology was also administered in addition to the final measure, the K10, which is a measure of felt psychological distress. Both the K10 and PCL-C produce a total score indicating severity of symptoms.

The Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aasland, Amundsen, et al., 1993; Saunders, Aasland, Babor, et al., 1993) was administered at Time 1 (pre-deployment) and Time 3 (post-deployment). Although internal consistency is not a requirement of indexes (Diamantopoulos & Winklhofer, 2001), the AUDIT showed reasonable internal consistency at each administration with the Cronbach alpha coefficient reaching .74 at both administrations.

The AUDIT responses were categorised in four different ways for the purposes of analyses. Firstly, an overall score indicating relative risk of drinking behaviour (AUDIT Total). Secondly, Question 1 of the AUDIT asks the respondents to indicate "How often do you have a drink containing alcohol?" providing an indication of '*frequency*' of alcohol consumption. Question 3 of the AUDIT asks respondents to indicate "How often do you have six or more drinks on one occasion?" providing an indicator of '*severity*' of binge-drinking behaviours. Finally, an assessment of Time 1 to Time 3 change in alcohol behaviours was gained by detracting each individuals Time 3 AUDIT scores from the respective Time 1 AUDIT score.

The measures were more fully described in Chapter 3 (Methodology) and validated in Chapter 4 (Instrument Validation).

6.3.2 Sample sizes. Figure 6.1 shows that of the 676 participants whose data were used in this study (See Chapter 3, Figure 1), 438 participants completed the AUDIT at the pre-deployment time point (Time 1) and 518 participants completed the AUDIT at post-deployment (Time 3). In order to assess the course of alcohol use across time, the analyses investigating the influence of the Time 1 characteristics on Time 1 alcohol behaviours used only those participants that also had a corresponding Time 1 AUDIT score. Therefore, of the 438 participants who completed the AUDIT at Time 1, 433 completed the TIPI; 435 completed the DSQ; 380 completed the K10; 378 completed the PCL-C and 418 completed the TSES-R (see Figure 6.1). Likewise, analyses investigating the influence of Time 1 characteristics on Time 3 alcohol behaviours used only those participants that also had a corresponding Time 3 AUDIT score. Therefore, of the 518 participants who completed the AUDIT at Time 1, 399 completed the TIPI; 404 completed the DSQ; 239 completed the K10; 239 completed the PCL-C; and 308 completed the TSES-R.

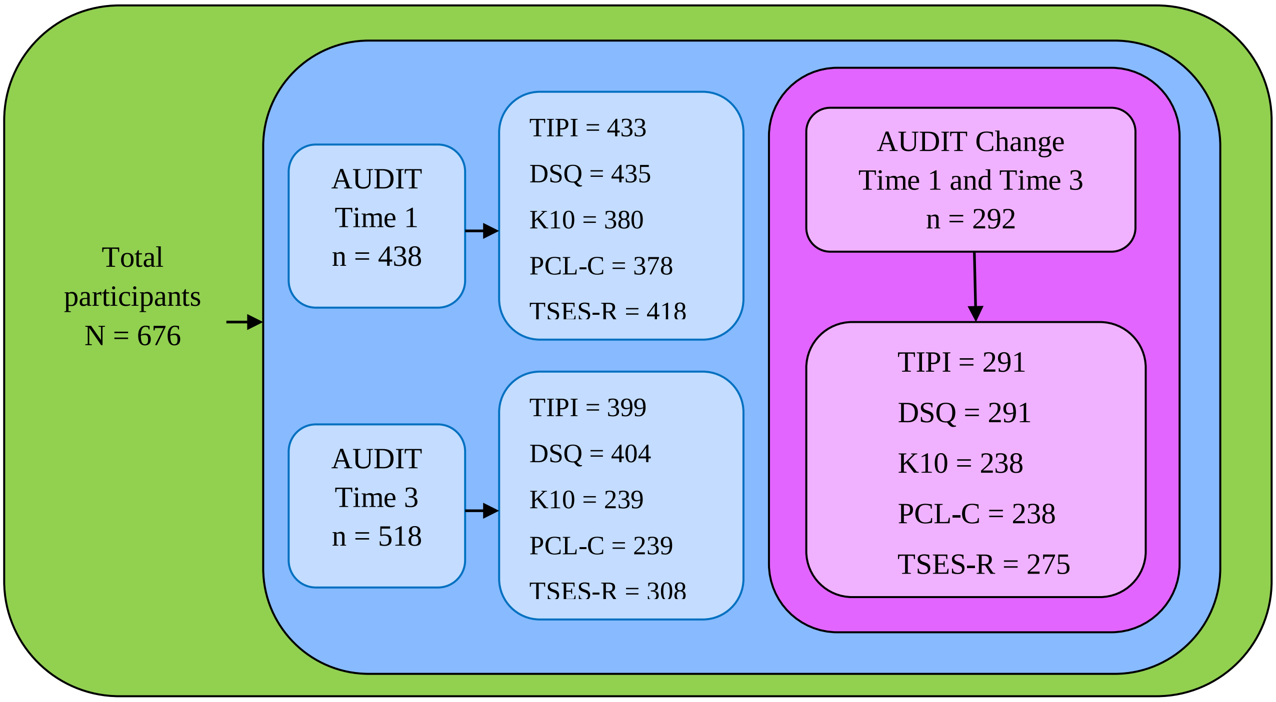

Figure 6.1 Summary of sampling and response for the AUDIT and Time 1 measures.

The analyses investigating the influence of the Time 1 alcohol use on Time 3 alcohol related behaviour (‘*change*’ score) used only those Time 1 AUDIT scores that also had a corresponding Time 3 AUDIT score (n = 292). Consequently, only those who also had a corresponding Time 1 characteristic score were used in the *change* analyses: TIPI = 291; DSQ = 291; K10 = 238; PCL-C = 238; TSES-R = 275.

6.3.3 Data analysis strategy. The data analysis strategy for Research Question Two comprised:

Step 1 – Examination of correlations between Time 1 characteristics and patterns of alcohol use (Time 1, Time 3, and Time1 / Time 3 change).

Step 2 – Prediction of AUDIT total, frequency and severity scores (Time 1, Time 3, and Time1 / Time 3 change) by combination of Time 1 characteristics through the use of simultaneous regression.

Step 3 – Investigation of the unique contribution Time 1 characteristics to the prediction of Time 3 AUDIT total, frequency and severity scores after controlling for Time 1 levels of alcohol consumption through the use of hierarchical regression.

Step 4 – Exploration of the Time 1 characteristics as predictors of membership to three alcohol behaviour groups (increased, stable, decreased) for the Time 3 AUDIT total, frequency and severity scores through the use of discriminant function analysis.

6.4 Step 1 – Examination of Correlations Between Time 1 Characteristics and Patterns of Alcohol Use (Time 1, Time 3, and Time1 / Time 3 Change)

The first step in the data analysis strategy for Research Question Two was to examine the direction and strength of the relationships between individual pre-deployment (Time 1) characteristics and patterns of alcohol use at pre-deployment (Time 1), post-deployment (Time 3) and for the pre- / post-deployment change scores.

The analysis was conducted by the use of Pearson product-moment correlations. The results of the analysis are presented in Table 6.1. The first set (Set 1) shows the Pearson correlations between each of the 10 Time 1 characteristics and Time 1 AUDIT scores. The second set (Set 2) shows the Pearson correlations between each of the 10 Time 1 characteristics and AUDIT scores at Time 3. The third set (Set 3) shows the Pearson correlations between each of the ten Time 1 characteristics and changes in AUDIT scores from Time 1 to Time 3.

6.4.1 Relationships between Time 1 characteristics and Time 1 alcohol use. As shown in the Set 1 results in Table 6.1, there were significant negative correlations between the pre-deployment (Time 1) AUDIT total score and three of the five TIPI dimensions, namely, agreeableness (r (431) = -.13, p < .01), conscientiousness (r (431) = -.26, p < .01), and emotional stability (r (431) = -.19, p < .01). As indicated by negative values of correlation coefficients, higher scores on the three TIPI dimensions were associated with decreased levels

Table 6.1

Pearson product-moment correlations between AUDIT Time 1, Time 3 and change scores and the Time 1 measures.

Pre-deployment variables	Set 1 Results AUDIT Pre-deployment (Time 1) Scores				Set 2 Results AUDIT Post-deployment (Time 3) Scores				Set 3 Results AUDIT Change (Time 3 - Time 1) Scores			
	n	Total	Frequency	Severity	n	Total	Frequency	Severity	n	Total	Frequency	Severity
Extraversion	433	.09	.04	.08	399	.05	.04	.08	291	.01	-.01	-.02
Agreeableness	433	-.13**	-.04	-.09	399	.04	.03	.05	291	.16**	-.09	.09
Conscientiousness	433	-.26**	-.10*	-.22**	399	-.17**	-.06	-.10	291	.01	.01	-.10
Emotional Stability	433	-.19**	-.06	-.15*	399	-.15**	-.03	-.08	291	.04	-.03	-.09
Openness	433	-.02	-.03	.04	399	-.05	-.04	-.01	291	-.02	-.05	-.05
Mature Coping	437	-.11*	-.08	-.10*	404	-.06	-.08	-.04	291	.02	.03	-.07
Immature Coping	435	.24**	.09	.16**	404	.12*	-.01	.05	291	-.08	.07	.08
K10	380	.23**	.14**	.12*	239	.31**	.21**	.19**	238	.10	-.02	-.07
PCL-C	378	.14**	.09	.07	239	.12	.13	.02	238	.02	-.03	.04
TSES-R Column 1	418	.13*	.01	.06	308	-.03	-.02	-.04	275	-.16**	.08	.12*

* Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

of Time 1 alcohol use. Conscientious also showed a significant negative relationship with the Time 1 frequency and severity of alcohol use (r (431) = -.10, $p < .05$, and r (431) = -.22, $p < .01$, respectively) and emotional stability also exhibited a significant negative correlation with Time 1 severity of alcohol use (r (431) = -.15, $p < .05$).

As also presented in the Set 1 results in Table 6.1, there were significant correlations between the Time 1 AUDIT total score and the DSQ dimensions of mature coping (r (435) = -.11, $p < .05$) and immature coping (r (433) = .24, $p < .01$). Mature coping also showed a significant negative relationship with Time 1 severity of alcohol use (r (435) = .10, $p < .01$) and a significant positive relationship was found for immature coping and severity of alcohol use (r (433) = .10, $p < .05$). As shown by the direction of the correlation coefficients, higher scores on mature coping were related to decreased levels of Time 1 alcohol consumption behaviours (total and severity), whereas higher scores on immature coping are associated with increased levels of Time 1 drinking (total and severity).

As a final set of results presented in the Set 1 results in Table 6.1, there were significant positive correlations between the Time 1 AUDIT total score and the three measures of mental health, namely, K10 (r (378) = .23, $p < .01$), PCL-C (r (376) = .14, $p < .01$) and TSES-R column 1 (r (410) = .13, $p < .01$). The K10 also showed a significant positive relationship with pre-deployment frequency (r (378) = .14, $p < .01$) and severity of alcohol consumption behaviours (r (378) = .12, $p < .05$). As indicated by the direction of the correlations, high scores on all three measures of mental health risk were associated with increased levels of pre-deployment alcohol related behaviours and the K10 is associated with increased frequency and severity of alcohol use.

Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitudes of the significant correlations in the Set 1 results were small (i.e., absolute values less than .30). The only values of r approaching a moderate level of magnitude (i.e., absolute values between .30 and .50) were conscientiousness, immature coping and K10 when correlated with pre-deployment AUDIT total scores (*r* = -.26, *r* = .24 and *r* = .23, respectively). None of the associations between pre-deployment characteristics and pre-deployment frequency and severity of alcohol use approached a moderate level of magnitude.

6.4.2 Relationships between Time 1 characteristics and Time 3 alcohol use. As shown in the Set 2 results in Table 6.1, there were significant negative correlations between the post-deployment (Time 3) AUDIT total score and two of the five TIPI dimensions, namely, conscientiousness (r (397) = -.17, $p < .01$) and emotional stability (r (397) = -.15, $p < .01$). As indicated by negative values of correlation coefficients, higher scores on the three TIPI dimensions at Time 1 were associated with decreased levels of Time 3 alcohol use. No significant correlations were found between the Time 3 measures of frequency and severity of alcohol use for any of the five TIPI dimensions.

As also presented in the Set 2 results in Table 6.1, there was significant correlations between the Time 3 AUDIT total score and the DSQ immature coping dimension (r (402) = .12, $p < .05$). The positive direction of this association indicates that higher levels of immature coping at Time 1 are associated with an increase in problematic alcohol behaviours at Time 3.

As a final set of results presented in the Set 2 results in Table 6.1, there were significant positive correlations between the Time 3 AUDIT total score and the K10 (r (237) = .31, $p < .01$). The K10 also showed a significant positive relationship with post-deployment frequency (r (237) = .21, $p < .01$) and severity of alcohol consumption behaviours (r (237) = .19, $p < .05$). As indicated by the direction of the correlations, high scores on the K10 measure of mental health risk were associated with increased levels of post-deployment problematic alcohol related behaviours including increased frequency and severity of alcohol consumption. No significant correlations were found for the remaining two Time 1 measures of mental health risk (PCL-C and TSES-R Column 1) and three Time 3 indicators of alcohol consumption risk (AUDIT total, frequency and severity).

Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitudes of the majority of the significant correlations in the Set 2 results were small (i.e., absolute values less than .30). Only the correlation between the K10 and Time 3 AUDIT total showed a moderate correlation magnitude (i.e., absolute values between .30 and .50) reaching $r = .31$.

6.4.3 Relationships between Time 1 characteristics and Time1 / Time 3 changes in alcohol use. As shown in the Set 3 results in Table 6.1, there was a significant positive correlation between the AUDIT total change score and the TIPI dimension of agreeableness (r (289) = .16, $p < .01$). As indicated by positive direction of correlation coefficient, higher scores on the agreeableness dimension at Time 1 were associated with a greater change in problematic alcohol related behaviours from Time 1 to Time 3. No significant correlations were found between the frequency and severity change measures for any of the five TIPI dimensions.

As also presented in the Set 3 results in Table 6.1, there were no significant correlations between the change scores (AUDIT total, frequency and severity scores) and either of the DSQ coping dimensions. As a final set of results presented in the Set 3 results in Table 6.1, there was a significant negative correlation between the AUDIT total change score and the Time 1 TSES-R (r (273) = -.16, $p < .01$). A significant negative correlation was found for the change in the severity of alcohol use from Time 1 to Time 3 and the Time 1 TSES-R (r (273) = .12, $p < .05$). As indicated by the direction of the correlations, high scores on the column 1 of the TSES-R administered at Time 1 were associated with a lesser degree of change in problematic alcohol related behaviours from Time 1 to Time 3 overall; however, they were also associated with a greater degree of change in relation to severity of alcohol consumption from Time 1 to Time 3. No significant correlations were found for the remaining two Time 1 measures of mental health risk (PCL-C and K10) and three Time 3 indicators of alcohol consumption risk (AUDIT total, frequency and severity). Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitudes of the significant correlations in the Set 3 results were small (i.e., absolute values less than .30).

6.5 Step 2 – Prediction of AUDIT Total, Frequency and Severity Scores (Time 1, Time 3, and Time1 / Time 3 change) by Combination of Time 1 Characteristics

The second step in the data analysis strategy for Research Question Two was to explore the degree to which the combination of pre-deployment characteristics predicted AUDIT total, frequency and severity scores (Time 1, Time 3 and Time1/Time 3 change). The second step also examined the relative contribution of each of the Time 1 characteristics to the total variance explained in the AUDIT total, frequency and severity scores.

The analysis was conducted by the use of simultaneous regression analyses. The results of the analysis for AUDIT total scores, frequency and severity scores are presented in the following three tables. For each table, the first set (Set 1) of results shows the regression analysis for the Time 1 characteristics and Time 1 AUDIT (total, frequency or severity) scores. The second set (Set 2) of results shows the regression analysis for the Time 1 characteristics and AUDIT (total, frequency and severity) scores at Time 3. The third set (Set 3) of results shows the regression analysis for the Time 1 characteristics and changes in AUDIT (total, frequency and severity) scores from Time 1 to Time 3.

Three simultaneous regression analyses are reported based on the information presented in each table. The report of each analysis commences with the statistical significance of the amount of variance accounted for by the regression model based on the use of an *F*-ratio statistic to test the null hypothesis that the value of *R* (multiple correlation coefficient) is equal to zero. The value of R^2 (also called the coefficient of determination) in then presented. R^2 represents the proportion of variance on the AUDIT total scores (pre, post and pre-post change) explained by the pre-deployment characteristics. The reporting of each regression is completed by the statistical significance of each of the pre-deployment characteristics based on the use of a *t* –statistic to test the null hypothesis that the value of individual variable coefficients is equal to zero. Both the unstandardised (B) and standardised (β) coefficients are displayed for each regression analysis.

The three simultaneous regression analyses (Sections 6.5.1 to 6.5.3) are reported below based on the information presented in Table 6.2.

6.5.1 Prediction of Time 1 AUDIT total scores by combination of Time 1 characteristics. The first simultaneous regression analysis (Set 1 results in Table 6.2) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted pre-deployment (Time 1) AUDIT total scores, F (10,359) = 8.19, $p < .001$. The value of R^2 shows that 19% of the variance in Time 1 AUDIT total scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that openness to experience, extraversion, immature coping, and mature coping demonstrated significant beta coefficients indicating that they made a statistically significant contribution to total variance explained by the combination of pre-deployment characteristics.

Consistent with the significant correlations reported in section 6.4, higher levels of mature coping and lower reliance on immature coping are predictive of lower participation in problematic drinking behaviours. Although significant correlations were found for the TIPI dimensions of agreeableness, conscientiousness and emotional stability with Time 1 AUDIT total, they were not found to be predictors of Time 1 problematic alcohol related behaviours. Conversely, although openness to experience and extraversion were not significantly correlated with Time 1 AUDIT total, they were found to be a significant predictor of Time 1 problematic alcohol related behaviour.

Table 6.2

Simultaneous regression analyses for the personality, coping styles, psychological distress and trauma exposure variables predicting AUDIT total at Time 1 (n = 369), Time 3 (n = 235)and Time 1 / Time 3 change (n = 234) .

Factor	Set 1 Results AUDIT Total Pre-deployment (Time 1)					Set 2 Results AUDIT Total Post-deployment (Time 3)					Set 3 Results AUDIT Total Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	8.23	2.01		4.09	.000	1.64	2.46		.67	.506	-7.04	2.46		-2.87	.005
Extra	-1.03	.22	-.27	-4.78	.000	-.51	.28	-.13	-1.80	.073	.29	.29	.08	1.02	.311
Agree	-.06	.22	-.02	-.28	.781	-.07	.28	-.02	-.25	.804	.05	.28	.01	.16	.875
Consc	-.06	.19	-.02	-.33	.742	.43	.25	.11	1.70	.091	.63	.25	.17	2.49	.013
Open	.57	.17	.18	3.31	.001	.61	.23	.19	2.61	.010	.13	.23	.04	.55	.582
ES	.26	.22	.07	1.19	.233	-03	.28	-.01	-.11	.914	-.08	.28	-.02	-.28	.777
Mature	-.42	.16	-.13	-2.59	.010	-.19	.22	-.06	-.89	.376	.00	.22	.00	.00	.997
Immature	.96	.30	.19	3.17	.002	.87	.42	.16	2.09	.037	-.04	.42	-.01	-.09	.929
K10	.10	.06	.10	1.68	.094	.27	.08	.29	3.60	.000	.15	.08	.17	1.96	.050
PCL-C	-.03	.04	-.04	-.64	.524	-.07	.05	-.11	-1.32	.188	.01	.05	.01	.11	.910
TSES C1	.06	.04	.08	1.52	.129	.03	.05	.04	.64	.525	-.08	.05	-.11	-1.47	.144
	R^2 = .19, F(10,359) = 8.19, p < .001					R^2 = .16, F(10,225) = 4.24, p <.001					R^2 = .07, F(10,224) = 1.70, p = .0831				

6.5.2 Prediction of Time 3 AUDIT total scores by combination of Time 1 characteristics. The second simultaneous regression analysis (Set 2 results in Table 6.2) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted post-deployment (Time 3) AUDIT total scores, F (10,225) = 4.24, $p < .05$. The value of R^2 shows that 16% of the variance in Time 3 AUDIT total scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that openness to experience, immature coping, and K10 demonstrated significant beta coefficients indicating that they made a statistically significant contribution to total variance explained by the combination of pre-deployment characteristics.

Consistent with the significant correlations reported in section 6.4, a lower reliance on immature coping and lower K10 scores are predictive of lower participation in problematic drinking behaviours at Time 3. Although significant correlations were found for the TIPI dimensions of conscientiousness and emotional stability with Time 3 AUDIT total, they were not found to be predictors of Time 3 problematic alcohol related behaviours. Conversely, although openness to experience was not significantly correlated with Time 3 AUDIT total, it was found to be a significant predictor of Time 3 problematic alcohol related behaviour.

6.5.3 Prediction of changes in Time 1 / Time 3 AUDIT total scores explained by combination of Time 1 characteristics. The third simultaneous regression analysis (Set 3 results in Table 6.2) shows that the change in AUDIT total scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the pre-deployment characteristics, F (10,224) = 1.70, $p > .05$. No further analyses are reported for Set 3 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

The three simultaneous regression analyses (Sections 6.5.4 to 6.5.6) are reported below based on the information presented in Table 6.3.

Table 6.3

Simultaneous regression analyses for the personality, coping styles, psychological distress and trauma exposure variables predicting AUDIT frequency scores at Time 1 (n = 369), Time 3 (n = 235)and Time 1 / Time 3 change (n = 234) .

Factor	Set 1 AUDIT Frequency Pre-deployment (Time 1)					Set 2 AUDIT Frequency Post-deployment (Time 3)					Set 3 AUDIT Frequency Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	2.18	.51		4.24	.000	1.87	.61		3.07	.002	-0.39	.55		-.70	.485
Extra	-.10	.06	-.11	-1.76	.080	-.03	.07	-.03	-.40	.687	0.01	.06	.01	.17	.863
Agree	.04	.06	.05	.74	.461	.03	.07	.03	.40	.692	-0.04	.06	-.05	-.56	.577
Consc	-.02	.05	-.02	-.41	.681	.05	.06	.06	.79	.433	0.14	.06	.18	2.51	.013
Open	.06	.04	.08	1.35	.179	.07	.06	.10	1.23	.220	0.01	.05	.02	.25	.806
ES	-.02	.06	-.02	-.38	.707	-.04	.07	-.05	-.68	.524	0.05	.06	.06	.76	.448
Mature	-.04	.04	-.06	-1.03	.303	-.10	.05	-.13	-1.80	.073	-0.07	.05	-.10	-1.44	.151
Immature	.07	.08	.06	.95	.343	.03	.10	.02	.23	.815	0	.09	.00	.00	.998
K10	.02	.02	.10	1.47	.142	.04	.02	.19	2.22	.027	0	.02	-.01	-.11	.909
PCL-C	.00	.01	.03	.42	.674	.00	.01	.03	.32	.750	0.01	.01	.06	.67	.550
TSES C1	-.00	.01	-.02	-.31	.761	-.00	.01	-.01	-.11	.910	-0.01	.01	-.08	-1.11	.270
	R^2 = .04, F(10,359) = 1.54, p = .122					R^2 = .06, F(10,225) = 1.49, p = .146					R^2 = .05, F(10,224) = 1.01, p = .360				

6.5.4 Prediction of Time 1 AUDIT frequency scores by combination of Time 1 characteristics. The first simultaneous regression analysis (Set 1 results in Table 6.3) shows that the combination of the pre-deployment (Time 1) characteristics could not reliably predict pre-deployment (Time 1) AUDIT frequency scores, F (10,359) = 1.54, p = .122. No further analyses are reported for Set 1 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

6.5.5 Prediction of Time 3 AUDIT frequency scores by combination of Time 1 characteristics. The second simultaneous regression analysis (Set 2 results in Table 6.3) shows that the combination of the pre-deployment (Time 1) characteristics could not reliably predict post-deployment (Time 3) AUDIT frequency scores, F (10,225) = 1.49, p = .146. No further analyses are reported for Set 2 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

6.5.6 Prediction of changes in Time 1 / Time 3 AUDIT frequency scores explained by combination of Time 1 characteristics. The third simultaneous regression analysis (Set 3 results in Table 6.3) shows that the change in AUDIT frequency scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the pre-deployment characteristics, F (10,224) = 1.01, p = .360. No further analyses are reported for Set 3 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

The three simultaneous regression analyses (Sections 6.5.7 to 6.5.9) are reported below based on the information presented in Table 6.4.

Table 6.4.

Simultaneous regression analyses for the personality, coping styles, psychological distress and trauma exposure variables predicting AUDIT severity scores at pre-deployment (n = 369), post-deployment (n = 235)and Time 1 / Time 3 change (n = 234) .

Factor	Set 1 AUDIT Severity Pre-deployment (Time 1)					Set 2 AUDIT Severity Post-deployment (Time 3)					Set 3 AUDIT Severity Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	2.32	.52		4.43	.000	.47	.65		.73	.467	1.56	.63		2.49	.014
Extra	.13	.05	.17	2.87	.004	.14	.06	.17	2.27	.024	-.01	.06	-.02	-.24	.809
Agree	-.02	.05	-.02	-.37	.709	.07	.07	.07	1.04	.289	-.09	.06	-.10	-1.45	.147
Consc	-.23	.06	-.24	-4.11	.000	-.02	.08	-.02	-.24	.814	-.17	.07	-.18	-2.30	.022
Open	.02	.06	.02	.32	.748	.01	.08	.01	.11	.910	-.02	.07	-.02	-.28	.782
ES	.01	.06	.01	.21	.835	-.01	.08	-.01	-.11	.912	.05	.07	-.06	.72	.467
Mature	-.09	.04	-.11	-2.06	.041	-.07	.06	-.09	-1.20	.231	-.02	.06	-.03	-.42	.677
Immature	.16	.08	.13	2.03	.043	.24	.11	.18	2.15	.032	-.04	.11	-.03	-.42	.736
K10	.01	.02	.03	.40	.692	.05	.02	.20	2.46	.015	-.03	.02	-.15	-1.77	.079
PCL-C	-.01	.01	-.01	-.15	.882	-.03	.01	-.16	-1.88	.061	.02	.01	.10	1.20	.232
TSES C1	.00	.01	.01	.15	.882	.01	.01	.01	.18	.856	.01	.01	.05	.71	.477
	R^2 = .10, F(10,359) = 4.11, p < .001					R^2 = .08, F(10,225) = 2.04, p < .05					R^2 = .06, F(10,224) = 1.35, p = .207				

6.5.7 Prediction of Time 1 AUDIT severity scores by combination of Time 1 characteristics. The first simultaneous regression analysis (Set 1 results in Table 6.4) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted pre-deployment (Time 1) AUDIT severity scores, F (10,359) = 4.11, p < .001. The value of R^2 shows that 10% of the variance in Time 1 AUDIT severity scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that conscientiousness, extraversion, immature coping and mature coping demonstrated significant beta coefficients indicating that they made a statistically significant contribution to total variance explained by the combination of pre-deployment characteristics.

Consistent with the significant correlations reported in section 6.4, higher levels of Time 1 mature coping and conscientiousness as well as a lower reliance on immature coping are predictive of lower participation in binge-drinking behaviours (severity) at Time 1. A significant negative correlation was found for the TIPI dimension of emotional stability and the Time 1 K10 measure of psychological distress for the Time 1 AUDIT severity; however, they were not found to be predictors of Time 1 binge-drinking (severity). Conversely, although conscientiousness was not significantly correlated with Time 3 AUDIT severity, it was found to be a significant predictor of Time 1 severity of alcohol consumption.

6.5.8 Prediction of Time 3 AUDIT severity scores by Combination of Time 1 characteristics. The second simultaneous regression analysis (Set 2 results in Table 6.4) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted post-deployment (Time 3) AUDIT severity scores, F (10,225) = 2.04, p < .05. The value of R^2 shows that 8% of the variance in Time 3 AUDIT severity scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that the TIPI dimension of extraversion and the K10 measure of psychological distress demonstrated significant beta coefficients indicating that they made a statistically significant contribution to total variance explained by the combination of pre-deployment characteristics.

Consistent with the significant correlations found in Section 6.4, higher K10 scores at Time 1 are predictive of participation in binge-drinking behaviours (Severity) at Time 3. Although the TIPI dimension of Extraversion was not significantly correlated with Time 3 AUDIT severity, it was found to be a significant predictor of Time 3 severity of alcohol consumption.

6.5.9 Prediction of changes in Time 1 / Time 3 deployment AUDIT severity scores explained by combination of Time 1 characteristics. The third simultaneous regression analysis (Set 3 results in Table 6.4) shows that the change in AUDIT severity scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the pre-deployment characteristics, F (10,224) = 1.70, $p > .05$. No further analyses are reported for Set 3 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

6.6 Step 3 – Investigation of the Unique Contribution Time 1 Characteristics to the Prediction of Time 3 AUDIT Total, Frequency and Severity Scores

The third step in the data analysis strategy for Research Question Two was to explore the degree to which the pre-deployment (Time 1) characteristics predicted AUDIT post-deployment (Time 3) total, frequency and severity scores after controlling for Time 1 alcohol consumption behaviours (AUDIT total, frequency, severity). The analyses were conducted by the use of hierarchical multiple regressions. After controlling for Time 1 alcohol consumption behaviours (Block 1), the unique combination of the Time 1 characteristics were assessed by entering the TIPI variables as Block 2, coping variables as Block 3, and mental health risk variables as Block 4. The results of the hierarchical regressions are presented in the following series of tables.

6.6.1 Unique contribution of Time 1 characteristics to the prediction of Time 3 AUDIT total. As shown in Table 6.5 the four-predictor model accounted for approximately 37% of the variance in AUDIT total scores from Time 1 to Time 3. This model was statically significant, $R^2 = .37$, $F(11,223) = 11.85$, $p < .001$. After controlling for the Time 1 levels of alcohol use which accounted for approximately 30% of the variance, the addition of the personality (TIPI) variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .02$, $F(5,228) = 1.51$, $p > .05$). However, statistically significant increases in R^2 were provided by addition of the coping variables ($\Delta R^2 = .02$, $F(2,226) = 3.09$, $p < .05$) accounting for 2% of the variance, and by the addition of the mental health risk variables ($\Delta R^2 = .03$, $F(3,223) = 3.59$, $p < .05$), which accounted for approximately 3% of the variance.

Table 6.5

Hierarchical regression analyses for the dependent variable Time 3 AUDIT total for the Time 1 measures (n = 234).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Time 1	.30	.30	98.82	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability	.32	.02	1.51	.188
Block 3	Coping Style: Mature, Immature	.34	.02	3.09	.047
Block 4	Time 1 Trauma Exposure and Psych Distress	.37	.03	3.59	.014

Table 6.6 demonstrates that only the TIPI dimension of agreeableness and the K10 measure of psychological distress contributed to the Time 3 alcohol consumption behaviours after controlling for Time 1 consumption.

Table 6.6

Block 4 beta weights, t-tests and significance levels for Time 1 variables predicting AUDIT total at Time 3 (n = 234).

Predictor	B	SE B	β	*t*	Sig
Constant	-2.73	2.20		-1.24	.216
AUDIT Time 1	.50	.06	.50	8.60	.000
Conscientiousness	-.12	.25	-.03	-.49	.624
Extraversion	.37	.21	.12	1.81	.071
Agreeableness	.52	.22	.14	2.36	.019
Openness	-.05	.24	-.01	-.19	.851
Emotional Stability	-.01	.25	-.00	-.02	.985
Mature Coping	-.09	.19	-.03	-.47	.643
Immature Coping	.41	.37	.08	1.12	.263
Trauma Exposure Time 1	-.02	.05	-.03	-.46	.647
PCL Total	-.03	.04	-.05	-.69	.492
K10 Total	.21	.07	.22	3.17	.002
	R^2 = .37, F(11,223) = 11.85, p < .001				

6.6.2 Unique contribution of Time 1 characteristics to the prediction of time 3 AUDIT frequency. As shown in Tables 6.7 and 6.8 the four-predictor model accounted for approximately 39% of the variance in AUDIT frequency scores from Time 1 to Time 3. This model was statically significant, $R^2 = .39$, $F(11,223) = 12.69$, $p < .001$. After controlling for the Time 1 levels of alcohol use frequency which accounted for approximately 35% of the variance, the addition of the personality (TIPI) variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .01$, $F(5,228) = .90$, $p > .05$). Non-significant increases in R^2 were also found for the addition of the coping variables ($\Delta R^2 = .01$, $F(2,226) = 2.41$, $p > .05$), and for the addition of the mental health risk variables ($\Delta R^2 = .01$, $F(3,223) = .85$, $p > .05$).

Table 6.7

Hierarchical regression analyses for the dependent variable Time 3 AUDIT frequency for the Time 1 measures (n = 234).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Frequency Time 1	.35	.35	126.69	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability	.37	.01	.90	.480
Block 3	Coping Style: Mature, Immature	.38	.01	2.41	.092
Block 4	Time 1 Trauma Exposure and Psych Distress	.39	.01	.85	.470

Table 6.8

Block 4 beta weights, t-tests and significance levels for Time 1 variables predicting AUDIT frequency at Time 3 (n = 234).

Predictor	B	SE B	β	*t*	Sig
Constant	.54	.51		1.06	.292
AUDIT Frequency Time 1	.59	.06	.59	10.80	.000
Conscientiousness	-.00	.06	-.00	-.01	.991
Extraversion	.04	.05	.05	.76	.449
Agreeableness	.11	.05	.12	2.08	.038
Openness	.01	.06	.01	.14	.890
Emotional Stability	-.01	.06	-.01	-.20	.838
Mature Coping	-.08	.04	-.11	-1.90	.059
Immature Coping	.01	.08	.01	.13	.895
Trauma Exposure Time 1	-.01	.01	-.05	-.81	.422
PCL Total	.01	.01	.04	.60	.548
K10 Total	.02	.02	.07	1.04	.302

$R^2 = .39, F(11,223) = 12.69, p < .001$

Table 6.8 demonstrates that only the TIPI dimension of agreeableness contributed to the Time 3 alcohol consumption frequency after controlling for Time 1 frequency of alcohol consumption.

6.6.3 Unique contribution of Time 1 characteristics to the prediction of Time 3 AUDIT severity. As shown in Table 6.9 the four-predictor model accounted for approximately 34% of the variance in AUDIT total scores from Time 1 to Time 3. This model was statically significant, $R^2 = .34$, $F(11,223) = 10.43$, $p < .001$. After controlling for the Time 1 levels of alcohol use severity which accounted for approximately 30% of the variance, the addition of the personality (TIPI) variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .01$, $F(5,228) = .83$, $p > .05$). Non-significant increases in R^2 were also found for the addition of the Coping variables ($\Delta R^2 = .01$, $F(2,226) = 1.73$, $p > .05$), and for the addition of the Mental Health Risk variables ($\Delta R^2 = .01$, $F(3,223) = 2.43$, $p > .05$).

Table 6.9

Hierarchical regression analyses for the dependent variable Time 3 AUDIT severity for the Time 1 measures (n = 234).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Severity Time 1	.30	.30	97.52	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability	.31	.01	.83	.531
Block 3	Coping Style: Mature, Immature	.32	.01	1.73	.179
Block 4	Time 1 Trauma Exposure and Psych Distress	.34	.02	2.43	.066

Table 6.10 demonstrates that only the K10 measure of psychological distress contributed to the Time 3 alcohol consumption severity after controlling for Time 1 severity of alcohol consumption.

Table 6.10

Block 4 beta weights, t-tests and significance levels for Time 1 variables predicting AUDIT severity at Time 3 (n = 234).

Predictor	B	SE B	β	*t*	Sig
Constant	-.63	.57		-1.11	.270
AUDIT Severity Time 1	.54	.06	.53	9.30	.000
Conscientiousness	.08	.07	.08	1.20	.230
Extraversion	.07	.05	.09	1.37	.172
Agreeableness	.08	.06	.08	1.41	.159
Openness	.02	.06	.02	.26	.793
Emotional Stability	-.03	.06	-.03	-.48	.634
Mature Coping	-.02	.05	-.02	-.35	.724
Immature Coping	.13	.10	.09	1.34	.181
Trauma Exposure Time 1	-.01	.01	-.02	-.32	.749
PCL Total	-.02	.01	-.13	1.74	.083
K10 Total	.04	.02	.17	2.40	.017
	R^2 = .34, F(11,223) = 10.43, p < .001				

6.7 Step 4 – Exploration of the Dimensions of Time 1 Characteristics as Predictors of Membership to Alcohol Behaviour Groups (Increased, Stable, Decreased) for the Time 3 AUDIT Total, Frequency, and Severity Scores

The fourth step in the data analysis strategy for Research Question Two was to explore the dimensions of Time 1 characteristics that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total, frequency and severity scores. The analyses were conducted by the use of discriminant function analyses. The Time 1 characteristics included the five TIPI dimensions (extraversion, agreeableness, conscientiousness, openness and emotional stability); the two coping dimensions (immature and mature); and the mental health risk measures (K10, PCL-C, TSES-R Column 1). The groups were *increased* drinking over time, *decreased* drinking over time and drinking remained *stable* over time. Analyses were conducted on the AUDIT total, frequency, and severity change groups.

The results of the discriminant function analysis for the AUDIT total are presented in Table 6.11 and Table 6.12. The results of the discriminant function analysis for the AUDIT frequency are presented in Table 6.13 and Table 6.14; and the results of the discriminant function analysis for the AUDIT severity are presented in Table 6.15 and Table 6.16.

Table 6.11

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the Time 1 measures (n = 235).

AUDIT Total Change	Function	
	1	2
Emotional Stability	.59*	.15
Mature	.45*	.13
Conscientiousness	.44*	-.03
Openness	-.16*	.05
Agreeableness	.04	-.64*
Trauma Exposure Time 1	-.27	.49*
Immature	-.05	.37*
Extraversion	.14	-.17*
K10 Total	.03	-.13*
PCL Total	.04	.13*

* Largest absolute correlation between variables and any discriminant function

Table 6.12

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the Time 1 measures (n = 235).

AUDIT Total Change	Function	
	1	2
Increase	-.16	-.30
Stable	.51	.02
Decrease	-.14	.21

* Largest absolute correlation between variables and any discriminant function

6.7.1 Dimensions of Time 1 characteristics that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total. Of the original 678 cases, 443 were cases were excluded due to missing or out-of-range group codes. For the remaining 235 participants' cases (109 decrease, 52 stable, 74 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 6.11, this analysis revealed two discriminant functions. The first explains 59.9% of the variance, canonical R^2 = .07, the second explained 40% of the variance, canonical R^2 = .05. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), Λ = .89, $x^2(20)$ = 27.69, p = .117. Removing the first function showed that the second function also did not significantly differentiate the groups, Λ = .95, $x^2(9)$ = 11.18, p = .264.

