

Running head: IMPACT OF MILITARY DEPLOYMENT ON WELLBEING IN NZDF

A Longitudinal Investigation of the Impact of Operational Deployment on the Psychological
Wellbeing of New Zealand Defence Force Service Personnel

By

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Abstract

The deleterious impact of combat on psychological wellbeing has been documented as early as 490 B.C. by Greek historians (Bentley, 2005), and researchers continue to delve into this phenomenon today. Published literature in this field largely emanates from the United States and United Kingdom, whilst research from New Zealand is largely absent. The current study seeks to fill this gap with an investigation of the impact of overseas deployment on the psychological wellbeing of New Zealand Defence Force (NZDF) military personnel. This study utilised data from 1410 NZDF military personnel who operationally deployed between 1 July 2015 and 31 October 2016 and completed two questionnaires: (1) immediately following deployment, and (2) six months after returning home. Regression, moderation, mediation, and path model analyses were used to analyse the data. Several key findings were obtained. Firstly, combat stressors, as expected, predicted posttraumatic stress disorder (PTSD) symptoms but surprisingly not psychological distress. PTSD, as expected, predicted distress. Secondly, moderation analysis revealed that experiencing medium to high levels of non-combat stressors in addition to combat stressors was likely to result in exacerbated levels of PTSD symptoms. Thirdly, demographic characteristics such as being in the Navy, being female, and not being in a relationship were all identified risk factors for poorer psychological outcomes (PTSD symptoms and psychological distress), whereas neither ethnicity nor prior deployment experience functioned as risk factors. Lastly, mediation analysis revealed that PTSD partially explained the relationship between combat events and posttraumatic growth, suggesting that PTSD symptomology may prompt military personnel to appraise outcomes from their deployment, and subsequently experience personal growth. Implications of the current research lay in the potential for improvements to be made to the education, training, and support offered by the NZDF to their service personnel.

A Longitudinal Investigation of the Impact of Operational Deployment on the Psychological Wellbeing of New Zealand Defence Force Service Personnel

“The soldier above all others prays for peace, for it is the soldier who must suffer and bear the deepest wounds and scars of war” (MacArthur, 1962). Literature has discussed the largely adverse impact of military combat on the psychological wellbeing of soldiers as early as 490 B.C. (Bentley, 2005) and it remains a topic of great investigation today. Contemporary studies have linked military combat experiences to a number of adverse, diagnosable psychological outcomes including posttraumatic stress disorder (PTSD), depression, anxiety, alcohol and substance misuse, and more. Most of the published literature in this field is from the United States and United Kingdom, but New Zealand is rarely covered. This absence indicates a need for research to investigate the impact of combat experiences on the psychological wellbeing of New Zealand Defence Force (NZDF) service personnel.

The necessity of this research becomes even more apparent when considering the relatively high prevalence of mental health issues in the New Zealand population, the vast majority of whom have not experienced military deployment. The recent New Zealand Health Survey 2016/2017 revealed that one in five New Zealanders have been diagnosed with a mood disorder (includes depression and bipolar disorder) and/or anxiety disorder (Ministry of Health, 2017). People serving in the NZDF experience the same life stressors, challenges, and vulnerabilities as New Zealand society, in addition to working for a unique organisation that at times requires being put in harm’s way. The occupationally increased mental health risk factors for NZDF deployable personnel means that it is incredibly important to increase understanding of deployment-related psychopathology in this populace.

The current study sought to determine how deployment-related experiences (e.g. combat and non-combat stressors) might predict future psychological wellbeing, and how psychological wellbeing (e.g. symptoms of depression, anxiety, and PTSD) changes across

time after deployment. These relationships were investigated using variables measured at two time points: immediately post-deployment, and six months post-deployment.

Background on New Zealand Defence Force Operational Military Service

Currently the NZDF employs 14,500 personnel, including 9,100 Regular Force members, 2,600 Reserve Force members, and 2,800 Civilian staff (New Zealand Defence Force & Ministry of Defence, 2017). These sizeable figures establish the NZDF as one of New Zealand's largest employers (Dewes, 2017). Of NZDF military personnel – both Regular and Reserve Force members – several hundred are deployed at any one time in support of around fifteen current overseas operations which are spread across six of the seven continents (New Zealand Defence Force, 2017). The scale of the military in New Zealand in addition to the NZDF's large international operational involvement, indicates that numerous NZDF service personnel are likely to experience military deployment during their tenure. Consequently, every year many serving New Zealanders experience events that are significant, extraordinary, and potentially life changing. Recent statistics reveal that New Zealand currently has over 41,000 veterans, three-quarters of whom are veterans of contemporary conflicts including Vietnam, East Timor, and Afghanistan (Radio New Zealand, 2018).

NZDF service personnel are principally deployed internationally in support of global United Nations (UN) headquarters, major peace operations, and training missions (Ministry of Defence, 2018). Deployment objectives are varied, ranging from maritime surveillance and fishery patrols, to peacekeeping and training members of other defence forces (NZDF, 2017). As part of the UN, the NZDF is often deployed to unsettled political settings alongside New Zealand's allies – United States, United Kingdom, and Australia – and this means that NZDF service personnel are exposed to complex, challenging, and often hostile environments (New Zealand Defence Force, 2018). New Zealand's support to international operations is

largely in a non-combat capacity, however it remains possible for NZDF service personnel to be exposed to dangerous and traumatic events (Adler, Litz, & Bartone, 2003).

Research conducted by Adler and colleagues (2003) establishes that conflict settings are characterised by events or stressors that are commonly experienced on both peacekeeping and combat operations. However, several distinctions can be made between the stressors experienced in peacekeeping versus combat environments, in particular, the likelihood and intensity of stressors, rules of engagement, and expectations of involvement from leaders (Adler et al., 2003). Nevertheless, peacekeeping operations – like combat operations – may expose service personnel to potentially traumatic stressors that threaten both physical and psychological wellbeing. Threats to psychological wellbeing might include witnessing various states of human degradation and misery such as: starvation, extreme distress and suffering, severely wounded or dead individuals, and killings (Adler et al., 2003). Threats to both physical and psychological wellbeing might include the fear of or experience of being fired upon, taken hostage, killed, exposed to minefields or unexploded ordnance, violent and unruly crowds, and dangerous and unpredictable patrols or circumstances (Adler et al., 2003).

The NZDF is morally and ethically obligated to prioritise the psychological wellbeing of its personnel, both military and civilian. The psychological wellbeing of military personnel is pertinent to combat readiness, which is critical as the NZDF is required by law to be able to respond to unpredictable events and various contingencies (State Services Commission, The Treasury, & Department of the Prime Minister and Cabinet, 2015). This requirement may become increasingly more difficult to meet amidst the current backdrop of rising tension and uncertainty in international strategic and geopolitical settings (Ministry of Defence, 2016). Accordingly, the Defence White Paper 2016 anticipated that “New Zealand’s ability to protect and advance its national interests will face increasing pressure over the coming decades” (Ministry of Defence, 2016, p. 37). In keeping with growing international tensions,

global defence expenditure is forecast to increase for the fifth year in a row to reach US \$1.67 trillion in 2018, a figure which will surpass the 2010 Cold War record of US \$1.63 trillion (IHS Markit, 2017). Domestically, the Defence White Paper 2016 announced a long-term investment plan for the NZDF worth NZ \$20 billion over the following 15 years (Ministry of Defence, 2016). The objective of such investment is the preparation of an NZDF that is skilled and equipped to protect national interests, as well as to support international operations (Ministry of Defence, 2016).

The NZ \$20 billion investment plan outlined in the Defence White Paper 2016 (Ministry of Defence, 2016) acknowledges that trained and committed personnel are vital to combat readiness and the subsequent success of NZDF taskings. It is clear that the NZDF must continue to attract and retain the resilient, adaptable, and professional personnel for which the NZDF is internationally renowned (New Zealand Defence Force & Ministry of Defence, 2017). Subsequently, an increased recognition of the extent of mental health issues within New Zealand society, the heightened mental health risk posed by military occupational demands, and the necessity of combat readiness, led NZDF leadership to develop the Defence Health Strategy 2016 (New Zealand Defence Force & Ministry of Defence, 2017). This strategy acknowledged an urgent need to shift from a treatment focus to a more holistic and comprehensive model of care that includes the maintenance, improvement, and restoration of health (New Zealand Defence Force & Ministry of Defence, 2017). It is expected that if the objectives of the Defence Health Strategy 2016 are successful the NZDF will be healthier, stronger, more effective, and combat ready.

The Chief of Defence Force has a duty of care for the physical and mental health of NZDF military personnel, both during and after their active service. Specifically, an unwritten covenant “places upon the Chief of Defence Force the responsibility to care for and fairly reward and compensate our uniformed members for their courage, commitment and

comradeship” (New Zealand Defence Force & Ministry of Defence, 2017, p. 42). Pastoral care is just one key part of this provision of care, and refers to support services such as chaplaincy, organisational psychology, and social workers, as well as campaigns focused on increasing education and awareness around optimising physical and mental health (New Zealand Defence Force & Ministry of Defence, 2017). The provision of care in the NZDF is particularly important given the stigma of asking for care in military environments (Greene-Shortridge, Britt, & Castro, 2007). At present NZDF personnel who are operationally deployed receive physical and psychological support at all stages of deployment: before, during, and after (New Zealand Defence Force & Ministry of Defence, 2017). In addition to this care and support, service personnel receive mental health focused training during courses such as induction and promotion, as well as training in the management of potentially traumatic events (New Zealand Defence Force & Ministry of Defence, 2017). Further, all NZDF personnel and their families are able to contact a confidential 24/7 helpline which provides access to advice from trained health professionals (New Zealand Defence Force & Ministry of Defence, 2017).

If strategy, policy, training, awareness initiatives, and support services are to be effective, it is imperative to first identify and understand the maladies of combat and deployment related trauma experienced by NZDF service personnel. A wealth of robust international literature links combat exposure with PTSD, in addition to a number of other psychological illnesses such as depression, anxiety, and alcohol or substance misuse. Identification of the adverse effects of combat exposure on the mental health of military personnel has been documented as early as 490 B.C. by Greek historians (Bentley, 2005). However, empirical studies on this topic properly commenced in the 1600s (Bentley, 2005). History provides insight into how early studies of warfare were instrumental in the conceptualisation of stress-related disorders as these are known today.