The structure matrix and group centroids for the first and second function are presented in Table 6.11 and Table 6.12 respectively. As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

6.7.2 Dimensions of Time 1 characteristics that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT frequency. Of the original 678 cases, 443 were cases were excluded due to missing or out-of-range group codes. For the remaining 235 participants' cases (60 decrease, 135 stable, 40 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices revealed no threat to multivariate analysis.

As shown in Table 6.13, this analysis revealed two discriminant functions. The first explains 72.3% of the variance, canonical $R^2 = .11$, whereas the second explained 27.7% of the variance, canonical $R^2 = .04$. In combination these discriminant functions significantly differentiated the change groups (increase, decrease, stable), $\Lambda = .86$, $x^2(20) = 33.73$, $p < .05$, but removing the first function indicated that the second function did not significantly differentiate the groups, $\Lambda = .96$, $x^2(9) = 9.56$, $p = .387$. The structure matrix and group centroids for the first and second function are presented in Table 6.13 and Table 6.14.

Table 6.13

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the Time 1 measures (n = 235).

AUDIT Frequency	Function	
	1	2
Mature	.48*	.17
Emotional Stability	-.23*	-.03
Immature	.22*	-.12
K10 Total	.13*	.06
Agreeableness	-.55	.65*
Extraversion	.41	.54*
Openness	.12	.34*
Trauma Exposure Time 1	.13	-.28*
Conscientiousness	.01	.27*
PCL Total	.02	-.16*

* Largest absolute correlation between variables and any discriminant function

Table 6.14

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the Time 1 measures (n = 235).

AUDIT Total Change	Function	
	1	2
Increase	-.51	.15
Stable	.27	.07
Decrease	-.12	-.45

* Largest absolute correlation between variables and any discriminant function

Group centroids are also shown in Figure 6.2 below.

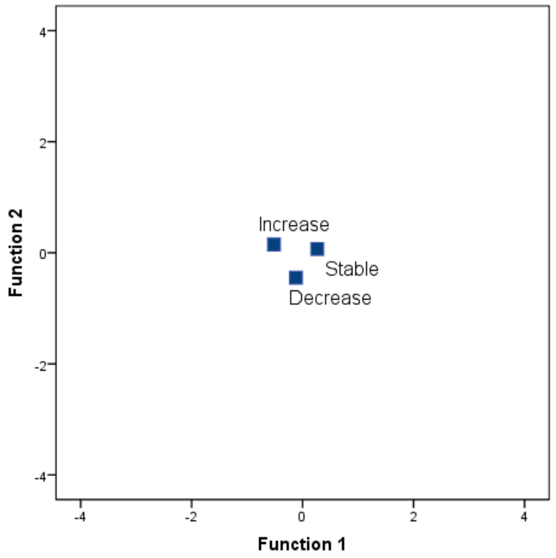

Figure 6.2. *Plots of the AUDIT frequency three group's centroids on two discriminant functions derived from the ten Time 1 variables.*

Figure 6.2 shows that the first discriminant function maximally separates increased drinking over time from the stable drinking with decreased drinking over time falling between these two groups. The second discriminant function appears to discriminate decreased drinking over time from the other two groups. According to the structure matrix the first function primarily represents mature coping which can be conceptualised as adaptive coping strategies. The group centroids as shown in Figure 6.2 suggest this function, and thus adaptive coping, tends to be most elevated in individuals whose drinking frequency remained stable over time and least pronounced in individuals whose drinking frequency decreased over time. The second function did not reach significance and will not be reported on further.

6.7.3 Dimensions of Time 1 characteristics that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT severity. Of the original 678 cases, 443 were cases were excluded due to missing or out-of-range group codes. For the remaining 235 participant cases (55 decrease, 124 stable, 56 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices revealed no threat to multivariate analysis. As shown in Table 6.15, this analysis revealed two discriminant functions. The first explains 80.5% of the variance, canonical $R^2 = .07$, whereas the second explained 19.5% of the variance, canonical $R^2 = .04$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .92$, $x^2(20) = 18.52$, p = .553. Removing the first function showed that the second function also did not significantly differentiate the groups, $\Lambda = .98$, $x^2(9) = 3.69$, p = .931. The structure matrix and group centroids for the first and second function are presented in Table 6.15 and Table 6.16 respectively.

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

Table 6.15

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the Time 1 measures (n = 235).

AUDIT Severity	Function	
	1	2
Openness	.69*	.54
Conscientiousness	.53*	-.24
Extraversion	.35*	.21
Agreeableness	.34*	-.27
Mature Coping	.34*	.21
K10 Total	26*	-.18
PCL-C Total	-.12*	-.06
Emotional Stability	.24	.33*
Immature Coping	-.11	.24*
Trauma Exposure Time 1	.05	.12*

* Largest absolute correlation between variables and any discriminant function

Table 6.16

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the Time 1 measures (n = 235).

AUDIT Total Change	Function	
	1	2
Increase	.09	-.23
Stable	.17	.09
Decrease	-.46	.03

* Largest absolute correlation between variables and any discriminant function

6.8 Chapter Summary

Results from this chapter indicate that the pre-deployment characteristics including the K10 measure of psychological distress, various personality characteristics (especially conscientiousness) and mature coping variables, may have some utility in predicting post-deployment risk of problematic alcohol related behaviours including binge-drinking. However, this study did not find strong support for the influence of pre-deployment trauma exposure and related trauma symptoms on alcohol-related behaviours pre- or post-deployment.

6.8.1 Personality. In terms of personality, the hierarchical regression analyses demonstrated that after controlling for pre-deployment alcohol-consumption, only the personality variable of agreeableness provided a unique contribution to the prediction of the frequency of alcohol use at post-deployment. However, no personality variables uniquely contributed to binge-drinking behaviours at post-deployment.

Lower levels of agreeableness, conscientiousness and emotional stability were associated with greater participation in generally problematic drinking behaviours at pre- and post-deployment. They were also associated with binge-drinking but only at pre-deployment. Correlations were demonstrated for agreeableness and emotional stability, although they were not found to be predictive of alcohol related behaviours including frequency and severity of alcohol use at either pre-or post-deployment.

While not significantly correlated, higher levels of conscientiousness were found to be predictive of greater change in the frequency of alcohol consumption. Conversely, higher levels of conscientiousness were also predictive of a decrease in binge-drinking behaviours from pre- to post-deployment. Higher levels of extraversion were also predictive of binge drinking at both pre- and post-deployment but were not predictive of a change in binge-drinking over time.

These results in relation to personality variables were consistent with research that found that personality traits interact with the development of problematic alcohol use, particularly the link between problematic alcohol use and low conscientiousness (Borja et al., 2009; Caska & Renshaw, 2013; Kotov et al., 2010). The current study also found a correlation between the Big Five personality factors of agreeableness and emotional stability (neuroticism) and alcohol related behaviours and consumption at both pre- and post-deployment. Evidence was also found for the role of high conscientiousness and low extraversion in the prediction of adaptive alcohol use at pre – and post-deployment. This is inconsistent with James et al. (2013) who found no predictive relationship between the Big Five personality factors and deployment related alcohol use.

6.8.2 Defensive coping style. Results also indicated that higher levels of mature coping and a lower reliance on immature coping appeared to be associated with lower participation in generally problematic drinking behaviours and binge-drinking but not frequency of alcohol consumption. This association was found at both pre- and post-deployment; however, they were not predictive of a change in drinking behaviour over time. While neither the immature or mature coping styles provided a unique contribution to the prediction of alcohol use (total, frequency or severity) at post-deployment after controlling for pre-deployment alcohol behaviours; lower levels of mature coping trended towards predicting an increased frequency in alcohol consumption at post-deployment.

As indicated previously, few studies have specifically investigated the interrelations between coping styles and problematic alcohol use, in relation to deployment stressors and trauma related symptoms. However, these results appear consistent with investigations that have suggested that habitually used unconscious defensive /coping styles may ameliorate the impact of stressors on psychological well-being and adjustment post-deployment (Bond, 1986; Brennan et al., 1990).

6.8.3 Mental health risk. In relation to mental health risk, greater levels of perceived psychological distress at pre-deployment were associated with increased participation in alcohol related behaviours including alcohol consumption frequency and binge-drinking at both pre- and post-deployment. However, only the level of pre-existing trauma exposure was found to be correlated with a change in alcohol consumption behaviours over time, with higher levels of pre-deployment trauma exposure predicting an increase in binge-drinking, but a general decrease in other problematic alcohol related behaviours. Despite these correlations, only the K10 measure of felt psychological distress was predictive of post-deployment alcohol frequency, severity and general problematic alcohol use behaviours, with greater levels of psychological distress being associated with an increase in alcohol consumption behaviours. Furthermore, after controlling for pre-deployment alcohol behaviours, the pre-deployment level of psychological distress (K10) was found to be the only measure of mental health risk that provided a unique contribution to the change in alcohol related behaviours and binge-drinking at post-deployment.

The K10 measure of psychological distress administered at pre-deployment appears to have some utility in the prediction of post-deployment problematic alcohol use. However, this study did not find strong support for the influence of pre-deployment trauma exposure and related trauma symptoms on alcohol-related behaviours pre- or post-deployment. These results were inconsistent with previous research that has found that pre-deployment trauma symptom severity increased the risk of problematic alcohol use post-deployment (Kline et al., 2014), but was consistent with Marshall et al., (2012) who found that pre-deployment reports of PTSD symptoms was not predictive of post-deployment alcohol misuse. They were also inconsistent with Marshall et al. (2012) who found that pre-deployment reports of depression (psychological distress) were not found to be predictive of post-deployment alcohol misuse.

6.8.4 Prediction of alcohol change group inclusion. The analyses exploring the dimensions of pre-deployment characteristics that differentiated between participants whose pattern of alcohol use increased, decreased or remained stable over time, were inconclusive with the majority of analyses failing to significantly discriminate between the functions.

6.8.5 Conclusion. Overall, the results of this chapter indicate that the pre-deployment characteristics including mature coping variables, the K10 measure of psychological distress and various personality characteristics (especially conscientiousness) may have some utility in predicting post-deployment risk of problematic alcohol related behaviours including binge-drinking. What they do not provide is insight into the impact of deployment related factors including trauma exposure, trauma symptoms and associated psychological distress on the course of alcohol related behaviours over time.

Given this, Chapter 7 will address Research Question Three "*Can within-deployment events and mental health outcomes be used to predict the course of alcohol consumption from pre- to post-deployment?"*

Chapter 7: Results - Impact of Within Deployment Events on the Course of Alcohol Consumption

7.1 Chapter Overview

The purpose of this chapter is to examine Research Question Three "*Can within deployment events be used to predict the course of alcohol consumption from pre- to post-deployment?*" The chapter begins by briefly discussing the relevant literature and then reviews the aspects of the Method that are pertinent to Research Question Three. The results that explore the associations between Time 2 (RtAPS) mental health risk measures and patterns of alcohol use (AUDIT total, frequency, severity) across time (Time 3, Time 1/Time 3 change) are then presented before summarising the key findings and conclusions.

7.2 Introduction

The experience of psychological distress is common to operational service regardless of the nature of the operation. Veterans, especially those who have been exposed to combat operations, are at high risk of subsequently developing a mental health disorder post-deployment such as an anxiety disorder, mood disorder, adjustment disorder, PTSD or alcohol use disorders (Bleier et al., 2011; M. J. Larson et al., 2013; Schultz et al., 2014; Wells et al., 2009).

The prevalence of mental health disorders attributed to operational service is on the increase (Milliken et al., 2007; Seal et al., 2011; Seal et al., 2010), with recent research estimating that approximately 13 – 20% of US Forces Iraq and Afghanistan veterans have or will be diagnosed with PTSD (Institute of Medicine, 2012) and that rates of depression, anxiety disorders, adjustment disorders and substance use disorders are increasing (Harrell & Berglass, 2011; Jacobson et al., 2008; US Army, 2012; Wells et al., 2009). Similarly, a study of UK Iraq and Afghanistan veterans found that approximately 17% of respondents meet the criteria for at least one psychological disorder (Mulligan et al., 2012).

The 2010 ADF Mental Health Prevalence and Wellbeing Study (McFarlane, Hodson, Van Hooff, Verhagen, et al., 2011) found that military service in general can increase the risk of experiencing psychological distress with the mean K10 scores being significantly higher than the general population (Australian Bureau of Statistics, 2008; Bleier et al., 2011). An increase in psychological distress between pre- and post-deployment measurements was found (Davy et al., 2012; Lorimer et al., 2012) and the researchers also reported an interaction between deployment and PTSD, with an increase in PTSD symptom severity in 9.6% of respondents. This is consistent with US research findings suggesting that deployments to Afghanistan and Iraq have been shown to be associated with PTSD symptoms (Cohen et al., 2009; Hoge et al., 2004; Kline et al., 2010; Maguen et al., 2009; Seal et al., 2007).

Problematic substance use, particularly alcohol, in veteran populations has been well documented (Fear et al., 2010; M. J. Larson et al., 2013; M. J. Larson et al., 2012; Milliken et al., 2007; Wilk et al., 2010) and it is well recognised that problematic alcohol use is highly comorbid with other psychiatric disorders (Chilcoat & Breslau, 1998a; Mills et al., 2006; Wessely et al., 2007). For example, veterans who are suffering a deployment- related mental health disorder have been found to be more likely to misuse alcohol than those who are psychologically well (Bremner et al., 1996; Wessely et al., 2007). Researchers are becoming increasingly aware of the relationships between exposure to deployment related stressors (including trauma events), mental health outcomes and problematic alcohol use (Bremner et al., 1996; Davidson et al., 1990; McFall et al., 1992; Ouimette & Brown, 2003; Ouimette et al., 2003; Ruzek, 2003). Although the drivers of alcohol misuse and alcohol-related behaviours among service personnel in general and ADF veterans in particular were not well defined or understood (Bray et al., 2013); deployment related factors such as trauma exposure may increase the incidence of mental health disorders including PTSD, depression, anxiety and alcohol misuse (Jacobson et al., 2008).

Yet while rates of alcohol use disorder for US and UK contemporary veterans of the Iraq and Afghanistan conflicts have been found to be higher than in the general population (Bray & Hourani, 2007; Bray et al., 2010; M. J. Larson et al., 2012), results of the 2010 Australian Defence Force Mental Health Prevalence and Wellbeing study found that rates of any alcohol disorders in the ADF were lower than the general Australian population (12 month prevalence: males 5.6%, females 2.2% vs. males 8.8%, females 5.1% (Davy et al., 2012; McFarlane, Hodson, Van Hooff, & Davies, 2011). The MEAO Prospective Health study (Davy et al., 2012) which assessed pre- and post-deployment drinking behaviours and found that although the overall change in mean AUDIT score from pre-to post-deployment was not statistically significant, a notable percentage of respondents reported an increase in the level of alcohol consumption pre- to post-deployment.

Even though the literature provides some support to the assumption that aspects of the deployment experience may impact the level and frequency of alcohol use, research has failed to investigate the association between deployment related psychological distress and trauma reaction and the course of alcohol consumption over time from pre-deployment (Time 1) to post-deployment (Time 3).

7.3 Review of Method

7.3.1 Measures. Three measures were administered at Time 2 to capture levels of mental health risk and trauma exposure. First, the K10, which is a measure of felt psychological distress administered at Time 2 (RtAPS) in addition to the PCL-C (Andrews et al., 1989; Weathers et al., 1993), which was designed to screen for trauma symptomatology. Both the K10 and PCL-C produce a total score indicating severity of symptoms. Finally, column 2 of TSES-R (Hodson, 2002) was administered to assess the level of distress experienced at the time of deployment related trauma exposure.

The AUDIT (Saunders, Aasland, Amundsen, et al., 1993; Saunders, Aasland, Babor, et al., 1993) was administered at Time-1 (pre-deployment) and Time-3 (post-deployment). As Australian Defence Force (ADF) personnel are prohibited from consuming alcohol while operationally deployed to the Middle East Area of Operations (MEAO), the AUDIT was not administered at Time 2. Although internal consistency is not a requirement of indexes (Diamantopoulos & Winklhofer, 2001), the AUDIT showed reasonable internal consistency at each administration with the Cronbach alpha coefficient reaching .74 at both administrations.

The AUDIT responses were categorised in four different ways for the purposes of analyses. Firstly, an overall score indicating relative risk of drinking behaviour (AUDIT Total). Secondly, Question 1 of the AUDIT asks the respondents to indicate “How often do you have a drink containing alcohol?” providing an indication of ‘Frequency’ of alcohol consumption. Question 3 of the AUDIT asks respondents to indicate “How often do you have six or more drinks on one occasion?” providing an indicator of ‘Severity’ of binge-drinking behaviours. Finally, an assessment of Time 1 to Time 3 change in alcohol behaviours was gained by detracting each individuals Time 3 AUDIT scores from the respective Time 1 AUDIT score.

The measures were more fully described in Chapter 3 (Methodology) and validated in Chapter 4 (Instrument Validation).

7.3.2 Sample sizes. Figure 7.1 shows that of the 676 participants whose data were used in this study (See Chapter 3, Figure 1), 438 participants completed the AUDIT at pre-deployment (Time 1) and 518 participants completed the AUDIT at post-deployment (Time 3). The analyses investigating the influence of mental health risk and trauma variables on Time 3 alcohol consumption behaviours used only those trauma exposure and mental health risk scores that also had a corresponding Time 3 AUDIT score. Therefore, of the 518 participants who completed the AUDIT at Time 3, 508 completed the K10; 510 completed the PCL-C; and 504 completed the TSES-R (see Figure 7.1).

In order to assess the course of alcohol use across time (Time 1 / Time 3 Change), the analyses investigating the influence of the Time 2 characteristics on Time 3 alcohol behaviours used only those participants that also had a corresponding Time 1 AUDIT score: K10 n = 283, PCL-C n = 285 and TSES-R n = 281.

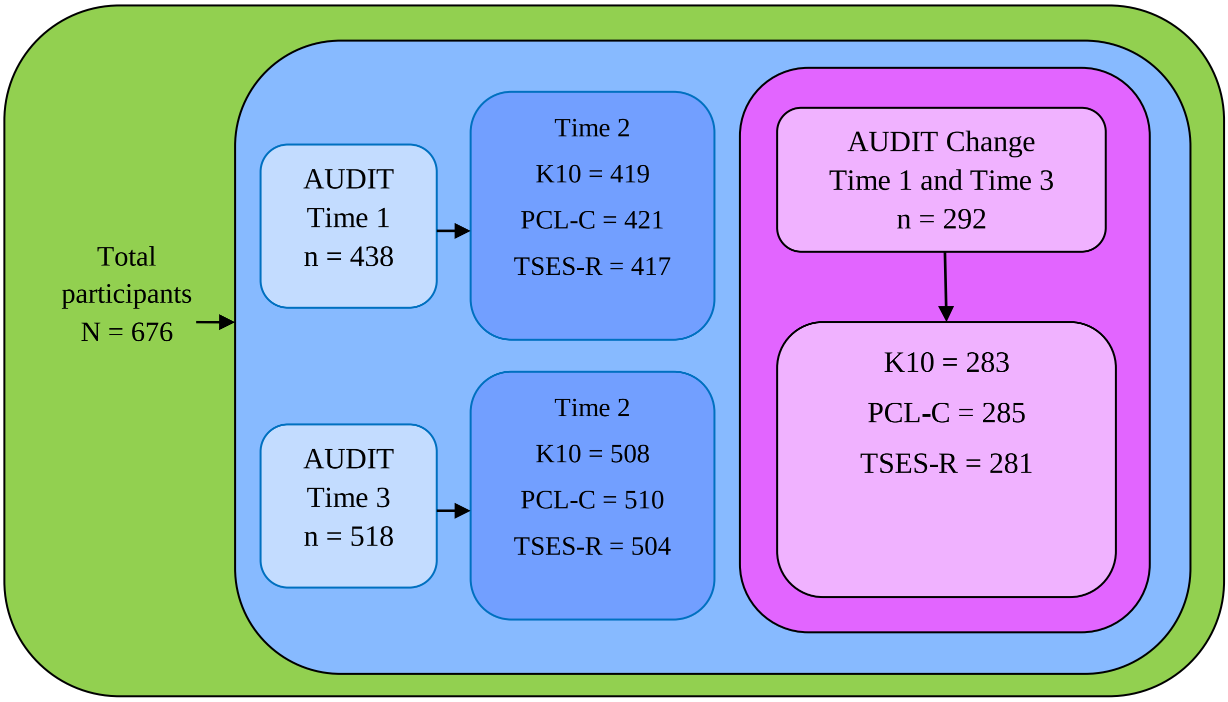

Figure 7.1 *Summary of sampling and response for the AUDIT and Time 2 measures*

7.3.3 Data analysis strategy. The data analysis strategy for Research Question Three comprised:

Step 1 – Examination of Correlations between Time 2 measures and patterns of Alcohol Use (Time 3, and Time1 / Time 3 change).

Step 2 – Prediction of AUDIT Total, Frequency and Severity Scores (Time 3, and Time1 / Time 3 change) by combination of Time 2 measures through the use of Simultaneous Regression.

Step 3 – Investigation of the Unique Contribution of Time 2 measures to the Prediction of Time 3 AUDIT Total, Frequency and Severity scores after controlling for Time 1 levels of alcohol consumption through the use of Hierarchical Regression.

Step 4 – Exploration of the Time 2 measures as predictors of membership to three alcohol behaviour groups (increased, stable, decreased) for the Time 3 AUDIT Total, Frequency, and Severity scores through the use of Discriminant Function Analysis

7.4 Step 1 – Examination of Correlations Between Time 2 Measures and Patterns of Alcohol Use (Time 3, and Time1 / Time 3 Change)

The first step in the data analysis strategy for Research Question Three was to examine the direction and strength of the relationships between RtAPS measures (Time 2) and patterns of alcohol use at post-deployment (Time 3) and for the pre- / post-deployment change scores.

The analysis was conducted by the use of Pearson product-moment correlations. The results of the analysis are presented in Table 7.1. The first set (Set 1) shows the Pearson correlations between each of the three Time 2 measures and Time 3 AUDIT scores. The second set (Set 2) shows the Pearson correlations between each of the three Time 2 measures and changes in AUDIT scores from Time 1 to Time 3.

7.4.1 Relationships between Time 2 measures and Time 3 alcohol use. As shown in the Set 1 results in Table 7.1, there was a significant positive correlation between the post-deployment (Time 3) AUDIT total score and the Time 2 K10 (r (508) = .22, p < .01). As indicated by positive direction of correlation coefficient, higher scores on the K10 at Time 2 were predictive of greater levels of problematic alcohol related behaviours at Time 3. A further significant positive correlation was found between the post-deployment (Time 3) AUDIT severity score and the Time 2 K10 (r (508) = .09, p < .01). No significant correlations were found between the AUDIT frequency scores for the K10 measure of mental health risk.

Table 7.1

Pearson product-moment correlations between the AUDIT post-deployment and pre-/post-deployment change scores for the Time 2 K10, PCL-C and TSES-R column 2 factors.

Time 2 Measures	Set 1 AUDIT Time 3 Scores				Set 2 AUDIT Change (T3-T1) Scores			
	n	Total	Freq	Severity	n	Total	Freq	Severity
K10	508	.22**	.03	.09*	283	.04	-.04	-.03
PCL-C	510	.07	.00	.04	285	.05	.02	-.05
Trauma	504	.05	.01	.01	281	.04	-.04	-.06

* Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

No significant correlations were found for the remaining two Time 2 measures of mental health risk and trauma exposure (PCL-C and TSES-R) and Time 3 indicators of alcohol consumption risk (AUDIT Total, Frequency and Severity). Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitude of the significant correlations in the Set 1 results were small (i.e., absolute values less than .30).

7.4.2 Relationships between Time 2 measures and Time1 / Time 3 changes in alcohol use. As shown in the Set 2 results in Table 7.1, no significant correlations were found between the AUDIT total, frequency, and severity change measures for any of the three Time 2 measures of mental health risk and trauma exposure reaction (K10, PCL-C, TSES-R).

7.5 Step 2 – Prediction of AUDIT Total, Frequency and Severity Scores (Time 3, and Time1 / Time 3 Change) by Combination of Time 2 Measures

The second step in the data analysis strategy for Research Question Three was to explore the degree to which the combination of Time 2 mental health risk and trauma exposure measures predicted AUDIT Total, Frequency and Severity scores (Time 3 and

Time1/Time 3 change). The second step also examined the relative combination of each of the Time 2 measures to the total variance explained in the AUDIT total, frequency and severity scores.

The analysis was conducted by the use of simultaneous regression analyses. The results of the analysis for AUDIT total, frequency and severity scores are presented in Table 7.2. The first set (Set 1) of results shows the regression analysis for the Time 2 measures and AUDIT (total, frequency and severity) scores at Time 3. The second set (Set 2) of results shows the regression analysis for the Time 2 measures and changes in AUDIT (total, frequency and severity) scores from Time 1 to Time 3.

Simultaneous regression analyses are reported based on the information presented in Table 7.2. The report of each analysis commences with the statistical significance of the amount of variance accounted for by the regression model, based on the use of an *F*-ratio statistic to test the null hypothesis that the value of *R* (multiple correlation coefficient) is equal to zero. The value of R^2 (also called the coefficient of determination) in then presented. R^2 represents the proportion of variance on the AUDIT total scores (post and pre-post change) explained by the within-deployment characteristics. The reporting of each regression is completed by the statistical significance of each of the within-deployment characteristics, based on the use of a *t* –statistic to test the null hypothesis that the value of individual variable coefficients is equal to zero. Table 7.2 presents both unstandardised (B) and standardised (β) coefficients for each regression analysis.

The six simultaneous regression analyses (Sections 7.5.1 to 7.5.6) are reported below based on the information presented in Table 7.2.

Table 7.2

Simultaneous regression analyses for the Time 2 psychological distress and trauma exposure variables predicting AUDIT total, frequency, and severity at post-deployment (n = 501) and across time (n = 278) .

Factor	Set 1 AUDIT Total Post-deployment (Time 3)					Set 2 AUDIT Total Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	4.36	.70		6.20	.000	-1.55	.97		-1.61	.109
K10	.26	.05	.28	5.04	.000	.13	.08	.13	1.66	.098
PCL-C	-.07	.04	-.11	-1.85	.065	-.02	.05	-.03	-041	.679
TSES C2	.02	.06	.01	.26	.794	.00	.08	.00	.02	.986
	R^2 = .05, F(3,498) = 9.40, p <.001					R^2 = .01 F(3,275) = 1.20, p = .311				

Factor	AUDIT Frequency Post-deployment (Time 3)					AUDIT Frequency Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	2.31	.17		13.61	.000	-.09	.21		-.42	.675
K10	.01	.01	.03	.58	.564	-.01	.02	-.05	-.68	.495
PCL-C	-.01	.01	-.02	-.41	.682	.01	.01	.06	.76	.448
TSES C2	.01	.01	.02	.31	.759	-.01	.02	-.04	-.58	.560
	R^2 = .00, F(3,498) = .15, p = .928					R^2 = .00, F(3,275) = .35, p = .788				

Factor	AUDIT Severity Post-deployment (Time 3)					AUDIT Severity Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	1.48	.18		8.23	.000	.05	.25		.21	.832
K10	.02	.01	.01	1.93	.054	.01	.02	.04	.53	.598
PCL-C	-.01	.01	-.05	-.84	.402	-.01	.01	-.06	-.74	.463
TSES C2	.01	.02	.02	.44	.661	-.02	.02	-.05	-.81	.417
	R^2 = .01, F(3,498) = .15, p = .222					R^2 = .01, F(3,275) = .53, p = .665				

7.5.1 Prediction of Time 3 AUDIT total scores by combination of Time 2 measures. The first simultaneous regression analysis (Set 1 results in Table 7.2) shows that the combination of the RtAPS (Time 2) measures significantly predicted post-deployment (Time 3) AUDIT total scores, F (3,498) = 9.40, $p < .001$. The value of R^2 shows that 5% of the variance in Time 3 AUDIT total scores was explained by the combination of Time 2 measures. Examination of the individual variable coefficients shows that only the K10 demonstrated a significant beta coefficient, indicating that the Time 2 K10 made a statistically significant contribution to total variance explained by the combination of Time 2 measures of mental health risk and trauma exposure reaction.

Consistent with the significant correlations found in the previous sections, higher levels of perceived psychological distress (K10) are predictive of increased participation in problematic drinking behaviours.

7.5.2 Prediction of changes in Time 1 / Time 3 AUDIT total scores explained by combination of Time 2 measures. The second simultaneous regression analysis investigating the AUDIT total (Set 2 AUDIT total results in Table 7.2) shows that the change in AUDIT total scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the Time 2 measures, F (3,275) = 1.20, $p > .05$. No further analyses are reported for AUDIT total Set 2 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

7.5.3 Prediction of Time 3 AUDIT frequency scores by combination of Time 2 measures. The third simultaneous regression analysis (Set 1 results in Table 7.2) shows that the combination of the RtAPS (Time 2) measures could not reliably predict post-deployment (Time 3) AUDIT frequency scores, F (3,498) = .15, $p > .05$. No further analyses are reported for the AUDIT frequency Set 1 results given the support for the null hypothesis.

7.5.4 Prediction of changes in Time 1 / Time 3 AUDIT frequency scores explained by combination of Time 2 measures. The fourth simultaneous regression analysis (AUDIT frequency Set 2 results in Table 7.2) shows that the change in AUDIT frequency scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the Time 2 mental health risk and trauma exposure measures, F (3,275) = .35, p > .05. No further analyses are reported for AUDIT Frequency Change Set 2 results given the support for the null hypothesis.

7.5.5 Prediction of Time 3 AUDIT severity scores by combination of Time 2 measures. The fifth simultaneous regression analysis (AUDIT Severity Set 1 results in Table 7.2) shows that the combination of the RtAPS (Time 2) characteristics do not significantly predict post-deployment (Time 3) AUDIT severity scores, F (3,498) = .15, p > .05. Examination of the individual variable coefficients showed that although not quite reaching significance, there is a trend toward the Time 2 K10 contributing to the total variance. This result is consistent with the significant correlation found in Section 7.4, which indicated that higher K10 scores at Time 2 are associated with participation in binge-drinking behaviours (Severity) at Time 3. No further analyses are reported for the AUDIT severity Set 1 results given the overall support for the null hypothesis.

7.5.6 Prediction of changes in Time 1 / Time 3 deployment AUDIT severity scores explained by combination of Time 2 measures. The final simultaneous regression analysis (AUDIT severity Set 2 results in Table 7.2) shows that the change in AUDIT severity scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the Time 2 measures, F (3,275) = .53, p > .05. No further analyses are reported for AUDIT severity Set 2 results given the support for the null hypothesis.

7.6 Step 3 – Investigation of the Unique Contribution Time 2 Measures to the Prediction of Time 3 AUDIT Total, Frequency and Severity Scores

The third step in the data analysis strategy for Research Question Three was to explore the degree to which the RtAPS (Time 2) measures of mental health risk and trauma exposure reaction predicted AUDIT post-deployment (Time 3) total, frequency and severity scores, after controlling for Time 1 alcohol consumption behaviours (AUDIT total, frequency, severity). The analyses were conducted by the use of hierarchical multiple regressions. After controlling for Time 1 alcohol consumption behaviours (Block 1), the unique combination of the Time 1 characteristics were controlled by entering the TIPI, coping and Time 1 mental health risk variables as Block 2. The Time 2 mental health risk variables (K10, PCL-C and TSES-R) were then added as Block 3. The results of the hierarchical regressions are presented in the following series of tables.

7.6.1 Unique contribution of Time 2 measures to the prediction of Time 3 AUDIT total. As shown in Table 7.3 the three-predictor model accounted for approximately 38% of the variance in AUDIT total scores from Time 1 to Time 3. This model was statically significant, R^2 = .38, $F(14,208) = 9.14$, $p < .001$. After controlling for the Time 1 levels of alcohol use, which accounted for approximately 30% of the variance, the addition of the Time 1 characteristics and mental health risk variables resulted in a statistically significant increase in R^2 of approximately 7% ($\Delta R^2 = .07$, $F(10, 211) = 2.21$, $p < .05$). However, statistically significant increases in R^2 were not found with the addition of the Time 2 variables ($\Delta R^2 = .01$, $F(3,208) = 1.15$, $p > .05$) accounting for only 1% of the variance.

Table 7.4 demonstrates that none of the Time 2 variables contributed to the Time 3 alcohol consumption behaviours after controlling for Time 1 consumption.

Table 7.3

Hierarchical regression analyses for the dependent variable AUDIT total post-deployment for the Time 2 measures (n = 222).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Time 1	.30	.30	96.92	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Mature, Immature Time 1 Trauma and Mental Health risk	.37	.07	2.21	.019
Block 3	Time 2 Mental Health Risk and Trauma Reaction	.38	.01	1.15	.329

Table 7.4

Block 3 beta weights, t-tests and significance levels for Time 2 variables predicting AUDIT total post-deployment total (n = 222).

Predictor	B	SE B	β	*t*	Sig
Constant	-4.91	2.39		-2.06	.041
AUDIT Time 1	.51	.06	.51	8.46	.000
Conscientiousness	-.12	.26	-.03	-.45	.652
Extraversion	.50	.21	.16	2.39	.018
Agreeableness	.44	.22	.12	1.98	.049
Openness	-.04	.25	-.01	-.06	.874
Emotional Stability	.11	.25	.03	.44	.662
Mature Coping	-.09	.19	-.03	-.48	.633
Immature Coping	.41	.39	.08	1.03	.303
Trauma Exposure Time 1	-.01	.05	-.02	-.26	.794
PCL Total Time 1	.00	.06	.00	.01	.991
K10 Total Time 1	.14	.07	.15	1.97	.050
Trauma Reaction Time 2	.01	.08	.00	.07	.948
PCL Total Time 2	-.03	.05	-.04	-.52	.601
K10 Total Time 2	.14	.08	.13	1.72	.086

$R^2 = .38$, $F(14,208) = 9.14$, $p < .001$

7.6.2 Unique contribution of Time 2 measures to the prediction of Time 3 AUDIT frequency. As shown in Table 7.5 the three-predictor model accounted for approximately 40% of the variance in AUDIT frequency scores from Time 1 to Time 3. This model was statically significant, $R^2 = .40$, $F(14,208) = 9.92$, $p < .001$. After controlling for the Time 1 levels of alcohol use frequency, which accounted for approximately 36% of the variance, the addition of Time 1 variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .03$, $F(10,221) = 1.38$, $p > .05$). Non-significant increases in R^2 were also found for the addition of the Time 2 variables ($\Delta R^2 = .01$, $F(2,226) = 1.38$, $p > .05$).

Table 7.5

Hierarchical regression analyses for the dependent variable AUDIT frequency post-deployment for the Time 2 measures (n = 222).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Frequency Time 1	.36	.36	125.60	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Mature, Immature Time 1 Trauma and Psych Distress	.39	.03	.90	.536
Block 3	Time 2 Mental Health Risk and Trauma Reaction	.40	.01	1.38	.250

Table 7.6 demonstrates that none of the Time 2 variables contributed to the Time 3 alcohol consumption frequency after controlling for Time 1 frequency of alcohol consumption. However, the Time 1 mature coping variable did reach significance ($p < .05$).

Table 7.6

Block 3 beta weights, t-tests and significance levels for Time 2 variables predicting AUDIT frequency post-deployment total (n = 222).

Predictor	B	SE B	β	*t*	Sig
Constant	.49	.56		.88	.381
AUDIT Frequency Time 1	.60	.06	.60	10.77	.000
Conscientiousness	.01	.06	.02	.24	.812
Extraversion	.06	.05	.08	1.24	.218
Agreeableness	.09	.05	.10	1.66	.098
Openness	.01	.06	.02	.24	.812
Emotional Stability	-.01	.06	-.01	-.20	.840
Mature Coping	-.09	.05	-.13	-2.11	.036
Immature Coping	.01	.09	.01	.15	.878
Trauma Exposure Time 1	-.01	.01	-.06	-.89	.375
PCL Total Time 1	.02	.01	.09	1.17	.242
K10 Total Time 1	.00	.02	.02	.23	.816
Trauma Reaction Time 2	.02	.02	.06	1.03	.306
PCL Total Time 2	-.02	.01	-.14	-1.86	.065
K10 Total Time 2	.02	.02	.09	1.20	.230
		R^2 = .40, F(14,208) = 9.92, p < .001			

7.6.3 Unique contribution of Time 2 measures to the prediction of Time 3 AUDIT severity. As shown in Table 7.7, the three-predictor model accounted for approximately 36% of the variance in AUDIT severity scores from Time 1 to Time 3. This model was statically significant, $R^2 = .36$, $F(14,208) = 8.24$, $p < .001$. After controlling for the Time 1 levels of alcohol use severity which accounted for approximately 31% of the variance, the addition of the Time 1 variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .05$, $F(10,211) = 1.50$, $p > .05$). A non-significant increase in R^2 was also found for the addition of the Time 2 variables ($\Delta R^2 = .01$, $F(3,208) = .54$, $p > .05$). Table 7.8 demonstrates that none of the Time 2 variables contributed to the Time 3 alcohol consumption frequency after controlling for Time 1 frequency of alcohol consumption.

Table 7.7

Hierarchical regression analyses for the dependent variable AUDIT severity post-deployment for the Time 2 measures (n = 222).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Severity Time 1	.00	.00	.19	.665
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Mature, Immature Time 1 Trauma and Psych Distress	.05	.05	1.15	.323
Block 3	Time 2 Mental Health Risk and Trauma Reaction	.07	.01	1.00	.395

Table 7.8

Block 3 beta weights, t-tests and significance levels for Time 2 variables predicting AUDIT severity post-deployment total (n = 222).

Predictor	B	SE B	β	*t*	Sig
Constant	2.01	.68		2.94	.004
AUDIT Severity Time 1	.01	.06	.01	.17	.865
Conscientiousness	-.01	.07	-.01	-.15	.885
Extraversion	.09	.06	.12	1.50	.136
Agreeableness	.04	.06	.04	.60	.552
Openness	-.07	.07	-.07	-.89	.373
Emotional Stability	.03	.07	.03	.40	.693
Mature Coping	-.11	.06	-.14	-1.88	.062
Immature Coping	.04	.12	.03	.34	.731
Trauma Exposure Time 1	.00	.01	-.00	-.02	.983
PCL Total Time 1	.01	.02	.03	.32	.748
K10 Total Time 1	.04	.02	.17	1.83	.069
Trauma Reaction Time 2	.02	.02	.08	1.03	.307
PCL Total Time 2	-.02	.02	-.15	-1.60	.118
K10 Total Time 2	.02	.02	.07	.73	.466
	$R^2 = .07$, $F(14,208) = 1.05$, $p = .404$				

7.7 Step 4 – Exploration of the Dimensions of Time 2 Variables as Predictors of Membership to Alcohol Behaviour Groups (Increased, Stable, Decreased) for the Time 3 AUDIT Total, Frequency, and Severity Scores

The fourth step in the data analysis strategy for Research Question Three was to explore the dimensions of Time 2 variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total, frequency and severity scores. The analyses were conducted by the use of discriminant function analyses. The Time 2 variables included the three mental health risk measures (K10, PCL-C, TSES-R Column 2). The groups were *increased* drinking over time, *decreased* drinking over time and drinking remained *stable* over time. Analyses were conducted on the AUDIT total, frequency, and severity change groups.

7.7.1 Dimensions of Time 2 variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total. Of the original 678 cases, 399 were cases were excluded due to missing or out-of-range group codes. For the remaining 279 participant cases (114 decrease, 65 stable, 100 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity and homogeneity of variance-covariance matrices revealed no threat to multivariate analysis. As shown in Table 7.9, this analysis revealed two discriminant functions. The first explains 74.0% of the variance, canonical $R^2 = .02$, whereas the second explained 26.0% of the variance, canonical $R^2 = .01$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .97$, $x^2(6) = 7.92$, $p > .05$. Removing the first function showed that the second function also did not significantly differentiate the groups, $\Lambda = .99$, $x^2(2) = 2.07$, p > 05. The structure matrix and group centroids for the first and second function are presented in Table 7.9 and Table 7.10 respectively.

Table 7.9

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the Time 2 measures (n = 279).

AUDIT Change	Function	
	1	2
Trauma Reaction Time 2	.91*	.41
K10 Total Time 2	.50*	-.19
PCL-C Total Time 2	.15	.59*

* Largest absolute correlation between variables and any discriminant function

Table 7.10

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the Time 2 measures (n = 279).

AUDIT Total Change	Function	
	1	2
Increase	.19	-.03
Stable	-.16	-.12
Decrease	-.07	.10

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

7.7.2 Dimensions of Time 2 variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT frequency. Of the original 678 cases, 399 were cases were excluded due to missing or out-of-range group codes. For the remaining 279 participant cases (71 decrease, 161 stable, 47 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices revealed no threat to multivariate analysis. As shown in Table 7.11, this analysis revealed two discriminant functions. The first explains 95.3% of the variance, canonical $R^2 = .01$, whereas the second explained 4.7% of the variance, canonical $R^2 = .01$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .99$, $x^2(6) = 3.49$, $p > .05$. Removing the first function showed that the second function also did not significantly differentiate the groups, $\Lambda = .99$, $x^2(2) = .16$, p > 05. The structure matrix and group centroids for the first and second function are presented in Table 7.11 and Table 7.12 respectively.

Table 7.11

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the Time 2 measures (n = 279).

AUDIT Frequency	Function	
	1	2
K10 Total Time 2	.48*	.29
Trauma Reaction Time 2	.41	.91*
PCL-C Total Time 2	-.30	.63*

* Largest absolute correlation between variables and any discriminant function

Table 7.12

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the Time 2 measures (n = 279).

AUDIT Total Change	Function	
	1	2
Increase	-.23	-.02
Stable	.02	.02
Decrease	.10	-.04

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

7.7.3 Dimensions of Time 2 characteristics that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT severity. Of the original 678 cases, 399 were cases were excluded due to missing or out-of-range group codes. For the remaining 279 participant cases (75 decrease, 143 stable, 61 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices revealed no threat to multivariate analysis. As shown in Table 7.13, this analysis revealed two discriminant functions. The first explains 78.6% of the variance, canonical $R^2 = .01$, whereas the second explained 21.4% of the variance, canonical $R^2 = .00$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .99$, $x^2(6) = 3.83$, $p > .05$. Removing the first function showed that the second function also did not significantly differentiate the groups, $\Lambda = .99$, $x^2(2) = .83$, p > 05. The structure matrix and group centroids for the first and second function are presented in Table 7.13 and Table 7.14 respectively.

Table 7.13

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the Time 2 measures (n = 279).

AUDIT Severity	Function	
	1	2
Trauma Reaction Time 2	.97*	.11
K10 Time 2	.61*	-.18
PCL-C Total Time 2	.47	..66*

* Largest absolute correlation between variables and any discriminant function

Table 7.14

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the Time 2 measures (n = 279).

AUDIT Total Change	Function	
	1	2
Increase	-.02	-.10
Stable	-.08	.03
Decrease	.17	.02

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

7.8 Chapter Summary

Results from this study indicate that the mental health risk and trauma exposure reaction measures administered during the RtAPS including the K10 and PCL-C measures of psychological distress and the TSES-R measure of deployment related trauma exposure and reaction, have little utility in predicting post-deployment risk of problematic alcohol related behaviours including frequency of alcohol consumption and binge-drinking.

7.8.1 Mental health risk. In relation to mental health risk, the correlation analyses suggested an association between increased reporting on the K10 measure of psychological distress and post-deployment participation in problematic alcohol related behaviours and binge-drinking. The regression analyses supported this finding, demonstrating that increased reporting on the K10 was predictive of increased participation in post-deployment problematic alcohol related behaviours, but was not predictive of frequency of alcohol consumption or binge-drinking. Similarly, the hierarchical regression analysis found that the K10 administered at RtAPS did not provide a significantly sufficient unique contribution to the overall explanation of factors influencing post-deployment alcohol use behaviours.

Non-significant findings for the PCL-C across all analyses indicated that the PCL-C administered at RtAPS (Time 2) demonstrates little to no utility as a predictor of post-deployment alcohol use.

7.8.2 Deployment related trauma exposure reaction. Consistent with the findings for the PCL-C, analyses investigating the TSES-R column 2 measure of felt reaction to deployment related trauma exposure failed to find any significant results. This indicates that the TSES-R column 2 demonstrates little to no utility as a predictor of post-deployment alcohol use.

7.8.3 Prediction of alcohol change group inclusion. The analyses exploring the dimensions of within-deployment variables that differentiated between participants whose pattern of alcohol use increased, decreased or remained stable over time, were inconclusive with the majority of analyses failing to significantly discriminate between the functions.

7.8.4 Conclusion. The K10 was the only measure that showed some association with subsequent alcohol use, which may indicate the influence of non-trauma related deployment factors which may be mediators of deployment related distress and associated post-deployment alcohol use. Overall, the results of this chapter indicate that the within-deployment variables as measured by the RtAPS instruments including the K10, PCL-C and column 2 of the TSES-R, demonstrated little utility in predicting post-deployment risk of problematic alcohol related behaviours including frequency of alcohol consumption and binge-drinking. This is an interesting finding as the ADF currently rely on the RtAPS instruments to assist in the screening for psychological distress or potential adjustment issues due to the impact of deployment related factors or trauma (K10, PCL-C, TSES-R).

Yet, previous research suggests that the impact of deployment as measured by the K10, PCL-C and TSES-R is predictive of a subsequent increase in alcohol use post-deployment (Bray et al., 2013; Jacobson et al., 2008). Results from this study may indicate that the measures were not sensitive enough to assess change or alternatively the factors influencing post-deployment alcohol use may be more related to post-deployment reintegration. Given this, the next chapter (Chapter 8) will address Research Question Four "*Can post-deployment reintegration as measured by changes in mental health outcomes and trauma reaction be used to predict the course of alcohol consumption from pre- to post-deployment?*"

Chapter 8: Results - Impact of Post-deployment Reintegration on the Course of Alcohol Consumption

8.1 Chapter Overview

The purpose of this chapter was to examine Research Question Four "*Can post-deployment reintegration as measured by changes in mental health outcomes and trauma reaction be used to predict the patterns of alcohol consumption pre- to post-deployment?*" The chapter begins by briefly discussing the relevant literature and then reviews the aspects of the Method that are pertinent to Research Question Four. The results that explore the associations between Time 3 (post-deployment) mental health risk measures and patterns of alcohol use (AUDIT total, frequency, severity) across time (Time 3, Time 1/Time3 change) are then presented before summarising the key findings and conclusions.

8.2 Introduction

The experience of psychological distress post-deployment is common to operational service regardless of the nature of the operation. Veterans, especially those who have been exposed to combat operations, have been found to be at high risk of developing a mental health disorder post-deployment, such as an anxiety disorder, mood disorder, adjustment disorder, PTSD or alcohol use disorders (Bleier et al., 2011; M. J. Larson et al., 2013; Schultz et al., 2014; Wells et al., 2009). A study of UK Iraq and Afghanistan veterans found that approximately 17% of respondents meet the criteria for at least one psychological disorder when assessed post-deployment (Mulligan et al., 2012). Similarly, the US Millennium Cohort Study found an increase of new onset depression following operational deployment (Wells et al., 2009) to Iraq and Afghanistan, in addition to an increase in alcohol misuse (Jacobson et al., 2008) and new-onset PTSD symptoms (Smith et al., 2008).

The link between depression and deployment in ADF contemporary veterans is inconclusive. A study of ADF personnel who had deployed to the Solomon Islands, East

Timor and / or Bougainville found an increased risk of experiencing psychological distress post-deployment (as measured by the K10) in comparison to a non-deployed comparison group (Bleier et al., 2011). In comparison, the MEAO Prospective Study (Davy et al., 2012) found no overall effect of deployment on the development of depressive symptoms. The study did, however, find a number of significant associations between a range of deployment and reintegration related factors and increased alcohol use at post-deployment (Davy et al., 2012). Furthermore, the MEAO Prospective Health Study found that there was a statistically significant increase in psychological distress between pre- and post-deployment (Davy et al., 2012). The study also reported an interaction between deployment and the development of PTSD post-deployment. This is consistent with US research findings suggesting that deployments to Afghanistan and Iraq have been shown to be associated with the subsequent development of post-deployment PTSD symptoms (Kline et al., 2010; Maguen et al., 2010; Maguen et al., 2009).

Problematic alcohol use following operational service has been well documented in veteran populations (Hooper et al., 2008; Jones & Fear, 2011). For example, the 2003 Australian Gulf War Veterans' Health Study (Monash University, 2003) revealed an increased risk of substance use disorder (primarily alcohol) for deployed members of up to one-and-a-half times that of defence personnel who had not deployed to the Gulf. Furthermore, a large-scale cohort study investigating US service personnel (Jacobson et al., 2008), found that 8.8% of the cohort reported a new-onset of heavy weekly drinking post-deployment. Other longitudinal studies have also reported the onset or increased rates of alcohol consumption post-deployment in a UK sample (Hooper et al., 2008).

Relatively few studies have investigated the effect of deployment on post-deployment binge-drinking behaviours. Of the studies which have investigated this effect, Ames et al. (2007) found that rates of binge drinking increased immediately after deployment and in another study, 16% of the US veteran sample who deployed between 2008 – 2011, 25.6% of respondents returning from a combat deployment in the past year reported binge-drinking (6+ drinks on one occasion) at least weekly (Adams et al., 2012; M. J. Larson et al., 2013).

While the literature provides support to the assumption that operational service may impact the level and frequency of post-deployment alcohol use in some way, to my knowledge there has been no study which investigates the impact of deployment on the course of alcohol related behaviours across the deployment cycle (pre- to post-deployment). In this current study, levels of deployment related mental health risk and trauma reaction measured prior to returning home from deployment (RtAPS) demonstrated little utility in predicting post-deployment problematic alcohol related behaviours (Chapter 7). Nevertheless, it has been suggested that the most stressful periods for deployed personnel may be the post-deployment phase as deployed personnel attempt to readjust to life back home (MacDonald et al., 1998). Therefore a stronger association between alcohol misuse and factors associated with post-deployment phase may exist than those associations shown at the pre- or within-deployment phases. Hence, this chapter focuses on the association between post-deployment psychological distress and trauma reaction and the course of alcohol consumption over time from pre- (Time 1) to post-deployment (Time 3).

8.3 Review of Method

8.3.1 Measures. Three measures were administered at Time 3 to capture levels of mental health risk and trauma exposure. First, the K10, which is a measure of felt psychological distress administered at Time 3 (post-deployment) in addition to the PCL-C (Andrews et al., 1989; Weathers et al., 1993) which was designed to screen for trauma symptomatology. Both the K10 and PCL-C produce a total score indicating severity of symptoms. Finally, column 3 of TSES-R (Hodson, 2002) was administered to assess the level of distress experienced 6 - 12 months post deployment related trauma exposure. Column totals were used in the data analysis.

The AUDIT (Saunders, Aasland, Amundsen, et al., 1993; Saunders, Aasland, Babor, et al., 1993) was administered at Time-1 (pre-deployment) and Time-3 (post-deployment). Although internal consistency is not a requirement of indexes (Diamantopoulos & Winklhofer, 2001), the AUDIT showed reasonable internal consistency at each administration, with the Cronbach alpha coefficient reaching .74 at both administrations.

The AUDIT responses were categorised in four different ways for the purposes of analyses. Firstly, an overall score indicating relative risk of drinking behaviour (AUDIT Total). Secondly, Question 1 of the AUDIT asks the respondents to indicate “How often do you have a drink containing alcohol?” providing an indication of ‘Frequency’ of alcohol consumption. Question 3 of the AUDIT asks respondents to indicate “How often do you have six or more drinks on one occasion?” providing an indicator of ‘Severity’ of binge-drinking behaviours. Finally, an assessment of Time 1 to Time 3 change in alcohol behaviours was gained by detracting each individuals Time 3 AUDIT scores from the respective Time 1 AUDIT score.

The measures were more fully described in Chapter 3 (Methodology) and validated in Chapter 4 (Instrument Validation).

8.3.2 Sample sizes. Figure 8.1 shows that of the 676 participants whose data were used in this study (See Chapter 3, Figure 1), 438 participants completed the AUDIT at pre-deployment (Time 1) and 518 participants completed the AUDIT at post-deployment (Time 3). The analyses investigating the influence of Time 3 mental health risk and trauma variables on Time 3 alcohol consumption behaviours used only those trauma exposure and mental health risk scores that also had a corresponding Time 3 AUDIT score. Therefore, of the 518 participants who completed the AUDIT at Time 3, 518 completed the K10; 518 completed the PCL-C; and 512 completed the TSES-R (see Figure 8.1).

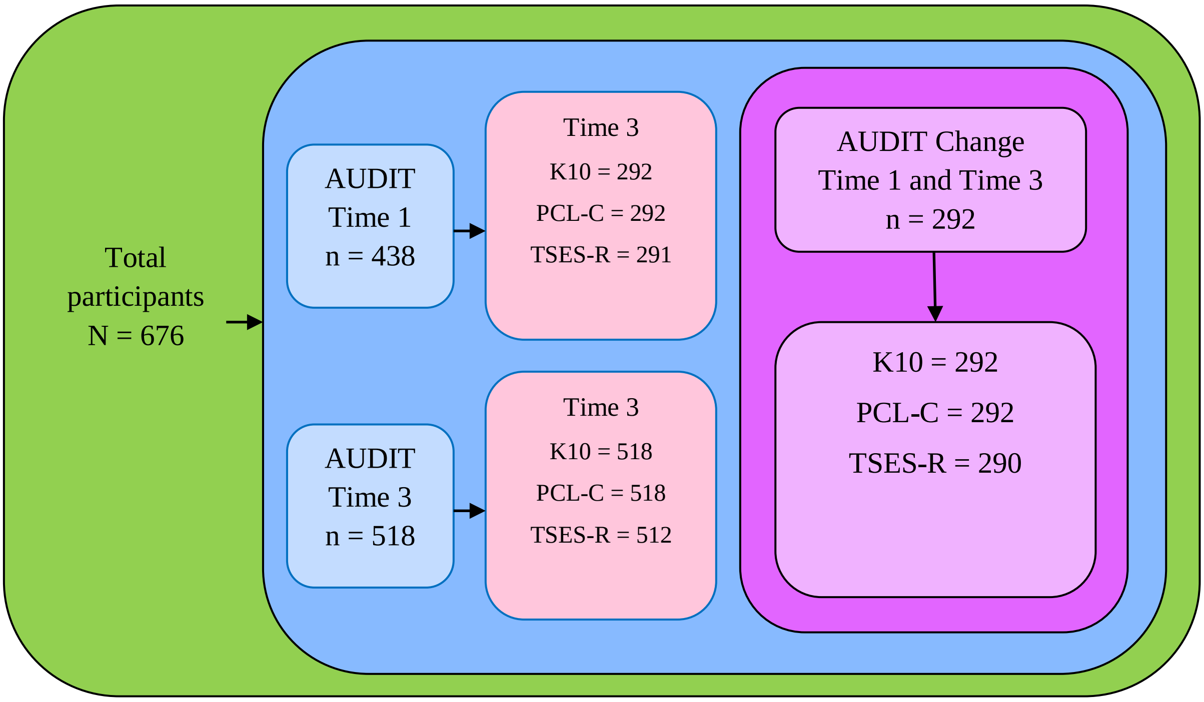

Figure 8.1 *Summary of sampling and response for the AUDIT and Time 3 measures*

In order to assess the course of alcohol use across time (Time 1 / Time 3 Change), the analyses investigating the influence of the Time measures on Time 3 alcohol behaviours used only those participants that also had a corresponding Time 1 AUDIT score: K10 n = 292, PCL-C n = 292 and TSES-R n = 290.

8.3.3 Data analysis strategy. The data analysis strategy for Research Question Four comprised:

Step 1 – Examination of correlations between Time 3 measures and patterns of alcohol use (Time 3, and Time1 / Time 3 change).

Step 2 – Prediction of AUDIT total, frequency and severity scores (Time 3, and Time1 / Time 3 change) by combination of Time 3 measures through the use of simultaneous regression.

Step 3 – Investigation of the unique contribution Time 3 measures to the prediction of Time 3 AUDIT total, frequency and severity scores after controlling for Time 1 levels of alcohol consumption through the use of hierarchical regression.

Step 4 – Exploration of the Time 3 measures as predictors of membership to three alcohol behaviour groups (increased, stable, decreased) for the Time 3 AUDIT total, frequency, and severity scores through the use of discriminant function analysis

8.4 Step 1 – Examination of Correlations Between Time 3 Measures and Patterns of Alcohol Use (Time 3, and Time1 / Time 3 change)

The first step in the data analysis strategy for Research Question Four was to examine the direction and strength of the relationships between post-deployment measures (Time 3) and patterns of alcohol use at post-deployment (Time 3) and for the pre- / post-deployment change scores.

The analysis was conducted by the use of Pearson product-moment correlations. The results of the analysis are presented in Table 8.1. The first set (Set 1) shows the Pearson correlations between each of the three Time 3 measures and Time 3 AUDIT scores. The second set (Set 2) shows the Pearson correlations between each of the three Time 3 measures and changes in AUDIT scores from Time 1 to Time 3.

8.4.1 Relationships between Time 3 measures and Time 3 alcohol use. As shown in the Set 1 results in Table 8.1, there was a significant positive correlation between the post-deployment (Time 3) AUDIT total score and the Time 3 K10 (r (518) = .17, $p < .01$). Further significant positive correlations were also found between the post-deployment (Time 3) AUDIT total score and the Time 3 PCL-C (r (518) = .24, $p < .01$) and the Time 3 AUDIT total and the Time 3 TSES-R (r (512) = .13, $p < .01$). As indicated by positive direction of correlation coefficients, higher scores on the mental risk and trauma exposure measures at Time 3 were associated with greater levels of problematic alcohol related behaviours at Time 3.

Table 8.1

Pearson product-moment correlations between the AUDIT post-deployment and pre-/post-deployment change scores for the Time 3 K10, PCL-C and TSES-R column 3 factors.

Time 3 Measures	Set 1 AUDIT Time 3 Scores				Set 2 AUDIT Change (T3-T1) Scores			
	n	Total	Freq	Severity	n	Total	Freq	Severity
K10	518	.17**	.00	.06	292	.14*	.04	.02
PCL-C	518	.24**	.07	.09*	292	.12*	.00	.02
Trauma	512	.13**	.05	.06	290	.14*	-.06	-.09

* Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

No significant correlations were found for any of the measures of mental health risk and trauma exposure (K10, PCL-C and TSES-R) and Time 3 indicators of alcohol frequency and severity. Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitude of the significant correlations in the Set 1 results were small (i.e., absolute values less than .30).

8.4.2 Relationships between Time 3 measures and Time1 / Time 3 changes in alcohol use. As shown in the Set 2 results in Table 8.1, there was a significant positive correlation between the AUDIT total change score and the Time 3 K10 (r (292) = .14, $p < .05$). Further significant positive correlations were also found between AUDIT total change score and the Time 3 PCL-C (r (292) = .12, $p < .05$) and the AUDIT total change and the Time 3 TSES-R (r (290) = .14, $p < .05$). As indicated by positive direction of correlation coefficients, higher scores on the mental risk and trauma exposure measures at Time 3 were associated with greater change in the level of problematic alcohol related behaviours from pre-deployment (Time 1) to post-deployment (Time 3).

No significant correlations were found for any of the measures of mental health risk and trauma exposure (K10, PCL-C and TSES-R) and indicators of change in alcohol frequency and severity from Time 1 – Time 3. Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitude of the significant correlations in the Set 2 results were small (i.e., absolute values less than .30).

8.5 Step 2 – Prediction of AUDIT Total, Frequency and Severity Scores (Time 3, and Time1 / Time 3 change) by Combination of Time 3 measures

The second step in the data analysis strategy for Research Question Four was to explore the degree to which the combination of Time 3 mental health risk and trauma exposure measures predicted AUDIT total, frequency and severity scores (Time 3 and Time1/Time 3 change). The second step also examined the relative contribution of each of the Time 3 measures to the total variance explained in the AUDIT total, frequency and severity scores.

The analysis was conducted by the use of simultaneous regression analyses. The results of the analysis for AUDIT total, frequency and severity scores are presented in Table 8.2. The first set (Set 1) of results shows the regression analysis for the Time 3 measures and AUDIT (total, frequency and severity) scores at Time 3. The second set (Set 2) of results shows the regression analysis for the Time 3 measures and changes in AUDIT (total, frequency and severity) scores from Time 1 to Time 3.

Table 8.2

Simultaneous regression analyses for the Time 3 psychological distress and trauma exposure variables predicting AUDIT total, frequency, and severity at post-deployment (n = 511) and across time (n = 289) .

Factor	Set 1 AUDIT Total Post-deployment (Time 3)					Set 2 AUDIT Total Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	3.42	.60		5.70	.000	-1.32	.82		-1.38	.170
K10	-.03	.05	-.04	-.57	.569	.08	.07	.11	1.11	.269
PCL-C	.16	.04	.29	3.97	.000	-.02	.06	-.03	-.24	.811
TSES C3	-.04	.10	-.02	-.41	.684	.16	.13	.09	1.23	.221
	R^2 = .06, F(3,508) = 11.33, p <.001					R^2 = .03 F(3,286) = 2.47, p = .062				
Factor	AUDIT Frequency Post-deployment (Time 3)					AUDIT Frequency Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	2.19	.15		15.11	.000	.24	.18		1.34	.182
K10	-.03	.01	-.13	-1.97	.049	-.02	.02	-.10	-.93	.351
PCL-C	.02	.01	.18	2.37	.018	.00	.01	.01	.08	.939
TSES C3	.00	.02	.00	.01	.990	.04	.03	.10	1.32	.189
	R^2 = .01, F(3,508) = 2.30, p = .077					R^2 = .01, F(3,286) = .89, p = .449				
Factor	AUDIT Severity Post-deployment (Time 3)					AUDIT Severity Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	1.14	.15		9.20	.000	-.40	.21		-1.91	.057
K10	-.00	.01	-.02	-.26	.796	-.00	.02	.01	.05	.960
PCL-C	.01	.01	.10	1.38	.169	.02	.02	.14	1.19	.235
TSES C3	.00	.03	.01	.12	.907	-.08	.03	-.18	-2.39	.017
	R^2 = .01, F(3,508) = 1.45, p =.208					R^2 = .02, F(3,286) = 1.96, p = .121				

Six simultaneous regression analyses are reported based on the information presented in Table 8.2. The report of each analysis commences with the statistical significance of the amount of variance accounted for by the regression model based on the use of an *F*-ratio statistic to test the null hypothesis that the value of *R* (multiple correlation coefficient) is equal to zero. The value of R^2 (also called the coefficient of determination) is then presented. R^2 represents the proportion of variance on the AUDIT total scores (post and pre-post change) explained by the post-deployment characteristics. The reporting of each regression is completed by the statistical significance of each of the post-deployment characteristics based on the use of a *t* –statistic to test the null hypothesis that the value of individual variable coefficients is equal to zero. Table 8.2 presents both unstandardised (B) and standardised (β) coefficients for each regression analysis.

The six simultaneous regression analyses (Sections 8.5.1 to 8.5.6) are reported below based on the information presented in Table 8.2.

8.5.1 Prediction of Time 3 AUDIT total scores by combination of Time 3 measures. The first simultaneous regression analysis (Set 1 results in Table 8.2) shows that the combination of the post-deployment (Time 3) mental health risk and trauma exposure reaction measures significantly predicted post-deployment (Time 3) AUDIT total scores, $F(3,508) = 11.33$, $p < .001$. The value of R^2 shows that 6% of the variance in Time 3 AUDIT total scores was explained by the combination of Time 3 measures. Examination of the individual variable coefficients shows that only the PCL-C demonstrated a significant beta coefficient indicating that the Time 3 PCL-C made a statistically significant contribution to total variance explained by the combination of Time 3 measures of mental health risk and trauma exposure reaction.

Consistent with the significant correlations found in Section 8.4, higher levels of mental health risk as measured by the PCL-C are predictive of increased participation in problematic drinking behaviours. The significant correlations found in Section 8.4 between the remaining two Time 3 measures (K10 and TSES-R) were not supported here.

8.5.2 Prediction of changes in Time 1 / Time 3 AUDIT total scores explained by combination of Time 3 measures. The second simultaneous regression analysis investigating the AUDIT total (Set 3 AUDIT total change results in Table 8.2) shows that the change in AUDIT total scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the Time 3 measures, F (3,286) = 2.47, p > .05. These results are inconsistent with the significant correlations found in the previous sections (Section 8.4) where higher levels of mental health risk as measured by the K10, PCL-C, and TSES-R were predictive of increased participation in problematic drinking behaviours. No further analyses are reported for AUDIT total change Set 2 results given the support for the null hypothesis, that is, the value of R (multiple correlation coefficient) is equal to zero.

8.5.3 Prediction of Time 3 AUDIT frequency scores by combination of Time 3 measures. The third simultaneous regression analysis (Set 1 results in Table 8.2) shows that the combination of the post-deployment (Time 3) measures could not reliably predict post-deployment (Time 3) AUDIT frequency scores, F (3,508) = 2.30, p > .05. No further analyses are reported for the AUDIT frequency Set 1 results given the support for the null hypothesis.

8.5.4 Prediction of changes in Time 1 / Time 3 AUDIT frequency scores explained by combination of Time 3 measures. The fourth simultaneous regression analysis (AUDIT frequency change Set 2 results in Table 8.2) shows that the change in AUDIT frequency scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the Time 3 mental health risk and trauma exposure measures, F (3,286) = .89, p > .05. No further analyses are reported for AUDIT frequency change Set 2 results given the support for the null hypothesis.

8.5.5 Prediction of Time 3 AUDIT severity scores by combination of Time 3 measures. The fifth simultaneous regression analysis (AUDIT severity Set 1 results in Table 8.2) shows that the combination of the post-deployment (Time 3) measures do not significantly predict post-deployment (Time 3) AUDIT severity scores, F (3,508) = 1.45, p > .05. These results are inconsistent with the significant correlation found in the previous sections (Section 8.4) where higher levels of mental health risk as measured by the PCL-C were associated with increased participation in binge-drinking behaviours. No further analyses are reported for the AUDIT severity Set 1 results given the overall support for the null hypothesis.

8.5.6 Prediction of changes in Time 1 / Time 3 deployment AUDIT severity scores explained by combination of Time 3 measures. The final simultaneous regression analysis (AUDIT severity change Set 2 results in Table 8.2) shows that the change in AUDIT severity scores from pre-deployment to post-deployment could not be reliably predicted by the combination of the Time 3 measures, F (3,286) = 1.96, p > .05. Although the overall model did not reach significance, examination of the individual variable coefficients showed that Time 3 TSES-R Column 3 demonstrated a significant beta coefficient indicating that the Time 3 TSES-R Column 3 made a statistically significant contribution to the total variance explained by the combination of Time 3 measures of mental health risk and trauma exposure reaction. This result is inconsistent with the non-significant correlation found in Section 8.4, which found no association between the Time 3 TSES-R and the level of Time 1 to Time 3 AUDIT severity. No further analyses are reported for the AUDIT severity change Set 2 results given the overall support for the null hypothesis.

8.6 Step 3 – Investigation of the Unique Contribution Time 3 Measures to the Prediction of Time 3 AUDIT Total, Frequency and Severity Scores

The third step in the data analysis strategy for Research Question Four was to explore the degree to which the post-deployment (Time 3) measures of mental health risk and trauma exposure reaction predicted AUDIT post-deployment (Time 3) total, frequency and severity scores after controlling for Time 1 alcohol consumption behaviours (AUDIT total, frequency, severity). The analyses were conducted by the use of hierarchical multiple regressions. After controlling for Time 1 alcohol consumption behaviours (Block 1), the unique combination of the Time 1 characteristics were controlled by entering the TIPI , coping and Time 1 mental health risk variables as Block 2. The Time 2 mental health risk variables (K10, PCL-C and TSES-R) were then added as Block 3. Finally, the Time 3 mental health risk variables (K10, PCL-C and TSER-R) were added as Block 4. The results of the hierarchical regressions are presented in the series of tables below.

8.6.1 Unique contribution of Time 3 measures to the prediction of Time 3 AUDIT total. As shown in Table 8.3 the four-predictor model accounted for approximately 41% of the variance in AUDIT total scores from Time 1 to Time 3. This model was statically significant, $R^2 = .41$, $F(17,203) = 8.16$, $p < .001$. After controlling for the Time 1 levels of alcohol use, which accounted for approximately 30% of the variance, the addition of the Time 1 characteristics and mental health risk variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .06$, $F(10, 209) = 1.18$, $p > .05$). Likewise, statistically significant increases in R^2 were also not found with the addition of the Time 2 variables ($\Delta R^2 = .01$, $F(3,206) = 1.11$, $p > .05$). The addition of the Time 3 variables, however, did result in a statistically significant increase in R^2 of approximately 4% ($\Delta R^2 = .04$, $F(3,203) = 4.38$, $p < .01$).

Table 8.3

Hierarchical regression analyses for the dependent variable AUDIT total post-deployment for the Time 3 measures (n = 220).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Time 1	.30	.30	94.62	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Mature, Immature Time 1 Trauma and Psych Distress	.36	.06	1.81	.060
Block 3	Time 2 Trauma and Psych Distress	.37	.01	1.11	.347
Block 4	Time 3 Trauma and Psych Distress	.41	.04	4.38	.005

Table 8.4 demonstrates that of the Time 3 variables, only the Time 3 Trauma Reaction variable was significant (p < .05) after controlling for pre-deployment consumption and the Time 1 and Time 2 variables. The time 1 Agreeableness and Time 1 K10 also reached significance (p < .05 for each).

Table 8.4

Block 4 beta weights, t-tests and significance levels for Time 3 variables predicting AUDIT total post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	-3.20	2.40		-1.33	.184
AUDIT Time 1	.51	.06	.52	8.63	.000
Conscientiousness	.09	.26	.02	.34	.732
Extraversion	.38	.21	.12	1.82	.070
Agreeableness	.44	.22	.12	2.00	.046
Openness	-.10	.24	-.03	-.43	.668
Emotional Stability	.01	.25	.00	.05	.957
Mature Coping	-.10	.19	-.03	-.55	.584
Immature Coping	.30	.39	.06	.78	.438
Trauma Exposure Time 1	-.02	.05	-.03	-.46	.648
PCL Total Time 1	-.04	.06	-.05	-.57	.567
K10 Total Time 1	.15	.07	.15	2.05	.041
Trauma Reaction Time 2	-.08	.09	-.06	-.90	.368
PCL Total Time 2	-.03	.05	-.05	-.61	.541
K10 Total Time 2	.15	.08	.14	1.86	.064
Trauma Reaction Time 3	.37	.15	.22	2.57	.011
PCL Total Time 3	.07	.07	.11	.91	.366
K10 Total Time 3	-.15	.09	-.18	-1.77	.079
		R^2 = .41, F(17,203) = 8.16, p < .001			

8.6.2 Unique contribution of Time 3 measures to the prediction of Time 3 AUDIT frequency. As shown in Table 8.5 the four-predictor model accounted for approximately 37% of the variance in AUDIT frequency scores from Time 1 to Time 3. This model was statically significant, R^2 = .37, F(17,203) = 8.68, p < .001. After controlling for the Time 1 levels of alcohol use frequency, which accounted for approximately 36% of the variance, the addition of Time 1 variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .03$, $F(10,209) = .87$, $p > .05$). Non-significant increases in R^2 were also found for the addition of the Time 2 variables ($\Delta R^2 = .01$, $F(3,206) = 1.36$, $p > .05$). Although not reaching the significance cut-off of .05, the addition of the Time 3 variables demonstrated a notable trend towards an increase in R^2 ($\Delta R^2 = .02$, $F(3,203) = 2.64$, $p = .051$).

Table 8.5

Hierarchical regression analyses for the dependent variable AUDIT frequency post-deployment for the Time 3 measures (n = 220).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Frequency Time 1	.36	.36	123.59	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Mature, Immature Time 1 Trauma and Psych Distress	.39	.03	.87	.558
Block 3	Time 2 Trauma and Psych Distress	.40	.01	1.36	.255
Block 4	Time 3 Trauma and Psych Distress	.42	.02	2.64	.051

Table 8.6 demonstrates that the Time 3 Trauma Reaction variable reached significance (p = < .05), the remainder of the Time 3 variables did not contribute to the prediction of post-deployment alcohol consumption after controlling for pre-deployment consumption and the

Time 1 and Time 2 variables. The time 1 Agreeableness neared significance (p = .052) while the Time 1 mature coping variable provided a significant contribution (p < .05).

Table 8.6

Block 4 beta weights, t-tests and significance levels for Time 3 variables predicting AUDIT frequency post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	.85	.57		1.48	.140
AUDIT Frequency Time 1	.59	.06	.59	10.51	.000
Conscientiousness	.02	.06	.03	.39	.693
Extraversion	.05	.05	.07	1.04	.300
Agreeableness	.10	.05	.11	1.95	.052
Openness	.00	.06	.00	.04	.969
Emotional Stability	-.02	.06	-.02	-.28	.779
Mature Coping	-.10	.05	-.13	-2.24	.026
Immature Coping	.02	.09	.02	.27	.790
Trauma Exposure Time 1	-.01	.01	-.07	-1.10	.274
PCL Total Time 1	.01	.01	.08	.93	.354
K10 Total Time 1	.01	.02	.05	.72	.475
Trauma Reaction Time 2	.01	.02	.02	.28	.777
PCL Total Time 2	-.02	.01	-.10	-1.24	.218
K10 Total Time 2	.03	.02	.11	1.48	.140
Trauma Reaction Time 3	.07	.03	.18	2.06	.041
PCL Total Time 3	-.01	.02	-.04	-.34	.736
K10 Total Time 3	-.04	.02	-.18	1.78	.077

$R^2 = .42$, $F(17,203) = 8.68$, $p < .001$

8.6.3 Unique contribution of Time 3 measures to the prediction of Time 3 AUDIT severity. As shown in Table 8.7 the four-predictor model accounted for approximately 31% of the variance in AUDIT severity scores from Time 1 to Time 3. This model was statically significant, $R^2 = .31$, $F(17,203) = 6.82$, $p < .001$. After controlling for the Time 1 levels of alcohol use severity which accounted for approximately 30% of the variance, the addition of Time 1 variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .05$, $F(10,209) = 1.44$, $p > .05$). Non-significant increases in R^2 were also found for the addition of the Time 2 variables ($\Delta R^2 = .01$, $F(3,206) = .58$, $p > .05$). Finally, non-significant increases in R^2 were also found for the addition of the Time 3 variables R^2 ($\Delta R^2 = .01$, $F(3,203) = 1.28$, $p > .05$).

Table 8.7

Hierarchical regression analyses for the dependent variable AUDIT severity post-deployment for the Time 3 measures (n = 220).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Severity Time 1	.30	.30	.94.23	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Mature, Immature Time 1 Trauma and Psych Distress	.35	.05	1.44	.164
Block 3	Time 2 Trauma and Psych Distress	.35	.00	.58	.627
Block 4	Time 3 Trauma and Psych Distress	.36	.01	1.28	.283

Table 8.8 demonstrates that none of the Time 3 variables significantly contributed to the prediction of post-deployment alcohol consumption after controlling for pre-deployment consumption and the Time 1 and Time 2 variables. No other variables reached significance.

Table 8.8

Block 4 beta weights, t-tests and significance levels for Time 3 variables predicting AUDIT severity post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	-.83	.65		-1.28	.200
AUDIT Severity Time 1	.55	.06	.54	9.01	.000
Conscientiousness	.09	.07	.09	1.28	.202
Extraversion	.09	.06	.12	1.66	.098
Agreeableness	.08	.06	.08	1.37	.171
Openness	.00	.07	.00	.04	.968
Emotional Stability	-.02	.07	-.02	-.30	.764
Mature Coping	-.03	.05	-.05	-.49	.623
Immature Coping	.12	.10	.09	1.17	.243
Trauma Exposure Time 1	-.01	.01	-.05	-.73	.465
PCL Total Time 1	-.01	.02	-.05	-.61	.544
K10 Total Time 1	.04	.02	.14	1.79	.076
Trauma Reaction Time 2	.01	.02	.04	.61	.545
PCL Total Time 2	.01	.01	.03	.34	.732
K10 Total Time 2	.00	.02	.12	.19	.847
Trauma Reaction Time 3	.05	.04	.11	1.17	.243
PCL Total Time 3	.01	.02	.07	.58	.564
K10 Total Time 3	-.04	.02	-.17	-1.60	.112
		$R^2 = .31$, $F(17,203) = 6.82$, $p < .001$			

8.7 Step 4 – Exploration of the Dimensions of Time 3 Variables as Predictors of Membership to Alcohol Behaviour Groups (Increased, Stable, Decreased) for the Time 3 AUDIT Total, Frequency, and Severity Scores

The fourth step in the data analysis strategy for Research Question Four was to explore the dimensions of Time 3 variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total, frequency and severity scores. The analyses were conducted by the use of discriminant function analysis. The Time 3 variables included the three mental health risk measures (K10, PCL-C, TSES-R Column 3). The groups were *increased* drinking over time, *decreased* drinking over time and drinking remained *stable* over time. Analyses were conducted on the AUDIT total, frequency, and severity change groups.