Historic Definitions of Posttraumatic Stress Disorder

Well-documented examination of the effects of warfare on soldiers began in 1678 with the term ‘Nostalgia’ as coined by Swiss military physicians (Bentley, 2005). Nostalgia was the term used to describe a grouping of symptoms seen in Swiss troops: melancholy, insomnia, lack of appetite, homesickness, cardiac palpitations, and anxiety (Bentley, 2005). Soon after, French, German, and Spanish doctors also began to find similar symptomology in their troops returning from battle (Bentley, 2005). At the end of the American Civil War in the 1860s, Doctor Jacob Mendez Da Costa began studying soldiers and theorised that many were suffering similar ‘cardiac’ symptoms due to an overstimulation of the heart’s nervous system (Friedman, 2017). These symptoms included trouble breathing, heart palpitations, anxiety, and a rapid pulse; the combination of which was later labelled ‘Irritable Heart’ or ‘Soldier’s Heart’ (Friedman, 2017).

World War I saw the term ‘Shell Shock’ used from 1915 onward to describe the dazed and disoriented state of many soldiers (Scott, 1990). It was theorised that trench warfare characterised by exploding shells had damaged the brain physiology of soldiers, and thereby the disease was named (Scott, 1990). The affected soldiers were considered weak, cowardly, and malingering (Scott, 1990). The symptoms of shell shock were subsequently found in soldiers who had not been exposed to shell explosions (Scott, 1990). During World War II the same constellation of symptoms were increasingly referred to as ‘Battle Fatigue’ or ‘Combat Stress Reaction’ by both British and American medical and military personnel (Friedman, 2017). It was believed that the symptoms of battle fatigue were largely caused by the duration and intensity of deployment. The American National Center for PTSD estimated that up to half of the military discharges during World War II were due to battle fatigue (Friedman, 2017). World War II was a catalyst for the realisation that it was not just the ‘weak’ who became psychological casualties of the war (Bentley, 2005).

In 1952 the first Diagnostic and Statistical Manual of Mental Disorders (DSM-I) included the diagnosis of 'Gross Stress Reaction'. Gross stress reaction was described as psychological issues caused by traumatic events, with symptoms lasting six months or less (American Psychiatric Association, 1952). It was thought that symptoms lasting longer than six months were due to pre-existing conditions (American Psychiatric Association, 1952). Despite mounting evidence of the relationship between trauma and psychological issues, in 1968 the DSM-II removed the gross stress reaction diagnosis, with no explanation (Andreasen, 2010). However, the psychological trauma suffered by soldiers returning from the Vietnam War became increasingly apparent and ultimately culminated in the introduction of the term Posttraumatic Stress Disorder (PTSD), as it is known today, in 1980 in the DSM-III (Andreasen, 2010). A DSM-III diagnosis of PTSD requires a person to have experienced a psychologically distressing event that is considered to be outside the range of usual human experience; the stressor is experienced with intense fear, terror and/or helplessness; and the stressor must not be one that the majority of one's cultural group could be reasonably expected to cope with (American Psychiatric Association, 1980).

Following the 1980 reinstatement of PTSD in the DSM-III, each successive DSM edition reflected new information garnered from ongoing research. For instance, several years later in 1987 the DSM-III-R specified the onset and duration of the syndrome, and categorised three types of stress response (re-experiencing, avoidance, and arousal), in addition to providing child-specific symptoms (American Psychiatric Association, 1987). Subsequently, the DSM-IV broadened the diagnosis of PTSD to include stress caused by threats to others, meaning that a diagnosis of PTSD was no longer limited to stress caused by threats to oneself only (American Psychiatric Association, 1994).

Current Definitions of Posttraumatic Stress Disorder

Contemporary literature defines PTSD as a mental illness that can develop after people experience or witness a traumatic or life-threatening event such as combat, sexual assault, terminal illness diagnosis, or natural disaster (Friedman, Resick, Bryant, & Brewin, 2011). In 2013 the most current version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) published a revised set of diagnostic criteria for PTSD. A DSM-5 PTSD diagnosis requires that a person: (A) was exposed to death, threatened death, actual or threatened serious injury, or actual or threatened sexual injury; (B) re-experiences the event; (C) avoids trauma-related stimuli; (D) experiences worsening negative thoughts or feelings; (E) experiences worsening trauma-related arousal; (F) has symptoms lasting more than one month; (G) experiences distress or functional impairment due to symptoms; and (H) that the symptoms are not due to medication, substance use, or other illness (American Psychiatric Association, 2013). Specific symptoms may include: nightmares, flashbacks, negative affect, hypervigilance, and difficulty sleeping (American Psychiatric Association, 2013).

Antecedents to Posttraumatic Stress Disorder

In accordance with the DSM-5 diagnostic criteria outlined above, a PTSD diagnosis requires that a person experiences or witnesses a traumatic event. In the context of military deployment literature, potentially traumatic events are referred to as combat-related stressors, i.e. sources of stress directly emanating from combat exposure (Booth-Kewley, Larson, Highfill-McRoy, Garland, & Gaskin, 2010). There is a dearth of contemporary literature exploring the full breadth and depth of specific combat experiences. Nevertheless, in a seminal piece of research, Guyker et al. (2013) examined and scrutinised what they considered to be the most promising measure of combat exposure: the 33-item Combat Experiences Scale (CES) developed by the Walter Reed Army Institute for Research. Subsequently, Guyker et al. (2013) reported that the CES showed adequate internal and

external validity and captured deployment-related experiences well. The authors proposed three factors to explain combat experiences on deployment: (1) exposure to combat environment (e.g. hostile reactions from civilians), (2) physical engagement (e.g. engaged in hand-to-hand combat), and (3) proximity to serious injury and death (e.g. saved the life of a soldier or civilian) (Guyker et al., 2013). Subsequently, Sudom, Watkins, Born, and Zamorski (2016) found evidence for the same three aforementioned factors, as well as evidence for two new factors: (1) personal suffering (e.g. being seriously injured), and (2) perceived responsibility (e.g. feeling responsible for the death of another). In light of the two new emergent factors, Sudom et al. (2016) urged researchers to assess a broader range of experiences in the combat environment, as it is likely that the way in which experiences cluster for each individual deployment is unique.

Predictably, research has shown a significant positive relationship between combat exposure and symptoms of PTSD (Pietrzak, Whealin, Stotzer, Goldstein, & Southwick, 2011; Rona et al., 2009). Additionally, both Pietrzak et al. (2011) and Rona et al. (2009) also determined that certain combat exposures or stressors are more strongly associated with PTSD symptomology than others. For instance, Rona et al. (2009) reported that the items most strongly associated with PTSD included experiencing a weapon discharged in combat, small arms fire, landmine strike, seeing people wounded or killed, and close enemy contact. Similarly, Pietrzak et al. (2011) found that witnessing a peer being seriously wounded or killed in combat and being exposed to friendly fire were items most strongly associated with PTSD. The studies conducted by Pietrzak et al. (2011) and Rona et al. (2009) were both cross-sectional in design and used association-based analyses; two limitations that suggest the need for further inspection of these proposed relationships between combat exposures and PTSD with longitudinal data. Research by Adler, Bliese, McGurk, Hoge, and Castro (2009) offers another avenue for examining the relationship between combat stressors and PTSD, by

exploring the notion that the number of combat events experienced on deployment may also predict subsequent – and possibly exponential – PTSD symptomology. This proposed curvilinear relationship between combat stressors and PTSD as not been examined fully in the literature, and so the current study seeks to explore this idea.

The relationship between combat exposure and PTSD has been extensively researched, whilst the nature of the relationship between combat exposure and depression and anxiety has remained relatively peripheral. Nevertheless, several studies have established that increased exposure to combat-related potentially traumatic events is significantly associated with symptoms of both depression and anxiety (Booth-Kewley et al., 2012; Wells et al., 2010; Sareen et al., 2007). Further, Sareen et al. (2007) reported in a study with Canadian service personnel that witnessing potentially traumatic events on deployment was associated with increased risk of major depression, panic disorder, social phobia, generalised anxiety disorder, PTSD, and alcohol dependence, as well as increased self-perceived need for care. Nascent research indicates that PTSD mediates or explains the relationship between combat exposure and depression (Koenen et al., 2003). This finding suggests that PTSD may be the primary psychopathology and any other symptoms of mental illnesses are secondary. The current study aims to investigate this proposed relationship further.

It is evident that operational deployment exposes military personnel to many possible psychological stressors. Looking at the sources of stress on deployment facilitates the categorisation of these psychological stressors as either: (a) combat related – as discussed above – or (b) non-combat related. Both combat and non-combat related stressors have unique and important roles in the development of deployment-related psychopathology. Non-combat related stressors are labelled differently among researchers (e.g. deployment-related stressors, operational stressors, non-trauma related stressors), however each term distinguishes operational deployment from combat exposure itself (Booth-Kewley et al.,

2010). Research demonstrates that non-combat stressors can be characterised by a three-factor structure: (1) work (e.g. difficulty with the military hierarchy), (2) separation from home, family, and friends (e.g. lack of contact with family and friends back home), and (3) operational environment (e.g. language barriers) (Orme & Kehoe, 2014). Of the three types of non-combat stressors, work-related stressors were found to cause greater stress ratings than both the separation from home and operational environment stressors, however overall self-reports of non-combat stressors were low (Orme & Kehoe, 2011; 2014). Orme and Kehoe (2014) also found a strong relationship between work-related stressors and negative ratings of one's deployment experience. Evidently, like combat stressors, non-combat stressors can also have quite adverse impacts on military personnel.

More specifically, several studies reveal significant associations between non-combat related stressors on deployment and poor mental health outcomes, including anxiety, depression, and PTSD (Booth-Kewley et al., 2010; Engelhard & van den Hout, 2007; Vogt, Pless, King, & King, 2005; King, King, Gudanowski & Vreven, 1995). Interestingly Booth-Kewley and colleagues (2010) found that non-combat stressors had a stronger association with PTSD symptomology than combat exposure (i.e. combat stressors). This finding is counterintuitive and cross-sectional which means that we cannot attribute causality. Relatedly, Bartone, Adler, and Vaikus (1998) found that non-combat stressors were strongly correlated with low personal morale. It is also probable that non-combat stressors experienced on deployment have operational costs for the military, perhaps in terms of interpersonal conflict, diminished performance in theatre, and even military attrition.

Research on military personnel establishes that independently both combat and non-combat stressors predict negative psychological outcomes, and nascent research indicates that the cumulative effect of these two types of deployment stress warrants further investigation. Findings in this area are tentative and few in number, but nonetheless important given that

militaries may be able to influence the levels of psychopathology experienced by their service personnel by ameliorating non-combat stressors. A study conducted by Interian, Kline, Janal, Glynn, and Losonczy (2014) found that service personnel who reported higher levels of home-related stressors before and after deployment also reported higher levels of PTSD post-deployment. Similarly, Vasterling et al. (2010) reported that home-related stressors and post-deployment related stressors were significantly and strongly associated with increased PTSD severity. The reason for this finding is unclear, however it is possible that when non-combat stressors (before, during, and/or after deployment) are experienced in addition to potentially traumatic events, one's psychological resources are taxed prematurely. This gap in knowledge compels further research to delineate the relationship between combat and non-combat related stressors and subsequent poor mental health outcomes.