8.7.1 Dimensions of Time 3 variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total. Of the original 678 cases, 388 were cases were excluded due to missing or out-of-range group codes. For the remaining 290 participant cases (117 decrease, 67 stable, 106 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 8.9, this analysis revealed one discriminant function which explained 100% of the variance, Canonical R^2 = .02. This discriminant function did not significantly differentiate the change groups (increase, decrease, stable), Λ = .98, x2(6) = 5.35, p = .499. The correlations between outcomes and the discriminant functions revealed that all factors loaded positively on the first function. The structure matrix and group centroids for the first function are presented in Table 8.9 and Table 8.10 respectively.

Table 8.9

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the Time 3 measures (n = 290).

AUDIT Change	Function
	1
Trauma Reaction Time 3	.96*
K10 Total Time 3	.46*
PCL-C Total Time 3	.45*

* Largest absolute correlation between variables and any discriminant function

Table 8.10

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the Time 3 measures (n = 290).

AUDIT Total Change	Function
	1
Decrease	-.09
Stable	-.13
Increase	.18

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

8.7.2 Dimensions of Time 3 variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT frequency. Of the original 678 cases, 388 were cases were excluded due to missing or out-of-range group codes. For the remaining 290 participant cases (76 decrease, 165 stable, 49 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 8.11, this analysis revealed two discriminant functions. The first explains 85.9% of the variance, canonical $R^2 = .01$, whereas the second explained 14.1% of the variance, canonical $R^2 = .01$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .98$, $x^2(6) = 4.74$, $p = .578$. Furthermore, removing the first function also showed that the second function did not significantly differentiate the groups, $\Lambda = 1.00$, $x^2(2) = .67$, $p = .714$. The structure matrix and group centroids for the first and second function are presented in Table 8.11 and Table 8.12 respectively.

Table 8.11

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the Time 3 measures (n = 290).

AUDIT Frequency	Function	
	1	2
K10 Total Time 3	.65*	.48
PCL-C Total Time 3	.32*	.11
Trauma Reaction Time 3	-.30	.62*

* Largest absolute correlation between variables and any discriminant function

Table 8.12

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the Time 3 measures (n = 290).

AUDIT Total Change	Function	
	1	2
Decrease	-.18	-.03
Stable	.04	.04
Increase	.16	-.08

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

8.7.3 Dimensions of Time 3 characteristics that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT severity. Of the original 678 cases, 388 were cases were excluded due to missing or out-of-range group codes. For the remaining 290 participant cases (81 decrease, 147 stable, 62 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 8.13, this analysis revealed two discriminant functions. The first explains 93% of the variance, canonical R2 = .03, whereas the second explained 7% of the variance, canonical R2 < .01. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .98$, $x^2(6) = 9.86$, p = .130. Removing the first function also confirmed that the second function did not significantly differentiate the groups, $\Lambda = .99$, $x^2(2) = .70$, p = .704. The structure matrix and group centroids for the first and second function are presented in Table 8.13 and Table 8.14 respectively.

Table 8.13

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the Time 3 measures (n = 290).

AUDIT Severity	Function	
	1	2
Trauma Reaction Time 3	.73*	.44
K10 Total Time 3	-.07	.95*
PCL-C Total Time 3	-.04	.59*

* Largest absolute correlation between variables and any discriminant function

Table 8.14

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the Time 3 measures (n = 290).

AUDIT Total Change	Function	
	1	2
Decrease	.26	.03
Stable	-.05	-.05
Increase	-.24	.07

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

8.8 Chapter Summary

Results from this chapter indicate that the mental health risk measures administered three to six months post-deployment have little and inconclusive utility, while the TSES-R showed some value in predicting post-deployment risk of problematic alcohol related behaviours, including frequency of alcohol consumption and binge-drinking.

8.8.1 Mental health risk. In relation to mental health risk, the correlation analyses suggested an association between increased reporting on the K10 and PCL-C measures of mental health risk and post-deployment participation in problematic alcohol related behaviours. These associations were not found for frequency of alcohol consumption and only for the PCL-C for binge-drinking. The regression analyses partially supported these findings, demonstrating that only increased reporting on the PCL-C measure at post-deployment was predictive of increased participation in post-deployment problematic alcohol related behaviours. Furthermore, although no correlations were found and the overall regression model was not significant, the regression analyses demonstrated that increased reporting on the post-deployment PCL- C and decreased reporting on the K10 were also predictive of increased frequency of alcohol consumption post-deployment. Interestingly, the hierarchical regression analyses found that neither the K10 nor PCL-C administered post-deployment provided a significantly sufficient unique contribution to the overall explanation of factors influencing post-deployment alcohol use behaviours.

Similar inconsistent results were found for the analyses investigating the course of alcohol use and related behaviours across the deployment cycle (pre- to post-deployment). Although significant correlations were found for the two measures (K10 and PCL-C) administered post-deployment for the overall measure of participation in problematic alcohol behaviours (AUDIT total), the regression analyses did not find that the measures had predictive utility in determining the extent of change in alcohol related behaviours (total, frequency, severity) from pre- to post-deployment.

8.8.2 Deployment related trauma exposure reaction. Consistent with the findings for the mental health risk measures, the correlation analyses suggested an association between increased reporting on the TSES-R column 3 measure of continuing distress related to exposure to trauma on deployment and post-deployment participation in problematic alcohol related behaviours. However, the regression analyses did not support these findings in that the TSES-R did not provide individual predictive utility in determining post-deployment alcohol related behaviours. No associations were found for the frequency of alcohol consumption or binge drinking.

Similar inconsistent results were found for the analyses investigating the course of alcohol use and related behaviours across the deployment cycle (pre- to post-deployment). Although significant correlations were found for the TSES-R column 3 administered post-deployment for the overall measure of participation in problematic alcohol behaviours (AUDIT total), the regression analyses did not find that the measures had predictive utility in determining the extent of change in alcohol related behaviours (total, frequency) from pre- to post-deployment except for reports of binge-drinking.

While the overall regression model was not significant, increased reporting in symptoms relating to deployment related trauma at post-deployment had individual utility in predicting a decrease in binge-drinking from pre- to post-deployment. This is a counter-intuitive result and was not supported in the hierarchical regression analysis. However, the hierarchical regression analysis did find that the post-deployment TSES-R provided a significant unique contribution to the overall explanation of factors influencing post deployment alcohol related behaviours including frequency of alcohol consumption.

8.8.3 Prediction of alcohol change group inclusion. The analyses exploring the dimensions of post-deployment variables that differentiated between group inclusions, for example, participants whose pattern of alcohol use increased, decreased or remained stable over time, were inconclusive with the majority of analyses failing to significantly discriminate between the functions.

8.8.4 Conclusion. Overall, results from this chapter indicate that the mental health risk and trauma exposure reaction measures administered three to six months post-deployment including the K10 and PCL-C measures of mental health symptoms and the TSES-R measure of deployment related trauma exposure and reaction, have some but inconclusive utility in predicting post-deployment risk of problematic alcohol related behaviours, including frequency of alcohol consumption and binge-drinking.

The PCL-C demonstrated predictive utility for overall participation in post-deployment problematic alcohol behaviours and alcohol consumption frequency which supports previous research that has found individuals may use alcohol to self-medicate against the effects of deployment related trauma exposure and associated psychological arousal (Marshall et al., 2012). However, the finding that the greater psychological distress reported on the K10 at post-deployment was related to lower alcohol consumption frequency is inconsistent with the literature and is counter-intuitive. The result may be suggestive of individuals who experience a dysphoriant effect of alcohol not choosing to self-medicate due to a deterioration of symptoms when drinking. Neither of these measures demonstrated a unique contribution in determining the overall course of alcohol use across the deployment cycle.

The TSES-R which assesses on-going symptoms related to deployment trauma exposure was not found to be predictive of post-deployment alcohol use. However, it did demonstrate some predictive utility in determining the course of alcohol use across the deployment cycle (pre- to post-deployment). These analyses provided conflicting results in that the increased reporting on the TSER-R at post-deployment was predictive of reduced alcohol participation from pre- to post-deployment. However, the TSES-R also provided a unique contribution in explaining the increase in alcohol related behaviours from pre-to post-deployment.

Given the inconclusive results in the literature and this study, it is clear that a further factor may be influencing the course of alcohol use across the deployment cycle. Alcohol consumption (drinking) motives have been identified as important components in understanding why individuals chose to consume alcohol (Carey & Correia, 1997; Cooper, 1994; Cooper et al., 1992; Cox & Klinger, 1988; Kuntsche et al., 2005, 2006a) and therefore may provide some insight into the patterns and course of alcohol consumption across the deployment cycle. Given this, the next chapter (Chapter 9) will address Research Question Five, "*Can motivation for alcohol use change following deployment? If so, does that change predict the course of alcohol consumption from pre- to post-deployment?*"

Chapter 9: Results - Impact of Motivation on the Course of Alcohol Consumption From Pre- to Post-deployment

9.1 Chapter Overview

The purpose of this chapter was to examine Research Question Five "*Can motivation for alcohol use change following deployment? If so, does that change predict the course of alcohol consumption from pre-to post-deployment?*" The chapter begins by briefly discussing the relevant literature and then reviews the aspects of the Method that are pertinent to Research Question Five. The results that explore the change in motivation (coping, enhance) across time (pre- to post- deployment) are then presented before discussing the results that investigate the associations between motivation (Time 1: coping, enhance; Time 3: coping, enhance) and alcohol use (AUDIT total, frequency, severity) across the deployment (Time 1, Time 3, Time 1/Time 3 change). The chapter concludes with a summary of the key findings and conclusions.

9.2 Introduction

In the previous chapters, it was found that the reported levels of pre-, within- and post-deployment related mental health risk and trauma reaction, demonstrated varying levels of utility in predicting post-deployment problematic alcohol related behaviours and the course of alcohol use across the deployment cycle. It is clear from the results outlined in the previous chapters that a further factor may be influential in determining the course of alcohol use across the deployment cycle.

Substance use behaviours can look very different for different people. Some individuals may differ in relation to the frequency of their alcohol use, whilst others in relation to the amount of alcohol that they consume on any given situation. Individuals can also differ regarding their motivations to consume alcohol (Cooper, 1994; Kuntsche et al., 2005; Kuntsche, Knibbe, Gmel, & Engels, 2006b). Alcohol consumption motives have been identified as important components in understanding why individuals choose to consume alcohol (Carey & Correia, 1997; Cooper, 1994; Cooper et al., 1992; Cox & Klinger, 1988; Kuntsche et al., 2005, 2006a) and may provide some insight into the patterns and course of alcohol consumption across the deployment cycle.

Motivational models of alcohol consumption have hypothesized that individuals choose to consume alcohol in order to achieve a desired outcome (Cox & Klinger, 1988). These models posit that an individual chooses to drink as a function of the subsequent impact on affect and whether this impact outweighs the consequences of not consuming alcohol (Piasecki et al., 2014). Two related but distinguishable pathways have been postured to explain the process and focus on internal states of affective factors. The first is consuming alcohol to enhance positive affect; the second is consuming alcohol to cope by numbing negative emotional states (Cooper et al., 1995; Crutzen et al., 2013; Doyle et al., 2011).

Enhancement motives represent anticipated positive reinforcement in the form of enhanced internal positive states or mood (Cooper, 1994; Cox & Klinger, 1988; Dixon et al., 2009; Piasecki et al., 2014) and has been associated with increased alcohol use, especially in situations that encourage heavy drinking (Cooper, 1994). It is generally assumed that the drinking to cope motive is associated with negative emotional states, including social anxiety and depression and is distinct from social drinking and enhancement motivations (Gratzer et al., 2004; Jackson & Sher, 2003; Stewart et al., 2006).

Drinking to cope as a way to manage negative affect is concerning as it is likely to exacerbate the contributing problems because the cognitive discrepancies which foster negative affect may not have been adequately addressed. This in turn may lead to alcohol dependence and habitual misuse in the long term. This premise has been supported in longitudinal studies using adult samples that have shown that coping motives predispose alcohol dependence and misuse (Beseler et al., 2008; Doyle et al., 2011; Holahan et al., 2001).

Crutzen et al. (2013) investigated the relationship between drinking motives and drinking behaviour over time and found that coping motives at Time 1 were positively associated with the number of drinks consumed on the heaviest drinking day during the last week at Time 2. Enhancement motives were also positively associated with the number of drinking days in the past week at Time 2. The authors posited that an individual may drink to cope in order to change their emotional state from negative to neutral. Similarly, in the same drinking session an individual may also be internally motivated to enhance positive affect from neutral to positive (Crutzen et al., 2013).

While the literature provides support to the assumption that motivations to consume alcohol may mediate alcohol behaviours pre- and post-deployment and influences the course of alcohol use across time, no research has expressly investigated the influence of alcohol consumption motivations on the course of alcohol use and associated behaviours across the deployment cycle. Hence, this chapter focused on the association between alcohol consumption motivation and alcohol related behaviours at pre- and post-deployment. It then went further to assess whether alcohol consumption motivation has utility in predicting the course of alcohol consumption from pre- (Time 1) to post-deployment (Time 3).

9.3 Review of Method

9.3.1 Measures. The Alcohol Motivations Questionnaire (AMQ) was administered at pre-deployment (Time 1) and post-deployment (Time 3) as an adjunct to the AUDIT. The scale explores motivations for consuming alcohol, with the motivations falling within two broad categories: 1) drinking to cope, 2) enhancement, which are consistent with the classification of drinking motives posited by Cooper (1994).

The AUDIT (Saunders, Aasland, Amundsen, et al., 1993; Saunders, Aasland, Babor, et al., 1993) was administered at Time-1 (pre-deployment) and Time-3 (post-deployment). Although internal consistency is not a requirement of indexes (Diamantopoulos &

Winklhofer, 2001), the AUDIT showed reasonable internal consistency at each administration with the Cronbach alpha coefficient reaching .74 at both administrations.

The AUDIT responses were categorised in four different ways for the purposes of analysis. Firstly, an overall score indicating relative risk of drinking behaviour (AUDIT Total). Secondly, Question 1 of the AUDIT asks the respondents to indicate "How often do you have a drink containing alcohol?" providing an indication of 'Frequency' of alcohol consumption. Question 3 of the AUDIT asks respondents to indicate "How often do you have six or more drinks on one occasion?" providing an indicator of 'Severity' of binge-drinking behaviours. Finally, an assessment of Time 1 to Time 3 change in alcohol behaviours was gained by detracting each individuals Time 3 AUDIT scores from the respective Time 1 AUDIT score.

The measures were more fully described in Chapter 3 (Methodology) and validated in Chapter 4 (Instrument Validation).

9.3.2 Sample sizes. Figure 9.1 shows that of the 676 participants whose data were used in this study (See Chapter 3, Figure 1), 438 participants completed the AUDIT at pre-deployment (Time 1) and 518 participants completed the AUDIT at post-deployment (Time 3). Figure 9.1 also shows that of the 438 participants who completed the AUDIT at Time 1, 437 completed the AMQ at Time 1 and 293 completed the AMQ at Time 3. Of the 518 participants who completed the AUDIT at post-deployment (Time 3), 313 had completed the AMQ at Time 1 and 517 completed the AMQ at Time 3.

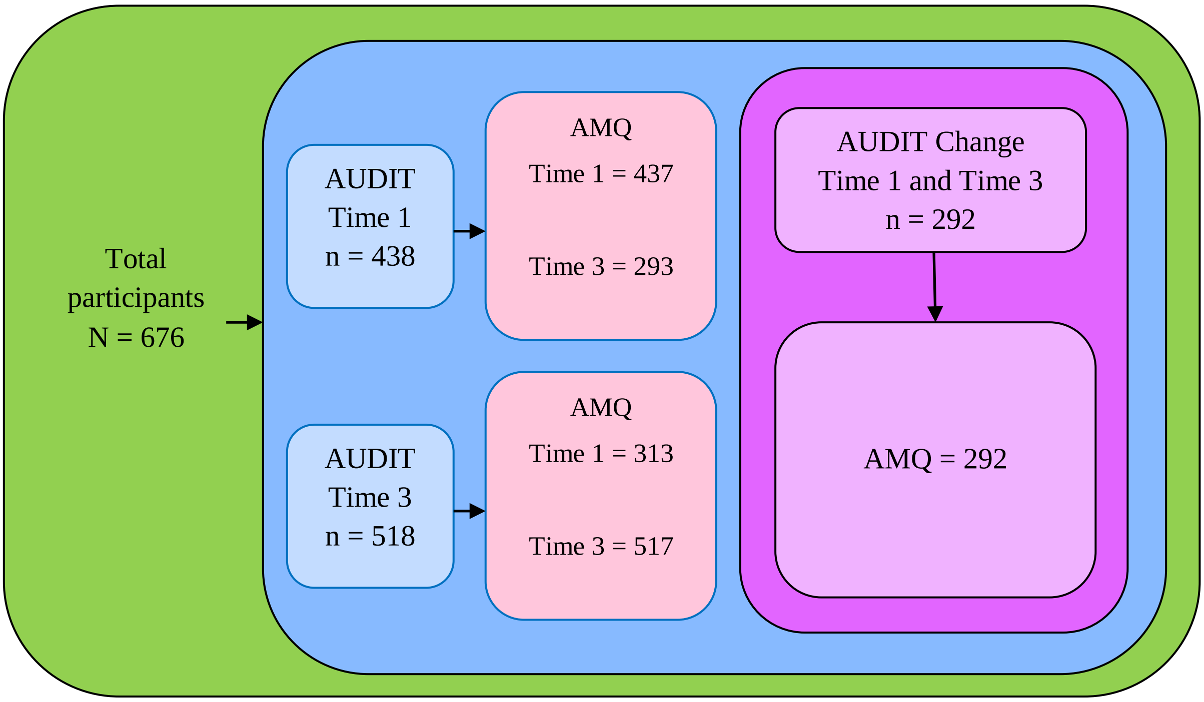

Figure 9.1 *Summary of sampling and response for the AUDIT and AMQ measures.*

In order to assess the course of alcohol use across time (Time 1 / Time 3 Change), the analyses investigating the influence of the AMQ on Time 3 alcohol behaviours used only those participants that also had a corresponding Time 1 AUDIT score: AMQ Time 1 n = 292, AMQ Time 3 n = 292.

9.3.3 Data analysis strategy. The data analysis strategy for Research Question Five comprised:

Step 1 – Examination of correlations between Time 1 and Time 3 AMQ coping and enhancement motivations.

Step 2 – Investigation of the change in mean AMQ coping and enhancement motivations (Time 1, Time 3) through the use of paired samples t-tests.

Step 3 - Examination of correlations between AMQ coping and enhancement motivations (Time 1, Time 3) and the patterns of alcohol use (Time 1, Time 3, Time 1/Time 3 change).

Step 4 – Prediction of AUDIT total, frequency and severity scores (Time 1, Time 3, and Time1 / Time 3 change) by combination of AMQ coping and enhancement motivations (Time 1, Time 3) through the use of simultaneous regression.

Step 5 – Investigation of the unique contribution of AMQ coping and enhancement motivations to the prediction of Time 3 AUDIT total, frequency and severity scores after controlling for Time 1 levels of alcohol consumption through the use of hierarchical regression.

Step 6 – Exploration of the AMQ coping and enhancement motivations as predictors of membership to three alcohol behaviour groups (increased, stable, decreased) for the Time 3 AUDIT total, frequency, and severity scores through the use of discriminant function analysis.

9.4 Step 1 – Examination of Correlations Between Coping and Enhancement Motivations (Time 1, Time 3)

The first step in the data analysis strategy for Research Question Five was to examine the direction and strength of the relationships between the Time 1 and Time 3 AMQ coping and enhancement motivations. The analysis was conducted by the use of Pearson product-moment correlations. The results of the analysis are presented in Table 9.1.

As shown in Table 9.1, there was a significant positive correlation between the pre- (Time 1) and post-deployment (Time 3) enhancement motivation (r (314) = .56, p < .01). A further significant positive correlation was also found between the Time 1 and Time 3 coping motivations (r (314) = .44, p < .01). As indicated by positive direction of correlation coefficients, higher scores on motivations at Time 1 were associated with higher scores on the paired motivation at Time 3. Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitude of the significant correlation for the coping motivation was moderate (i.e., absolute values greater than .30 but less than .50). The effect size for the enhancement motivation was large (i.e., absolute values greater than .50).

Table 9.1

Pearson product-moment correlations between the Time 1 and Time 3 coping and enhancement motivations.

		Time 3	
		Coping	Enhance
Time 1	Coping	.44**	.21**
	Enhance	.27**	.56**

** Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

9.5 Step 2 – Examination of Change in Mean Coping and Enhancement Motivation Scores (Time 1 - Time 3)

The second step in the data analysis strategy for Research Question Five was to explore the changes in mean scores for the coping and enhancement motivations from Time 1 to Time 3 administration. The analysis was conducted by the use of paired samples t-tests. The results of the analyses are presented in Table 9.2.

Table 9.2

Paired samples t-test between the Time 1 and Time 3 coping and enhancement motivations.

	Mean	SD	SEM (CI)	t	df	Sig (2-tailed)
T1*T3 Coping	.02	.16	.01 (.00, .03)	2.06	313	.040
T1*T3 Enhance	.03	.27	.02 (.00, .06)	2.17	313	.031

The paired samples t-tests (Table 9.2) show that there was a significant change in motivations across the deployment cycle. On average, participants reported a decrease in coping motivations from Time 1 (M = .08, SD = .15, SEM = .01) compared to Time 3 (M = .06, SD = .14, SEM = .01), t (313) = 2.06, $p < .05$; $r = .44$, $p < .001$. Similarly, participants reported a decrease in enhancement motivations from Time 1 (M = .57, SD = .30, SEM = .02) compared to Time 3 (M = .53, SD = .28, SEM = .02), t (313) = 2.17, $p < .05$; $r = .56$, $p < .001$.

The results suggest that motivation for alcohol use does change following deployment and that the strength of both the coping and enhancement motivations decreases over time. The next section will investigate whether that change predicts the course of alcohol consumption from pre-to post-deployment.

9.6 Step 3 – Examination of Correlations Between Coping and Enhancement Motivations (Time 1, Time 3) and the Patterns of Alcohol Use (Time 1, Time 3, Time 1/Time 3 Change)

The third step in the data analysis strategy for Research Question Five was to examine the direction and strength of the relationships between pre- (Time 1) and post-deployment (Time 3) coping and enhancement motivations with the patterns of alcohol use at pre-deployment (Time 1), post-deployment (Time 3) and for the pre- / post-deployment change scores.

The analyses were conducted by the use of Pearson product-moment correlations. The results of the analyses are presented in Table 9.3. The first set (Set 1) shows the Pearson correlations between the coping and enhancement motivations and Time 1 AUDIT scores. The second set (Set 2) shows the Pearson correlations between the coping and enhancement motivations and Time 3 AUDIT scores. Finally, the third set (Set 3) shows the Pearson correlations between each of motivation variables and changes in AUDIT scores from Time 1 to Time 3.

Table 9.3

Pearson product-moment correlations between the AUDIT Time 1, Time 3 and Time 1 / Time 3 change scores for the Time 1 and Time 3 coping and enhancement motivations.

Variables	Set 1 AUDIT Pre-deployment (Time 1) Scores				Set 2 AUDIT Post-deployment (Time 3) Scores				Set 3 AUDIT Change (Time 3 - Time 1) Scores			
	n	Total	Frequency	Severity	n	Total	Frequency	Severity	n	Total	Frequency	Severity
Time 1												
Coping	437	.33**	.24**	.21**	313	.33**	.27**	.28**	291	-.03	-.03	-.04
Enhancement	437	.38**	.45**	.40**	313	.36**	.39**	.36**	291	-.01	.07	.03
Time 3												
Coping	293	.34**	.19**	.24**	517	.47**	.30**	.31**	292	.20**	-.12*	-.06
Enhancement	293	.26**	.33**	.23**	517	.31**	.36**	.33**	292	.11	-.06	-.13*

* Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

9.6.1 Relationships between motivations and Time 1 alcohol use. As shown in the Set 1 results in Table 9.3, there were moderate (Cohen, 1988, 1992) positive correlations between the pre-deployment (Time 1) AUDIT total score and the Time 1 coping (r (437) = .33, p < .01) and enhancement variables (r (437) = .38, p < .01). Further significant positive correlations were also found between the pre-deployment (Time 1) AUDIT total score and the Time 3 coping (r (293) = .34, p < .01) and enhancement (r (293) = .26, p < .01) motivation variables.

Similar results were found for the Time 1 AUDIT frequency (Set 1) correlations. Table 9.3 shows that there were positive correlations between the pre-deployment (Time 1) AUDIT frequency score and the Time 1 coping (r (437) = .24, p < .01) and enhancement variables (r (437) = .45, p < .01). Further significant positive correlations were also found between the pre-deployment (Time 1) AUDIT frequency score and the Time 3 coping (r (293) = .19, p < .01) and enhancement (r (293) = .33, p < .01) motivation variables.

Consistent positive correlations were also found for the Time 1 AUDIT severity (Set 1) correlations. Table 9.3 shows that there were positive correlations between the pre-deployment (Time 1) AUDIT severity score and the Time 1 coping (r (437) = .21, p < .01) and enhancement variables (r (437) = .40, p < .01). Further significant positive correlations were also found between the pre-deployment (Time 1) AUDIT severity score and the Time 3 coping (r (293) = .24, p < .01) and enhancement (r (293) = .23, p < .01) motivation variables.

As indicated by positive direction of all of the Set 1 correlation coefficients, higher scores on the motivations variables at Time 1 were associated with greater levels of problematic alcohol related behaviours at Time 1. Similarly, a greater risk of pre-deployment alcohol related behaviours was associated with higher endorsement of both the coping and enhancement motivation variables at Time 3.

Based on accepted standards for evaluating the strength of correlations (Cohen, 1988, 1992), the magnitude of the significant correlations in the Set 1 results were generally moderate (i.e., absolute values less than .50 but greater than .30) with a number demonstrating a small effect size (i.e., absolute values less than .30).

9.6.2 Relationships between motivations and Time 3 alcohol use. As shown in the Set 2 results in Table 9.3, there were moderate (Cohen, 1988, 1992) positive correlations between the post-deployment (Time 3) AUDIT total score and the Time 1 coping (r (313) = .33, $p < .01$) and enhancement variables (r (313) = .36, $p < .01$). Further significant positive correlations were also found between the post-deployment (Time 3) AUDIT total score and the Time 3 coping (r (517) = .47, $p < .01$) and enhancement (r (517) = .31, $p < .01$) motivation variables.

Similar results were found for the Time 3 AUDIT frequency (Set 2) correlations. Table 9.3 shows that there were positive correlations between the post-deployment (Time 3) AUDIT frequency score and the Time 1 coping (r (313) = .27, $p < .01$) and enhancement variables (r (313) = .39, $p < .01$). Further significant positive correlations were also found between the post-deployment (Time 3) AUDIT frequency score and the Time 3 coping (r (517) = .30, $p < .01$) and enhancement (r (517) = .36, $p < .01$) motivation variables.

Consistent positive correlations were also found for the Time 3 AUDIT severity (Set 2) correlations. Table 9.3 shows that there were positive correlations between the post-deployment (Time 3) AUDIT severity score and the Time 1 coping (r (313) = .28, $p < .01$) and enhancement variables (r (313) = .36, $p < .01$). Further significant positive correlations were also found between the post-deployment (Time 3) AUDIT severity score and the Time 3 coping (r (517) = .31, $p < .01$) and enhancement (r (517) = .33, $p < .01$) motivation variables.

As indicated by positive direction of all of the Set 2 correlation coefficients, higher scores on the motivations variables at Time 1 were associated with greater levels of problematic alcohol related behaviours at Time 3. Similarly, a greater risk of post-deployment alcohol related behaviours was associated with higher endorsement of both the coping and enhancement motivation variables at Time 3.

The magnitude of the effect size for the significant correlations in the Set 2 results were generally moderate (i.e., absolute values less than .50 but greater than .30) with a number demonstrating a small effect size (i.e., absolute values less than .30).

9.6.3 Relationships between motivations and Time 1 / Time 3 changes in alcohol use. As shown in the Set 3 results in Table 9.3, no significant associations were found for the AUDIT change (total, frequency or severity) scores and the Time 1 coping and enhancement motivations. A small positive correlation was found between the AUDIT total change score and the post-deployment (Time3) coping motivation (r (292) = .20, $p < .01$). A small negative correlation was found between the AUDIT frequency change score and the Time 3 coping motivation (r (292) = -.12, $p < .05$). A similar negative correlation was also found between the AUDIT severity change score and the Time 3 enhancement motivation (r (292) = -.12, $p < .05$).

As indicated by positive direction of the Time 3 coping motivation and the AUDIT total change correlation coefficients, higher scores on the motivations variables at Time 3 were associated with greater levels of change in problematic alcohol related behaviours (AUDIT total) at Time 3. Conversely, a greater change in the risk of alcohol consumption frequency from pre- to post-deployment was associated with lower endorsement of the Time 3 coping motivation. A greater change in the risk of binge-drinking (severity) from pre- to post-deployment was associated with a lower endorsement of the Time 3 enhancement motivation.

The magnitude of the effect size for all three significant Set 3 correlations was small (absolute values less than .30).

9.7 Step 4 – Prediction of AUDIT Total, Frequency and Severity Scores (Time 1, Time 3, and Time1 / Time 3 Change) by Coping and Enhancement Motivations (Time 1, Time 3)

The fourth step in the data analysis strategy for Research Question Five was to explore the degree to which the coping and enhancement motivations predicted AUDIT total, frequency and severity scores (Time 3 and Time1/Time 3 change). The second step also examined the relative contribution of each of the motivations to the total variance explained in the AUDIT total, frequency and severity scores

The analysis was conducted by the use of simultaneous regression analyses. The results of the analysis for AUDIT total, frequency and severity scores are presented in Table 9.4. The first set (Set 1) of results shows the regression analysis for the motivation variables and the Time 1 AUDIT (total, frequency and severity) scores. The second set (Set 2) of results shows the regression analysis for the motivation variables and the Time 3 AUDIT (total, frequency and severity) scores. Set 3 results show the regression analysis for the motivation variables and the changes in AUDIT (total, frequency and severity) scores from Time 1 to Time 3.

Simultaneous regression analyses are reported based on the information presented in Table 9.4. The report of each analysis commences with the statistical significance of the amount of variance accounted for by the regression model based on the use of an *F*-ratio statistic to test the null hypothesis that the value of *R* (multiple correlation coefficient) is equal to zero. The value of R^2 (also called the coefficient of determination) is then presented. R^2 represents the proportion of variance on the AUDIT total scores (pre, post and pre-post change) explained by the motivations variables. The reporting of each regression is completed by the statistical significance of each of the motivations variables based on the use of a *t* – statistic to test the null hypothesis that the value of individual variable coefficients is equal to

Table 9.4

Simultaneous regression analyses for the pre- and post-deployment motivation variables predicting AUDIT total, frequency, and severity at pre-deployment, post-deployment and across time.

Factor	Set 1 AUDIT Total Pre-deployment (Time 1)					Set 2 AUDIT Frequency Pre-deployment (Time 1)					Set 3 AUDIT Severity Pre-deployment (Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	3.46	.36		9.51	.000	1.40	.09		16.51	.000	.78	.09		8.22	.000
Coping T1	7.46	1.28	.26	5.84	.000	.98	.30	.14	3.29	.001	.89	.33	.12	2.66	.008
Enhance T1	4.16	.57	.32	7.33	.000	1.27	.13	.42	9.59	.000	1.21	.15	.37	8.18	.000
	R^2 = .21, F(2,434) = 57.31, p <.001					R^2 = .22 F(2,434) = 62.44, p < .001					R^2 = .17 F(2,434) = 44.67, p < .001				

Factor	AUDIT Total Post-deployment (Time 3)					AUDIT Frequency Post-deployment (Time 3)					AUDIT Severity Post-deployment (Time 3)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	3.53	.44		8.09	.000	1.65	.10		16.33	.000	.95	.11		8.69	.000
Coping T1	6.59	1.36	.26	4.85	.000	1.14	.32	.19	3.60	.000	1.31	.34	.20	3.83	.000
Enhance T1	4.01	.71	.30	5.68	.000	1.05	.16	.34	6.41	.000	1.04	.18	.31	5.87	.000
	R^2 = .19, F(2,310) = 36.86, p < .001					R^2 = .43, F(2,310) = 34.80, p < .001					R^2 = .17, F(2,310) = 32.03, p < .001				

Factor	Set 1 cont... AUDIT Total Post-deployment (Time 3)					Set 2 cont... AUDIT Frequency Post-deployment (Time 3)					Set 3 cont... AUDIT Severity Post-deployment (Time 3)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	4.9	.32		12.87	.000	1.73	.08		22.02	.000	1.07	.08		12.82	.000
Coping T3	12.95	1.20	.42	10.76	.000	1.69	.30	.23	5.70	.000	1.96	.32	.26	6.21	.000
Enhance T3	3.09	.54	.22	5.71	.000	1.01	.13	.31	7.54	.000	.94	.14	.27	6.59	.000
	R^2 = .26, F(2,514) = 91.62, p <.001					R^2 = .18, F(2,514) = 56.45, p < .001					R^2 = .17, F(2,514) = 52.18, p < .001				

Factor	AUDIT Total Change (Time 3 - Time 1)					AUDIT Frequency Change (Time 3 - Time 1)					AUDIT Severity Change (Time 3 - Time 1)				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	-.62	.50		-1.25	.212	.13	.11		1.22	.225	.03	.13		.26	.797
Coping T1	-3.48	1.56	-.14	-2.22	.027	-.09	.34	-.02	-.27	.790	-.03	.40	-.00	-.06	.950
Enhance T1	-1.38	.84	-.11	-1.64	.102	-.43	.18	-.17	-2.38	.018	.45	.22	.15	2.08	.038
Coping T3	6.95	1.73	.25	4.03	.000	.76	.37	.13	2.04	.043	-.34	.45	-.05	-.77	.445
Enhance T3	2.03	.89	.16	2.28	.023	.35	.19	.13	1.84	.067	-.64	.23	-.20	-2.78	.006
	R^2 = .07, F(4,286) = 5.66, p <.001					R^2 = .03, F(4,286) = 2.54, p = .040					R^2 = .03, F(4,286) = 2.38, p = .052				

zero. Table 9.4 presents both unstandardised (B) and standardised (β) coefficients for each regression analysis. The twelve simultaneous regression analyses (Sections 9.7.1 to 9.7.12) are reported below based on the information presented in Table 9.4.

9.7.1 Prediction of Time 1 AUDIT total scores by combination of Time 1 coping and enhancement motivations. The first simultaneous regression analysis (Set 1 results in Table 9.4) shows that the combination of the pre-deployment (Time 1) motivations significantly predicted pre-deployment (Time 1) AUDIT total scores, F (2,434) = 57.31, p < .001. The value of R^2 shows that 21% of the variance in Time 1 AUDIT total scores was explained by the combination of Time 1 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the Time 1 coping and of the enhancement motivations are predictive of greater participation in problematic drinking behaviours at pre-deployment (Time 1).

9.7.2 Prediction of Time 1 AUDIT frequency scores by combination of Time 1 coping and enhancement motivations. The second simultaneous regression analysis (Set 2 results in Table 9.4) shows that the combination of the pre-deployment (Time 1) motivations significantly predicted pre-deployment (Time 1) AUDIT frequency scores, F (2,434) = 62.44, p < .001. The value of R^2 shows that 22% of the variance in Time 1 AUDIT frequency scores was explained by the combination of Time 1 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the Time 1 coping and of the enhancement motivations are predictive of greater frequency of alcohol consumption at pre-deployment (Time 1).

9.7.3 Prediction of Time 1 AUDIT severity scores by combination of Time 1 coping and enhancement motivations. The third simultaneous regression analysis (Set 3 results in Table 9.4) shows that the combination of the pre-deployment (Time 1) motivations significantly predicted pre-deployment (Time 1) AUDIT severity scores, F (2,434) = 44.67, p < .001. The value of R^2 shows that 17% of the variance in Time 1 AUDIT severity scores was explained by the combination of Time 1 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the Time 1 coping and of the enhancement motivations are predictive of greater participation in binge-drinking behaviours (severity) at pre-deployment (Time 1).

9.7.4 Prediction of Time 3 AUDIT total scores by combination of Time 1 coping and enhancement motivations. The first simultaneous regression analysis (Set 1 results in Table 9.4) shows that the combination of the pre-deployment (Time 1) motivations significantly predicted post-deployment (Time 3) AUDIT total scores, F (2,310) = 36.86, p < .001. The value of R^2 shows that 19% of the variance in Time 3 AUDIT total scores was explained by the combination of Time 1 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the coping and of the enhancement motivations at pre-deployment (Time 1) are predictive of greater participation in problematic drinking behaviours at post-deployment (Time 3).

9.7.5 Prediction of Time 3 AUDIT frequency scores by combination of Time 1 coping and enhancement motivations. The second simultaneous regression analysis (Set 2 results in Table 9.4) shows that the combination of the pre-deployment (Time 1) motivations significantly predicted post-deployment (Time 3) AUDIT frequency scores, F (2,310) = 34.80, $p < .001$. The value of R^2 shows that 43% of the variance in Time 3 AUDIT frequency scores was explained by the combination of Time 1 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the coping and of the enhancement motivations at pre-deployment (Time 1) are predictive of greater frequency of alcohol consumption at post-deployment (Time 3).

9.7.6 Prediction of Time 3 AUDIT severity scores by combination of Time 1 coping and enhancement motivations. The third simultaneous regression analysis (Set 3 results in Table 9.4) shows that the combination of the pre-deployment (Time 1) motivations significantly predicted post-deployment (Time 3) AUDIT severity scores, F (2,310) = 32.03, $p < .001$. The value of R^2 shows that 17% of the variance in Time 3 AUDIT severity scores was explained by the combination of Time 1 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the coping and of the enhancement motivations at pre-deployment (Time 1) are predictive of greater participation in binge-drinking behaviours (severity) at post-deployment (Time 3).

9.7.7 Prediction of Time 3 AUDIT total scores by combination of Time 3 coping and enhancement motivations. The first simultaneous regression analysis (Set 1 results in Table 9.4) shows that the combination of the post-deployment (Time 3) motivations significantly predicted post-deployment (Time 3) AUDIT total scores, F (2,514) = 91.62, p < .001. The value of R^2 shows that 26% of the variance in Time 3 AUDIT total scores was explained by the combination of Time 3 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 3 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the coping and of the enhancement motivations at post-deployment (Time 3) are predictive of greater participation in problematic drinking behaviours at post-deployment (Time 3).

9.7.8 Prediction of Time 3 AUDIT frequency scores by combination of Time 3 coping and enhancement motivations. The second simultaneous regression analysis (Set 2 results in Table 9.4) shows that the combination of the post-deployment (Time 3) motivations significantly predicted post-deployment (Time 3) AUDIT frequency scores, F (2,514) = 56.45, p < .001. The value of R^2 shows that 18% of the variance in Time 3 AUDIT frequency scores was explained by the combination of Time 3 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 3 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the coping and of the enhancement motivations at post-deployment (Time 3) are predictive of greater frequency of alcohol consumption at post-deployment (Time 3).

9.7.9 Prediction of Time 3 AUDIT severity scores by combination of Time 3 coping and enhancement motivations. The third simultaneous regression analysis (Set 3 results in Table 9.4) shows that the combination of the post-deployment (Time 3) motivations significantly predicted post-deployment (Time 3) AUDIT severity scores, F (2,514) = 52.18, p < .001. The value of R^2 shows that 17% of the variance in Time 3 AUDIT severity scores was explained by the combination of Time 3 motivations. Examination of the individual variable coefficients shows that both the coping and enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 3 motivations.

Consistent with the significant correlations found in Section 9.6, greater endorsement of the coping and of the enhancement motivations at post-deployment (Time 3) are predictive of greater participation in binge-drinking behaviours (severity) at post-deployment (Time 3)

9.7.10 Prediction of changes in Time 1 / Time 3 AUDIT total scores explained by combination of coping and enhancement motivations (Time 1, Time 3). The first simultaneous regression analysis (Set 1 results in Table 9.4) shows that the combination of Time 1 and Time 3 coping and enhancement motivations significantly predicted the change in AUDIT total scores from pre-deployment to post-deployment, F (4,268) = 5.66, p < .001. The value of R^2 shows that 7% of the variance in the change AUDIT total scores (Time 1 / Time 3) was explained by the combination of motivations (Time 1 and Time 3). Examination of the individual variable coefficients shows that the Time 1 coping and both the Time 1 and Time 3 enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 and Time 3 motivations.

Consistent with the significant negative correlation found in Section 9.6, greater endorsement of the Time 3 coping motivation was predictive of an increase in AUDIT total from Time 1 to Time 3. Conversely, although the Time 1 coping motivation was not significantly correlated with the change in alcohol related behaviours, the simultaneous regression analysis found that the an increase in Time 3 coping motivation was predictive of a reduction in alcohol related behaviours from Time 1 to Time 3. Similarly, although neither of the Time 1 or Time 3 enhancement coping variables were demonstrated to be significantly correlated with a change in problematic alcohol related behaviours from Time 1 to Time 3, the simultaneous regressions found that an increase in post-deployment (Time 3) endorsement of enhancement motivations was predictive of an increase in problematic alcohol related behaviours. Whereas, an increase in pre-deployment (Time 1) enhancement motivations was predictive of a decrease in problematic alcohol related behaviours from pre- to post-deployment.

9.7.11 Prediction of changes in Time 1 / Time 3 AUDIT frequency scores explained by combination of coping and enhancement motivations (Time 1, Time 3). The second simultaneous regression analysis (Set 2 results in Table 9.4) shows that the combination of Time 1 and Time 3 coping and enhancement motivations significantly predicted the change in AUDIT frequency scores from pre-deployment to post-deployment, F (4,268) = 2.54, p < .05. The value of R^2 shows that 3% of the variance in the change AUDIT frequency scores (Time 1 / Time 3) was explained by the combination of motivations (Time 1 and Time 3). Examination of the individual variable coefficients shows that the Time 1 enhancement and the Time 3 coping motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 and 3 motivations.

Inconsistent with the significant negative correlation found in Section 9.6, greater endorsement of the Time 3 coping motivation was predictive of an increase in AUDIT frequency from Time 1 to Time 3. Although the Time 1 enhancement motivation was not significantly correlated with the change in alcohol consumption frequency, the simultaneous regression analysis found that the an increase in Time 1 enhancement motivation was predictive of a reduction in alcohol related behaviours from Time 1 to Time 3.

9.7.12 Prediction of changes in Time 1 / Time 3 AUDIT severity scores explained by combination of coping and enhancement motivations (Time 1, Time 3). The third simultaneous regression analysis (Set 3 results in Table 9.4) shows that although not quite reaching significance, the combination of Time 1 and Time 3 coping and enhancement motivations showed a strong trend towards predicting the change in AUDIT severity scores from pre-deployment to post-deployment, F (4,268) = 2.38, p = .052. The value of R^2 shows that 3% of the variance in the change AUDIT severity scores (Time 1 / Time 3) was explained by the combination of motivations (Time 1 and Time 3). Examination of the individual variable coefficients shows that both the Time 1 and Time 3 enhancement motivations demonstrated significant beta coefficients, indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 and 3 motivations.

Consistent with the significant negative correlation found in Section 9.6, greater endorsement of the Time 3 enhancement motivation was predictive of an increase in AUDIT frequency from Time 1 to Time 3. Conversely, although the Time 1 enhancement motivation was not significantly correlated with the change in alcohol consumption frequency, the simultaneous regression analysis found that the an increase in Time 1 enhancement motivation was predictive of an increase in alcohol related behaviours from Time 1 to Time 3.

9.8 Investigation of the Unique Contribution of Coping and Enhancement Motivations to the Prediction of Time 3 AUDIT Total, Frequency and Severity Scores

The fifth step in the data analysis strategy for Research Question Five was to explore the degree to which the pre- and post-deployment motivation variables predicted AUDIT post-deployment (Time 3) total, frequency and severity scores after controlling for Time 1 alcohol consumption behaviours (AUDIT total, frequency, severity). The analyses were conducted by the use of hierarchical multiple regressions. After controlling for Time 1 alcohol consumption behaviours (Block 1), the unique combination of the Time 1 motivation variables (coping, enhancement) were added as Block 2. The Time 2 motivation variables (coping, enhancement) were then added as Block 3. The results of the hierarchical regressions for are presented in the next series of tables.

9.8.1 Unique contribution of motivation variables to the prediction of Time 3 AUDIT total. As shown in Table 9.5 the three-predictor model accounted for approximately 46% of the variance in AUDIT total scores from Time 1 to Time 3. This model was statically significant, $R^2 = .46$, $F(5,285) = 48.64$, $p < .001$. After controlling for the Time 1 levels of alcohol use, which accounted for approximately 29% of the variance, the addition of the Time 1 motivations resulted in a statistically significant increase in R^2 ($\Delta R^2 = .46$, $F(2, 287) = 9.50$, $p < .001$). Likewise, statistically significant increases in R^2 were also found with the addition of the Time 3 motivations ($\Delta R^2 = .12$, $F(2, 285) = 32.21$, $p < .001$).

Table 9.5

Hierarchical regression analyses for the dependent variable AUDIT total post-deployment for the motivation measures (n = 290).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Total Time 1	.29	.29	120.73	.000
Block 2	Time 1 Motivations	.34	.04	9.50	.000
Block 3	Time 3 Motivations	.46	.12	32.21	.000

Table 9.6 demonstrates that the Time 3 coping and enhancement motivations provided significant contributions ($p < .01$) after controlling for pre-deployment consumption and the Time 1 motivations. The Time 1 coping and enhancement motivations failed to reach significance ($p > .05$ for each).

Table 9.6

Block 3 beta weights, t-tests and significance levels for motivation variables predicting AUDIT total post-deployment total (n = 290).

Predictor	B	SE B	β	*t*	Sig
Constant	1.71	.45		3.84	.000
AUDIT Total Time 1	.36	.05	.35	6.85	.000
Coping Time 1	.28	1.31	.01	.22	.829
Enhance Time 1	1.00	.71	.08	1.41	.161
Coping Time 3	10.64	1.43	.36	7.43	.000
Enhance Time 3	1.91	.72	.14	2.66	.008
		$R^2 = .46$, $F(5,285) = 48.64$, $p < .001$			

9.8.2 Unique contribution of motivation variables to the prediction of Time 3 AUDIT frequency. As shown in Table 9.7 the three-predictor model accounted for approximately 43% of the variance in AUDIT frequency scores from Time 1 to Time 3. This model was statically significant, $R^2 = .43$, $F(5,285) = 45.26$, $p < .001$. After controlling for the Time 1 levels of alcohol use which accounted for approximately 38% of the variance, the addition of the Time 1 motivations resulted in a statistically significant increase in R^2 ($\Delta R^2 = .03$, $F(2, 287) = 6.26$, $p < .01$). Likewise, statistically significant increases in R^2 were also found with the addition of the Time 2 motivations ($\Delta R^2 = .03$, $F(2,285) = 8.71$, $p < .001$).

Table 9.7

Hierarchical regression analyses for the dependent variable AUDIT frequency post-deployment for the motivation measures (n = 290).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Frequency Time 1	.38	.38	179.21	.000
Block 2	Time 1 Motivations	.41	.03	6.26	.002
Block 3	Time 3 Motivations	.44	.03	8.71	.000

Table 9.8 demonstrates that the Time 3 coping and enhancement motivations provided significant contributions (p < .01) after controlling for pre-deployment consumption and the Time 1 motivations. The Time 1 coping and enhancement motivations failed to reach significance (p > .05 for each).

Table 9.8

Block 3 beta weights, t-tests and significance levels for motivation variables predicting AUDIT frequency post-deployment total (n = 290).

Predictor	B	SE B	β	*t*	Sig
Constant	.79	.12		6.70	.000
AUDIT Frequency Time 1	.52	.05	.51	10.09	.000
Coping Time 1	.24	.30	.04	.81	.419
Enhance Time 1	.10	.17	.03	.59	.554
Coping Time 3	.96	.33	.14	2.93	.004
Enhance Time 3	.48	.17	.15	2.84	.005
	R^2 = .44, F(5,285) = 45.26, p < .001				

9.8.3 Unique contribution of motivation variables to the prediction of Time 3 AUDIT severity. As shown in Table 9.9 the three-predictor model accounted for approximately 38% of the variance in AUDIT severity scores from Time 1 to Time 3. This model was statically significant, R^2 = .38, F(5,285) = 35.16, p < .001. After controlling for the Time 1 levels of alcohol use which accounted for approximately 29% of the variance, the addition of the Time 1 motivations resulted in a statistically significant increase in R^2 (ΔR^2 = .05, F(2,287) = 10.29, p < .001). Likewise, statistically significant increases in R^2 were also found with the addition of the Time 2 motivations (ΔR^2 = .04, F(2,285) = 8.55, p < .001).

Table 9.9

Hierarchical regression analyses for the dependent variable AUDIT severity post-deployment for the motivation measures (n = 290).

Pre	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Severity Time 1	.29	.29	122.30	.000
Block 2	Time 1 Motivations	.34	.05	10.29	.000
Block 3	Time 3 Motivations	.37	.04	8.55	.000

Table 9.10 that the Time 3 coping and enhancement motivations provided significant contributions ($p < .01$) after controlling for pre-deployment consumption and the Time 1 motivations. The Time 1 coping and enhancement motivations failed to reach significance ($p > .05$ for each).

Table 9.10

Block 3 beta weights, t-tests and significance levels for motivation variables predicting AUDIT severity post-deployment total (n = 290).

Predictor	B	SE B	β	*t*	Sig
Constant	.44	.11		3.91	.000
AUDIT Severity Time 1	.42	.05	.44	8.45	.000
Coping Time 1	.38	.33	.06	1.15	.251
Enhance Time 1	.21	.19	.07	1.14	.256
Coping Time 3	.93	.37	.13	2.51	.013
Enhance Time 3	.60	.19	.19	3.15	.002
	$R^2 = .38$, $F(5,285) = 35.16$, $p < .001$				

9.9 Exploration of the Coping and Enhancement Motivations as Predictors of Membership to Three Alcohol Behaviour Groups (Increased, Stable, Decreased) for the Time 3 AUDIT Total, Frequency, and Severity Scores

The final step in the data analysis strategy for Research Question Five was to explore the dimensions of motivation variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total, frequency and severity scores. The analyses were conducted by the use of discriminant function analyses. The motivations variables included the coping and enhancement variables at Time 1 and Time 3. The groups were *increased* drinking over time, *decreased* drinking over time and drinking remained *stable* over time. Analyses were conducted on the AUDIT total, frequency, and severity change groups.

9.9.1 Dimensions of the motivations variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT total. Of the original 678 cases, 387 were cases were excluded due to missing or out-of-range group codes. For the remaining 291 participant cases (118 decrease, 67 stable, 106 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 9.11, this analysis revealed two discriminant functions. The first explains 93.5% of the variance, canonical $R^2 = .05$, whereas the second explains 6.5% of the variance, canonical $R^2 < .01$. In combination these discriminant functions significantly differentiated the change groups (increase, decrease, stable), $\Lambda = .95$, $x^2(8) = 15.89$, $p = .044$. However, removing the first function did not significantly differentiate the groups, $\Lambda = 1.00$, $x^2(3) = 1.05$, $p = .788$. The structure matrix and group centroids for the first and second function are presented in Table 9.11 and Table 9.12 respectively.

Table 9.11

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the motivations variables (n = 291).

AUDIT Change	Function	
	1	2
Coping Time 3	.84*	.37
Enhance Time 3	.46*	.34
Enhance Time 1	-.03	.87*
Coping Time 1	.24	.64*

* Largest absolute correlation between variables and any discriminant function

According to the structure matrix the first function primarily represents the Time 3 motivation variables which can be conceptualised as post-deployment drinking motives. The group centroids as shown in Table 9.12 suggest this function tends to be most elevated in individuals whose drinking increased over time and least pronounced in individuals whose drinking decreased over time. The second function did not reach significance and will not be reported on further.

Table 9.12

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT total for the motivations variables (n = 291).

AUDIT Total Change	Function	
	1	2
Increase	.30	.01
Stable	-.14	-.10
Decrease	-.19	.05

* Largest absolute correlation between variables and any discriminant function

9.9.2 Dimensions of the motivations variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT frequency. Of the original 678 cases, 387 were cases were excluded due to missing or out-of-range group codes. For the remaining 291 participant cases (76 decrease, 167 stable, 48 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 9.13, this analysis revealed two discriminant functions. The first explains 94.5% of the variance, canonical $R^2 = .02$, whereas the second explained 5.5% of the variance, canonical $R^2 < .01$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .98$, $x^2(8) = 6.81$, $p = .557$. Similarly, removing the first function also showed that the second function did not significantly differentiate the groups, $\Lambda = 1.00$, $x^2(3) = .38$, $p = .945$. The structure matrix and group centroids for the first and second function are presented in Table 9.13 and Table 9.14 respectively.

Table 9.13

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the motivations variables (n = 291).

AUDIT Frequency	Function	
	1	2
Coping Time 3	.55*	-.13
Enhance Time 1	-.53*	.39
Coping Time 1	.27*	-.19
Enhance Time 3	.17	.87*

* Largest absolute correlation between variables and any discriminant function

Table 9.14

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT frequency for the motivations variables (n = 291).

AUDIT Total Change	Function	
	1	2
Increase	.16	.05
Stable	.01	-.03
Decrease	-.31	.04

* Largest absolute correlation between variables and any discriminant function

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

9.9.3 Dimensions of the motivations variables that differentiate the three patterns of alcohol consumption change (increased, stable, decreased) in Time 3 AUDIT frequency. Of the original 678 cases, 387 were cases were excluded due to missing or out-of-range group codes. For the remaining 291 participant cases (80 decrease, 149 stable, 62 increase) evaluation of assumptions of linearity, normality, multicollinearity or singularity, and homogeneity of variance-covariance matrices, revealed no threat to multivariate analysis. As shown in Table 9.15, this analysis revealed two discriminant functions. The first explains 77.9% of the variance, canonical $R^2 = .03$, whereas the second explained 22.1% of the variance, canonical $R^2 < .01$. In combination these discriminant functions did not significantly differentiate the change groups (increase, decrease, stable), $\Lambda = .96$, $x^2(8) = 10.75$, $p = .217$. Similarly, removing the first function also showed that the second function did not significantly differentiate the groups, $\Lambda = .99$, $x^2(3) = 2.40$, $p = .494$. The structure matrix and group centroids for the first and second function are presented in Table 9.15 and Table 9.16 respectively.

As the analysis failed to significantly discriminate between the functions, the results will not be reported upon further.

Table 9.15

Structure matrix that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the motivations variables (n = 291).

AUDIT Severity	Function	
	1	2
Enhance Time 3	.82*	.37
Coping Time 3	.49*	.14
Enhance Time 1	.35	.94*
Coping Time 1	1.00	.46*

* Largest absolute correlation between variables and any discriminant function

Table 9.16

Group centroids that emerged from the discriminant function analysis for the dependent variable Time 3 AUDIT severity for the motivations variables (n = 291).

AUDIT Total Change	Function	
	1	2
Increase	-.16	.15
Stable	-.08	-.08
Decrease	.27	.03

* Largest absolute correlation between variables and any discriminant function

9.10 Chapter Summary

Results from this chapter indicate that exploration of motivations to consume alcohol shows good utility in predicting post-deployment risk of problematic alcohol related behaviours, including frequency of alcohol consumption and binge-drinking.

9.10.1 Motivation change. In relation to the question of whether motivation for alcohol consumption changes over the deployment cycle, the comparison of means from pre- to post-deployment (paired samples t-tests) indicate that endorsement of both the enhancement and coping motivations increase from pre- to post-deployment. The correlation analyses supported these results by revealing a positive association between the pre-deployment enhancement and coping motivations and the paired post-deployment motivations.

9.10.2 Coping motivations and alcohol use. In relation to the influence of the coping motivations on subsequent alcohol related behaviours, the correlation analyses suggested an association between increased reporting of the pre-deployment coping motivation and both the pre- and post-deployment participation in alcohol related behaviours, including frequency of alcohol consumption and binge-drinking. A similar result was found for the influence of the post-deployment motivations on post-deployment alcohol use, including frequency and binge-drinking. The regression analyses support these findings demonstrating that an increase in endorsement of coping motivations at pre-deployment was predictive of an increase in problematic alcohol related behaviours (frequency and binge-drinking) at pre- and post-deployment. Similarly, increased endorsement of post-deployment coping motivations was predictive of an increase in problematic alcohol use. The hierarchical regression analyses provided further support to the influence of coping motivations on alcohol use, showing that the post-deployment coping motivation provided a significant unique contribution to the overall explanation of factors influencing post-deployment alcohol related behaviours including frequency of alcohol consumption.

The analyses investigating the course of alcohol use and relation behaviours across the deployment cycle (pre- to post-deployment) provided some mixed results. The results found a positive association and predictive utility of post-deployment reporting of coping motivation and an increase in problematic alcohol related behaviours from pre- to post-deployment.

Although the correlation analyses found a negative association, the regression analyses also found that post-deployment reporting of coping motivation was predictive of an increase in frequency of alcohol consumption from pre- to post-deployment. Conversely, pre-deployment reporting of coping motivation appeared to predict a decrease in total problematic alcohol behaviours from pre- to post-deployment.

9.10.3 Enhancement motivations and alcohol use. Consistent with the findings for the coping motivation, the correlation analyses suggested an association between increased reporting of the pre-deployment enhancement motivation and both the pre- and post-deployment participation in alcohol related behaviours including frequency of alcohol consumption and binge-drinking. A similar result was found for the influence of the post-deployment enhancement motivations on post-deployment alcohol use, including frequency and binge-drinking. The regression analyses support these findings demonstrating that an increase in endorsement of enhancement motivations at pre-deployment was predictive of an increase in problematic alcohol related behaviours (frequency and binge-drinking) at pre- and post-deployment. Similarly, increased endorsement of post-deployment enhancement motivations was predictive of an increase in problematic alcohol use. The hierarchical regression analyses provided further support to the influence of enhancement motivations on alcohol use, showing that the post-deployment enhancement motivation provided a significant unique contribution to the overall explanation of factors influencing post-deployment alcohol related behaviours including frequency of alcohol consumption.

The analyses investigating the course of alcohol use and relation behaviours across the deployment cycle (pre- to post-deployment) provided some mixed results. The results found a positive association and predictive utility of post-deployment reporting of enhancement motivation and an increase in problematic alcohol related behaviours from pre- to post-deployment. Pre-deployment enhancement motivations were found to be predictive of a decrease in the frequency of alcohol consumption over the deployment cycle. Consistent with the correlation results that found a negative association between the pre-deployment enhancement motivations and change in binge-drinking behaviours, the regression analyses also found that post-deployment reporting of enhancement motivations was predictive of an decrease in binge-drinking from pre- to post-deployment. Conversely, pre-deployment reporting of enhancement motivation appeared to predict an increase in binge-drinking from pre- to post-deployment.

9.10.4 Prediction of alcohol change group inclusion. The analyses exploring the dimensions of post-deployment variables that differentiated between participants whose pattern of alcohol use increased, decreased or remained stable over time, were largely inconclusive with the results failing to significantly discriminate between the functions for the frequency of alcohol consumption and binge-drinking. The post-deployment alcohol consumption motivations (coping and enhancement) significantly discriminated between those change groups with endorsement of post-deployment motives being most elevated in individuals whose drinking increased over time and least pronounced in individuals whose drinking decreased over time.

9.10.5 Conclusion. Overall, results from this chapter indicate that the exploration of motivations to consume alcohol shows good utility in predicting post-deployment risk of problematic alcohol related behaviours, including frequency of alcohol consumption and binge-drinking. These results are generally consistent with previous research which has found that drinking to cope with negative affect or to enhance neutral or positive affect was associated with increased alcohol consumption (Crutzen et al., 2013; Doyle et al., 2011; Holahan et al., 2003).

Results demonstrated that endorsement of the coping and enhancement motivations at pre-deployment was predictive of an increase in problematic alcohol related behaviours (frequency and binge-drinking) at pre- and post-deployment. Similarly, endorsement of post-deployment coping and enhancement motivations was predictive of an increase in problematic alcohol use post-deployment. Additionally, both motivations provided a unique contribution to the overall explanation of factors influencing post-deployment alcohol related behaviours. Both motivations reported post-deployment were predictive of an increase in alcohol related behaviours (total, frequency) across the deployment cycle (pre- to post-deployment). However, the pre-deployment enhancement motive signaled a reduction in alcohol consumption frequency over time, while the post-deployment enhancement motive signaled a reduction in binge-drinking over the deployment cycle. Conversely, pre-deployment reporting of enhancement motivation appeared to predict an increase in binge-drinking from pre- to post-deployment. Respondents who reported a general increase in drinking over time generally reported greater endorsement of post-deployment motivations.

Given the strong support found in this study for the role of motivations in alcohol use, it is clear that both the coping and enhancement motivations for consuming alcohol influence the course of alcohol use across the deployment cycle. Alcohol consumption motives have also been identified as mediating the relationship between alcohol behaviours and various mental health problems including social anxiety disorders (Lewis et al., 2008), depressive symptoms (Holahan et al., 2003) and symptoms associated with PTSD (Dixon et al., 2009; Lehavot et al., 2014). It is therefore posited that alcohol motivations may interact with pre-, within, and post-deployment characteristics, trauma exposure and mental health risk to influence the course of alcohol use across the deployment cycle. Given this, the next chapter (Chapter 10) will address the final research question, Research Question Six, "*What individual characteristics are influential in explaining motivation to consume alcohol across the deployment cycle*?*"*

Chapter 10: Results – Influence of Deployment Characteristics on Alcohol Motivations and the Course of Alcohol Use From Pre- to Post-deployment

10.1 Chapter Overview

The purpose of this chapter is to examine the final research question, Research Question Six, "*What individual characteristics are influential in explaining motivation to consume alcohol across the deployment cycle*?" The chapter begins by briefly discussing the relevant literature and then reviews the aspects of the Method that are pertinent to Research Question Six. The results that explore the associations between the Time 1, Time 2 and Time 3 characteristics, motivations to consume alcohol and patterns of alcohol use (AUDIT total, frequency, severity) across time (Time 3, Time 1/Time 3 change) are then presented before summarising the key findings and conclusions.

10.2 Introduction

In Chapters 6 to 8, it was found that the reported levels of pre-, within- and post-deployment related mental health risk and trauma reaction demonstrated varying levels of utility in predicting post-deployment problematic alcohol related behaviours and the course of alcohol use across the deployment cycle. It was clear from those results that a further factor may be influential in determining the course of alcohol use across the deployment cycle.

Alcohol consumption motives were then explored (Chapter 9) and it was found that the investigation of motivations to consume alcohol showed good utility in predicting post-deployment risk of problematic alcohol related behaviours, including frequency of alcohol consumption and binge-drinking. The current chapter builds upon these important findings by exploring the individual characteristics that may be influential in explaining motivation to consume alcohol and subsequent alcohol behaviours across the deployment cycle.

It is generally assumed that drinking to cope is associated with negative emotional states including social anxiety and depression (Gratzer et al., 2004; Jackson & Sher, 2003;

Stewart et al., 2006). One of the most frequently researched mental health diagnosis, with respect to drinking motive, is social anxiety disorder with a number of studies finding that coping motives mediated the relationship between social anxiety and negative consequences of drinking (Clerkin et al., 2014; Lewis et al., 2008). Villarosa et al. (2014) investigated the mediating effects of drinking motives on social anxiety symptoms and drinking behaviours. They found that participants who favoured the enhancement as opposed to the coping motives participated in more problematic drinking patterns.

A few studies have investigated the mediating effects of motivation on alcohol consumption in relation to posttraumatic stress symptoms. Consistently, research has found that individuals experiencing comorbid PTSD and alcohol use disorders, reported that they were motivated to drink in an attempt to cope with negative affect (Dixon et al., 2009; Kaysen et al., 2006; Lehavot et al., 2014; Miranda et al., 2002; Simpson, 2003; Ullman et al., 2005). Simpson et al. (2014) investigated whether drinking motives moderate the association between PTSD symptoms and alcohol use. The authors found that the results generally supported a self-medication model explanation of alcohol use, as more severe PTSD symptoms were predictive of increased alcohol use. Furthermore, significant interactions were found between PTSD symptom severity and both the coping and enhancement motives. coping motives showed a positive relationship between alcohol use and PTSD symptom severity, whereas enhancement motives showed a negative relationship with those with low enhancement motives showing significant increases in alcohol consumption with increasing PTSD symptom severity (Simpson et al., 2014).

A number of studies have linked drinking motives to personality variables. For example, studies that have examined the relationship between personality and alcohol consumption motivations have found that drinking to cope was associated with high neuroticism whereas enhancement motives were associated with high extraversion and low conscientiousness (Stewart & Devine, 2000; Stewart et al., 2001). Theakston et al. (2004) also examined the relations between the Big-Five personality domains and motivations for drinking and found that the personality domains predicted the internal (coping and enhancement) drinking motives. Overall, these findings suggest that neuroticism and low conscientiousness are predictive of developing alcohol-related problems and extraversion may be more directly related to binge-drinking (Mezquita et al., 2010).

The literature provides support to the assumption that individual characteristics can be prominent in explaining motivation to consume alcohol and that those motivations may influence the course of alcohol use across time. However, no research has expressly investigated the influence of individual characteristics of deployed personnel or deployment related characteristics on alcohol consumption motivations and the subsequent impact on the course of alcohol use and associated behaviours across the deployment cycle. Hence, this study investigated whether *individual characteristics are influential in explaining motivation to consume alcohol* and whether this in turn, is influential in predicting the course of alcohol consumption from pre- (Time 1) to post-deployment (Time 3).

10.3 Review of Method

10.3.1 Measures. Two measures were administered during pre-deployment (Time 1) baseline data collection to assess broad personality traits and coping styles. First, the TIPI (Gosling et al., 2003) was administered to assess the participants' personality traits along five-dimensions; openness to experience, conscientiousness, extraversion, agreeableness and emotional stability. Second, two of the three dimensions (mature and immature – see Chapter 4) in the DSQ (Andrews et al., 1989) were used to assess individual habitual coping styles.

An additional three measures were administered during pre-deployment to capture trauma exposure and levels of mental health risk. First, Column 1 of the TSES-R (Hodson, 2002) was administered to assess the level of trauma exposure pre-deployment (base-line). The column total was used in the data analysis. Second, the PCL-C (Andrews et al., 1989;

Weathers et al., 1993) which was designed to screen for trauma symptomatology was also administered in addition to the final measure, the K10, which is a measure of felt psychological distress. Both the K10 and PCL-C produce a total score indicating severity of symptoms.

The AUDIT (Saunders, Aasland, Amundsen, et al., 1993; Saunders, Aasland, Babor, et al., 1993) was administered at Time-1 (pre-deployment) and Time-3 (post-deployment). Although internal consistency is not a requirement of indexes (Diamantopoulos & Winklhofer, 2001), the AUDIT showed reasonable internal consistency at each administration with the Cronbach alpha coefficient reaching .74 at both administrations.

The AUDIT responses were categorised in four different ways for the purposes of analyses. First, an overall score indicating relative risk of drinking behaviour (AUDIT Total). Second, Question 1 of the AUDIT asks the respondents to indicate "How often do you have a drink containing alcohol?" providing an indication of '*frequency'* of alcohol consumption. Question 3 of the AUDIT asks respondents to indicate "How often do you have six or more drinks on one occasion?" providing an indicator of '*severity*' of binge-drinking behaviours. Finally, an assessment of Time 1 to Time 3 change in alcohol behaviours was gained by detracting each individuals Time 3 AUDIT scores from the respective Time 1 AUDIT score.

The AMQ was administered at pre-deployment (Time 1) and post-deployment (Time 3) as an adjunct to the AUDIT. The scale explores motivations for consuming alcohol, with the motivations falling within two broad categories: 1) drinking to cope, 2) enhancement, which are consistent with the classification of drinking motives posited by Cooper (1994).

The measures were more fully described in Chapter 3 (Methodology) and validated in Chapter 4 (Instrument Validation).

10.3.2 Sample sizes. Figure 10.1 depicts the sampling and response for the AMQ, Time 1, Time 2, and Time 3 measures. It shows that of the 676 participants whose data were used in this study, 459 completed the AMQ at pre-deployment (Time 1) and 520 participants completed the AMQ at post-deployment. The analyses investigating the influence of various measures (TIPI, DSQ, K10, PCL-C, TSES-R) at the three sampling points on motivations to consume alcohol, used only those participants who had corresponding AMQ scores.

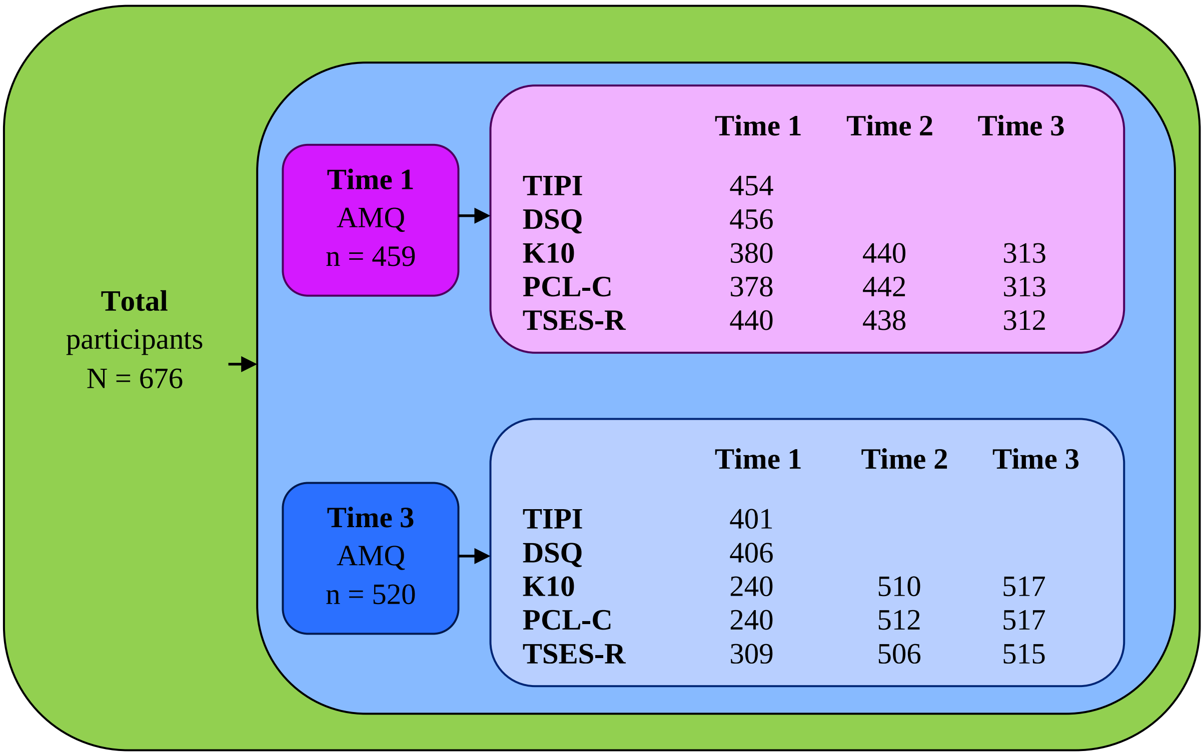

Figure 10.1 *Summary of sampling and response for the AMQ and Time 1, 2, and 3 measures.*

Figure 10.2 depicts the sampling and response for the AUDIT, AMQ and Time 1, Time 2, and Time 3 measures. It shows that of the 676 participants whose data were used in this study (See Chapter 3, Figure 1), 438 participants completed the AUDIT at the pre-deployment time point (Time 1) and 518 participants completed the AUDIT at post-deployment (Time 3). The analyses investigating the influence of the scores on the various measures (TIPI, DSQ, K10, PCL-C, TSES-R, AMQ) at the three sampling points on pre- and post-deployment alcohol behaviours, used only those participants who had corresponding AUDIT score.

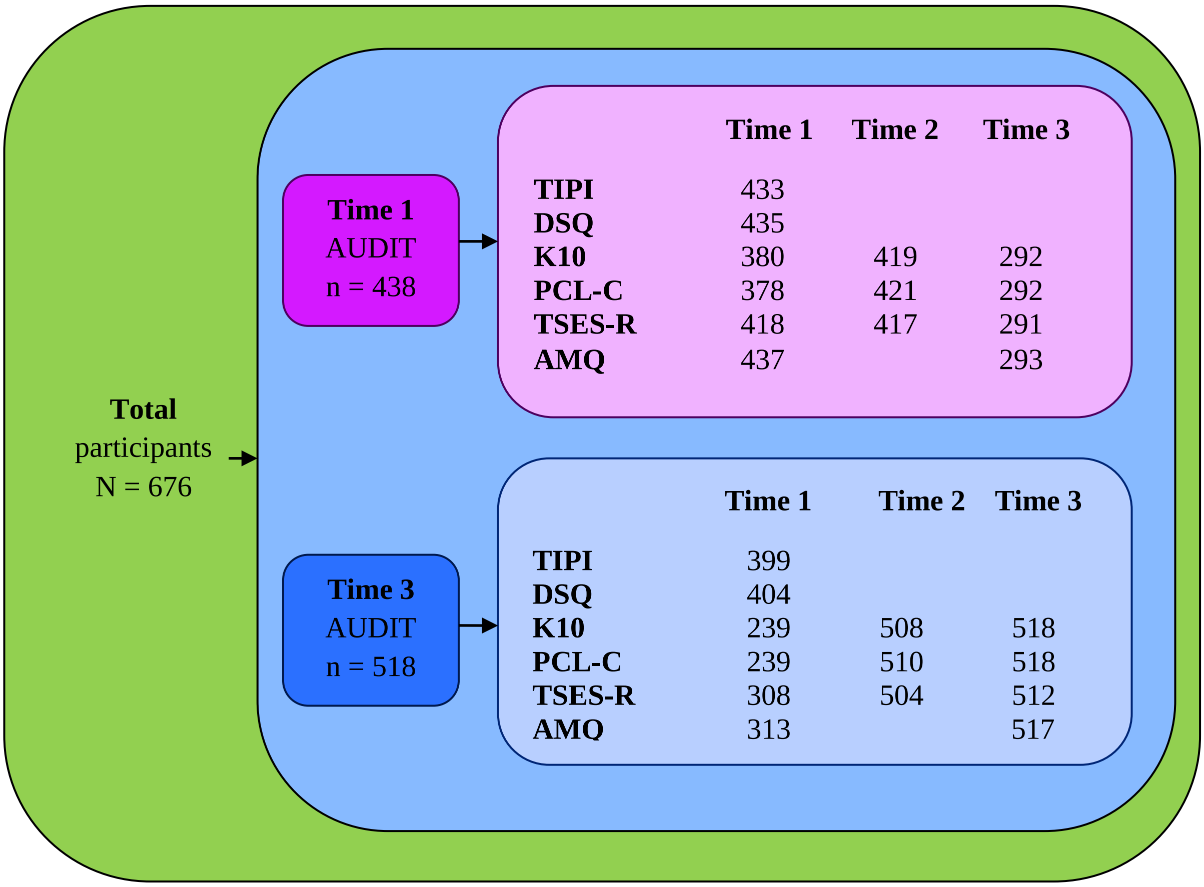

Figure 10.2 *Summary of sampling and response for the AUDIT, AMQ and Time 1, 2, and 3 measures*

10.3.3 Data analysis strategy. The data analysis strategy for Research Question Six comprised:

Step 1 – Examination of correlations between the Time 1 / Time 3 motivation scores and the Time 1, Time 2, and Time 3 characteristics.

Step 2 – Prediction of motivations (Time 1 and Time 3) by combination of Time 1, Time 2 and Time 3 characteristics through the use of simultaneous regression.

Step 3 – Investigation of the unique contribution Time 1, Time 2, and Time 3 characteristics to the prediction of Time 3 motivations after controlling for Time 1 motivations through the use of hierarchical regression.

Step 4 – Investigation of the unique contribution of the motivation variables, and the Time 1, Time 2, Time 3 characteristics to the prediction of Time 3 AUDIT total, frequency and severity scores after controlling for Time 1 AUDIT through the use of hierarchical regression.

10.4 Step 1 - Examination of Correlations Between the Time 1 / Time 3 Motivation Variables and the Time 1, Time 2, and Time 3 Characteristics

The first step in the data analysis strategy for Research Question Six was to examine the direction and strength of the relationships between pre- (Time 1) and post-deployment (Time 3) coping and enhancement motivations with the pattern of reporting on the Time 1 (pre-deployment), Time 2 (RtAPS) and Time 3 (post-deployment) characteristics.