Pre-Deployment Risk Factors for Posttraumatic Stress Disorder Development

Recently, the military-related PTSD literature has increasingly focused on risk factors that are present before deployment. Subsequently, a number of factors have been shown to influence the onset, development, and severity of PTSD symptomology. These pre-deployment risk factors can be categorised as either socio-demographic factors: (1a) gender, (1b) marital status, (1c) ethnicity, and (1d) age, or military factors: (2a) deployment experience, (2b) military rank, and (2c) military service (e.g. Navy vs. Army). This body of research provides mixed results for many of the examined risk factors due to inconsistencies in sampling, methodological design, scales and measures used, and statistical analysis (Xue et al., 2015). Discord in the literature highlights the need for further consolidatory research into the roles of the aforementioned risk factors in the development of deployment-related PTSD. For instance, a piece of research that included multiple potential risk factors in one longitudinal analysis would be an invaluable contribution to the literature.

(1a) Gender. Research examining the gender differences in combat-related PTSD risk has produced mixed results. Some researchers have found that females are at greater risk of developing PTSD post-deployment than males (Hourani, Williams, Bray, & Kandel, 2015; Polusny et al., 2014; Luxton, Skopp, & Maguen, 2010; Smith et al., 2008), whereas others have found no gender differences (Cohen et al., 2015; Woodhead, Wessely, Jones, Fear, & Hatch, 2012; Vogt et al., 2011; Rona, Fear, Hull, & Wessely, 2007). Vogt et al. (2011) found no significant gender differences but advocated the need for a longitudinal study to explore gender differences in more long-term effects of combat exposure on PTSD symptomology.

Hourani et al. (2015) conducted a systematic – albeit cross-sectional, not longitudinal – investigation on this topic. First, Hourani et al. (2015) established three factors of combat experience on deployment: (1) combat exposed (e.g. encountered mines or IEDs), (2) violence (e.g. engaged in hand-to-hand combat), and (3) bodies exposed (e.g. handled or saw dead bodies). Subsequently Hourani et al. (2015) found gender differences for many of the items included in the ‘violence’ factor – females typically reported significantly greater PTSD symptoms than males – but far fewer significant gender differences for items in the ‘combat exposure’ and ‘bodies exposed’ factors (Hourani et al., 2015). These findings indicate that gender differences in the development of deployment-related PTSD symptomology may be dependent on the type of exposure, e.g. combat exposed, violence, or bodies exposed.

(1b) Marital status. Military deployment literature consistently demonstrates that service personnel who are single are at elevated risk of developing PTSD following combat experiences on deployment. Riddle et al. (2007) report that the prevalence of combat-related PTSD is higher for service personnel who are single than for those who are married. Similarly, in a study using United States Millennium Cohort data, Smith et al. (2008) found that self-reported PTSD symptoms were significantly higher among cohort members who

were divorced or never married, in comparison to cohort members who were married. Booth-Kewley et al. (2010) found that divorced Marines were at greater risk of developing symptoms of PTSD than Marines who were currently married or never married. Most expressly, Iversen et al. (2008) found that PTSD symptoms were significantly more frequent among single service personnel (single, divorced, widowed, or separated) than among service personnel in a relationship (married or cohabitating). Together these four slightly different pieces of research indicate that having a partner is a protective factor for combat-related PTSD, whereas being single is a risk factor, particularly when divorced.

(1c) Ethnicity. Conflicting results have been found by studies exploring the relationship between ethnicity and the development of combat-related PTSD symptomology. Some researchers report that military personnel of ethnic minority groups are at greater risk of developing PTSD post-deployment (Kaczurkin et al., 2016; Koo, Hebenstreit, Madden, and Maguen, 2016; Smith et al., 2008; Ruef, Litz, & Schlenger, 2000), whereas a number of other researchers report no significant ethnic group differences (Muralidharan, Austern, Hack, & Vogt, 2016; Friedman, Schnurr, Sengupta, Holmes, & Ashcraft, 2004; Monnier, Elhai, Frueh, Sauvageot, & Magruder, 2002; Trent, Rushau, Munley, Bloem, & Driesenga, 2000). Kaczurkin et al. (2016) found that following deployment, Hispanic/Latino and African American (ethnic minorities) service personnel reported significantly greater PTSD symptomology than non-Hispanic Caucasian service personnel (ethnic majority). The authors concluded that these ethnic group differences could reflect true differences or differences in the expression of PTSD symptoms (Kaczurkin et al., 2016). Accordingly, Koo et al. (2016) found differences in the clustering of PTSD symptoms by ethnic group. Together the aforementioned two studies indicate a need for further investigation into culturally different expressions of PTSD, particularly if measures of PTSD are to be considered reliable.

Conversely, Muralidharan et al. (2016) compared the deployment experiences and post-deployment mental health outcomes of African American, Caucasian, and Hispanic veterans of American forces. This study found that African American and Hispanic females (ethnic minorities) were significantly more likely than Caucasian females (ethnic majority) to report symptoms of anxiety post-deployment, but that this difference disappeared once the contribution of perceived threat and social support had been accounted for (Muralidharan et al., 2016). Ethnic groups were not significantly different in their experiences of either PTSD or depression post-deployment (Muralidharan et al., 2016). These results prompt future research to explore the role that group differences in pre-deployment characteristics and experiences might play in accounting for ethnic differences in the expression of PTSD and other psychopathology post-deployment.

(1d) Age. The nature of the relationship between age and the subsequent risk of developing combat-related PTSD is not well defined in the current literature. It is possible that this ambiguity has arisen because analyses of the relationship between age and PTSD are largely peripheral, and not the focus of investigation. Nonetheless, Booth-Kewley et al. (2010), Riddle et al. (2007), and Iversen et al. (2008) each found a stronger association between PTSD symptomology and younger age, than between PTSD and older age. In particular Riddle et al. (2007) found that service personnel aged 17-24 showed the greatest prevalence of not only PTSD, but also major depressive disorder, panic syndrome, other anxiety syndrome, alcohol abuse, and eating disorders. Whereas Smith et al. (2008) purported that self-reported symptoms of new onset PTSD (no symptoms of PTSD shown at baseline) were proportionately higher among younger service personnel, but that persistent PTSD symptoms (symptoms of PTSD shown at baseline) were proportionately higher in older service personnel. Notably, a meta-analysis conducted by Xue et al. (2015) reviewed thirty-

two studies of combat-related PTSD risk factor research and concluded that younger age was not a risk factor. This apparent discord in the literature highlights a need for further research.

(2a) Deployment experience. Extant literature reveals mixed results regarding the relationship between deployment experience and the risk of developing symptoms of PTSD. Research on this topic has found evidence for a negative (Adler, Huffman, Bliese, & Castro, 2005; Martinez, Huffman, Adler, & Castro, 2000), a positive (Kline et al., 2010; Polusny et al., 2009; Reger, Gahm, Swanson, & Duma, 2009), and even a non-existent relationship (Fear et al., 2010) between deployment experience and PTSD symptoms. Martinez et al. (2000) found that soldiers who had previously deployed on one or more peacekeeping missions showed significantly lower levels of psychological distress than soldiers who had not previously been deployed. Similarly, Adler et al. (2005) revealed that soldiers with previous deployment experience reported lower PTSD and depression symptoms upon their return home from a peacekeeping mission. The findings of these two studies suggest that deployment experience is protective for service personnel, whereas deployment novelty creates a vulnerability. Both studies used samples of soldiers returning from non-combat missions, therefore it is worth noting the possibility that different results could have been obtained had the soldiers been returning from combat missions. Fittingly, Kline et al. (2010) used a sample of American soldiers returning home from combat deployment to either Afghanistan or Iraq. This study found that soldiers who had previously deployed (to Afghanistan or Iraq) were more than three times as likely as soldiers who had not previously deployed to screen positive for PTSD and major depression (Kline et al., 2010). This result indicates that cumulative combat deployment experience may lead to the erosion of psychological wellbeing.

Interestingly, a study by Killgore, Stetz, Castro, and Hoge (2006) observed that the percentage of soldiers who screened positive for PTSD was not significantly different

between soldiers who had deployed before (experienced) and soldiers who had not deployed before (inexperienced). But that combat-experienced soldiers showed relatively higher somatic symptoms (e.g. sleep disturbance) and relatively lower affective symptoms (e.g. depressed mood), than combat-inexperienced soldiers (Killgore et al., 2006). The authors theorised that this result was due to combat-experienced soldiers using emotion-repressing coping strategies (Killgore et al., 2006). The mixed results regarding the nature of the relationship between deployment experience and PTSD prompts further research on the topic.

(2b) Military rank. Studies consistently show that service personnel in the enlisted ranks (i.e. lower ranks) report higher levels of combat-related PTSD symptoms than service personnel in the officer ranks (i.e. higher ranks) (Armenta et al., 2018; Blackburn & Owens, 2016; Jones et al., 2013; Seal et al., 2009; Iversen et al., 2008; Smith et al., 2008; Adler, Vaitkus, & Martin, 1996). A study by Adler et al. (1996) conducted with Gulf War veterans revealed that enlisted service members were between two and three times as likely as officers to meet the criteria for PTSD. Similarly, Seal et al. (2009) collected data from veterans of Afghanistan and Iraq and found that enlisted rank status was associated with elevated risk of developing PTSD symptomology. Seal and colleagues (2009) reasoned that enlisted status is a proxy for combat exposure and therefore attributed their results to the tendency for enlisted members to have experienced greater and more risky combat exposure. Additionally, Blackburn and Owens (2016) noted that enlisted service members have a less significant role in deployment decision making than officers. Subsequently Blackburn and Owens (2016) proposed that lesser autonomy plays a role in the relationship between enlisted rank and elevated risk of developing PTSD.

(2c) Military service. Extant research concurs that Army service personnel, in comparison to personnel of the other military services, are more at risk of developing symptoms of PTSD post-deployment. Researchers are less in agreement with regards to the

vulnerability of service personnel belonging to the other services including the Navy, Coast Guard, Air Force, and Marine Corps. Riddle et al. (2007) conducted a systematic analysis and revealed that six mental health disorders (e.g. major depressive disorder and alcohol abuse), including PTSD, were more prevalent in their sample of Army personnel than in their samples of Air Force, Navy/Coast Guard, and Marine Corps personnel. Similarly, Smith et al. (2008) reported that following deployment new onset self-reported symptoms of PTSD were proportionately higher among Army personnel than among Air Force, Navy/Coast Guard, and Marine Corps personnel. For each military service included in this study the people who had deployed and reported combat experiences were significantly more likely, than the respective group who did not deploy, to report PTSD symptoms (Smith et al., 2008). In the same year Iversen et al. (2008) reported an association between service and PTSD, such that Army and Navy personnel showed more symptoms of PTSD than both Air Force and Marine Corps personnel. However, the sample sizes in this study were very small and therefore may diminish the reliability of these findings. Later Hines et al. (2014) observed that Army and Marine Corps personnel displayed higher PTSD prevalence rates than Navy and Air Force personnel. Perhaps the most comprehensive finding is derived from a meta-analysis conducted by Xue et al. (2015). Xue et al. (2015) examined 32 studies and determined that Army service personnel are significantly more likely to report PTSD symptoms than members of the Marine Corps, Air Force, Navy, or Coast Guard.