The analyses were conducted by the use of Pearson product-moment correlations. The results of the analyses are presented in Table 10.1. The first set (Set 1) shows the Pearson correlations between the coping and enhancement motivations and Time 1 AUDIT scores. The second set (Set 2) shows the Pearson correlations between the coping and enhancement motivations and Time 3 AUDIT scores. Finally, the third set (Set 3) shows the Pearson correlations between each of motivation variables and changes in AUDIT scores from Time 1 to Time 3.

Table 10.1

Pearson product-moment correlations between the pre-/post-deployment motivation variables and the Time 1, Time 2 and Time 3 characteristics.

Variables	Set 1 Coping Time 1		Set 2 Enhance Time 1		Set 3 Coping Time 3		Set 4 Enhance Time 3	
	n	*r*	n	*r*	n	*r*	n	*r*
Extraversion	454	-.09*	454	.06	401	-.05	401	.01
Agreeableness	454	-.05	454	-.04	401	-.04	401	-.01
Conscientiousness	454	-.08	454	-.13**	401	-.13*	401	-.07
Emotional Stability	454	-.26**	454	-.06	401	-.23**	401	.00
Openness	454	-.10*	454	-.02	401	-.11*	401	-.09
Immature Coping	456	.21**	456	.14**	406	.19**	406	.09
Mature Coping	458	-.10*	458	-.06	406	-.07	406	.00
K10 Time 1	380	.29**	380	.12*	240	.24**	240	.13*
K10 Time 2	440	.17**	440	.08	510	.15**	210	.02
K10 Time 3	313	.08	313	.07	517	.33**	517	-.01
PCL-C Time 1	378	.30**	378	.06	240	.19**	240	.01
PCL-C Time 2	442	.17**	442	.09	512	.14**	512	-.02
PCL-C Time 3	313	.15**	313	.13*	517	.38**	517	-.02
TSES-R Time 1	440	.07	440	.04	309	.01	309	.14*
TSES-R Time 2	438	.13**	438	.03	506	.06	506	.06
TSES-R Time 3	312	.11	312	.09	515	.31**	515	.05

* Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

10.4.1 Relationships between Time 1 coping motivation and Time 1, Time 2 and Time 3 characteristics. As shown in the Set 1 results in Table 10.1, there were small (Cohen, 1988, 1992) negative correlations between the pre-deployment (Time 1) coping motivation and the TIPI extraversion (r (454) = -.09, p < .05), emotional stability (r (454) = -.26, p < .01), and openness variables (r (454) = -.10, p < .05). A significant negative correlation was also found between the pre-deployment (Time 1) coping motivation and the mature coping variable (r (458) = -.10, p < .05). Conversely, a positive correlation was found for the immature variable (r (456) = .21, p < .01).

Positive correlations were also found between the pre-deployment coping motivation and K10 scores at Time 1 (r (380) = .29, p < .01) and Time 2 (r (340) = .17, p < .01). Similar results were found for the PCL-C with positive correlations between the pre-deployment (Time 1) coping motivation and the PCL-C at Time 1 (r (378) = .30, p < .01), Time 2 (r (442) = .17, p < .01), and Time 3 (r (313) = .15, p < .01). A further significant positive correlation was also found between the pre-deployment (Time 1) coping motivation and the Time 2 TSES-R (r (438) = .13, p < .01).

10.4.2 Relationships between Time 1 enhancement motivation and Time 1, Time 2 and Time 3 characteristics. As shown in the Set 2 results in Table 10.1, there was a small (Cohen, 1988, 1992) negative correlation between the pre-deployment (Time 1) enhancement motivation and the TIPI conscientiousness variable (r (454) = -.13, p < .01). Conversely, a positive correlation was found between the pre-deployment (Time 1) enhancement motivation and the DSQ immature (r (456) = .14, p < .01) variable.

Positive correlations were also found between the pre-deployment enhancement motivation and Time 1 K10 score (r (380) = .12, p < .05). Similar results were found for the PCL-C with a positive correlation between the pre-deployment (Time 1) enhancement motivation and the PCL-C at Time 3 (r (313) = .13, p < .05).

10.4.3 Relationships between Time 3 coping motivation and Time 1, Time 2 and Time 3 characteristics. As shown in the Set 3 results in Table 10.1, there were small (Cohen, 1988, 1992) negative correlations between the post-deployment (Time 3) coping motivation and the TIPI conscientiousness (r (454) = -.13, p < .05) and emotional stability (r (454) = -.23, p < .01) variables. A moderate positive correlation was also found between the post-deployment (Time 3) coping motivation and the immature coping variable (r (456) = .19, p < .01).

Table 10.1 also shows a moderate positive correlation between the post-deployment (Time 3) coping motivation and the PCL-C at Time 3 (r (313) = .38, p < .01). A further significant positive correlation was also found between the post-deployment (Time 3) coping motivation and the Time 3 TSES-R (r (438) = .31, p < .01).

10.4.4 Relationships between Time 3 enhancement motivation and Time 1, Time 2 and Time 3 characteristics. As shown in the Set 4 results in Table 10.1, there was a small (Cohen, 1988, 1992) positive correlation between the post-deployment (Time 3) enhancement motivation and the Time 1 K10 score (r (380) = .13, p < .05). A similar results was also found for the TSES-R with a positive correlation between the post-deployment (Time 3) enhancement motivation and the TSES-R at Time 3 (r (440) = .14, p < .05).

10.5 Step 2 – Prediction of Coping and Enhancement Motivation Variables (Time 1 and Time 3) by the Time 1, Time 2, and Time 3 Characteristics

The fourth step in the data analysis strategy for Research Question Six was to explore the degree to which the Time 1, Time 2 and Time 3 characteristics predicted coping and enhancement motivations (Time 1 and Time 3). The second step also examined the relative contribution of each of the characteristics to the total variance explained by the coping and enhancement variables (Time 1 and Time 3).

The analysis was conducted by the use of simultaneous regression analyses. The results of the analysis for characteristics scores are presented in the following series of tables. The first set (Set 1) of results for each table shows the regression analysis for the coping motivation (Time 1 or Time 3) and the study measures (TIPI, DSQ, K10, PCL-C and TSES-R) scores at Time 1, Time 2 or Time 3. The second set (Set 2) of results show the regression analysis for the enhancement motivation (Time 1 or Time 3) and the study measures (TIPI, DSQ, K10, PCL-C and TSES-R) scores at Time 1, Time 2 or Time 3.

The report of each analysis commences with the statistical significance of the amount of variance accounted for by the regression model based on the use of an *F*-ratio statistic to test the null hypothesis that the value of *R* (multiple correlation coefficient) is equal to zero. The value of R^2 (also called the coefficient of determination) is then presented. R^2 represents the proportion of variance on the motivation scores explained by the Time 1, Time 2 or Time 3 variables. The reporting of each regression is completed by the statistical significance of each of the variables based on the use of a *t* –statistic to test the null hypothesis that the value of individual variable coefficients is equal to zero. The tables present both unstandardised (B) and standardised (β) coefficients for each regression analysis. The eight simultaneous regression analyses (Sections 10.5.1 to 10.5.8) are reported below.

10.5.1 Prediction of the Time 1 coping motivation by combination of Time 1 characteristics. The first simultaneous regression analysis (Set 1 results in Table 10.2) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted pre-deployment (Time 1) coping motivation scores, F (10,359) = 6.08, $p < .001$. The value of R^2 shows that 15% of the variance in Time 1 coping motivation scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that TIPI agreeableness, K10 and PCL-C demonstrated significant beta coefficients indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 characteristics.

Table 10.2

Simultaneous regression analyses for the Time 1 characteristics predicting Time 1 alcohol consumption motivation (n = 369).

Time 1 Factors	Set 1 Coping Time 1					Set 2 Enhance Time 1				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	-.01	.08		-.09	.933	.59	.17		3.45	.001
Open	-.00	.01	-.01	-.23	.798	.02	.02	.09	1.50	.135
Consc	.00	.01	.03	.58	.561	-.01	.02	-.02	-.38	.701
Extra	.01	.01	.09	1.61	.109	-.04	.02	-.12	-1.92	.056
Agree	-.02	.01	-.17	-2.76	.006	.01	.02	.04	.60	.551
ES	-.00	.01	-.02	-.34	.737	.01	.02	.02	.40	.686
Immature	.01	.01	.07	1.06	.289	.06	.03	.16	2.49	.013
Mature	-.01	.01	-.05	-.96	.340	-.02	.01	-.08	-1.37	.173
K10	.01	.00	.13	2.07	.039	.00	.01	.06	.89	.374
PCL-C	.00	.00	.18	2.72	.007	-.00	.00	-.04	-.55	.580
TSES-R	-.00	.00	-.03	-.48	.635	-.00	.00	-.01	-.23	.817
	R^2 = .15, F(10,359) = 6.08, p < .001					R^2 = .05, F(10,359) = 1.96, p = .036				

Consistent with the significant correlations found in section 10.4, higher levels of mental health risk as measured by the K10 and PCL-C at Time 1 are predictive of greater endorsement of the coping motivation at pre-deployment (Time 1). Furthermore, lower levels of agreeableness are predictive of greater endorsement of the coping motivation at Time 1 – this result is inconsistent with the correlations reported in section 10.4. The other significant correlations found in Section 10.4 were not support in the simultaneous regression analyses.

10.5.2 Prediction of the Time 1 enhancement motivation by combination of Time 1 characteristics. The second simultaneous regression analysis (Set 2 results in Table 10.2) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted pre-deployment (Time 1) enhancement motivation scores, F (10,359) = 1.96, $p <$ .05. The value of R^2 shows that 5% of the variance in Time 1 enhancement motivation scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that TIPI extraversion and the immature coping variable both demonstrated significant beta coefficients indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 1 characteristics.

Lower levels of extraversion and increased immature coping are predictive of greater endorsement of the enhancement motivation at Time 1. These results are inconsistent with the correlations reported in section 10.4. The other significant correlations found in Section 10.4 were not support in the simultaneous regression analyses.

10.5.3 Prediction of the Time 3 coping motivation by combination of Time 1 characteristics. The third simultaneous regression analysis (Set 1 results in Table 10.3) shows that the combination of the pre-deployment (Time 1) characteristics significantly predicted post-deployment (Time 3) coping motivation scores, F (10,226) = 2.04, $p < .05$. The value of R^2 shows that 15% of the variance in Time 3 coping motivation scores was explained by the combination of Time 1 characteristics. Examination of the individual variable coefficients shows that none of the Time 1 characteristics demonstrated significant beta coefficients.

Table 10.3

Simultaneous regression analyses for the Time 1 characteristics predicting Time 3 alcohol consumption motivation (n = 236).

Time 1 Factors	Set 1 Coping Time 3					Set 2 Enhance Time 3				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	-.06	.09		-.71	.477	.64	.19		3.32	.001
Open	.01	.01	.10	1.32	.188	.01	.02	.02	.26	.792
Consc	.01	.01	.08	1.16	.247	-.01	.02	-.03	-.44	.657
Extra	-.01	.01	-.04	-.55	.585	-.02	.02	-.06	-.72	.470
Agree	-.01	.01	-.05	-.62	.539	.02	.02	.07	.84	.403
ES	-.00	.01	-.01	-.15	.882	-.03	.02	-.12	-1.55	.123
Immature	.02	.02	.09	1.15	.251	.03	.03	.07	.90	.370
Mature	-.01	.01	-.06	-.89	.375	-.00	.02	-.02	-.25	.803
K10	.01	.00	.15	1.77	.078	.01	.01	.17	1.99	.048
PCL-C	.00	.00	.07	.85	.394	-.01	.00	-.17	-2.01	.046
TSES-R	.00	.00	.00	-.01	.994	.01	.00	.20	2.77	.006
	R^2 = .08, F(10,226) = 2.04, p = .030					R^2 = .17, F(10,226) = 1.81, p = .060				

10.5.4 Prediction of the Time 3 enhancement motivation by combination of Time 1 characteristics. The fourth simultaneous regression analysis (Set 2 results in Table 10.3) shows that the combination of the pre-deployment (Time 1) characteristics did not significantly predict post-deployment (Time 3) enhancement motivation scores, *F* (10,226) = 2.04, *p* < .05. No further analyses are reported for Time 3 enhancement motivation results given the support for the null hypothesis.

10.5.5 Prediction of the Time 3 coping motivation by combination of Time 2 characteristics. The fifth simultaneous regression analysis (Set 1 results in Table 10.4) shows that the combination of the within-deployment (Time 2) characteristics significantly predicted post-deployment (Time 3) coping motivation scores, F (3,500) = 4.19, $p < .05$. The value of R^2 shows that 3% of the variance in Time 3 coping motivation scores was explained by the combination of Time 2 characteristics. Examination of the individual variable coefficients shows that none of the Time 2 characteristics demonstrated significant beta coefficients.

Table 10.4

Simultaneous regression analyses for the Time 2 characteristics predicting Time 3 alcohol consumption motivation (n = 503).

Time 2 Factors	Set 1 Coping Time 3					Set 2 Enhance Time 3				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	-.03	.02		-1.11	.268	.56	.05		10.90	.000
K10	.00	.00	.09	1.57	.117	.00	.00	.05	.80	.425
PCL-C	.00	.00	.09	1.55	.122	-.01	.00	-.09	-1.58	.115
TSES-R	.00	.00	-.01	-.20	.841	.01	.00	.09	1.84	.066
	R^2 = .03, F(3,500) = 4.19, p = .006					R^2 = .01, F(3,500) = 1.56, p = .200				

10.5.6 Prediction of the Time 3 enhancement motivation by combination of Time 2 characteristics. The sixth simultaneous regression analysis (Set 2 results in Table 10.4) shows that the combination of the within-deployment (Time 2) characteristics did not significantly predict post-deployment (Time 3) enhancement motivation scores, F (3,500) = 1.56, $p > .05$. No further analyses are reported for Time 3 enhancement motivation results given the support for the null hypothesis.

10.5.7 Prediction of the Time 3 coping motivation by combination of Time 3 characteristics. The seventh simultaneous regression analysis (Set 1 results in Table 10.5) shows that the combination of the post-deployment (Time 3) characteristics significantly predicted post-deployment (Time 3) coping motivation scores, *F* (3,508) = 32.80, *p* < .001. The value of R^2 shows that 16% of the variance in Time 3 coping motivation scores was explained by the combination of Time 3 characteristics. Examination of the individual variable coefficients shows that the PCL-C and TSES-R demonstrated significant beta coefficients indicating that they each made a statistically significant contribution to total variance explained by the combination of Time 3 characteristics.

Consistent with the significant correlations found in section 10.4, higher levels of mental health risk as measured by the PCL-C and TSES-R at Time 3 are predictive of greater endorsement of the coping motivation at post-deployment (Time 3).

Table 10.5

Simultaneous regression analyses for the Time 3 characteristics predicting Time 3 alcohol consumption motivation (n = 511).

Time 3 Factors	Set 1 Coping Time 3					Set 2 Enhance Time 3				
	B	SE B	β	*t*	Sig	B	SE B	β	*t*	Sig
constant	-.08	.02		-4.13	.000	.58	.05		12.90	.000
K10	.00	.00	.11	1.75	.081	.00	.00	.00	.02	.983
PCL-C	.00	.00	.22	3.14	.002	-.00	.00	-.07	-.90	.370
TSES	.01	.00	.14	2.85	.005	.01	.01	.09	1.63	.104
	R^2 = .16, F(3,508) = 32.80, p < .001					R^2 = .01, F(3,508) = .92, p = .429				

10.5.8 Prediction of the Time 3 enhancement motivation by combination of Time 3 characteristics. The final simultaneous regression analysis (Set 2 results in Table 10.5) shows that the combination of the post-deployment (Time 3) characteristics did not significantly predict post-deployment (Time 3) enhancement motivation scores, F (3,508) = .92, $p > .05$. No further analyses are reported for Time 3 enhancement motivation results given the support for the null hypothesis.

10.6 Step 3 – Investigation of the Unique Contribution Time 1, Time 2, and Time 3 Measures to the Prediction of Coping and Enhancement Motivations

The third step in the data analysis strategy for Research Question Six was to explore the degree to which the Time 1, Time 2, and Time 3 characteristics predicted the post-deployment (Time 3) motivation variables after controlling for associated Time 1 motivation. The analyses were conducted by the use of hierarchical multiple regressions. After controlling for Time 1 alcohol consumption motivation (Block 1), the unique combination of the Time 1 personality and coping variables (conscientiousness, extraversion, agreeableness, emotional stability, immature coping, mature coping) were added as Block 2. The Time 1 mental health risk variables (K10, PCL-C, TSES-R) were then added as Block 3. Block 4 included the Time 2 mental health risk variables (K10, PCL-C, TSES-R) and the Time 3 mental health variables (K10, PCL-C, TSES-R) were added as Block 5.

10.6.1 Unique contribution of Time 1, Time 2, and Time 3 characteristics to the prediction of Time 3 coping motivation. As shown in Table 10.6 the five-predictor model accounted for approximately 33% of the variance in coping motivation scores from Time 1 to Time 3. This model was statically significant, $R^2 = .33$, $F(17,203) = 5.79$, $p < .001$. After controlling for the Time 1 coping motivation which accounted for approximately 10% of the variance, only the addition of the Time 3 trauma and mental health risk variables resulted in a statistically significant increase in R^2 ($\Delta R^2 = .16$, $F(3, 203) = 15.84$, $p < .001$).

Table 10.6

Hierarchical regression analyses for the dependent variable coping motivation post-deployment for the Time 1, 2 and 3 measures (n = 220).

	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	Coping Time 1	.10	.10	25.02	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Immature, Mature	.15	.05	1.67	.117
Block 3	Time 1 Trauma Exposure and Psych Distress	.16	.01	1.13	.340
Block 4	Time 2 Trauma Reaction and Psych Distress	.17	.01	.48	.695
Block 5	Time 3 Trauma Reaction and Psych Distress	.33	.16	15.84	.000

Table 10.7 demonstrates that although the Time 3 Trauma Reaction ($p < .001$) and the Time 2 Trauma Reaction ($p < .05$) variables were significant, pre-deployment base-line trauma exposure did not contribute to the prediction of post-deployment coping motivation after controlling for pre-deployment coping motivation. Further the pre-deployment psychological distress variables (K10, $p = .05$; PCL-C, $p < .05$) contributed to the prediction post-deployment coping motivation.

Table 10.7

Block 5 beta weights, t-tests and significance levels for measured variables predicting Coping motivation post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	-.03	.08		-.36	.722
Coping Time 1	.26	.05	.34	5.19	.000
Extraversion	.01	.01	.14	1.95	.053
Agreeableness	.01	.01	.09	1.35	.179
Conscientiousness	-.01	.01	-.94	-1.16	.248
Emotional Stability	.01	.01	.09	1.14	.258
Openness	-.01	.01	-.10	-.1.34	.183
Immature Coping	.02	.01	.10	1.30	.195
Mature Coping	-.00	.01	-.02	-.29	.771
Trauma Exposure Time 1	.00	.00	.02	.22	.823
K10 Time 1	.01	.00	.16	1.97	.050
PCL-C Time 1	-.01	.00	-.20	-2.25	.025
Trauma Reaction Time 2	-.01	.00	-.21	-2.99	.003
K10 Time 2	.00	.00	.03	.35	.725
PCL-C Time 2	.00	.00	.01	.11	.915
Trauma Reaction Time 3	.03	.01	.48	5.13	.000
K10 Time 3	.00	.00	.01	.07	.947
PCL-C Time 3	-.00	.00	-.03	-.24	.809
		R^2 = .33, F(17,203) = 5.79, p < .001			

10.6.2 Unique contribution of Time 1, Time 2, and Time 3 characteristics to the prediction of Time 3 enhancement motivation. As shown in Table 10.8 and Table 10.9, the five-predictor model accounted for approximately 28% of the variance in enhancement motivation scores from Time 1 to Time 3. This model was statically significant, $R^2 = .28$, $F(17,203) = 4.66$, $p < .001$. After controlling for the Time 1 enhancement motivation which accounted for approximately 21% of the variance, only the addition of the Time 3 trauma and mental health risk variables resulted in a statistically significant increase in R^2 ($\Delta R^2 = .03$, $F(3, 203) = 2.95$, $p < .05$).

Table 10.8

Hierarchical regression analyses for the dependent variable enhancement motivation post-deployment for the Time 1, 2 and 3 measures (n = 220).

	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	Enhance Time 1	.21	.21	58.35	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Immature, Mature	.22	.01	.30	.952
Block 3	Time 1 Trauma Exposure and Psych Distress	.23	.01	1.38	.250
Block 4	Time 2 Trauma Reaction and Psych Distress	.25	.02	1.48	.222
Block 5	Time 3 Trauma Reaction and Psych Distress	.28	.03	2.95	.034

Table 10.9

Block 5 beta weights, t-tests and significance levels for measured variables predicting Enhancement motivation post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	.68	.20		3.44	.001
Enhance Time 1	.44	.06	.46	7.28	.000
Extraversion	-.01	.02	-.04	-.53	.599
Agreeableness	-.00	.02	-.00	-.05	.963
Conscientiousness	.00	.02	.01	.11	.912
Emotional Stability	-.00	.02	-.01	-.14	.890
Openness	-.01	.02	-.05	-.61	.540
Immature Coping	.01	.03	.03	.34	.722
Mature Coping	-.01	.02	-.06	-.84	.400
K10 Time 1	.01	.01	.09	1.12	.264
PCL-C Total	-.00	.01	-.03	-.29	.773
Trauma Exposure Time 1	.01	.00	.10	1.47	.145
K10 Time 2	-.00	.01	-.02	-.26	.797
PCL-C Time 2	-.00	.00	-.05	-.60	.547
Trauma Reaction Time 2	.01	.01	.05	.69	.493
K10 Time 3	.01	.01	.07	.65	.518
PCL-C Time 3	-.02	.01	-.36	-2.59	.010
Trauma Reaction Time 3	.03	.01	.22	2.24	.026
		R^2 = .28, F(17,203) = 4.66, p < .001			

Table 10.9 demonstrates that although the although the Time 3 Trauma Reaction (p < .001) and the Time 3 PCL-C total (p < .10) variables were significant, none of the other variables provided a significant contribution to the post-deployment Enhancement motivation.

10.7 Step 4 – Investigation of the Unique Contribution Time 1, Time 2, and Time 3 Measures and Time 1 and Time 3 Motivations to the Prediction of Time 3 AUDIT Total, Frequency and Severity Scores

The fourth step in the data analysis strategy for Research Question Six was to explore the degree to which the Time 1, Time 2 and Time 3 measures and Time 1 and Time 3 motivations predicted AUDIT post-deployment (Time 3) total, frequency and severity scores, after controlling for Time 1 alcohol consumption behaviours (AUDIT total, frequency, severity). The analyses were conducted by the use of hierarchical multiple regressions. After controlling for Time 1 alcohol consumption behaviours (Block 1), the unique combination of the Time 1 personality and coping variables (conscientiousness, extraversion, agreeableness, emotional stability, immature coping, mature coping) were added as Block 2. The Time 1 mental health risk variables (K10, PCL-C, TSES-R) were then added as Block 3. The Time 1 motivation variables (coping, enhancement) were added at Block 4. Block 5 included the Time 2 mental health risk variables (K10, PCL-C, TSES-R) and the Time 3 mental health variables (K10, PCL-C, TSES-R) were added as Block 6. Finally, the Time 3 motivation variables (coping, enhancement) were added as Block 7.

10.7.1 Unique contribution of Time 1, Time 2, Time 3 measures and the Time 1 and Time motivations to the prediction of Time 3 AUDIT total. As shown in Table 10.10 and 10.11, the seven-predictor model accounted for approximately 55% of the variance in AUDIT total scores from Time 1 to Time 3. This model was statically significant, $R^2 = .55$, $F(21,199) = 11.39$, $p < .001$. After controlling for the Time 1 levels of alcohol use which accounted for approximately 30% of the variance, the addition of the personality and coping variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .03$, $F(7,212) = 1.55$, $p > .05$). Likewise, the addition of the Time 1 trauma and mental health risk variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .02$, $F(3,209) = 2.36$, $p > .05$), nor did the addition of the Time 2 trauma and mental health risk variables ($\Delta R^2 = .01$, $F(3,204) = .83$, *p* > .05). The addition of the Time 3 variables, however, did result in a statistically significant increase in R^2 of approximately 3% ($\Delta R^2 = .03$, $F(3,201) = 3.84$, $p < .01$). Similarly, the addition of the Time 1 motivations ($\Delta R^2 = .03$, $F(2,207) = 4.94$, $p < .01$) and the Time 3 motivations ($\Delta R^2 = .12$, $F(2,199) = 26.04$, $p < .001$) did result in a statistically significant increase in R^2.

Table 10.10

Hierarchical regression analyses for the dependent variable AUDIT total post-deployment for the personality, coping, psychological distress and trauma exposure measures (n = 220).

	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Total Time 1	.30	.30	94.62	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Immature, Mature	.34	.03	1.55	.153
Block 3	Time 1 Trauma Exposure and Psych Distress	.36	.02	2.36	.072
Block 4	Motivation Time 1: Coping, Enhance	.39	.03	4.94	.008
Block 5	Time 2 Trauma Reaction and Psych Distress	.39	.01	.83	.477
Block 6	Time 3 Trauma Reaction and Psych Distress	.43	.03	3.84	.010
Block 7	Motivation Time 3: Coping, Enhance	.55	.12	26.04	.000

Table 10.11

Block 7 beta weights, t-tests and significance levels for measured variables predicting AUDIT total post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	-3.58	2.22		-1.61	.108
AUDIT Total Time 1	.37	.06	.38	6.37	.000
Extraversion	.27	.19	.08	1.42	.157
Agreeableness	.30	.20	.08	1.51	.133
Conscientiousness	.07	.24	.02	.31	.758
Emotional Stability	-.10	.23	-.03	-.46	.650
Openness	.15	.22	.04	.66	.508
Immature Coping	.09	.35	.02	.25	.806
Mature Coping	-.04	.17	-.02	-.25	.803
K10 Time 1	.07	.07	.07	1.08	.281
PCL-C Total	.00	.06	.00	.05	.959
Trauma Exposure Time 1	-.03	.04	-.5	-.78	.439
Coping Time 1	-.88	1.41	-.04	-.62	.534
Enhance Time 1	.58	.74	.05	.79	.430
K10 Time 2	.13	.07	.12	1.88	.062
PCL-C Time 2	-.03	.05	-.05	-.64	.523
Trauma Reaction Time 2	-.00	.08	-.00	-.02	.982
K10 Time 3	-.14	.08	-.17	-1.88	.062
PCL-C Time 3	.09	.07	.15	1.35	.178
Trauma Reaction Time 3	.01	.14	.01	.10	.919
Coping Time 3	11.11	1.82	.37	6.12	.000
Enhance Time 3	2.28	.75	.18	3.04	.003

$R^2 = .55$, $F(21,199) = 11.39$, $p < .001$

Table 10.11 demonstrates that when all the variables entered into the analysis, only the Time 3 coping ($p < .001$) and enhancement ($p < .01$) motivations were significant after controlling for pre-deployment consumption and the Time 1, Time 2, Time 3 measures and the motivation variables. The Time 2 and Time 3 K10 neared significance with each reaching p = .062.

10.7.2 Unique contribution of Time 1, Time 2, Time 3 measures and the Time 1 and Time motivations to the prediction of Time 3 AUDIT frequency. As shown in Table 10.12 and 10.13, the seven-predictor model accounted for approximately 48% of the variance in AUDIT frequency scores from Time 1 to Time 3. This model was statically significant, $R^2 = .48$, $F(21,199) = 8.84$, $p < .001$. After controlling for the Time 1 levels of alcohol frequency which accounted for approximately 36% of the variance, the addition of the personality and coping variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .02$, $F(7,212) = 1.07$, $p > .05$). Likewise, the addition of the Time 1 trauma and mental health risk variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .00$, $F(3,209) = .44$, $p > .05$) nor did the addition of the Time 2 trauma and mental health risk variables ($\Delta R^2 = .01$, $F(3,204) = 1.08$, $p > .05$). The addition of the Time 3 variables neared significance ($\Delta R^2 = .02$, $F(3,201) = 2.49$, $p = .06$). The addition of the Time 1 motivations ($\Delta R^2 = .03$, $F(2,207) = 4.82$, $p < .01$) and the Time 3 motivations ($\Delta R^2 = .04$, $F(2,199) = 7.51$, $p < .001$) did result in a statistically significant increase in $R^{2.}$

Table 10.12

Hierarchical regression analyses for the dependent variable AUDIT frequency post-deployment for the personality, coping, psychological distress and trauma exposure measures (n = 220).

	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Frequency Time 1	.36	.36	123.59	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Immature, Mature	.38	.02	1.07	.384
Block 3	Time 1 Trauma Exposure and Psych Distress	.39	.00	.44	.726
Block 4	Motivation Time 1: Coping, Enhance	.41	.03	4.82	.009
Block 5	Time 2 Trauma Reaction and Psych Distress	.42	.01	1.08	.358
Block 6	Time 3 Trauma Reaction and Psych Distress	.44	.02	2.49	.061
Block 7	Motivation Time 3: Coping, Enhance	.48	.04	7.51	.001

Table 10.13

Block 7 beta weights, t-tests and significance levels for Time 3 variables predicting AUDIT frequency post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	.56	.56		.99	.324
AUDIT Frequency Time 1	.50	.06	.50	8.43	.000
Extraversion	.04	.05	.05	.80	.425
Agreeableness	.09	.05	.10	1.73	.086
Conscientiousness	.03	.06	.03	.52	.603
Emotional Stability	-.02	.06	-.03	-.41	.679
Openness	.03	.06	.04	.56	.574
Immature Coping	-.03	.09	-.02	-.29	.774
Mature Coping	-.09	.04	-.11	-1.99	.048
K10 Time 1	.00	.02	.01	.13	.901
PCL-C Total	.02	.01	.10	1.25	.212
Trauma Exposure Time 1	-.02	.01	-.10	-1.63	.106
Coping Time 1	.11	.35	.02	.32	.751
Enhance Time 1	.17	.19	.06	.85	.396
K10 Time 2	.02	.01	.09	1.27	.205
PCL-C Time 2	-.01	.02	-.08	-1.05	.293
Trauma Reaction Time 2	.01	.02	.02	.35	.730
K10 Time 3	-.03	.02	-.17	-1.15	.082
PCL-C Time 3	-.00	.02	-.01	-.07	.945
Trauma Reaction Time 3	.03	.04	.08	.91	.366
Coping Time 3	.88	.46	.12	1.93	.055
Enhance Time 3	.60	.19	.19	3.15	.002

$R^2 = .48$, $F(21,199) = 8.84$, $p < .001$

Table 10.13 demonstrates that when all the variables entered into the analysis, only an increase in the Time 3 enhancement ($p < .01$) motivation and a reduction of mature coping (p < .05) were significant after controlling for pre-deployment consumption and the Time 1, Time 2, Time 3 measures and the motivation variables. The Time 3 coping motivation neared significance reaching $p = .055$.

10.7.3 Unique contribution of Time 1, Time 2, Time 3 measures and the Time 1 and Time 3 motivations to the prediction of Time 3 AUDIT severity. As shown in Table 10.14 and 10.15, the seven-predictor model accounted for approximately 42% of the variance in AUDIT severity scores from Time 1 to Time 3. This model was statically significant, $R^2 = .42$, $F(21,199) = 6.89$, $p < .001$. After controlling for the Time 1 levels of alcohol severity, which accounted for approximately 30% of the variance, the addition of the personality and coping variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .04$, $F(7,212) = 1.59$, $p > .05$). Likewise, the addition of the Time 1 trauma and mental health risk variables did not result in a statistically significant increase in R^2 ($\Delta R^2 = .01$, $F(3,209) = 1.10$, $p > .05$) nor did the addition of the Time 2 ($\Delta R^2 = .00$, $F(3,204) = .30$, $p > .05$) or Time 3 ($\Delta R^2 = .01$, $F(3,201) = .91$, $p > .05$) trauma and mental health risk variables . The addition of the Time 1 motivations ($\Delta R^2 = .03$, $F(2,207) = 4.80$, $p < .01$) and the Time 3 motivations ($\Delta R^2 = .03$, $F(2,199) = 5.99$, $p < .001$) did result in a statistically significant increase in $R^{2.}$

Table 10.14

Hierarchical regression analyses for the dependent variable AUDIT severity post-deployment for the Time 3 measures (n = 220).

	Trauma Predictors	R2	Change Statistics		
			ΔR2	F	p
Block 1	AUDIT Severity Time 1	.30	.00	94.23	.000
Block 2	Personality: Conscientiousness, Extraversion, Agreeableness, Emotional Stability Coping Style: Immature, Mature	.34	.04	1.59	.140
Block 3	Time 1 Trauma Exposure and Psych Distress	.35	.01	1.20	.351
Block 4	Motivation Time 1: Coping, Enhance	.38	.03	4.80	.009
Block 5	Time 2 Trauma Reaction and Psych Distress	.38	.00	.30	.829
Block 6	Time 3 Trauma Reaction and Psych Distress	.39	.01	.91	.437
Block 7	Motivation Time 3: Coping, Enhance	.42	.03	5.99	.003

Table 10.15 demonstrates that when all the variables entered into the analysis, only an increase in the Time 3 enhancement ($p < .01$) motivation was significant after controlling for pre-deployment consumption and the Time 1, Time 2, Time 3 measures and the motivation variables.

Table 10.15

Block 7 beta weights, t-tests and significance levels for Time 3 variables predicting AUDIT severity post-deployment total (n = 220).

Predictor	B	SE B	β	*t*	Sig
Constant	-1.23	.65		-2.00	.047
AUDIT Severity Time 1	.50	.06	.49	7.87	.000
Extraversion	.09	06	.11	1.66	.098
Agreeableness	.07	.06	.08	1.28	.204
Conscientiousness	.08	.07	.08	1.15	.251
Emotional Stability	-.02	.07	-.02	-.28	.778
Openness	.04	06	.04	.57	.569
Immature Coping	.09	.10	.06	.86	.391
Mature Coping	-.01	.05	-.01	-.23	.817
K10 Time 1	.02	.02	.08	1.10	.272
PCL-C Total	-.01	.02	-.04	-.51	.610
Trauma Exposure Time 1	-.02	.01	-.08	-1.21	.226
Coping Time 1	.40	.40	.06	.87	.386
Enhance Time 1	.05	.22	.02	.23	.820
K10 Time 2	.01	.02	.01	.13	.898
PCL-C Time 2	.01	.01	.04	.53	.597
Trauma Reaction Time 2	.01	.02	.03	.43	.669
K10 Time 3	-.03	.02	-.15	-1.46	.145
PCL-C Time 3	.02	.02	.11	.89	.375
Trauma Reaction Time 3	.01	.04	.03	.30	.762
Coping Time 3	.53	.53	.07	1.02	.311
Enhance Time 3	.70	.22	.21	3.17	.002

$R^2 = .42$, $F(21,199) = 6.89$, $p < .001$

10.8 Chapter Summary

Results from this chapter indicate that the mental health risk measures (K10, PCL-C, post-deployment TSES-R) and the immature coping style variables demonstrate good utility in predicting drinking to cope motivations. The pre-deployment psychological distress measure and pre-deployment trauma variable showed good utility in predicting drinking to enhance affect motivations. Furthermore, the post-deployment coping and enhancement motivations show good utility in predicting the post-deployment risk of problematic alcohol related behaviours, including frequency of alcohol consumption and binge-drinking. Although the personality and mature coping variables were shown to have varying levels of association with the coping and enhancement motivations, they had little predictive value.

10.8.1 Drinking to cope. The correlation analyses suggested a negative association between the personality variables of extraversion, emotional stability, openness and the coping motivation at Time 1. Correlations were also found for emotional stability, openness and conscientiousness at the Time 3 coping motivation. The regression analyses did not support these findings, demonstrating that only decreased reporting on agreeableness was predictive of increased reporting for the Time 1 coping motivation. Nevertheless, the correlation analyses also suggested that higher ratings on the immature coping scale were associated with endorsement on both the pre- and post-deployment coping motivation. Again, the regression analyses did not support these findings. The hierarchical regression analyses found that none of the personality or coping style variables provided a significantly sufficient unique contribution to the overall explanation of factors influencing endorsement of the coping motivation for alcohol consumption.

In relation to mental health risk, the correlation analyses suggested a positive association between K10 measure of psychological distress at both pre- and during-deployment and the coping motivation reported at pre-deployment. Furthermore, positive correlations were also found for the K10 at all three time points and the post-deployment coping motivation. A similar pattern of results was found for the PCL-C measures of mental health risk, with positive associations being found between the PCL-C at all three time points and the coping motivations at pre- and post-deployment. The regression analyses, however, only supported these results for the pre-deployment K10 and PCL-C scores for pre-deployment coping motivation and for the post-deployment K10 and PCL-C scores for the post-deployment coping motivation. The results suggest that higher scores on the K10 and PCL-C at pre- or post-deployment were reflective of greater endorsement of the coping motivation at the corresponding time-point. The hierarchical regression analyses suggested that the K10 and PCL-C at pre-deployment provided a significant unique contribution to the overall explanation of factors influencing post-deployment drinking to cope motivations.

Deployment related trauma exposure reaction reported at post-deployment was positively associated and predictive of increased reporting of post-deployment drinking to cope motivations. This result was supported in the hierarchical regression analyses finding, that increased reporting on the Time 3 trauma measure provided a unique contribution to the overall explanation of factors influence endorsement of the post deployment coping motivation for alcohol consumption.

The analyses exploring the dimensions of post-deployment variables that differentiated between group inclusions, i.e., participants whose pattern of alcohol use increased, decreased or remained stable over time, were inconclusive with all analyses failing to significantly discriminate between the functions.

10.8.2 Drinking to enhance neutral or positive affect. The correlation analyses suggested a negative association between the personality variables of conscientiousness and the enhancement motivation at Time 1. No other correlations were found between the personality variables and enhancement motivations at either pre- or post-deployment. Furthermore, the regression analyses did not support this finding, finding that no personality variables were predictive of pre- or post-deployment reporting of enhancement motivations.

The correlation analyses also suggested that higher ratings on the immature coping scale were associated with endorsement on the pre-deployment enhancement motivation. This time the regression analyses did support this finding, suggesting that the higher reporting on the pre-deployment immature coping styles variable was predictive of increased reporting on the pre-deployment enhancement variable. Interestingly, the hierarchical regression analyses found that higher reporting on the post-deployment trauma reaction variable and lower reporting at the Time 2 trauma reaction variable, provided significantly sufficient unique contributions to the overall explanation of factors influencing endorsement of the enhancement motivation for alcohol consumption.

In relation to mental health risk, the correlation analyses suggested a positive association between K10 measure of psychological distress at pre-deployment and the enhancement motivation reported at both pre- and post-deployment. Furthermore, a positive correlation was also found between increased reporting on the pre-deployment enhancement variable and the post-deployment PCL-C. The regression analyses only supported these results for the pre-deployment K10 being predictive of post-deployment enhancement motivation reporting. The hierarchical regression analyses suggested that the post-deployment PCL-C provided a significant unique contribution to the overall explanation of factors influencing post-deployment drinking to enhance motivations.

Interesting only increased reporting on the pre-deployment trauma exposure scale was positively associated with, and predictive of increased reporting of post-deployment drinking to enhance motivations. Conversely, the hierarchical regression analyses found that increased reporting on the Time 3 trauma measure provided a unique contribution to the overall explanation of factors that influence endorsement of the post-deployment coping motivation for alcohol consumption.

The analyses exploring the dimensions of post-deployment variables that differentiated between group inclusions, i.e., participants whose pattern of alcohol use increased, decreased or remained stable over time, were inconclusive with all analyses failing to significantly discriminate between the functions.

10.8.3 Unique contributions of study variables on alcohol related behaviours, frequency of consumption and binge-drinking. Hierarchical regression analyses found that increased reporting on the Time 3 coping and enhancement motivations provided a unique contribution to the overall explanation of factors influence post-deployment alcohol behaviours including frequency of alcohol consumption and binge-drinking. Higher reporting on the mature coping scale also provided a unique contribution to the reduced frequency of alcohol consumption.

10.8.4 Conclusion. Overall, the results from this chapter indicate that the mental health risk measures (K10, PCL-C, post-deployment TSES-R) and the immature coping style variables demonstrate good utility in predicting drinking to cope motivations. The pre-deployment psychological distress measure and pre-deployment trauma variable showed good utility in predicting drinking to enhance affect motivations. Furthermore, the post-deployment coping and enhancement motivations show good utility in predicting the post-deployment risk of problematic alcohol related behaviours including frequency of alcohol consumption and binge-drinking. Although the personality and mature coping variables were shown to have varying levels of association with the coping and enhancement motivations, they had little predictive value.

Chapter 11: Discussion

11.1 Chapter Overview

The final chapter of this thesis is divided into four main sections and reviews the findings and implications of the research. The first section summarises the research goals and method. The second section discusses the key findings in relation to the research variables and relevant literature. Section three then addresses a range of methodological issues pertinent to this research. The fourth and final section outlines a number of key considerations borne from the research including recommendations for both ADF and civilian healthcare policy and practice in addition to suggestions for future research.

This body of research aimed to add to the existing literature by exploring the drivers, predictors and correlates of the course of alcohol use in the aftermath of military deployment. It is important to note that these predictors and correlates were examined across the full spectrum of alcohol use behaviours within a population based sample and goes beyond much of the literature that focuses their examinations on a more clinical sample of disordered drinkers. The study further built upon previous research through the employment of a prospective, longitudinal design in order to capture the trajectories of alcohol related behaviours over the operational deployment cycle. It also explored the influence of characteristic personality and coping styles, mental health correlates, trauma exposure and motivation on the course of alcohol consumption behaviours from pre- to post-deployment.

In order to meet these aims a series of self-report measures were administered to participants at three time points across the deployment cycle with approximately 14 – 18 months between the first and last data collection points. Data were collected immediately prior to deployment (pre-deployment), immediately prior to returning to Australia (RtAPS) and approximately six months post-deployment (POPS). Where possible, administration was completed in conjunction with the pre-existing ADF operational mental health screening regime in order to minimize the participant burden of the research.

The materials used in this research measured three broad domains 1) mental health risk and trauma reactions, 2) alcohol consumption behaviour and 3) personality and coping style predictors. The outcome variables in the form of the presence or absence of mental health symptoms were evaluated with the use of the PCL-C (Weathers et al., 1993), K10 (Kessler et al., 2002) and the TSES-R (Hodson, 2001). These three measures are integral elements of the ADF operational mental health screening regime. The AUDIT (Saunders, Aasland, Babor, et al., 1993) evaluated alcohol consumption behaviour while coping styles and personality were assessed using the DSQ-Short Form (Andrews et al., 1989) and the TIPI (Gosling et al., 2003). As an adjunct to the AUDIT, participants were provided with the AMQ which was developed for this research and asked participants to respond to 21 questions designed to assess motivations for consuming alcohol. Factorial analysis conducted in Chapter 4 found that the two dimensions (enhancement and coping) which formed the basis of the scale were consistent with the classification of drinking motives posited by Cooper (1994).

Surveys were administered by the principal researcher, with the assistance of other Australian Army Psychology Corps members, to 1035 Australian Army personnel deployed to the MEAO in varying locations. Due to the nature of the operational screening process and timely access to the study population, 359 participants were excluded from the study leaving 676 participants who were utilised in the subsequent analyses. The sample was predominantly male. Statistical analyses and data transformations were predominantly performed using SPSS and included EFA, Pearson product-moment correlations, paired t-tests, simultaneous and hierarchical regressions and discriminant function analyses. Analyses revealed a number of key research findings which are reviewed in the next section and discussed in relation to the previous literature.

11.2 Review of Key Research Findings.

Previous literature (i.e., Jacobson et al., 2008; James et al., 2013; Kehle et al., 2012) has suggested that there are a range of characteristics which are important as explanatory variables for the patterns of alcohol use including: personality, coping style, psychological distress and trauma exposure. No studies to date have explored the interconnected influences of these variables on the course of alcohol related behaviour in military personnel over the deployment cycle. Furthermore, although previous research has suggested that motivations for alcohol use may be important determinants of the level and patterns of alcohol use, motivations have not been explored as potential factors in the course of alcohol use from pre- to post-deployment. Given this, this study sought to explore the drivers, predictors and correlates of the course of alcohol use in the aftermath of military deployment by assessing the impact of characteristic personality, coping styles, mental health correlates, trauma exposure and motivation on the course of alcohol consumption behaviours. Importantly, it focuses on a spectrum of alcohol consumption behaviours and not just disordered drinking.

11.2.1 Overall changes in alcohol behaviour. In order to address the research aims, the first research question explored whether alcohol related behaviours changed over the course of an operational deployment. Participant age and rank were found to demonstrate small negative relationships with alcohol consumption risk and binge-drinking suggesting that as age and rank increased the tendency to participate in problematic drinking behaviours decreases. These findings are consistent with previous surveys of veterans drinking behaviours (Clarke-Walper et al., 2014; Fear et al., 2007; Steele & Twomey, 2006). Findings also suggest that the reported level of alcohol consumption for this population appeared to be within the low-risk ranges and the risk group remained relatively steady across the two administrations. These results are unsurprising, as it was expected that the population used in this study would prove to be a generally healthy cohort due to the stringent initial recruitment selection criteria and subsequent health and mental health checks throughout their career and at pre-deployment (Larson, Highfill-McRoy, & Booth-Kewley, 2008). However, there is also the potential that the information related to drinking disordered and risky drinkers may have been diluted in overall means.

While generally remaining in the low-risk ranges, there was a demonstrated propensity for the group to increase their frequency and severity of alcohol consumption between pre- and post-deployment. These results were generally consistent with the MEAO Prospective Study (Davy et al., 2012) at pre-deployment and lower than the post-deployment average risk rate found by Steele and Twomey (2006). They are also consistent with other literature which has found that whilst increased rates of alcohol use have been commonly observed post-deployment (Jacobson et al., 2008; Spera et al., 2011), the substantial majority of soldiers do not evidence an increase in alcohol disorder, use or misuse, post-deployment (Spera et al., 2011; Verrall, 2011). This observation is important as it counters the common perception of veterans being a population who are characterised by problems with alcohol abuse.

While the results for this initial research question suggested that reliance on an overall AUDIT score does not particularly assist our understanding of the influence of deployment on alcohol consumption risk, they did reveal that there is individual variability in the patterns of alcohol use. The analyses found three distinct patterns in the course of alcohol use across time including a group who were found to be at increased risk of alcohol misuse, a group whose alcohol use showed no notable changes and a further group who demonstrated a decreased risk of alcohol consumption from pre- to post-deployment. This decrease in alcohol consumption risk has also been found in previous research investigating the impact of military deployment on alcohol use (Jacobson et al., 2008; Russell et al., 2014; Trautmann et al., 2015; Verrall, 2011).

11.2.2 Alcohol behaviour mediated by personality and coping variables. The second research question investigated the influence of pre-deployment personality and coping characteristics on the course of alcohol consumption from pre- to post-deployment. The investigation into the influence of personality and coping characteristics on the course of alcohol consumption (presented in Chapter 6) revealed that pre-deployment characteristics including mature coping variables and various personality characteristics may have some utility in predicting post-deployment risk of problematic alcohol related behaviours, including binge-drinking.

Overall, it was not surprising that lower levels of agreeableness, conscientiousness and emotional stability were associated with greater participation in generally problematic drinking behaviours at pre- and post-deployment, but only at pre-deployment for binge-drinking. Furthermore, higher conscientiousness was predictive of greater change in the frequency of alcohol consumption including a decrease in binge-drinking behaviours from pre- to post-deployment. The risk of pre- and post- deployment problematic use of alcohol increased exponentially with increased levels of immature coping and lower levels of mature coping. Extraverted individuals were also more likely to demonstrate an increase in binge drinking at post-deployment. These results were consistent with research that has found that personality traits interact with the development of problematic alcohol use. In particular the link between low conscientiousness, agreeableness and emotional stability which may lead to impulsivity and a lack of consideration of the consequences of problematic alcohol use and associated risk behaviours (Borja et al., 2009; Caska & Renshaw, 2013; Kotov et al., 2010).

It is interesting to note that after controlling for pre-deployment alcohol-consumption, the personality variable of agreeableness and to some extent extraversion provided unique contributions to the prediction of the frequency of alcohol use at post-deployment. Although conscientiousness and the two coping variables did not reach significance in the hierarchical regression analyses, their contribution should not be underestimated. It is also feasible that other personality characteristics not included in this study may have significantly predicted alcohol misuse. For instance, recent studies have documented associations between disinhibition and alcohol use problems in military personnel (Kehle et al., 2012; Miller et al., 2006). These findings may be particularly relevant when considering the method or focus of intervention and treatment options as specific personality and coping styles will tolerate and respond individually to various treatment options.

While no studies have specifically investigated the interrelations between defensive coping style, personality and problematic alcohol use, these results appear consistent with investigations that have suggested that habitually used unconscious defensive coping and personality styles may moderate the impact of stressors on psychological well-being and adjustment post-deployment (Bond, 1986; Brennan et al., 1990). This moderating effect, in addition to a capacity for self-observation and self-modulation, is consistent with the concepts of heightened conscientiousness, emotional stability and mature coping, and may in turn encourage a more mature approach to general drinking behaviours. Similarly, those who show increased levels of conscientiousness may perceive risky alcohol consumption as irresponsible, having an adverse impact on their health, fitness, family and career responsibilities and therefore choose to manage stress in more adaptive ways. Whilst the data showed a relationship between extraversion and alcohol consumption, this relationship may be less about a desire to increase confidence in social settings but be more reflective of an extraverts need to seek social contact. Furthermore, the positive relationship between extraversion and binge-drinking may be linked to the propensity of extraverts for risk-taking behaviour, specifically in association with the consumption of alcohol. In some ways, agreeableness may be more analogous to social desirability in that those who wish to be agreeable in social settings may believe that excessive alcohol use and binge-drinking will make them more socially acceptable or assist them to cope in social settings, particularly for those who seek social contact (extraverts). This may be particularly relevant for young people who are choosing binge-drinking to build their confidence in social environments (immature coping).

Many of the results reported here were consistent from pre- to post-deployment suggesting that personality style and coping method may remain consistent over time. Furthermore, while the DSQ claims to measure an individual's preferred stress defensive coping style it may also reflect an individual's preferred problem solving method. With this in mind, individuals may develop a framework for coping and problem-solving pre-deployment that is carried throughout the deployment cycle.

Overall the results of this investigation indicated that pre-deployment personality and coping characteristics may have some utility in predicting post-deployment risk of problematic alcohol related behaviours including binge-drinking. Furthermore, they are also important contextual variables in the consideration of appropriate intervention and treatment options.

11.2.3 Alcohol behaviour as mediated by mental health risk. The second research question investigated the influences of the pre-deployment mental health and trauma variables (Chapter 6); the third research question investigated the during-deployment (RtAPS) variables (Chapter 7); while the fourth research question assessed the influence of the post-deployment variables on post-deployment alcohol behaviours (Chapter 8). Previous literature has found evidence to support the association between psychopathology, trauma exposure and patterns of alcohol use post-deployment (Davy et al., 2012; Kline et al., 2014; M. J. Larson et al., 2013). However, no studies have specifically investigated the impact of deployment experiences, mental health correlates and trauma on the course of alcohol use from pre- to post-deployment. This body of research attempted to gain a better understanding of the interactions between these variables by utilising a prospective, longitudinal design which measured trauma and mental health symptoms at three time points (pre, during, and post-deployment). The mental health symptoms were assessed along a gradient of symptomatic severity; however, the majority of participants reported within the subsyndromal levels.

In relation to mental health risk, the K10 measure of psychological distress showed utility in predicting pre- and post-deployment risk of problematic alcohol related behaviours including frequency of consumption and binge-drinking. Increased reports of pre-deployment psychological distress showed strong associations with greater levels of alcohol related behaviours at both pre- and post-deployment. Consistent with findings of previous research (Bray et al., 2013; Jacobson et al., 2008), higher levels of psychological distress (K10) reported at pre-deployment as well as at RtAPS also demonstrated particular utility at predicting subsequent increased problematic alcohol behaviours including binge-drinking at post-deployment. Conversely, the finding in this study that greater psychological distress reported on the K10 at post-deployment was related to lower alcohol consumption frequency. This last result may be suggestive of individuals who experience a dysphoriant effect of alcohol not choosing to self-medicate due to a worsening of symptoms when drinking or may reflect limitations of correlational analyses which do not account for differing trajectories (increase or decrease) in alcohol use. Neither of these effects have been sufficiently investigated in the literature.

The K10 was the only RtAPS measure which demonstrated an association with later alcohol use. Other measures designed to assess trauma exposure and trauma symptoms (PCL-C and TSES-R) administered at pre-deployment and RtAPS had little to no utility as predictors of post-deployment alcohol use. No support was found for the influence of pre-deployment trauma exposure and related trauma symptoms on alcohol-related behaviours pre- or post-deployment. A similar absence of significant results was also found at the RtAPS administration. As the K10 is a measure of general psychological distress and is not a specific measure of trauma symptoms (i.e., PCL-C), these results may indicate that non-trauma stressors such as separation from family or organizational stressors may be stronger mediators of deployment related distress and associated post-deployment alcohol use than trauma exposure. Alternatively, the lack of significant findings may also be a resultant effect of the correlational analyses used, in that increases reported by one group of participants may have been cancelled out by the decreases shown by another group.

These results were inconsistent with some previous research that has suggested that the impact of deployment as measured by these instruments is predictive of subsequent increases in alcohol use post-deployment (Kline et al., 2014). However, the results of this study are consistent with Marshall et al. (2012) who found that pre-deployment reports of PTSD symptoms was not predictive of post-deployment alcohol misuse.

This is an interesting finding as the ADF currently rely on the RtAPS instruments to assist in the screening for psychological distress or potential adjustment issues post-deployment. Results from this study may indicate that the measures were not sensitive enough to assess change or alternatively the factors influencing post-deployment alcohol use may be more related to post-deployment reintegration than deployment related factors. Alternatively, the length of time between the end of the operational deployment and the final data collection point was not sufficient to capture any potential delayed onset of symptoms (Eekhout, Reijnen, Vermetten, & Geuze, 2015; Hermes, Fontana, & Rosenheck, 2015). Either way, early post-deployment trauma reactions were not found to be a good measure of later morbidity, and while the RtAPS is a useful tool to assess the impact of general psychological distress on latter alcohol use, a post-deployment follow-up (POPS) is required to better assess the emerging patterns of trauma related symptoms and alcohol use.

Interestingly, both the reports of ongoing trauma reaction (TSES-R) and trauma symptoms (PCL-C) post-deployment demonstrated an association with post-deployment alcohol behaviours with heightened ongoing trauma reactions predicting greater post-deployment alcohol risk. These findings support the literature that found individuals may use alcohol to self-medicate against the effects of deployment related trauma exposure and associated psychological arousal (Marshall et al., 2012). As the post-deployment data-collection was administered approximately 3 – 6 months post-deployment, it would have been interesting to further test the self-medication hypothesis by following the study cohort at a later time point to assess for the possibility of delay onset of trauma reactions and the subsequent impact on alcohol use.

Three key considerations from this data are: firstly, the importance of pre-deployment consumption patterns on later use; secondly, the influence of perceived psychological distress on later alcohol use; and thirdly, the importance of post-deployment trauma measures on the prediction of post-deployment alcohol dysfunction. The challenge for this data is that there is only a small group of participants that have developed problematic behaviours. Therefore, the changes in the population and the effect of symptoms largely sit within nonclinical behaviours. Furthermore, there appears to be multiple trajectories of disorder and alcohol usage operating, with multiple potential contributors. The final two research questions explored the influences of one potential contributor, motivation to consume alcohol, on the course of alcohol use from pre- to post-deployment.

11.2.4 Alcohol behaviour as mediated by motivation to consume alcohol. In order to investigate the influence of motivations on alcohol consumption across the deployment cycle, the remaining two research questions (Chapters 9 and 10) focused on the association between alcohol consumption motivation, individual characteristics and alcohol related behaviours at pre- and post-deployment. Substance use behaviours and trajectories of disorder can look very different for different people. One of the factors that may influence these differences are an individual's motivations to consume alcohol (Kuntsche et al., 2006b). Motivational models generally hypothesise that individuals choose to consume alcohol in order to achieve a desired outcome on affect with two related but distinguishable pathways posited to explain the process: to enhance positive affect, or to cope by numbing negative emotional states (Cooper et al., 1995; Crutzen et al., 2013; Piasecki et al., 2014).

Overall, results indicated that the exploration of motivations to consume alcohol shows good utility in predicting post-deployment risk of problematic alcohol behaviours including frequency of consumption and binge-drinking. These results were generally consistent with other research which has found that drinking to cope with negative affect, or to enhance neutral or positive affect, was associated with increased alcohol consumption (Crutzen et al., 2013; Doyle et al., 2011; Holahan et al., 2003; Meyer, Long, Fanselow, & Spigelman, 2013). Results also demonstrated that endorsement of coping and enhancement motivations at either pre- or post-deployment was predictive of an increase in problematic alcohol use. Unsurprisingly, pre-deployment reporting of enhancement motivation predicted an increase in binge-drinking over time. However, interestingly, post-deployment enhancement motives signaled a reduction in binge-drinking at post-deployment. This last result may be indicative of a group of individuals who experience a dysphoriant effect of alcohol preferring to enhance affect through other means. Just what these other means are, was beyond the scope of this investigation, but pose an interesting question for future research.

Increased endorsement of the coping motivation was predictive of increased reporting of mental health risk factors, trauma exposure and immature coping styles while increased psychological distress was predictive of a preference to drink to enhance positive affect. These results are consistent with the literature which supports the association between drinking motives and a self-medication model of alcohol consumption (Clerkin et al., 2014; Villarosa et al., 2014). Although the personality and mature coping variables were shown to have varying levels of association with the coping and enhancement motivations, they had little predictive value and appear to add little to the existing literature supporting the link between drinking motives and personality (Mezquita et al., 2010; Stewart & Devine, 2000; Stewart et al., 2001; Theakston et al., 2004). However, it is important to consider when interpreting these data that although the later analyses cancelled out the effects of some of the earlier variables, the limitations associated with multiple comparisons (regression) means that correlations should not be dismissed. For example, the finding that some personality-related effects (extraversion, agreeableness, emotional stability) are partially mediated by motives increases the likelihood that motive-based preventative efforts will help reduce alcohol use among service personnel who display particular personality traits.

Overall, what is clear from these findings is that motivation to consume alcohol incorporates a significant component of the variance and becomes the dominant descriptor in the investigation of predictors of alcohol use across the deployment cycle. Although, in general, the amount of variance explained by all factors is low, it highlights the complex matrix of determinants of post-deployment alcohol use. Although in many ways the problematic use of alcohol is related to inherent characteristics (personality and coping style) and psychopathology, it is also a conscious choice of strategy (motivation) to manage those factors.

Consideration of these individual differences, particularly an individual's motivation to consume alcohol, can have significant ramifications for public health interventions as well as ADF intervention programs. A 'one-intervention-for-all' generalized approach to the management of problematic alcohol use will lead to sub-standard and potentially ineffective treatment for a proportion of the patient demographic. This is also a pertinent consideration in the development of prevention programs and public health messages around safe-drinking. The supposition that all at-risk groups have the same motivation to consume alcohol, or that certain demographics (e.g., young adults, clinical populations) are motivated by the same triggers, is a dangerous assumption, which may ultimately lead to the failure of the message to influence potentially at-risk groups.

11.3 Methodological Considerations

A range of strengths and limitations associated with this body of research have been identified and are discussed below. These include limitations relating to the sample, specific measures, and procedural implications. However, off-setting these limitations are the studies many strengths, including its longitudinal, prospective design; sample size and composition; and the use of continuous data, as opposed to specific cut-offs allowing for the gradient of effect to be examined.

11.3.1 Strengths. The relationship between pre- and post-deployment psychological health is not clearly understood. Much of the literature describes investigations of post-deployment mental health and alcohol use risk factors as having employed retrospective methods (i.e., Fear et al., 2007; Seal et al., 2011), making it difficult to accurately ascertain the mental health of personnel before they deploy (Beckett, Da Vanzo, Sastry, Panis, & Peterson, 2001). The key strength of this study is its prospective, longitudinal design which allows for conclusions to be made about the temporal sequence of factors assessed across the deployment cycle. For instance, the collection of pre-deployment levels of alcohol use in this study provides a measurement of causality which indicates whether or not deployment related factors are determinants of changes in pre- to post-deployment alcohol use. The collection of data at the three time points also greatly reduced the potential for recall bias which is often a key limitation in studies that use retrospective designs or in those that allow for significant periods of time to elapse before collecting data post-deployment. There is only one prior study which has employed a longitudinal design to investigate an Australian veteran population (Davy et al., 2012). Whilst that study provided a comprehensive look into a range of mental, physical and social health indicators post-deployment, the current study is the first longitudinal, prospective study to investigate the collective influence of personality, coping style and motivations on pre- and post-deployment alcohol consumption and associated coping behaviours.

Much of the previous literature has focused on a clinical population which may have much higher rates of problematic alcohol use than a general population sample. Therefore, the use of a clinical sample may limit the generalisability of the findings, particularly to military personnel. The reliance on specific mental health disorders or a specific set of clinical symptoms, narrows the research scope and may lead the researcher to underestimate sub-clinical concerns. It also limits the scope of investigation into the complex nature of the variable interactions. The importance of considering subsyndromal symptoms should not be underestimated in the conceptualization of mental health concerns (including alcohol misuse), particularly in populations such as the military or police, as operational definitions of mental health disorders and conventional screening cut-offs may underestimate the psychological distress experience by this population (Pietrzak et al., 2012). Furthermore, some populations may have the potential to either under-report or alternatively inflate estimates of mental health risk and alcohol use behaviours. For example, currently serving military personnel may be loath to report, may not appreciate the severity of their condition, or alternatively over report for secondary gain. This body of research overcame these limitations by investigating mental health risk and alcohol behaviours along a continuum of symptoms inclusive of subsyndromal responses, in order to assess even subtle shifts in reporting.

This methodology also allowed for individuals to act as their own control, overcoming the need to identify a matched control group. In addition, the consistent use of measures (PCL-C, K10, AUDIT, AMQ) across the three phases of the study provided the added advantage of allowing comparisons with other studies which have used standard measures, for example Davy et al. (2012).

11.3.2 Limitations. Notwithstanding the unique findings of this longitudinal, prospective study, some limitations should be noted. In particular, these focus on limitations of sample selection, materials chosen, statistical analyses used and procedural considerations.

11.3.2.1 Sample selection. It was expected that the population used in this study would prove to be a particularly healthy cohort due to the stringent initial recruitment selection criteria and due to the subsequent health and mental health checks throughout their career and at pre-deployment. Furthermore, health and mental health support are easily accessible during deployment as well as pre- and post-deployment. This allowed for the investigation across a gradient of effect. However, this could have impacted on the sensitivity of analyses due to small numbers meeting clinical criterion. There is also a possibility that participants who experience significant distress post-deployment may have been discharged from the military, or had not undertaken the screening process as they were already under psychological care. It is also possible that deployment related and clinically relevant symptoms may have been effectively managed prior to data collection. This would have further depleted the number of participants experiencing clinically relevant symptoms in this study.

All care was taken to ensure that as many participants as possible were administered the survey at each time point. Unfortunately, due to the nature of operational deployments, command priorities and the limitations associated with ADF mental health screening impacted the ability to capture all participants at each time point. Time 1 data collection occurred at pre-deployment during the respective groups Mission Rehearsal Exercises (MRE) providing only one opportunity per group to collect the pre-deployment data. Due to training and operational commitments, the time provided by some command elements for the undertaking of surveys was insufficient to allow for completion of the entire package, and the high tempo of training, limited access to the study population. The post-deployment data collection phase also held inherent challenges as disbandment of the augmented units post-deployment, extended leave periods, posting cycles, course attendance and discharges resulted in participants being geographically dispersed with no centralised screening location or predictable dates. Given the resources required to survey all personnel at post-deployment and the limited resources available to collect data, phase three data collection efforts were focused in the two regional centres (Brisbane and Townsville) with the largest number of research participants which resulted in a depleted sample at the final data-collection phase. Although it is considered unlikely, as in this study there was no indication that participants had self-selected out of the research, the inability to access all participants at each time point has the potential to introduce bias. The difficulties experienced gaining access to the study population at all three time-points highlights the many challenges of undertaking real world research with military populations.

Although the sample used in this body of research provided sufficient power to conduct most of the analyses, a sample with a larger number of soldiers matched over time would provide greater power. In this study, however, the soldiers from whom it was possible to derive longitudinal data are not fundamentally different from those soldiers from whom such data on the key variables were not available. In particular, levels of alcohol use and misuse pre-deployment in the entire pre-deployment sample were comparable to the matched pre- and post-deployment sub-sample.

While also seen as a strength of this study, utilising a population of generally healthy military personnel rather than a clinical sample meant that only a small minority of participants in this study showed sufficient symptoms to be considered to be within a clinical range. Therefore, in many ways this thesis looks at patterns of consumption that are more on the spectrum of the social consumption of alcohol and the role of subsyndromal alcohol use, rather than disordered use which has pervasive impacts. As such, this thesis is unable to make assumptions about the role of deployment on the development of clinically disordered alcohol use due to the relatively low prevalence of disorder within this population. As it is not possible to prospectively select for disorder in a military population, future research would benefit from obtaining a larger sample of participants in an attempt to obtain a larger cohort of disordered drinkers.

The individuals recruited to participate in this research were not guaranteed to have experienced trauma or stressful experiences either prior to or during deployment. Those who had experienced trauma may have experienced a diverse range of traumatic events. Accordingly, the results of this research provide a general overview of the impacts of deployment related trauma on subsequent psychological distress and alcohol use. It is acknowledged that the use of a relatively heterogeneous population of trauma sufferers may prevent detection of differences the management of trauma symptoms including potential self-medication tendencies and that differences will necessitate consideration that any post trauma symptoms can vary in relation to trauma type (Zatzick, Marmar, Weiss, & Metzler, 1994). Future research should examine the findings of this research in homogeneous trauma populations to determine whether different coping methods are employed for distinct trauma groups.

It should be noted that these results were based on three specific battle-groups who deployed during 2007 to Baghdad (Iraq), Western Iraq, and Afghanistan and therefore may not be applicable to earlier or later ADF operational cohorts. However, as the demographics and combat exposures are similar to those found in later deployment groups it is likely that these results will be representative of veterans who served in later MEAO deployments. What this does highlight, is that consideration of the context in which the study was conducted is essential. Although within the cohort there were individual groups which were deployed in different locations (Baghdad, Western Iraq, Afghanistan), it captures a “snapshot” of the military over one period of time.

Future studies may also benefit from examining problematic alcohol use and disordered drinking among female veterans. The subsample of women in this study was very small relative to the male sample, which reduced the statistical power necessary to support between-gender comparisons. These findings, therefore, may not be applicable to females. Furthermore, the population was predominantly regular Army soldiers which limit the applicability of findings to Navy or Air Force cohorts and to Army Reserve personnel. This is relevant as several studies have suggested that Army Reserve forces may be at a higher risk of misusing alcohol post-deployment than regular (Jacobson et al., 2008; Milliken et al., 2007; Riddle et al., 2007; Wynd & Ryan-Wenger, 1998). For example, Jacobson et al. (2008) found that National Guard and Reserve personnel were at increased risk for new-onset heavy weekly drinking, binge drinking, and alcohol-related problems compared to active duty forces.

11.3.2.2 Material and statistical limitations. It is acknowledged that the findings of this research are based on self-reports and are therefore not free of potential social desirability bias. For example, the alcohol misuse measure requires a respondent to make a judgment about their alcohol behaviours as opposed to merely reporting it; soldiers had to respond yes or no to whether they thought that they wanted or needed to cut down on their drinking or used alcohol more than they meant to. We have no means of independent corroboration of drinking history and current behaviours. Furthermore, the AUDIT is linked to the RtAPS and POPS process and therefore results of these specific components of the research are not anonymous. Consequently, a positive response to the alcohol misuse item of the RtAPS or POPS may lead to referral to medical or mental health professionals, which in turn may encourage bias in reporting. Furthermore, although each of the measures used in this research are widely used, self-report assessments, particularly of psychopathology symptoms, fall short of gold-standard diagnostic interviews. Nonetheless, the rates of overall problematic alcohol use reported in this research are consistent with other large epidemiological studies, for example Davy et al. (2012).

As with all studies that use retrospective data, there will be recall bias. Furthermore, there is some evidence that recall for deployment related events, particularly combat-related traumatic events may be biased when relying on self-report measures such as used in this research (Southwick, Morgan, Nicolaou, & Charney, 1997). However, other research has supported the reliability of these types of measures (Bramsen, Kirkzwager, van Esch, & van der Ploeg, 2001). Furthermore, in this study the respondents were asked to report on their experiences prior to return to Australia as well as approximately 3 – 6 months post-deployment which will have reduced recall biases.

Extant literature concerning both military and civilian samples reveals mixed findings regarding relations among alcohol misuse and specific disorders, especially those related to PTSD symptom clusters. Researchers investigating these associations have reported hyperarousal, reexperiencing, and most recently, numbing as being uniquely and strongly associated with alcohol misuse (Fetzner et al., 2013). Our data did not require specification of the type of traumatic event experienced. As such, it is difficult to know whether participants were completing the PCL-C in reference to an event that meets the DSM criterion A standards, or some other event causing distress at that time (i.e., relationship breakdown).

The AUDIT purports to screen for alcohol consumption and related risks in primary care medical settings and has also been shown to be effectively applied in many other contexts including military populations (Babor et al., 2001). However, the use of the AUDIT as the standard measure of problematic alcohol use is not without limitations. For example, the use of a total score for the purposes of identification and diagnosis does not accurately reflect the division between various problematic drinking behaviours (i.e., binge-drinking), consequences of such behaviours (i.e. social, professional, health), and the reasons motivating alcohol use.

The use of a non-standardised and normed measure of motivation precludes the definitive comparison of these findings with other research investigating motivations. However, the factor analysis of the AMQ revealed that the coping and enhancement motivation factors were consistent with those found in other research using alcohol consumption motivation measures (Cooper, 1994; Cooper et al., 1995; Crutzen et al., 2013). Future research would also include the recognised measure of alcohol use motivation to allow for accurate comparisons with a broad range of research within the motivations literature.

The study design allows for a prospective investigation of the course of alcohol following deployment; however, as data collection limitations resulted in inconsistent numbers of participants across the data collection points, it could be argued that the design was not fully prospective and somewhat unbalanced. However, while the use of hierarchical regressions allowed for prospective investigation using a reduced cohort (n = 292) acting as their own within-groups control, further correlational (simultaneous regression and Pearson product moment correlation) analysis allowed for a between groups, cross-sectional investigations of the larger cohort.

Furthermore, it is acknowledged that although the overall sample size used in this research was quite large (N = 676), the analyses used multiple comparisons which may reduce the statistical power of the analyses subsequently limiting detection of potential differences (Tabachnick & Fidell, 2001). While the analyses did not allow for Bonferroni corrections, this research accepted the limitations of probability estimates and explored the statistical trends of significance. The analyses used in this study are generally correlation in nature and, therefore whilst the analyses allow for predictions related to variable interactions to be made, no definitive statements of causality or direction of causality can be made (Field, 2009; Tabachnick & Fidell, 2001). The standard and hierarchical regression analyses used in this study have numerous strengths in that they allow for the assessment of relationships between variables and can be applied to data in which two or more independent variables (IVs) are correlated. However, in addition to the limitations to correlation analyses outlined above, it is possible for the effects of a variable to appear unimportant in the proffered multiple regression solution when it is actually highly correlated with the dependent variable. This is due to the effects of one independent variable diluting the contribution of another. For this reason it is important to consider both the correlation and unique contribution of all IVs when interpreting the outcome of regression analyses (Field, 2009; Tabachnick & Fidell, 2001).

Future studies may consider the use of statistical analyses such as structural equation modeling or latent growth mix model analyses (LGMM). These types of analyses may lead to a better understanding of the interactional and mediating effects of the variables measured over different time points. For example LGMM has been applied to the investigation of PTSD symptoms post trauma exposure by classifying homogenous groups to identify classes of variance over time. The growth curves can be modeled separately, which permits identification of different trajectories of responses (Muthen, 2004).

11.3.2.3 Procedural limitations. Although longitudinal data were used, the post-deployment data were collected at three to six months post-deployment which has the potential to miss clinically relevant symptoms which emerge at delayed time-points (Smid, Mooren, van der Mast, Gersons, & Kleber, 2009). Furthermore, the measures of post-deployment adjustment were assessed at only one post-deployment time point. Therefore it is not known if changes in post-deployment alcohol consumption are consistent over time, or a product of temporal and situational factors. Additional post-deployment time points might prove useful given prior research which suggests that alcohol misuse and other behavioural problems among soldiers may follow different trajectories, including a worsening of symptoms with time and the delayed emergence of maladaptive coping (Eekhout et al., 2015; Hermes et al., 2015; McFarlane, 1998b; O'Donnell et al., 2013; Solomon & Mikulincer, 2006; Wilk et al., 2010).

The analysis of the TSER-R data was focused on an overall trauma score and did not look at specific deployment experiences or trauma types such as combat exposures or killing. It is acknowledged that collapsing the TSES-R trauma types into one overall score may have diluted the impact of trauma on the analysis of subsequent mental health risk and alcohol misuse. For example, prior research has found that responders who have reported specific types of traumatic deployment exposures (i.e., killing, combat exposure, handling or seeing dead bodies) were significantly more likely to meet criteria for a major depressive syndrome and PTSD than those reporting general exposures (Davy et al., 2012; Maguen et al., 2010; Maguen et al., 2009; Maguen, Vogt, King, King, & Litz, 2011; Sareen et al., 2007).

The study also asked participants to recall aspects of their deployment at different time points. Recall of their experience may have been affected by their mental health (or other factors) when they completed the measures. Therefore, it is not possible to be positive as to whether adverse deployment experiences led to increased problematic alcohol use or whether increased alcohol behaviours caused participants to recall their deployment experiences more negatively.

11.4 Study Considerations and Future Research Directions

Throughout the course of the research a number of considerations have been raised relating to study design, further areas of exploration and implications of the research findings on both ADF and civilian healthcare policy and practice. These are summarised below.

11.4.1 Trauma exposure. This current body of research used an overall measure of trauma exposure pre-, during and post-deployment via the use of the TSER-R, and found inconclusive results. A general strength of the TSES-R is that it also allows for measurement of discreet military trauma dimensions and the specific distress related to each dimension of exposure; however, it does not address the number of times a trauma event is experienced. While the current analysis did not specifically address discreet trauma events, it is possible that further interrogation of the data may reveal interactions between deployment, trauma event and alcohol misuse. For example, while general trauma exposure has been found to be a significant risk factor for a number of psychological conditions, including alcohol misuse (Davy et al., 2012; Maguen et al., 2011; Sareen et al., 2007), specific trauma types have been shown to have individual interactions with mental health and disordered behaviour (Davy et al., 2012; Maguen et al., 2009; Sareen et al., 2007). These traumatic deployment exposures include handling or seeing dead bodies, being in a threatening situation and unable to respond and witnessing human degradation and misery (Davy et al., 2012), witnessing atrocities (Sareen et al., 2007), perceived danger and exposure to death and dying (Maguen et al., 2011). The act of killing is also significantly associated with increased rates of PTSD together with increased anger, violence and antisocial behaviours (Maguen et al., 2010; Maguen et al., 2009; Maguen et al., 2011). The MEAO Prospective Study (Davy et al., 2012) found that both the number and type of traumatic deployment experiences were significantly associated with a change in reported PTSD symptoms. This research did not measure specific trauma type and frequency therefore limiting the applicability of this research into investigations into the impact of cumulative trauma on post-deployment alcohol use.

11.4.2 Combat exposure. Combat exposure has been found to be a significant risk factor in the development of a number of psychological conditions including depression (Sareen et al., 2007; Wells et al., 2009; Wells et al., 2010), PTSD (Davy et al., 2012; Hoge et al., 2004; Maguen et al., 2010; Maguen et al., 2009; Maguen et al., 2011) and alcohol misuse (Bray & Hourani, 2007; Fear et al., 2010; Fear et al., 2009; K. T. Green, Beckham, Youssef, & Elbogen, 2014; Hoge et al., 2006; Koenen et al., 2008; Kulka et al., 1990; Seal et al., 2007; Wilk et al., 2010). For example, studies have revealed that alcohol use and binge-drinking are more common among military personnel who have experienced combat operations versus those who have not deployed to an area of combat operations (Mills et al., 2006). Furthermore, within the U.S. Army it has been found that the combat-related trades (e.g., infantry) are at higher risk of problematic alcohol related behaviours and have higher rates of alcohol use (Williams, Bell, & Amoroso, 2002).