Pre-Deployment Risk Factors for Psychological Distress Development

Several demographic variables have been identified as risk factors for the onset of post-deployment depression and anxiety. These risk factors are similar to the aforementioned pre-deployment PTSD risk factors and include enlisted rank status (i.e. lower rank), unmarried relationship status, current or past smoker, younger age, baseline PTSD symptomology, and lower level of education (Wells et al., 2010). Booth-Kewley, Highfill-

McRoy, Larson, Garland, and Gaskin (2012) pioneered research to explore which deployment related factors – other than combat exposure – might explain service person vulnerability to depression and anxiety following deployment. Subsequently, Booth-Kewley et al. (2012) found that post-deployment depression was significantly associated with five factors: non-combat stressors, combat exposure, attitudes towards leadership, symptoms of traumatic brain injury, and marital status. At the same time, post-deployment anxiety was significantly associated with four of the same factors with the exclusion of marital status (Booth-Kewley et al., 2012). Elucidation of the vulnerability to post-deployment depression and anxiety remains an avenue of research that begs further exploration, particularly given the use of cross-sectional data in the extant literature.

Comorbidity of Posttraumatic Stress Disorder with Other Mental Health Issues

In addition to increased risk of PTSD, operational deployment can have a multitude of negative impacts on the psychological wellbeing of military personnel. International research has linked military deployment with increased risk of depression, anxiety, and alcohol and substance misuse (Garber, Zamorski, & Jetly, 2012; Fear et al., 2010; Milliken, Auchterlonie, & Hoge, 2007). Poor mental health outcomes can result in considerable stress for the individual, their family, the Defence Force, mental health providers, and the community. Specific implications could include: reduced emotional quality of life for the individual, damaging impacts on family functioning, relationship breakdown, diminished performance in theatre and upon return home, military attrition, and strain on mental health providers (Milliken et al., 2007).

PTSD is regarded as the mental health issue most characteristic of combat-related potentially traumatic events. However, a large body of research establishes that veterans are more likely to screen positive for PTSD and an additional mental health issue than they are to screen positive for PTSD alone. Studies provide evidence for the comorbidity of PTSD and a

number of other mental health issues including: major depression, dysthymia, generalised anxiety disorder, social phobia, panic disorder, alcohol abuse/dependence, or substance abuse/dependence (Ginzburg, Ein-Dor, & Solomon, 2010; Hashemian, Khoshnood, & Desai, 2006; Koenen et al., 2003; Engdahl, Dikel, Eberly, & Blank, 1998; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Moreover, Ginzburg et al. (2010) reported that nearly half of the veterans in their 20-year longitudinal study showed triple lifetime comorbidity, namely suffering PTSD, depression, and anxiety. Researchers have long questioned the nature – specifically, the direction over time – of the relationships between and among PTSD, depression, and anxiety. Researchers have found evidence that PTSD precedes in time any comorbid mood disorder, and therefore PTSD is considered to be the core of a post-combat disordered psychological response (Ginzburg et al., 2010; Koenen et al., 2003; Kessler et al. 1995). Ginzburg and colleagues (2010) found that PTSD predicted the development of both depression and anxiety, as well as comorbid depression and anxiety, whereas, experiencing either depression or anxiety did not predict PTSD. This pattern of results elucidates the findings in the extant literature and reinforces the notion that PTSD is the dominant response, which, over time, facilitates the development of depression and anxiety. Notably, the aforementioned triple comorbidity (PTSD, anxiety, and depression) amplifies the sufferers' distress and culminates in more severe PTSD symptoms and greater psychosocial difficulties (Ginzburg et al., 2010; Maes, Mylle, Delmeire, & Altamura, 2000). Next steps for research should further unravel this pernicious triple comorbidity.

Changes in Post-Deployment Psychopathology over Time

An extensive body of literature details the disordered psychological responses to stressors experienced on military deployment. However, an interconnected body of literature indicates that fortunately the majority of people respond well to potentially traumatic events following deployment. Accordingly, Bonanno (2004) noted that not everyone copes with the

experience of a traumatic event in the same way, but that the majority of people show resilience. Resilience describes the ability to maintain a relatively stable and healthy level of psychological functioning in response to stressors (Bonanno, 2004). A person exhibiting a resilient response trajectory may still experience disruptions to healthy psychological functioning, however this disruption will be short-lived, with symptoms likely intermittent and lasting only several weeks (Bonanno, 2004). Subsequent research using military samples concur that the majority of service personnel, whether on a combat or peacekeeping mission, show a resilient trajectory following deployment. Specifically, Dickstein, Suvak, Litz, and Adler (2010) reported that 84% of their sample followed the ‘resilience’ trajectory whereby personnel showed no significant changes in PTSD symptomology after a peacekeeping mission. Similarly, Bonanno et al. (2012) found that 85% of their sample followed a ‘low-stable’ trajectory, meaning that their symptoms of PTSD were consistently low after a combat mission in Afghanistan.

Success of the Transition Home

As evidenced above, the stressors experienced on deployment – both combat and non-combat – can result in poor mental health outcomes. This symptomology can subsequently impact how successfully military personnel reintegrate back into home and work life after a deployment (Adler, Britt, Castro, McGurk, & Bliese, 2011a). Conversely, anticipation of one’s homecoming can be a source of significant stress for military personnel and can exacerbate or trigger poor mental health outcomes (Adler et al., 2011a). Adler, Zamorski, and Britt (2011b) explain that having unrealistic expectations about homecoming is likely to result in a more difficult transition, largely because people are prone to underestimating or overestimating the impact of large and small events, respectively, on wellbeing.

Adler et al. (2011b) explain that the transition home from military deployment is not a static event, but a process; a challenging and iterative process that involves physical,

emotional/cognitive, and social dimensions. Each dimension can include both positive and negative changes. The physical dimension encompasses physical adjustments, for instance needing to reduce hypervigilance, experiencing increased privacy, and adopting different sleeping patterns (Adler et al., 2011b). The emotional/cognitive dimension encompasses the management of emotions, for instance joy at seeing family again, grief for deceased comrades, appreciation for life, and boredom with routine work (Adler et al., 2011b). The social dimension encompasses adjustments to relationships, for instance re-establishing the connection between family and friends, loss of cohesion with the deployed unit due to dispersion upon return home, and difficulty engaging with peers in the home unit who did not deploy (Adler et al., 2011b). Ultimately it is clear that the transition home from deployment can result in many positive and meaningful changes, but can also be arduous, fraught, and can unsurprisingly induce considerable stress for service personnel anticipating their homecoming.

A poor or difficult reintegration can have negative ramifications for the individual, their family, friends, colleagues, and for their military organisation. The importance of a positive transition home is epitomised by research conducted by Bolton, Litz, Glenn, Orsillo, and Roemer (2002), which revealed a significant association between one's perception of their homecoming reception and the success of one's adaptation home. Expressly, positively perceiving one's homecoming reception was significantly associated with lower PTSD symptomology (Bolton et al., 2002). The authors explain that the perceived success of a service member's homecoming reception influences their subsequent efforts to cope with, appraise, and validate their deployment experiences (Bolton et al., 2002). It is evident that militaries and families can take action to alleviate some of the stress caused by the anticipation of and actual homecoming.

The previous sections have largely explored the negative impacts that operational deployment can have on the psychological wellbeing of military personnel. The vast majority of contemporary research on military deployment examines the prevalence of and risk factors for the development of PTSD and related psychopathology post-deployment. However, it is also important to consider the possibility of positive psychological outcomes of deployment for military personnel. The next section will discuss the evidence for personal growth as a result of deployment.

Positive Impacts of Deployment on Psychological Wellbeing

Relatively new research in the field of positive psychology provides evidence that a traumatic experience can result in a positive psychological outcome. In essence, experiencing a traumatic event and grappling with any subsequent negative psychological outcomes can facilitate personal growth. Growth research is burgeoning and has already touched on a wide range of samples including: cancer patients (Danhauer et al., 2013); victims of sexual assault (Frazier, Tashiro, Berman, Steger, & Long, 2004); refugees (Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003); and – most relevantly – military personnel (Tedeschi, 2011). These findings hold promise for use by militaries to ultimately reduce the psychological harm suffered by their service people.

This concept was coined ‘posttraumatic growth’ (PTG) by Tedeschi and Calhoun (1996) and defined as the positive change that occurs as a result of a struggle with trauma and its psychological consequences. Tedeschi and Calhoun (2004) explain that PTG begins with the experience of a traumatic event which challenges a person’s emotional capability, as well as their beliefs about life and their place in life. Subsequently the individual must cognitively process the event; a deep, iterative process that can be facilitated by self-disclosure (e.g. journal writing) and social support (e.g. attending a support group) (Tedeschi & Calhoun, 2004). Next, the event and emotion processing prompt a person to amend their beliefs about

life and their life story (Tedeschi & Calhoun, 2004). Finally, the changes that occur as a result of PTG are characterised by five domains of perceived benefits: new possibilities, relating to others, personal strength, spiritual change, and appreciation for life (Tedeschi & Calhoun, 2004; Tedeschi & Calhoun, 1996).

PTG literature argues that stress and growth are not mutually exclusive, and that in fact positive outcomes often arise from challenging life experiences (Tedeschi & Calhoun, 2004; Tedeschi & Calhoun, 1996). Research indicates that PTG is positively associated with perception of life-threat (Maguen, Vogt, King, King, & Litz, 2006). Correspondingly, research shows a positive relationship between PTSD and posttraumatic growth (Solomon & Dekel, 2007). The coexistence of both trauma and positive outcomes sounds somewhat counterintuitive, however Fontana and Rosenheck (1998) offer the explanation that surviving and coping with trauma fortifies self-esteem and belief in one's abilities.

Only a handful of studies have been conducted with military samples to explore the idea of combat exposure promoting PTG. A comprehensive review of war experience literature by Schok, Kleber, Elands, and Weerts (2008) concluded that veterans were more likely to report positive effects of their war experiences than they were to report negative effects. The authors organised these positive effects into three categories of change: (1) self-image (e.g. enhanced confidence and coping skills), (2) social relationships (e.g. increased compassion and decreased prejudice), and (3) personal growth/life priorities (e.g. greater appreciation of life, peace, and family) (Schok et al., 2008). In summary, military personnel who experienced potentially traumatic events typically perceived their deployment as challenging, an opportunity to use and develop their skills and training, and a meaningful personal contribution (Schok et al., 2008).