Interestingly, a UK study has found mixed results. At pre-deployment, there were no differences found between the Combat Arms (CA) (e.g., infantry, cavalry), Combat Service (CS) arms (e.g., engineers, artillery) and Combat Service Support (CSS) arms (e.g., admin, signals, logistics) on measures of alcohol frequency and binge-drinking. However, there was a significant difference for the amount of alcohol consumed, with the CA consuming more than the CSS. At post-deployment, the CA engaged in more binge-drinking than CSS, but there were no further differences between CA, CS and CSS for either frequency or amount of alcohol consumed (Verrall, 2011). This raises the question as to whether different group (corps) membership in the ADF is associated with a particular drinking culture which may, in turn, increase the risk of the development of problematic alcohol use.

McFall et al. (1992) compared 108 Vietnam combat veterans with 151 veterans who had no combat exposure and found no between-groups difference in the severity of alcohol use disorders. However, they did find that veterans with PTSD had more severe problematic substance use. Similarly, a study of 2490 Vietnam veterans with combat exposure and 1,972 without combat exposure, found that the level of combat exposure was significantly related to recent substance use (Reifman & Windle, 1996). Research using a more contemporary ADF sample found that increases in psychological distress, alcohol use and a number of somatic symptoms were greatest or more likely for veterans who operated in a combat role or who were based outside of the main support base (Davy et al., 2012).

It is clear from the above, that combat exposure may have a significant impact on post-deployment reintegration, mental health risk and problematic alcohol use. Further research may reveal a more detailed story outlining the relationship between combat exposures and problematic alcohol use behaviours. Additionally, future research would benefit from investigating the role of combat exposures as distinct from general trauma exposure on mental health risk and post-deployment alcohol use.

11.4.3 Trajectories of mental health symptoms. Studies vary in the reported delay in onset of PTSD with length of delay varying from less than two years (Bryant & Harvey, 2002; McFarlane, 1998b) to up to 20 years (Karstoft, Armour, Elklit, & Solomon, 2013; Solomon & Mikulincer, 2006). For example, Hermes et al. (2015) found that a US Vietnam veteran population suffering PTSD retrospectively reported experiencing onset of PTSD symptoms approx six years post-trauma. However, awareness of the implication of these symptoms could occur up to 20 years post-trauma. Similarly, a further study followed-up Dutch veterans who had served in Afghanistan at five time-points (1 month, 6 months, 12 months, 2 years, and 5 years) post-deployment finding an increase in long-term symptoms at five years post-deployment (Eekhout et al., 2015). Although the current research was longitudinal, the latest data collection point was a relatively early follow-up at six months post-deployment and therefore the consequences of deployment may not be fully declared. Future studies in this area would benefit from taking supplementary measurements at later time points (i.e., 12 months, 2 years, 5 years) in order to factor in potential delayed onset of symptoms and associated problematic alcohol use. This would also allow for closer attention to be paid to other stressors and characteristics which may impact on post-deployment adjustment. For example, recent studies have documented associations between disinhibition and alcohol use problems in military personnel (Kehle et al., 2012; Miller et al., 2006).

This current body of research has also found evidence for differing trajectories in that there is a group of individuals who are clearly at increased risk of alcohol misuse following deployment; however, there is also a group who demonstrate a decreased risk of alcohol consumption post-deployment. This is consistent with the literature which has found that whilst increased rates of alcohol use have been commonly observed post-deployment (Jacobson et al., 2008; Spera et al., 2011), the overwhelming majority of soldiers do not evidence an increase in alcohol disorder, use or misuse, post-deployment (Spera et al., 2011; Verrall, 2011). Three possible psychological adjustment outcomes post trauma or a stressful experience have been posited: 1) a return to pre-event baseline levels; 2) an increase in negative outcomes; and 3) a decrease in negative outcomes (positive psychological growth / resilience) (Pat-Horenczyk & Brom, 2007). This suggests that exposure to a traumatic or stressful event may actually result in a reduction in alcohol consumption (Killgore et al., 2008).

Research has found that military deployment can lead to both increases and decreases in alcohol use by different groups operating under the same conditions (Cann, Calhoun, Tredeschi, & Solomon, 2010; Jacobson et al., 2008; Russell et al., 2014; Trautmann et al., 2015; Verrall, 2011). For example, recent studies have found that various trajectories of

PTSD post a traumatic experience including (1) a resilient class with consistently few or no symptoms; (2) recovery, experiences initial distress but has gradual reduction of symptoms over time; (3) delayed onset of worsening symptoms; (4) chronic distress with consistent severe symptoms; (5) initial worsening of symptoms over time followed by recovery (Bonanno et al., 2012; Bryant et al., 2015; deRoon-Cassini, Mancini, Rusch, & Bonanno, 2010; Norris, Tracy, & Galea, 2009).

Furthermore, Russell et al. (2014) documented the impact of combat experiences on the alcohol use patterns of US National Guard soldiers using a pre- and post-deployment design (Russell et al., 2014) and found that alcohol use prevalence rates increased from 70.8% pre-deployment to 80.5% post-deployment; however, alcohol misuse decreased in the sub-population who had experienced killing during their combat experience. A similar inference was drawn from a cross-sectional data set collected for soldiers who had reported surviving a close-call in combat (Killgore et al., 2008). A further study found that a Norwegian general population sample who experienced extreme trauma exposure as a result of the 2004 Southeast Asia tsunami were associated with both a self-perceived increase and decrease in alcohol consumption (Nordlokken, Pape, Wentzel-Larsen, & Heir, 2013). The authors posited a range of explanations to account for this polarization including a self-medicating effect of increased alcohol use, whilst a reduction in alcohol consumption post-trauma may reflect a desire to preserve mental health, or alternatively may indicate an increase in social withdrawal and related social drinking (Nordlokken et al., 2013).

Although the literature supports the assumption that military deployment can lead to both increases and decreases in alcohol use under different conditions, findings highlight the requirement for future research to consider the different courses of alcohol use in order to understand the associations between military deployment and the subsequent increases or decreases in alcohol consumption. For example, deployment experiences including trauma exposure may result in positive growth leading to a decrease in alcohol consumption.

Alternatively there may also be a sub-set of individuals who experience a dysphoriant effect of alcohol with associated increases in psychological distress, and therefore, choose to abstain or limit their alcohol consumption. This is in opposition to those who experience a euphoriant effect of alcohol and use alcohol to self-medicate their psychological distress.

A further consideration of these findings is that mental health outcomes following deployment cannot necessarily be predicted within the first months or years post-deployment, as the course of mental health risk does not follow a linear course. Therefore, future research may attempt to prospectively track the trajectories of alcohol use within a military population to gain a better understanding of the determinants of trajectory group membership. These characteristics may be important in the identification of disorder or subsyndromal symptoms and in the subsequent development and selection of appropriate intervention strategies.

11.4.4 Further considerations. This body of research has highlighted a number of other factors that may influence the course of alcohol related behaviours across the deployment-cycle and which require further analysis. Firstly, the study was a population based study and although it was expected that the population used would prove to be a particularly healthy cohort, only a small minority of participants have sufficient symptoms to be within a clinical range. Limited numbers impact on the sensitivity of analyses and, therefore, the relevant influence of the study variables on a clinical sample has likely been diluted. Further research assessing the impact of the inherent personality and coping variables on drinking in a disordered population would provide a more in-depth understanding of the patterns of alcohol use across the deployment cycle. It would also allow for the assessment of the prevalence of alcohol use disorders to see to what degree alcohol motives mediate specific relationships between alcohol related behaviours.

Much of the research exploring trajectories of mental health symptoms post-deployment has focused on the development of PTSD (i.e., Eekhout et al., 2015), with no specific focus on the course / trajectory of alcohol misuse behaviours post-deployment.

Furthermore, to date, little is known of the predictors of trajectory class in relation to minor traumatic brain injury (MTBI) (Bryant, 2008), nor in relation to the influence of exposure to stressful life events, pre-, during and post-deployment (Hobfoll, Tracy, & Galea, 2006; Smid et al., 2012) on post-deployment alcohol use. It is posited that the post-deployment environment and MTBI are potential mediators and moderators of trajectory class membership and therefore are worthy of further research.

The study found that the early post-deployment trauma reactions (RtAPS) were not necessarily a good measure of latter alcohol morbidity, and while the RtAPS is a useful tool to assess the impact of general psychological distress, it highlights the requirement for a post-deployment follow-up (POPS) to better assess the emerging patterns of trauma related symptoms and alcohol. Given the emerging literature on delayed onset of disorder post-deployment (Bryant et al., 2015; Hermes et al., 2015), the delay of 3 – 6 months post-deployment before POPS may not be sufficient to identify those personnel who may experience post-deployment trauma reactions. Alternatively, the lack of association between RtAPS measures and post-deployment alcohol use may highlight other post-deployment adjustment factors other than deployment-related trauma at play.

As highlighted previously, the use of the total score on the TSES-R may have diluted the effects of specific trauma types on subsequent psychopathology and alcohol use behaviours. Given the evidence in the literature for the role of discreet trauma types on subsequent psychopathology (Davy et al., 2012; Maguen et al., 2011), it is suspected that interrogation of future TSES-R data in relation to the specific trauma types (combat, killing, etc) may reveal a stronger associations between the alcohol use and the other studies characteristics. Lastly, future studies will be required to explore whether the associations suggested in this study can be generalised to other populations including female veterans and reserve forces.

11.4.5 Implications for clinical treatment and interventions. There are a range of considerations and implications arising from the findings of this research which are important in determining assessment, intervention and treatment strategies. There are also implications of particular relevance to the ADF such as in the identification of persons at risk, marketing of prevention strategies and in the future development of the ADF mental health screening continuum and follow-up treatment considerations.

The key findings of this research highlight the need for tailored programs of intervention and suggest that examining motivations to consume alcohol may have considerable clinical utility. Intervention and treatment programs would be improved by a direct focus on the impact of personal drinking motives on subsequent alcohol behaviours. For example, clients may be encouraged to identify the factors that motivate them to consume alcohol in problematic ways. Strategies need to be designed to assist individuals to recognize circumstances in which they may be at increased risk of being ‘motivated’ to self-medicate (cope) or to enhance positive affect in response to psychopathology. Supporting clients’ ability to then question the validity of these motivations is fundamental. This would require the development and delivery of psycho-education designed to enhance a clients’ understanding of the link between motivation (coping and enhancement) and alcohol consumption.

These suggestions would be consistent with strategies already included in many alcohol prevention and treatment programs which call for the development of insight and self-awareness, including the ADF Outpatient Alcohol Treatment Program. Furthermore, while a key focus of many therapeutic interactions is on diminishing the effect of felt psychological distress which leads to the desire to self-medicate, the findings of this study show that alcohol consumption is also linked to a desire to increase positive affect. Therefore, the mental health practitioner should also assist patients and clients to identify and implement healthier coping strategies for enhancing positive affect other than by consuming alcohol.

Results from this study could also be used to enhance existing post-operational decompression and reintegration programs in an attempt to raise soldiers' and commanders' awareness of the impact of motivations, post-deployment stressors and trauma reaction on subsequent alcohol related behaviours. Furthermore, greater awareness of the potential differences in the trajectories of post-deployment alcohol use, influencing factors and motivators can lead to better monitoring by health staff, commanders, and peers.

This information may also be useful in the development of strategies designed to message harm minimization. Clearly there are some characteristics like agreeableness, a lack of conscientiousness and an immature coping style that are predictors of problematic alcohol use and binge-drinking. These are not the type of personalities who would normally respond well to the average health literacy messages. Given this, various types of messages may need to be developed to resonate with as broad an audience as possible, but a focus on addressing low conscientiousness personality types may be a good start. Furthermore, education campaigns may also be targeted at high conscientiousness groups appealing to their responsible natures in looking after their mates, encouraging them to champion the use of more adaptive methods to cope with stress and engage in social activity.

It is important to note that this study observed the patterns of usage at a time when the cohort are still in the military and the military social context may well constrain consumption. It is likely that an individual's pattern of alcohol use may change over time, particularly once they leave the Army or move into social groups that facilitate increased consumption. Furthermore, there may be a likelihood of delayed onset and exacerbation of psychopathology in the future and resultant changes in alcohol use. It is important, therefore, that information pertaining to the possible delayed onset of symptoms, potential trajectories of disorder, and the mediators and motivators for alcohol use, are adequately covered during transition from the military.

Finally, differences in results pertaining to the frequency and severity of alcohol use behaviours highlight the problem of the AUDIT as a measure of problematic alcohol use and also highlight the intermixture of the social alcohol consumption and misuse that are contained in this population. The findings suggest that the AUDIT may not adequately partition the correlates of problematic use including social, frequency, severity (binge-drinking) and motivation correlates. Therefore, mental health practitioners need to be mindful that the AUDIT is a screen only and that further exploration and interrogation of individual responses to the AUDIT questions are essential.

11.5 Concluding Comments

Prior research has suggested that there is evidence to support an association between deployment experiences and the development of impaired mental health including maladaptive post-deployment alcohol use (i.e., Davy et al., 2012; Jacobson et al., 2008; Stewart et al., 1998). Self-medicating as a means of coping with deployment related distress may subsequently manifest in increased symptoms and significantly disordered drinking behaviours (Chilcoat & Breslau, 1998b; Tomlinson et al., 2006). However, the drivers of problematic alcohol use among service personnel in general and ADF veterans in particular, are not well defined or understood. This thesis investigated the utility of individual differences in inherent personality and coping characteristics as potential moderators of self-medicating and other problematic alcohol use in addition to exploring how these factors may interact to mediate the impact of deployment on the subsequent development of problematic drinking behaviours. Drinking motives have been identified as important components in the determinants of alcohol use (Crutzen et al., 2013; Doyle et al., 2011), however, their contribution remained untested until investigated with this body of research.

This thesis has highlighted a number of factors that influence post-deployment alcohol behaviours by using a longitudinal, prospective design. In doing so, the thesis has both supported and extended the understanding of the associations between alcohol use and deployment. Three key clinical considerations from this data are firstly, the importance of pre-deployment consumption patterns on later use; secondly, the influence of perceived psychological distress of later alcohol use and the third is the importance of post-deployment trauma measures on the prediction of post-deployment alcohol dysfunction. The results also raised questions about the determination of factors that will influence one group of people to decrease alcohol use following deployment while another group will increase alcohol use when exposed to similar experiences.

The challenge for this data is that there is only a small group of participants that have developed problematic behaviours. Therefore, the changes in the population and the effect of symptoms largely sit within nonclinical behaviours. While the rates of maladaptive drinking behaviours in the present sample were relatively low, they were consistent with those reported for other population studies (Davy et al., 2012) and provided valuable insight into the patterns of consumption related to the spectrum of social consumption of alcohol and the role of subsyndromal symptoms.

While no prior research has specifically investigated the interrelations between coping style, personality and problematic alcohol, results of this study suggest that habitually used unconscious coping and personality styles may moderate the impact of stressors on psychological well-being and adjustment post-deployment. This moderating effect in addition to a capacity for self-observation and self-modulation, which is consistent with the concepts of heightened conscientiousness, emotional stability and mature coping, may in turn encourage a more mature approach to general drinking behaviours. Conversely, a lack of mature coping combined with a need to seek social contact (extraversion) may be particularly relevant for young people who are choosing binge-drinking to build their confidence in social environments.

The dominant finding of this research is the influence of motivations to consume alcohol on the characteristic patterns of alcohol use and the subsequent interactions between these motivations, inherent personality characteristics and mental health correlates. Motivations to consume alcohol have not been previously investigated in relation to a deployment cohort; what is clear from these findings is that motivation to consume alcohol incorporates a significant component of the variance and becomes the dominant descriptor in the investigation of predictors of alcohol use across the deployment cycle. Although in many ways the problematic use of alcohol is related to inherent characteristics and psychopathology, it is also a conscious choice of strategy (motivation) to manage those factors.

A number of considerations and implications arose from the research with the key findings highlighting the need for tailored programs of intervention, with the examination of motivations to consume alcohol and personality and coping style correlates promising considerable clinical utility in the determination of the mechanisms and programs to bolster protection against problematic drinking. Public health intervention and treatment programs in general, and ADF programs specifically, would be improved by a direct focus on the impact of personal drinking motives on subsequent alcohol behaviours as opposed to a “one-intervention-for all” generalized approach to the management of problematic alcohol use. This is also a pertinent consideration in the development of prevention programs and public health messages around safe-drinking, in that, assuming that all at-risk groups have the same motivation to consume alcohol, or that all demographics are motivated by the same triggers, will ultimately lead to the failure of messages designed to influence at-risk groups.

This research has drawn attention to the complex matrix of factors that contribute to problematic alcohol use following deployment. It highlights that the evaluation of inherent personality and coping protective factors, as well as mental health risk factors in alcohol misuse may have much to contribute to a more comprehensive approach to assessment and treatment of alcohol misuse. Early identification and intervention is vital in the prevention, intervention and treatment of post-deployment alcohol misuse and the consideration of alcohol consumption motivations have been revealed as having a promising role in the prediction of post-deployment alcohol consumption risk and the subsequent intervention and treatment of problematic alcohol use.

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Appendices

Appendix A – Introduction Letter

1 Psychology Unit

Invites you to participate in the investigation into Coping as a result of Operational Deployment

This study forms a collaboration between 1 Psychology Unit and the Centre of Military and Veterans' Health at the University of Adelaide and aims to improve the services provided to personnel deploying to and returning from operations. This will be achieved by learning more about effective coping strategies and the maintenance of wellbeing. Data will also be used to form part of a Doctoral study.

In brief, we would like to follow up on members prior to, during, and following return from deployments. Your participation in this part of the study involves the completion of the standard operational psychological screening questionnaires and a number of study specific questionnaires on 3 separate occasions:

a. During pre-deployment training,
b. At the Return to Australia Screening (RtAPS), and
c. At Post Operational Psychological Screening (POPS).

This package contains:

A copy of the Information Sheet explaining the procedures and requirements related to participation in the Study,

A copy of the study Consent Form that outlines your rights as a Study participant and the obligations of the Study Investigators,

The routine operational psychological screening questionnaires and additional study specific questionnaires.

Please read the enclosed information, particularly the Information Sheet and Consent Form. If you would like to ask any further questions, please speak with the researcher present or phone 1 Psychology Unit on 02 9349 0445. Please fill in the questionnaires and return the documents to the researcher.

Thank you for your consideration of this invitation. This study provides a rare opportunity to improve the support provided to operationally deployed members on their return from operations. We look forward to including your experience soon.

Thanks:

LTCOL Stephanie Hodson
CO, 1 Psych Unit

Appendix B – Information Sheet

Mental Health Outcomes following Deployment: Investigation into Coping as a result of Operational Deployment

INFORMATION SHEET

Brief Description of Study: All ADF members returning from deployments undergo psychological screening and re-integration processes prior to and after returning to Australia. The aims of these processes are to monitor the well-being of the deployed force, identify individuals who may be experiencing difficulties and assist the re-integration process following an operational deployment.

The aims of this study are to improve the services provided to personnel deploying to and returning from operations. This will be achieved by assessing the effectiveness of the psychology screens and by learning more about effective coping strategies and the maintenance of wellbeing. The information will be collected from routine operational psychological screening and further study specific measures administered during Force Preparation Training, Return to Australia Psychological Screens (RtAPS), and the Post Operational Psychological Screens (POPS). Furthermore, this study forms a collaboration between 1 Psychology Unit and the Centre of Military and Veterans' Health at the University of Adelaide and the data will be used to form part of a doctoral study. Your assistance is requested by your participation in this study.

Your part in the Study: Your participation in the study is entirely voluntary. There is no obligation to take part in the study. If you are still serving in the Defence Force, a decision not to participate will not lead to any detriment to your career or future health care. You may withdraw from the study at any time without detriment to your career or future health care.

If you agree to participate in the study, you will be asked to complete a series of questionnaires of three separate occasions:

a. During pre-deployment training,
b. at the Return to Australia Psychological Screening (RtAPS) immediately prior to departure from the deployment, and
c. at Post Operational Psychological Screening (POPS) 3-6 months following your return to Australia.

There will be no cost to you to be involved in the study. Completion of the questionnaires on this occasion is expected to take approximately 45 minutes with completion times on other occasions varying somewhat according to the questionnaires employed.

Benefits of Participating: By participating in the research you may benefit from the many opportunities provided to discuss your wellbeing with a mental health professional. Your participation should also assist Defence improve on current procedures to more effectively support deployed personnel.

Risks of Participating: There is a theoretical risk involved in participating in this study related to the confidentiality of the information provided in the questionnaire. We have put in place many vigorous processes to prevent and guard against this risk. The handling of this information is discussed below in the section entitled "Your Privacy".

Your Privacy: All information provided by you will be treated confidentially. All personally identifying information will be removed and be given a special identification code. The code may be used to link data, however the key to the identification code will be stored in a secure location separate to the data and the de-identified data will be also stored in a secure environment. The data will be used by 1 Psychology Unit to examine effective coping strategies and the potential for positive mental well being after operational deployment. It is possible that the data you have provided may potentially prove valuable for additional future research of importance to the ADF. If so, you will be contacted for approval before the data can be used for this research.

All participants will be provided with information on where to access support should they feel that assistance is required. If current suicide intent is revealed, immediate referral to ADF health resources will result.

We recognise that ADF members are invited to participate in Surveys on a regular basis, and that sometimes this research seems to be irrelevant or overlap with other studies. We would like to assure all members that Health Services research is conducted for separate and equally important purposes, and we encourage you to participate in this Study as it aims to improve health services for all ADF members.

Principal Investigator:

CAPT Alison Kaine
1st Psychology Unit
Contact telephone: 02 9349 0347

Should you have any questions, problems or concerns about the conduct of this project, please do not hesitate to contact the Principal Investigator, or you may prefer to contact:

The Australian Defence Human Research Ethics Committee at the following address:

Executive Secretary
Australian Defence Human Research Ethics Committee
CP2-7-66
Department of Defence
CANBERRA ACT 2600
Telephone: 02 6266 3837
Facsimile: 02 6266 4982
Email: ADHREC@defence.gov.au

Mental Health Resources

There may be questions you find distressing. Should you feel distressed, you can contact:

1 Psychology Unit on (02) 9349 0844 OR speak with a researcher.

ADF Mental Health Strategy All-hours Support Line (ASL). The ASL is a confidential telephone triage support service for ADF members and their families that is available 24 hours a day, 7 days per week.

1800 628 036 (FREECALL within Australia)

61 2 9425 3878 (outside Australia).

Local Medical Centre. Your local medical officer can provide immediate assistance and referrals as required.

Psychology Support Section. All Psychology Support Sections can offer after-hours, critical incident support through the local Duty Officer.

Chaplains. There are Chaplains connected to all units in Australia who can provide support and appropriate referrals.

Lifeline. If you, or a friend, need to talk to someone about a problem immediately, you can call Lifeline for the cost of a local call. **131 144**

Vietnam Veterans Counselling Service (VVCS). This service is available to veterans of all deployments and their families.

1800 011 046 (VETLINE – 24 hour emergency line Sydney/Canberra).

Appendix C – Consent Form

Mental Health Outcomes Following Deployment: Investigation into Coping as a result of Operational Deployment

CONSENT

I (PMKeys #, Rank, Name)…………………………………………… give my consent to participate in the Validation study.

My consent is provided on the following basis:

a. I have read the information provided to me about the aims of this research, how it will be conducted and my role in it.
b. I understand the risks involved as described in the information sheet.
c. I am cooperating in this project on the conditions that:
    i. Questionnaire Data collected as part of this study will be linked to RtAPS and POPS psych records.
    ii. The linked data will be used to investigate coping as a result of Operational Deployment.
    iii. Identifying information will be removed from the linked data set and stored separately. Codes may be used to re-link data if required.
    iv. All data and codes will be stored in a secure location.
    v. If the data are requested by other researchers, separate consent will be requested from you before its release.
    vi. that the data will be used as part of a Doctoral study.
d. I can discuss my participation at any time with the Principal Investigator, a Research Assistant or a representative of one of the relevant Ethics Committees.

The study report will be made available to me at my request and any published reports of this study will preserve my anonymity.

I understand that:
a. There is no obligation to take part in this study.
b. If I choose not to participate there will be no detriment to my career, future health care, service pension, DVA pension or compensation claims.
c. I am free to withdraw at any time with no detriment to my career or future health care.
d. I will be provided with information on where to access support.
e. If I reveal current suicide intent that I will be immediately referred to ADF health resources.

I have been provided with a copy of the information / consent sheet, signed by me for my records.

I have also been given a copy of the Australian Defence Health Research Ethics Committee's (ADHREC) Guidelines for Volunteers

………………………………………… ……………………………

Signature of Volunteer Date

This form will be removed from the questionnaires

Appendix D – Complaint Form

THE UNIVERSITY OF ADELAIDE HUMAN RESEARCH ETHICS COMMITTEE

Document for people who are participants in a research project

CONTACTS FOR INFORMATION ON PROJECT AND INDEPENDENT COMPLAINTS PROCEDURE

The Human Research Ethics Committee is obliged to monitor approved research projects. In conjunction with other forms of monitoring it is necessary to provide an independent and confidential reporting mechanism to assure quality assurance of the institutional ethics committee system. This is done by providing research participants with an additional avenue for raising concerns regarding the conduct of any research in which they are involved.

The following study has been reviewed and approved by the University of Adelaide Human Research Ethics Committee:

Project title: Mental Health Outcomes following Deployment: Investigation into Coping as a result of Operation Deployment.

……………………………………………………………………………………

1. If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the project coordinator:

   Name: Captain Alison Kaine

   1 Psych Unit

   Department of Defence – Army

   1 Psych Unit, Randwick Barracks, Avoca Street

   RANDWICK NSW 2031………………………………………………………….

   telephone: Wk: ………………………………..

2. If you wish to discuss with an independent person matters related to

   - making a complaint, or
   - raising concerns on the conduct of the project, or
   - the University policy on research involving human participants, or
   - your rights as a participant

Contact the Human Research Ethics Committee's Secretary, Ms Sabine Schreiber on phone (08) 8303 6028

Appendix E – Research Measures

PSYCHOLOGY IN CONFIDENCE (After first entry)

QUESTIONNAIRE PACKAGE

To ensure your confidentiality and anonymity, you are requested to place a specific code in the boxes below. The code is determined as follows:

a. First two boxes contain the **first** two letters of your First Name
b. The second two boxes contain the **last** two numbers of your PMKeys number.
c. The last two boxes contain the **first** two letters of your mother's maiden name.

The questionnaire package includes the following:

a. Coping Styles Questionnaire
b. Alcohol Questionnaire
c. Tobacco Use Questionnaire
d. Burnout Survey
e. TSES-R
f. Kessler 10
g. PCL-C

Please follow the instructions for completion provided on each questionnaire.

Prior Deployment Experience

Have you been on an ADF operational deployment (war-like, peacekeeping, peace monitoring or humanitarian support)? Please circle the appropriate response.

○ Yes ○ No

If you have been deployed, how many times have you been deployed prior to this deployment:

Below, list the Operation Name, Year of Deployment, and Length of Deployment for each operational deployment.

OP NAME	YEAR	DURATION (in months)

COPING STYLES

Below are a number of statements about personal attitudes. There are no right or wrong answers. Read each statement carefully and colour the circle that best describes you on a 9-point scale from strongly disagree to strongly agree.

	Strongly Disagree				Moderately Agree				Strongly Agree
1. People often call me a sulker.	O	O	O	O	O	O	O	O	O
2. I'm able to keep a problem out of my mind until I have time to deal with it.	O	O	O	O	O	O	O	O	O
3. I'm always treated unfairly.	O	O	O	O	O	O	O	O	O
4. I work out my anxiety through doing something constructive and creative.	O	O	O	O	O	O	O	O	O
5. I keep getting into the same type of frustrating situations and I don't know why.	O	O	O	O	O	O	O	O	O
6. I am able to laugh at myself easily.	O	O	O	O	O	O	O	O	O
7. I act like a child when I'm frustrated.	O	O	O	O	O	O	O	O	O
8. People tend to mistreat me.	O	O	O	O	O	O	O	O	O
9. People say I tend to ignore unpleasant facts.	O	O	O	O	O	O	O	O	O
10. Someone is robbing me emotionally of all I've got.	O	O	O	O	O	O	O	O	O
11. I pride myself on my ability to cut people down to size.	O	O	O	O	O	O	O	O	O
12. People tell me I have a persecution complex.	O	O	O	O	O	O	O	O	O
13. I get physically ill when things are not going well for me.	O	O	O	O	O	O	O	O	O
14. I'm a very inhibited person.	O	O	O	O	O	O	O	O	O
15. My friends see me as a clown.	O	O	O	O	O	O	O	O	O
16. I work more things out in my daydreams than in real life.	O	O	O	O	O	O	O	O	O
17. I'm very shy about approaching people.	O	O	O	O	O	O	O	O	O
18. I fear nothing.	O	O	O	O	O	O	O	O	O
19. I always feel that someone I know is like a guardian angel.	O	O	O	O	O	O	O	O	O
20. As far as I'm concerned, people are either good or bad.	O	O	O	O	O	O	O	O	O
21. Everyone is against me.	O	O	O	O	O	O	O	O	O
22. I can keep the lid on my feelings if letting them out would interfere with what I'm doing.	O	O	O	O	O	O	O	O	O
23. Some people are plotting to kill me.	O	O	O	O	O	O	O	O	O
24. I'm usually able to see the funny side of an otherwise painful predicament.	O	O	O	O	O	O	O	O	O
25. I get a headache when I have to do something I don't like.	O	O	O	O	O	O	O	O	O
26. There's no such thing as "finding a little good in everyone". If you're bad, you're all bad.	O	O	O	O	O	O	O	O	O
27. We should never get angry at people we don't like.	O	O	O	O	O	O	O	O	O
28. When I have to face a difficult situation I try to imagine what it will be like and plan ways to cope with it.	O	O	O	O	O	O	O	O	O
29. When someone close to me dies, I don't feel upset.	O	O	O	O	O	O	O	O	O
30. After I fight for my rights, I tend to apologise for my assertiveness.	O	O	O	O	O	O	O	O	O

COPING STYLES
continuted..

	Strongly Disagree				Moderately Agree				Strongly Agree
31. Hard work makes me feel better.	O	O	O	O	O	O	O	O	O
32. I have habits or rituals which I feel compelled to do or something terrible will happen.	O	O	O	O	O	O	O	O	O
33. If I can predict that I'm going to be sad ahead of time, I can cope better.	O	O	O	O	O	O	O	O	O
34. Often I find that I don't feel anything when the situation would seem to warrant strong emotions.	O	O	O	O	O	O	O	O	O
35. Sticking to the task at hand keeps me from feeling depressed or anxious.	O	O	O	O	O	O	O	O	O
36. If I have an aggressive thought, I feel the need to do something to compensate for it.	O	O	O	O	O	O	O	O	O

Below are a number of strategies that are commonly used to cope when people feel pressured, stressed, depressed, or anxious. Read each carefully and colour the circle that best describes which strategies you use.

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
1. Talk to someone (e.g. friend or family member)	O	O	O	O	O
2. Email a friend or family member	O	O	O	O	O
3. Light up a cigarette	O	O	O	O	O
4. Have an alcoholic beverage	O	O	O	O	O
5. Exercise or play sports	O	O	O	O	O
6. Eat something	O	O	O	O	O
7. Listen to music	O	O	O	O	O
8. Read a book or magazine	O	O	O	O	O
9. Play computer games	O	O	O	O	O
10. Surf the internet	O	O	O	O	O
11. Watch movies	O	O	O	O	O
12. Think of a plan to solve the problem	O	O	O	O	O
13. Consider hurting or killing yourself	O	O	O	O	O
14. Other	O	O	O	O	O

Here are a number of personality traits that may or may not apply to you. Please indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more stronly than the other.

	Disagree strongly	Disagree moderately	Disagree a little	Neither agree or disagree	Agree a little	Agree moderately	Agree strongly
1. Extraverted / Enthusiastic	O	O	O	O	O	O	O
2. Critical / Quarrelsome	O	O	O	O	O	O	O
3. Dependable / Self-disciplined	O	O	O	O	O	O	O
4. Anxious / Easily Upset	O	O	O	O	O	O	O
5. Open to new experiences / Complex	O	O	O	O	O	O	O
6. Reserved / Quiet	O	O	O	O	O	O	O
7. Sympathetic / Warm	O	O	O	O	O	O	O
8. Disorganised / Careless	O	O	O	O	O	O	O
9. Calm / Emotionally stable	O	O	O	O	O	O	O
10. Conventional / Uncreative	O	O	O	O	O	O	O

ALCOHOL QUESTIONNAIRE

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

	Never	*Once a month or less*	*2 to 4 times a month*	*2 to 3 times a week*	*4 or more times a week*
1. How often do you have a drink containing alcohol?	O	O	O	O	O

	1 or 2	*3 or 4*	*5 or 6*	*7 to 9*	*10 or more*
2. How many 'standard' drinks containing alcohol do you have on a typical day when you are drinking?	O	O	O	O	O

	Never	*Less than once a month*	*Monthly*	*Weekly*	*Daily or almost daily*
3. How often do you have six or more drinks on one occassion?	O	O	O	O	O
4. How often during the last 12 months have you found that you were not able to stop drinking once you had started?	O	O	O	O	O
5. How often during the last 12 months have you failed to do what was normally expected from you because of drinking?	O	O	O	O	O
6. How often during the last 12 months have you needed a drink in the morning to get yourself going after a heavy drinking session?	O	O	O	O	O
7. How often during the last 12 months have you had a feeling of guilt or remose after drinking?	O	O	O	O	O
8. How often during the last 12 months have you been unable to remember what happened the night before because you had been drinking?	O	O	O	O	O

	No	*Yes, but not in the last 12 months*	*Yes, during the last 12 months*
9. Have you or someone else been injured as a result of your drinking?	O	O	O
10. Has a relative, a friend, a doctor or other health professional been concerned about your drinking or suggested you cut down?	O	O	O

	No	*Probably not*	*Unsure*	*Possibly*	*Definitely*
A. Do you think you presently have a problem with drinking?	O	O	O	O	O

	Very easy	*Fairly easy*	*neither difficult nor easy*	*Fairly difficult*	*Very difficult*
B. In the next 3 months, how difficult would you find it to cut down or stop drinking?	O	O	O	O	O

Below are some of the most common reasons why people consume alcohol. Colour the circles of those that apply to you.

Stressed	O	Reward	O	Boredom	O
Upset	O	Pleasure	O	Fear	O
Angry	O	Social Pressure	O	Relaxing	O
Frustrated	O	Habit	O	Social Interaction	O
Depressed	O	To make me feel better	O	Confidence Boost	O
De-stress	O	Reduce Physical pain	O	Escape	O
Help with sleep	O	Reduce Emotional pain	O	Other	

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PSYCHOLOGY IN CONFIDENCE (After first entry)

K10

The following questions inquire about how you have been feeling over the last four (4) weeks.

Please fill in the circle that best describes how you have been feeling.

	All of the time	*Most of the time*	*Some of the time*	*A little of the time*	*None of the time*
1. In the past four (4) weeks, about how often did you feel tired for no good reason?	⬭	⬭	⬭	⬭	⬭
2. In the past four (4) weeks, about how often did you feel nervous?	⬭	⬭	⬭	⬭	⬭
3. In the past four (4) weeks, about how often did you feel so nervous that nothing could calm you down?	⬭	⬭	⬭	⬭	⬭
4. In the past four (4) weeks, about how often did you feel hopeless?	⬭	⬭	⬭	⬭	⬭
5. In the past four (4) weeks, about how often did you feel restless or fidgety?	⬭	⬭	⬭	⬭	⬭
6. In the past four (4) weeks, about how often did you feel so restless that you could not sit still?	⬭	⬭	⬭	⬭	⬭
7. In the past four (4) weeks, about how often did you feel depressed?	⬭	⬭	⬭	⬭	⬭
8. In the past four (4) weeks, about how often did you feel that everything was an effort?	⬭	⬭	⬭	⬭	⬭
9. In the past four (4) weeks, about how often did you feel so sad that nothing could cheer you up?	⬭	⬭	⬭	⬭	⬭
10. In the past four (4) weeks, about how often did you feel worthless?	⬭	⬭	⬭	⬭	⬭

41827

PSYCHOLOGY IN CONFIDENCE (After first entry)

PCL

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

*Please read each one carefully and then indicate how much you have been bothered by that problem **in the past month**.*

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

41827

PSYCHOLOGY IN CONFIDENCE (After first entry)

TSES-R

The following questionnaire asks you about events that may have occurred during your deployment. Please indicate how often you experienced the event, how it affected you at the time and how it affects you now. For each question some examples are given, please indicate if you experienced these or similar experiences. ***It is important that you mark a response in each of the three***

EVENT	How often did you experience the event?					How did it affect you at the time? (felt fear or horror)				How does it affect you now? (feelings of fear or horror)			
How often did the following occur..?	Never	Rarely	On Occasion (x2-5)	Often (x6-10)	Very Often (x11+)	Not at all	A little	A moderate amount	A great deal	Not at all	A little	A moderate amount	A great deal
1. You were in danger of being killed e.g. combat, MVA, assault, sexual assault, natural disaster, hostage situation	○	○	○	○	○	○	○	○	○	○	○	○	○
2. You were in danger of being injured e.g. combat, MVA, assault, sexual assault, natural disaster, hostage situation	○	○	○	○	○	○	○	○	○	○	○	○	○
3. You had to handle dead bodies e.g. disaster situation, temporary morgue, mass graves including any form of human remains	○	○	○	○	○	○	○	○	○	○	○	○	○
4. You saw dead bodies e.g. disaster situation, temporary morgue, mass graves including any form of human remains	○	○	○	○	○	○	○	○	○	○	○	○	○
5. You heard of a close friend or co-worker who had been injured or killed e.g. combat, MVA, disaster situation	○	○	○	○	○	○	○	○	○	○	○	○	○
6. You were present when a close friend or co-worker was injured or killed e.g. combat, MVA, disaster situation	○	○	○	○	○	○	○	○	○	○	○	○	○
7. You feared that you had been exposed to a contagious disease, toxic agent or injury e.g. radioactivity, HIV, chemical warfare	○	○	○	○	○	○	○	○	○	○	○	○	○
8. You were witness to human degradation and misery on a large scale e.g. refugee camps, starvation	○	○	○	○	○	○	○	○	○	○	○	○	○
9. You heard of a loved one who had been injured or killed	○	○	○	○	○	○	○	○	○	○	○	○	○
10. You were present when a loved one was injured or killed	○	○	○	○	○	○	○	○	○	○	○	○	○
11. You believe your action or inaction resulted in someone being seriously injured e.g. in combat or as a result of rules of engagement or UN restrictions not allowing you to act	○	○	○	○	○	○	○	○	○	○	○	○	○
12. You believe your actions or inaction resulted in someone being killed e.g. in combat or as a result of rules of engagement or UN restrictions not allowing you to act	○	○	○	○	○	○	○	○	○	○	○	○	○

13. Were there any events that you found to be traumatic but that are not listed above? Please specify below:

____

____