The nature of the relationship between combat exposure, PTSD, and PTG has thus far been rarely explored. However, Aldwin, Levenson, and Srip (1994) found a statistical

mediation such that one's appraisal (positive or negative) of a combat experience explained the relationship between combat exposure and PTSD symptoms. For instance, a positive appraisal of one's combat experiences decreased the strength of the relationship between combat exposure and PTSD; resulting in lower PTSD symptoms. Similarly, Wood, Britt, Wright, Thomas, and Bliese (2012) found a statistical moderation such that soldiers who showed higher levels of benefit finding (the ability to find value in stressful or traumatic experiences) also reported lower levels of PTSD post-combat exposure than soldiers who reported lower levels of benefit finding. However, the results of Wood et al. (2012) indicated that benefit finding was a successful buffer for soldiers on shorter deployments (3 or 6 months), but not for soldiers on longer deployments (9 or 12 months). Likewise, Fontana and Rosenheck (1998) found a curvilinear relationship between psychological benefits (e.g. solidarity with others) and combat exposure, suggesting that at intermediate levels of trauma exposure people are able to translate the trauma into growth, but that at lower and higher levels of trauma exposure the relationship between trauma and growth is weaker.

The aforementioned studies indicate that the ability to positively create meaning from traumatic experiences mitigates the relationship between potentially traumatic events and negative psychological outcomes. But this ability seems to be a limited resource; there is a point at which stressors (e.g. length of deployment, severity of combat exposure) exceed one's ability to translate trauma into benefit. The palpable benefit of PTG and the promise it holds for psychotherapy led Tedeschi and McNally (2011) to develop the Comprehensive Soldier Fitness Programme for the United States Army. This programme was designed to strengthen resilience and increase the likelihood of PTG for deploying soldiers (Tedeschi & McNally, 2011).

Rationale of the Current Study

The purpose of the current study was to examine the impacts of operational deployment on the psychological wellbeing of NZDF personnel. This goal was achieved utilising data collected from routine psychological screening undertaken by the NZDF post-deployment. The NZDF collects screening data from their serving military personnel at two time points post-deployment: immediately following deployment (time 1) and six months after their return home (time 2). These data were used in the current study to explore the relationships over time among the following variables: combat stressors, non-combat stressors, PTSD, psychological distress, PTG, anticipated adjustment difficulty, and transition stressors. This study contributes to the deployment literature given the dearth of extant research with New Zealand military personnel. In particular, this research was designed to examine whether findings evidenced with predominantly American, British, or Canadian military samples would replicate with a New Zealand sample. The hypotheses posed for this study are discussed below.

Does Trauma and Stress During Deployment Predict Poorer Outcomes Later?

Existing deployment-related research demonstrates that both combat and peacekeeping deployments commonly expose service personnel to potentially traumatic events (Adler et al., 2003). Further, research into PTSD development post-deployment reveals that these potentially traumatic events can directly and significantly contribute to adverse psychological outcomes such as PTSD (Pietrzak et al., 2011; Rona et al., 2009). Therefore, Hypothesis 1a was:

- **Hypothesis 1a:** combat stressors reported at time 1 would predict PTSD symptoms longitudinally at time 2.

Military deployment can also be a source of a considerable non-combat stress. Causes of such stress might include overload of work or being away from friends and family. Studies

show significant associations between non-combat stressors on deployment and subsequent poor mental health outcomes, including anxiety, depression, and PTSD (Booth-Kewley et al., 2010; Engelhard & van den Hout, 2007; Vogt et al., 2005; King et al., 1995). However, it is likely that whilst these stressors contribute to poorer outcomes, they do not directly predict the development of PTSD. Therefore, Hypothesis 1b was:

- **Hypothesis 1b:** non-combat stressors at time 1 would not predict PTSD symptoms longitudinally at time 2.

Literature has linked operational deployment with increased risk of depression and anxiety (Garber et al., 2012; Fear et al., 2010; Milliken et al., 2007). In fact, studies reveal that military personnel who develop PTSD post-deployment are most likely to develop at least one other comorbid mental health issue, for example depression or anxiety (Ginzburg et al., 2010; Hashemian et al., 2006; Koenen et al., 2003; Engdahl et al., 1998; Kessler et al., 1995). Researchers have also found evidence that PTSD precedes in time any comorbid mood disorder and thus PTSD is considered to be the core of a post-combat disordered psychological response (Ginzburg et al., 2010; Koenen et al., 2003; Kessler et al. 1995).

Therefore, Hypothesis 1c was:

- **Hypothesis 1c:** psychological distress at time 1 would not predict PTSD symptoms longitudinally at time 2.

Research demonstrates that the majority of military personnel will follow a resilience trajectory after a deployment; healthy psychological functioning may be temporarily disrupted (i.e. PTSD symptoms) following a potentially traumatic event, but soon returns to equilibrium (Bonanno, 2004). Therefore, Hypothesis 2 was:

- **Hypothesis 2:** the level of PTSD symptoms would be significantly higher at time 1 than at time 2.

Nascent literature indicates that the relationship between combat events and PTSD symptoms may have a curvilinear component (Adler et al., 2009). Therefore, Hypothesis 3 was:

- **Hypothesis 3:** the longitudinal relationship between combat stressors at time 1 and residualised PTSD symptoms at time 2 would have a curvilinear component.

Studies indicate that service personnel who experience both combat and non-combat stressors are likely to report higher levels of PTSD symptomology post-deployment, than personnel who experience combat stressors alone (Interian et al., 2014; Vasterling et al., 2010). Therefore, Hypothesis 4 was:

- **Hypothesis 4:** non-combat stressors at time 1 would moderate (exacerbate) the longitudinal relationship between combat stressors at time 1 and PTSD symptoms at time 2.

As discussed above, the majority of military personnel are resilient and relatively resistant to the possible long-term negative impacts of deployment (Bonanno et al., 2012; Dickstein et al., 2010; Bonanno, 2004). These studies explored the trajectory of PTSD symptomology, however when considering the comorbid nature of the relationship between PTSD and psychological distress (Ginzburg et al., 2010; Hashemian et al., 2006; Koenen et al., 2003; Engdahl et al., 1998; Kessler et al., 1995), it is feasible to expect to see a similar pattern for psychological distress (i.e. reductions in symptoms of depression and anxiety) across time.

Hypothesis 5: the level of psychological distress would be significantly higher at time 1 than at time 2.

Hypothesis 6 is based on the aforementioned research which supports Hypothesis 2c, whereby PTSD precedes in time any comorbid mood disorder, and is considered to be the

core of the disordered psychological response to trauma (Ginzburg et al., 2010; Koenen et al., 2003; Kessler et al. 1995).

- **Hypothesis 6:** PTSD symptoms at time 1 would predict an increase in psychological distress longitudinally from time 1 to time 2.

As mentioned previously, research suggests that the relationship between combat events and PTSD symptoms may have a curvilinear component (Adler et al. 2009).

Further, as studies (Ginzburg et al., 2010; Koenen et al., 2003; Kessler et al. 1995) indicate that psychological distress is comorbid, but secondary in time, to PTSD it is possible that the relationship between PTSD and distress may also have a curvilinear component. Therefore, Hypothesis 7 was:

- **Hypothesis 7:** the longitudinal relationship between PTSD at time 1 and residualised psychological distress at time 2 would have a curvilinear component.

Findings in the literature show that the risk of developing depression or anxiety is significantly associated with combat exposure (Wells et al., 2010; Sareen et al., 2007).

Research also indicates that PTSD at least partially explains this relationship between combat exposure and depression and anxiety (Koenen et al., 2003). Therefore, Hypothesis 8 was:

- **Hypothesis 8:** PTSD symptoms would mediate the effect of combat stressors on the outcome of psychological distress.

Who is Most Vulnerable to the Development of Psychopathology Post-Deployment?

Despite lack of consistency in the literature, many possible pre-deployment risk factors for the development of PTSD symptoms and psychological distress symptoms were considered and hypotheses formed. These pre-deployment risk factors are categorised as either socio-demographic factors (Hypotheses 9, parts a-j) or military factors (Hypotheses 10, parts a-f). Hypotheses 9a-j and 10a-f were:

- **Hypotheses 9a and 9b:** females would report significantly higher levels of PTSD symptoms (Hypothesis 9a) and psychological distress (Hypothesis 9b) post-deployment than males.
- **Hypotheses 9c and 9d:** individuals who are single would report significantly higher levels of PTSD symptoms (Hypothesis 9c) and psychological distress (Hypothesis 9d) post-deployment than individuals in a relationship (coupled).
- **Hypotheses 9e and 9f:** service personnel of ethnic minority groups (Asian, Maori, Other, Other European, and Pacific Islander) would report significantly higher levels of PTSD symptoms (Hypothesis 9e) and psychological distress (Hypothesis 9f) post-deployment than service personnel who identify as the New Zealand ethnic majority (New Zealand European).
- **Hypotheses 9g and 9h:** younger personnel would report significantly higher levels of PTSD symptoms (Hypothesis 9g) and psychological distress (Hypothesis 9h) post-deployment than older personnel.
- **Hypotheses 10a and 10b:** service personnel with greater deployment experience would report significantly higher levels of PTSD symptoms (Hypothesis 10a) and psychological distress (Hypothesis 10b) than service personnel with less deployment experience.
- **Hypotheses 10c and 10d:** lower ranked personnel would report significantly higher levels of PTSD symptoms (Hypothesis 10c) and psychological distress (Hypothesis 10d) post-deployment than higher ranked personnel.

- **Hypotheses 10e and 10f:** Army personnel would report significantly higher levels of PTSD symptoms (Hypothesis 10e) and psychological distress (Hypothesis 10f) post-deployment than Navy and Air Force personnel.

Can Deployment-Related Trauma Facilitate Personal Growth?

Posttraumatic growth research indicates that stress and growth are not mutually exclusive, and that in fact positive outcomes often arise from challenging life experiences (Tedeschi & Calhoun, 2004; Tedeschi & Calhoun, 1996). Research shows a positive relationship between PTSD and PTG (Solomon & Dekel, 2007). The nature of the relationship between combat exposure, PTSD, and PTG is yet to be fully understood. However, as extant literature describes PTG as a product of coping with the negative psychological outcomes of traumatic events (Tedeschi & Calhoun, 1996), it was expected that PTSD would facilitate the relationship between combat stressors and PTG. Therefore, Hypotheses 11a, 11b, and 12 were:

- **Hypothesis 11a:** PTSD symptoms at time 1 would predict PTG longitudinally at time 2.
- **Hypothesis 11b:** combat stressors would not predict PTG longitudinally at time 2.
- **Hypothesis 12:** PTSD symptoms would mediate the effect of combat stressors on the outcome of PTG.

One study found evidence that at intermediate levels of trauma exposure people are able to translate trauma into growth, but that at lower and higher levels of trauma exposure the relationship between trauma and growth is weaker (Fontana & Rosenheck, 1998). Therefore, Hypothesis 13 was:

- **Hypothesis 13:** the longitudinal relationship between combat stressors at time 1 and residualised PTG at time 2 would have a curvilinear component.

Resilience research indicates that with increased distance in time from deployment both symptoms of PTSD and psychological distress are likely to decrease (Bonanno, 2004). As PTSD and PTG share a positive relationship (Solomon & Dekel, 2007) it is possible that similarly to PTSD, PTG also decreases across time. Therefore, Hypothesis 14 was:

- **Hypothesis 14:** the level of PTG would be significantly higher at time 1 than at time 2.

Success of the Transition Home

Research indicates that poor mental health post-deployment can influence how successfully military personnel transition home, and that the stress of anticipating the transition can influence mental health post-deployment (Adler et al., 2011a). Therefore, Hypotheses 15a and 15b were:

- **Hypothesis 15a:** higher PTSD symptoms and psychological distress at time 1 would predict higher transition stress at time 2.
- **Hypothesis 15b:** higher anticipation of adjustment difficulty at time 1 would predict higher transition stress, PTSD symptoms, and psychological distress at time 2.

Method

Participants

Participants were 1410 NZDF personnel who were operationally deployed between 1 July 2015 and 31 October 2016. Participants completed psychological screens at two time points six months apart. The first time point (time 1) was upon returning to New Zealand from deployment, and the second time point (time 2) was six months after returning to New Zealand. Frequencies for participant demographics are presented below in Table 1. As expected attrition occurred; there was a number of participants ($N=507$) who completed the first questionnaire but did not complete the second questionnaire.

Data from 1410 participants were included in this study. The majority of participants were male (84%). Participants were more likely to be serving in the Army (47%), than serving in the Navy (29%) or Air Force (24%). All participants were over the age of 17 due to NZDF minimum enlistment requirements, with the greatest number of participants in the youngest two age categories 17-24 (27%) and 25-29 (25%). Participants came from a range of ranks, however most were either junior other ranks (44%) or senior other ranks (27%), as opposed to junior officers (19%) or senior officers (10%). Nearly all participants were Regular Force personnel (98%). Two-thirds of the participants (66%) had been deployed (for more than 30 days) at least twice or more, including the current deployment. The majority of participants were in a couple (70%), with only 30% being single.

Table 1

Demographic Data for Participants in the Study

		Time 1		Time 2	
		<i>N</i>	%	<i>N</i>	%
Gender					
	Female	223	16%	128	14%
	Male	1187	84%	775	86%
Service					
	Navy	414	29%	233	26%
	Army	654	47%	463	52%
	Air Force	338	24%	203	23%
Age					
	17-24	348	27%	201	22%
	25-29	322	25%	237	27%
	30-34	220	17%	158	18%
	35-39	135	11%	107	12%
	40-44	113	9%	87	10%
	45-49	87	7%	61	7%
	50+	54	4%	43	5%
Ethnicity					
	NZ European	977	71%	640	71%
	Maori	245	18%	168	19%
	Pacific Islander	55	4%	28	3%
	Other	54	4%	33	4%
	Other European	39	3%	20	2%
	Asian	16	1%	13	1%
Rank					
	Junior other ranks	557	44%	338	38%
	Senior other ranks	339	27%	257	29%
	Junior officers	238	19%	201	23%
	Senior officers	123	10%	85	10%
Engagement type					
	Regular Force	1259	98%	877	98%
	Reserve Force	23	2%	18	2%
Number of deployments					
	One deployment	432	34%	274	31%
	Two or more deployments	845	66%	615	69%
Marital status					
	Single	381	30%	229	26%
	Coupled	898	70%	668	75%
Total sample		1410		903	

Materials

This study utilised data collected as part of psychological screening administered by the NZDF. Two pen and paper format psychological screens were administered by NZDF

immediately following deployment (time 1) and the second screen was six months after their return home (time 2). Both screening questionnaires included the following three scales (see Appendix C), the Kessler Psychological Distress Scale (K10), the Posttraumatic Stress Disorder Checklist – Civilian Form (PCL-C), and the Posttraumatic Growth Inventory – Short Form (PTGI-SF). The remainder of each questionnaire (see Appendix C) differed in order to assess time-specific issues (e.g. time 1 measured the number of potentially traumatic events experienced during the deployment). Analyses were conducted using IBM SPSS Statistics 22, IBM SPSS Amos 22, and ModGraph (Jose, 2013).

Measures

Demographics. A number of demographic questions were asked, including gender, service, age, ethnicity, rank, type of engagement, number of deployments, and marital status. Gender was measured with the options “Male” and “Female”. Service was measured with the options “RNZN” (Navy), “NZ Army” (Army), and “RNZAF” (Air Force). Age was measured with the options “16-19”, “20-24”, “25-29”, “30-34”, “35-39”, “40-44”, “45-49”, and “50+”. For the purposes of analysis (due to small sample size and minimum enlistment requirements) two age groups “16-19” and “20-24” were recoded into one group “17-24”. Ethnicity was measured with the options “NZ European”, “Maori”, “Asian”, “Other European”, “Pacific Islander”, and “Other”. Rank was measured with the options “PTE(E)”, “JNCO(E)”, “SNCO(E)”, “WO(E)”, “2LT-CAPT(E)”, and “MAJ-COL+(E)”. For the purposes of analysis rank groups were recoded into four groups ordered by level of authority, (1) junior other ranks (“PTE(E)” and “JNCO(E)”), (2) senior other ranks (“SNCO(E)” and “WO(E)”), (3) junior officers (“2LT-CAPT(E)”), and (4) senior officers (“MAJ-COL+(E)”). The term ‘other rank’ refers to personnel of non-commissioned ranks, and the term ‘officer’ is used to refer to personnel of commissioned ranks (UK Ministry of Defence, 2018). Officers are commissioned by the New Zealander Governor General on behalf of the New

Zealand Sovereign; this practice presents officers with their authority (UK Ministry of Defence, 2018). Type of engagement was measured with the options “Regular Force” and “Reserve Force”. Number of deployments was measured with the options “One”, “Two”, “Three”, “Four”, and “Five +”. For the purposes of analysis this question was also recoded into “One deployment” and “Two or more deployments”. Relationship status was measured with the options “Single”, “Girlfriend/Boyfriend”, “Married”, and “Defacto Partner”. For the purposes of analysis this question was recoded into “Single” and “Coupled”, with the “Coupled” group comprised of the latter three marital statuses.

Kessler Psychological Distress Scale (K10). The K10 is a 10-item scale designed by Kessler et al. (2002) to assess psychological distress based on symptoms of anxiety and depression. The K10 is used for screening, clinical, and research purposes. Participants were asked to indicate the frequency at which they had felt each item in the past four weeks using a five-point scale, from 1 ‘*none of the time*’ to 5 ‘*all of the time*’. Items measure experiences of anxiety (e.g. “So nervous that nothing could calm you down”) and depression (e.g. “So sad that nothing could cheer you up”). The K10 was used at both time 1 and time 2. The minimum score is 10 and indicates no psychological distress, and the maximum score is 50 and indicates severe psychological distress (Kessler et al., 2002). Excellent internal reliability has been reported at $\alpha = .92$ (Kessler et al., 2002). For the full list of items in the K10, see Kessler et al. (2002).

Posttraumatic Stress Disorder Checklist – Civilian (PCL-C). The Posttraumatic Stress Disorder Checklist (PCL) is a 17-item scale designed by Weathers et al. (1993) to assess the 17 symptoms of PTSD, as defined in the DSM. There are three versions of the PCL, the PCL-M (military) which asks about a “stressful military experience”, the PCL-S (specific) which asks about a specific “stressful experience”, and the PCL-C (civilian) which asks about a “stressful experience from the past” and is not linked to a specific event (U.S.

Department of Veterans Affairs, 2012). The present study used the PCL-C for DSM-IV and this scale was included at both time 1 and time 2.

Using the PCL-C, participants in this study were asked to indicate how much they experienced each of the 17 items using a five-point scale that ranged from 1 '*not at all*' to 5 '*extremely*'. As in the DSM, there are three factors in the PCL: re-experiencing (e.g. "Repeated, disturbing dreams of a stressful experience from the past?"), avoidance (e.g. "Avoiding activities or situations because they reminded you of a stressful experience from the past?"), and arousal (e.g. "Feeling jumpy or easily startled?"). The PCL has yielded excellent internal consistency with Cronbach's alphas ranging between .94 (Blanchard et al., 1996) and .97 (Weathers et al., 1993), as well as an excellent test-retest reliability of .96 at 2-3 days (Weathers et al., 1993). For the full list of items in the PCL-C for DSM-IV, see Weathers, Litz, Huska, and Keane (1994).

Posttraumatic Growth Inventory – Short Form (PTGI-SF). The PTGI-SF is a 10-item scale created by Cann et al. (2010) to measure positive psychological change experienced as a result of a traumatic event or major life crisis. The PTGI-SF was developed from the original 21-item Posttraumatic Growth Inventory (PTGI) designed by Tedeschi and Calhoun (1996). The PTGI-SF asks participants to indicate the extent of change they have experienced for ten items, each on a six-point scale from 1 '*not at all*' to 6 '*very great deal of change*'. There are five factors each measured by two items: personal strength (e.g. "I discovered that I am stronger than I thought I was"), relating to others (e.g. "I have a greater sense of closeness with others"), appreciation of life (e.g. "I have a greater appreciation for the value of my own life"), new possibilities (e.g. "I established a new path for my life"), and spiritual change (e.g. "I have a better understanding of spiritual matters"). The PTGI-SF was included at both time 1 and time 2. Cann et al. (2010) found the PTGI-SF to manifest excellent internal reliability with a Cronbach's alpha consistently in the range of .90 across

several samples (e.g. cancer patients, victims of intimate partner violence, and bereaved parents). For the full list of items in the PTGI-SF, see Cann et al. (2010).

Non-combat stressors. The non-combat stressors scale was developed for the purposes of psychological screening in the NZDF. This scale is a set of eighteen items which assess the level of stress caused by deployment-related issues such as interpersonal relationships, workload, and characteristics of deployment. Participants were asked to indicate to what extent each item caused them trouble or concern at any stage during their deployment. A five-point scale that ranged from 1 '*no stress*' to 5 '*extreme stress*' was used. Three example items were: "Being away from friends and family", "Overload of work", and "Language barriers". The non-combat stressors scale was only included at time 1.

Combat stressors. The combat stressors scale was developed for the purposes of psychological screening in the NZDF. This scale is comprised of ten items, each of which is a potentially traumatic event feasibly experienced on deployment. Participants were asked to indicate how many times they were involved in each of the ten incidents using a four-point scale that ranged from 1 '*0 times*' to 4 '*5 or more times*'. Items included: "Witnessing extreme poverty, starvation, malnutrition", "Receiving small arms or sniper fire", and "Experiencing hostile reactions from civilians". The combat stressors scale was only included at time 1.

Anticipated adjustment difficulty. The anticipated adjustment difficulty scale was developed for the purposes of psychological screening in the NZDF. This is a brief four-item scale used to measure areas of concern about returning home. A four-point scale ranging from 1 '*never*' to 4 '*all of the time*' was used to indicate a participant's level of concern with items such as: "Settling down to normal life after deployment" and "Thoughts of unpleasant events that happened during the deployment". The anticipated adjustment difficulty scale was only included at time 1.

Transition stressors. The transition stressors scale was developed for the purposes of psychological screening in the NZDF. This is a nine-item scale designed to measure the extent of concern or trouble experienced during the transition home after deployment. Participants used a five-point scale, ranging from 1 '*no stress*' to 5 '*extreme stress*', to indicate the amount of stress nine different issues caused them. Examples of the items included: "Relating to others who were not on my deployment", "Being more agitated and easily startled since I have been home", and "Being generally less motivated following my deployment". The transition stressors scale was only included at time 2.

Procedure

The current study makes use of an already existing and current NZDF process whereby participation in two psychological screening questionnaires (time 1 and time 2) is mandatory for NZDF personnel following operational deployment, as part of the Psychological Support to Deployment Programme (PSDP). The PSDP was designed to assist NZDF personnel with their transition back home to New Zealand following operational service. Consequently, NZDF personnel returning home from operational deployment are expected to complete the two questionnaires six months apart, and the questionnaires are completed using pen and paper. The first questionnaire (time 1) is completed immediately following deployment, and the second questionnaire (time 2) is completed six months after return to New Zealand. Both questionnaires are administered by NZDF Organisational Psychologists.

The two psychological screens serve three key purposes for the NZDF: (1) information gathering to guide the provision of post-deployment support; (2) recording of emotional, mental, and general health following deployment; and (3) facilitation of research to better understand and manage the impacts of deployment on the mental health of service personnel. The information sheets (see Appendices A and B) for participants outline these

three purposes and how their personal data would be stored, disclosed, and used to serve these purposes. Participants are advised that their information will be treated confidentially and are asked to sign to acknowledge the terms of storage and use for their data. Though the screens are mandatory in accordance with NZDF policy, service personnel are able to decline participation and are not be penalised for doing so.

NZDF Organisational Research Approval. The NZDF requires that anyone intending to conduct research involving the use of data collected from NZDF personnel must obtain NZDF Organisational Research Approval (Defence Force Order 3, part 14, chapter 5). This is to protect the NZDF personnel participating in the research and to ensure that all personnel research complies with legislation, ethics, and research quality standards. Accordingly, NZDF Organisational Research Approval was sought via the internal NZDF ethics review process, and approval was granted on the 26th of October 2016 (ORG RESEARCH 2016/29).

It was agreed with the NZDF that archival data collected by the NZDF Directorate of Psychology from the Initial (IPQ) and Follow-up (FPQ) Psychological Questionnaires would be provided for the purposes of this study. Specifically, data collected between 1 July 2014 and 31 October 2016 was provided to the researcher after having been anonymised by removing service numbers, service member names, and mission names.

Results

Treatment of Missing Data

In order to determine whether the data were missing completely at random (MCAR), Little's MCAR test was conducted. The Little's MCAR test resulted in a non-significant chi-square test, $\chi^2(33100, N = 1261) = 32896.115, p = .786$, indicating that the data were indeed missing completely at random. Subsequently the data were imputed using the Expectation Maximisation (EM) imputation method in order to maximise statistical power. EM is considered to be an excellent, unbiased, and efficient method of handling missing data, particularly with large data sets (Graham, Cumsille, & Shevock, 2012).

Reliability Analyses

Cronbach's alpha analyses were conducted to assess the internal consistency of each scale utilised in this study (Table 2). Internal consistency refers to the extent to which items within a scale correlate well with each other (Allen & Bennett, 2010). Allen and Bennett (2010) state that a Cronbach's alpha of approximately .9 is ideal, but that an alpha of .7 or higher is acceptable for most research. All scales measured in this study yielded Cronbach's alphas greater than .7, indicating moderate to good internal consistency. Therefore, the scales were judged to be adequate for the purposes of this study.

Table 2

The Cronbach's Alpha for Each Scale Included in this Study

Time 1	α
Posttraumatic growth	.90
Combat stressors	.88
Psychological distress	.87
PTSD symptoms	.87
Non-combat stressors	.82
Anticipated adjustment difficulty	.76
Time 2	α
Posttraumatic growth	.89
PTSD symptoms	.87
Psychological distress	.80
Transition stressors	.70

 $N = 1434$.

In addition to the Cronbach's alpha analyses, test-retest reliabilities were calculated for each of the three scales that were included at both time 1 and time 2. This analysis found that the time 1 and time 2 scores for each of these three scales were positively and statistically significantly correlated with one another (Table 3).

Coolican (2009) states that the strength of a correlation – regardless of positive or negative direction – can be assessed according to the following general rule for the correlation coefficient value: between 0 and .30 is weak, between .31 and .60 is moderate, between .61 and .80 is strong, and between .81 and 1.00 is very strong. In accordance with the aforementioned rule, the correlation coefficient value for posttraumatic growth was strong, whilst the correlation coefficient values for PTSD symptoms and psychological distress were moderate in size. The relatively weaker test-retest reliabilities for the PTSD symptoms and psychological distress scales met expectations when considering factors likely to impact PTSD and distress from time 1 to time 2, including psychological resilience,

decreased proximity to deployment, passage of time, change in location, and change in daily routine for the NZDF service personnel involved in this study.

Table 3

Test-Retest Reliabilities for Scales Included at Both Time 1 and Time 2 in this Study

Scale	Test-retest reliability
Posttraumatic growth	.68**
PTSD symptoms	.48**
Psychological distress	.37**

$N = 1434$.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Descriptive Statistics

The zero-order correlations, means, standard deviations, skewness, and kurtosis for all scales used in the subsequent analyses are reported below in Table 4. Overall, participants tended to report low levels of psychological distress, PTSD symptoms, combat stressors, non-combat stressors, and transition stressors. On the positive side as well, participants expressed moderate levels of posttraumatic growth. This pattern of results indicates that NZDF service personnel reported largely positive outcomes post-deployment.

Kline (2010) recommends a rule of thumb whereby any problems with the normality of data can be indicated by skewness of ± 3 and kurtosis of ± 10 . Using Kline's (2010) guideline for the data in this study, we identified two skewness violations and five kurtosis violations. These violations indicate that certain variables were non-normal (Kline, 2010), however this is not considered problematic, these scores simply indicate that the majority of the sample is low in psychological distress, PTSD symptoms, and transition stressors.

Table 4

*Intercorrelations, Means, Standard Deviations, Skewness, and Kurtosis for all Scales**Included in this Study*

	T1 PD	T1 NCS	T1 CS	T1 PTSD	T1 AAD	T1 PTG	T2 PD	T2 TS	T2 PTSD	T2 PTG
T1 PD	--									
T1 NCS	.47**	--								
T1 CS	-.00	.06*	--							
T1 PTSD	.57**	.44**	.05*	--						
T1 AAD	.31**	.39**	.20**	.35**	--					
T1 PTG	.18**	.27**	.07*	.20**	.25**	--				
T2 PD	.37**	.25**	.03	.36**	.23**	.14**	--			
T2 TS	.28**	.38**	.09**	.39**	.33**	.17**	.46**	--		
T2 PTSD	.31**	.24**	.12**	.48**	.26**	.12**	.47**	.44**	--	
T2 PTG	.19**	.27**	.06*	.21**	.26**	.68**	.18**	.19**	.17**	--
<i>M</i>	1.47	1.82	.21	1.17	.56	2.42	1.31	.37	1.14	1.21
<i>SD</i>	0.50	0.48	0.35	0.28	0.59	1.06	0.38	0.45	0.28	0.97
Skewness	2.60	.94	1.99	2.98	1.29	.66	3.48	2.72	4.71	.99
Kurtosis	9.70	1.26	3.56	15.43	1.67	.09	22.49	18.60	42.90	1.31

Note: T1 PD = Time 1 Psychological Distress; T1 NCS = Time 1 Non-Combat Stressors; T1 CS = Time 1 Combat Stressors; T1 PTSD = Time 1 PTSD Symptoms; T1 AAD = Time 1 Anticipated Adjustment Difficulty; T1 PTG = Time 1 Posttraumatic Growth; T2 PD = Time 2 Psychological Distress; T2 TS = Time 2 Transition Stressors; T2 PTSD = Time 2 PTSD Symptoms; T2 PTG = Time 2 Posttraumatic Growth.

N = 1434.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Each hypothesis will now be considered in turn, starting with Hypothesis 1 and proceeding through to Hypothesis 15. The hypotheses and associated results are grouped by outcome variable, firstly PTSD symptoms, secondly psychological distress, and thirdly PTG.

Does Trauma and Stress During Deployment Predict Poorer Outcomes Later?

The relationship between combat and non-combat stressors and posttraumatic stress disorder. Hypothesis 1a postulated that combat stressors reported at time 1 would predict PTSD symptoms longitudinally at time 2. Hypothesis 1b predicted that contrary to combat stressors, non-combat stressors at time 1 would *not* predict PTSD symptoms longitudinally at time 2. Hypothesis 1c theorised that psychological distress at time 1 would not predict PTSD symptoms longitudinally at time 2. Longitudinal hierarchical multiple regression was used to analyse these three hypotheses.

The first step of the regression analysis (Model 1) analysed the effects of demographic variables alone on PTSD symptoms at time 2, the demographics included gender, ethnicity, age, service, engagement, rank, and deployment experience. In order to residualise PTSD symptoms, Model 2 accounted for the effect of PTSD symptoms at time 1 on PTSD symptoms at time 2. Finally, Model 3 analysed the effect of the remaining five time 1 variables on residualised PTSD symptoms, and these included psychological distress, non-combat stressors, combat stressors, anticipated adjustment difficulty, and PTG.

Table 5 includes the results of the longitudinal hierarchical multiple regression. At step one (Model 1), demographic variables accounted for a non-significant 1.9% of the variance in PTSD symptoms at time 2, $R^2 = .019$, adjusted $R^2 = .008$, $F(14, 1244) = 1.687$, $p = .052$. At step two (Model 2) PTSD symptoms at time 1 was added to the equation and, as expected, accounted for an additional 22% of the variance in PTSD symptoms at time 2, $\Delta R^2 = .220$, $\Delta F(1, 1243) = 358.450$, $p < .001$. Finally, at step three (Model 3) the set of five time 1 variables was added to the equation and accounted for an additional 1.6% of the variance in PTSD symptoms at time 2, $\Delta R^2 = .016$, $\Delta F(5, 1238) = 5.249$, $p < .001$. Together the predictor variables explained 25.4% of the variance in PTSD symptoms at time 2, $R^2 = .254$, adjusted $R^2 = .242$, $F(20, 1238) = 21.087$, $p < .001$, with a large effect size $f^2 = .340$.

In confirmation of Hypothesis 2a, combat stressors at time 1 significantly – and more strongly than any other variable – predicted PTSD symptoms at time 2 ($\beta = .081, p < .01$).

Confirming Hypothesis 2b, non-combat stressors at time 1 did not significantly predict PTSD symptoms at time 2 ($\beta = .003, p = .917$). Confirming Hypothesis 2c, psychological distress at time 1 did not significantly predict PTSD symptoms at time 2 ($\beta = .047, p = .134$).

Additionally, anticipated adjustment difficulty ($\beta = .075, p < .01$) was seen to predict increased PTSD symptoms at time 2. In the final regression model none of the demographic variables were significant predictors of PTSD symptoms at time 2.

Table 5

Multiple Regression Analysis for Predictors of PTSD

	Model 1					Model 2					Model 3				
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>sr</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sr</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sr</i> ²
Gender (1, female; 0 male)	.04	.02	.05	1.69	.00	.01	.02	.02	.66	.00	.01	.02	.01	.44	.00
<i>Ethnicity</i>															
NZ European (1, yes; 0, no)	-.03	.04	-.05	-.80	.00	-.02	.04	-.03	-.54	.00	-.03	.04	-.05	-.81	.00
Maori (1, yes; 0, no)	-.06	.05	-.08	-1.29	.00	-.03	.04	-.04	-.81	.00	-.05	.04	-.06	-1.12	.00
Asian (1, yes; 0, no)	-.04	.09	-.02	-.52	.00	-.05	.08	-.02	-.70	.00	-.06	.08	-.02	-.82	.00
Other European (1, yes; 0, no)	.05	.06	.03	.71	.00	.03	.06	.02	.51	.00	.02	.06	.01	.41	.00
Pacific Islander (1, yes; 0, no)	.03	.06	.02	.59	.00	.06	.05	.04	1.28	.00	.04	.05	.03	.87	.00
Age	.01	.01	.05	1.28	.00	.01	.01	.04	1.18	.00	.01	.01	.04	1.16	.00
<i>Service</i>															
Navy (1, yes; 0, no)	.05	.03	.07	1.97*	.00	-.02	.02	-.04	-1.04	.00	-.03	.02	-.05	-1.37	.00
Army (1, yes; 0, no)	.03	.02	.06	1.64	.00	.01	.02	.02	.57	.00	-.02	.02	-.03	-.86	.00
Engagement (1, Regular; 0, Reserve)	.03	.06	.01	.41	.00	.01	.06	.01	.21	.00	.01	.06	.00	.12	.00
<i>Rank</i>															
Junior Other Rank (1, yes; 0, no)	.01	.03	.01	.23	.00	.02	.03	.04	.77	.00	.02	.03	.04	.83	.00
Senior Other Rank (1, yes; 0, no)	.00	.03	.00	-.01	.00	.04	.03	.05	1.36	.00	.04	.03	.07	1.75	.00
Junior Officer (1, yes; 0, no)	-.02	.03	-.02	-.56	.00	.01	.03	.01	.26	.00	.01	.03	.01	.28	.00
Deployment experience (1, 2+; 0, 1)	.03	.02	.04	1.29	.00	.02	.02	.04	1.30	.00	.03	.02	.04	1.44	.00
PTSD symptoms time 1						.48	.03	.48	18.93***	.22	.42	.03	.42	13.48***	.11
Psychological distress											.03	.02	.05	1.50	.00
Non-combat stressors											.00	.02	.00	.10	.00
Combat stressors											.06	.02	.08	2.98**	.01
Anticipated adjustment difficulty											.04	.01	.08	2.66**	.00
Posttraumatic growth											.01	.01	.03	.91	.00
Constant	1.07	.09		12.37***		.52	.08		6.45***		.53	.08		6.30***	
<i>R</i> ²	.02					.24					.25				
<i>Adjusted R</i> ²	.01					.23					.24				
ΔR^2	.02					.22					.02				

* $p < .05$; ** $p < .01$; *** $p < .001$.

Changes in posttraumatic stress disorder over time. Hypothesis 2 predicted that the level of PTSD symptoms would be significantly higher at time 1 than at time 2. Paired samples *t* tests were used to examine this hypothesis by comparing the time 1 ($M = 1.17$, $SD = .28$) and time 2 ($M = 1.14$, $SD = .28$) *Posttraumatic Stress Disorder Checklist – Civilian* scores (PCL-C). On average, respondents' PCL-C scores were .04 points higher at time 1 than at time 2, 95% CI [.02, .05]. This difference was statistically significant, indicating that PTSD symptoms decreased from time 1 to time 2; $t(1433) = 5.18$, $p < .001$. Cohen's *d* (effect size) for this paired samples *t*-test was .14, which can be described as small (Cohen, 1988). This result shows that symptoms of PTSD decreased as the time since deployment increased (i.e. from immediately post-deployment to six months post-deployment). This finding illustrates the resilience of service personnel as their psychological wellbeing begins returning to a healthy equilibrium following the stress and potential trauma of deployment.

Curvilinear relationship between combat stressors and posttraumatic stress disorder symptoms. Hypothesis 3 predicted that the longitudinal relationship between combat stressors at time 1 and residualised PTSD symptoms at time 2 would have a curvilinear component. This hypothesis was designed to examine whether the quadratic term would explain significant new variance above and beyond the variance explained by the linear term (see Table 5). Curvilinear regression analysis was conducted by creating a quadratic term for combat stressors and adding it on the step after the linear term. A significant longitudinal curvilinear relationship was found between combat stressors at time 1 and residualised PTSD symptoms at time 2 ($\beta = .191$, $\Delta R^2 = .005$, $p = .002$), and Figure 1 depicts the obtained result. The pattern of the curve suggests that as experiences of combat stressors increased, there was an acceleration in the increase of PTSD symptoms at time 2.

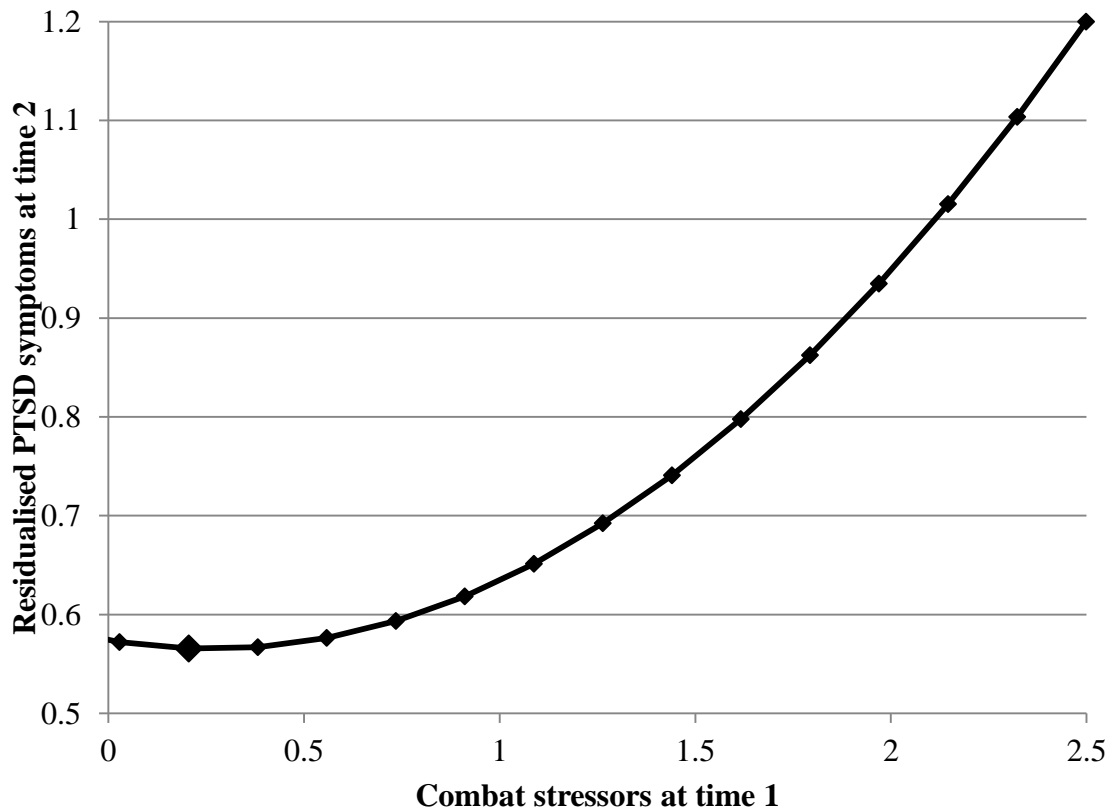


Figure 1. Quadratic relationship between combat stressors at time 1 and residualised PTSD symptoms at time 2.

Cumulative effect of combat and non-combat stressors on posttraumatic stress disorder symptoms. Hypothesis 4 postulated that non-combat stressors at time 1 would moderate (exacerbate) the longitudinal relationship between combat stressors at time 1 and PTSD symptoms at time 2. Longitudinal moderation analyses were conducted in order to examine this moderation hypothesis (Jose, 2013). For this analysis, combat stressors was the independent variable, non-combat stressors was the moderating variable, and residualised PTSD symptoms at time 2 was the dependent variable. In order to create the interaction term, the combat stressors variable was multiplied with the non-combat stressors variable. Then a longitudinal moderation regression was performed. In order to residualise PTSD symptoms at step one, PTSD symptoms at time 1 was entered as an independent variable and PTSD symptoms at time 2 was entered as a dependent variable. At step two, combat stressors and

non-combat stressors were entered as independent variables. Lastly, at step three, the interaction term was entered as an independent variable.

A statistically significant moderation of the effect of combat stressors (time 1) on residualised PTSD (time 2) by non-combat stressors (time 1) was found. The significant interaction ($\beta = .078$, $p = .024$) was graphed in ModGraph (Jose, 2013) in order to help with interpretation (see Figure 2). The figure shows that experiencing non-combat deployment stressors exacerbated the positive relationship between combat events and the outcome of PTSD symptomology.

Simple slopes analysis was conducted for the association between combat stressors and PTSD symptoms for the three levels of the moderator: low (-1 SD below mean), medium (mean), and high (+1 SD above mean) levels of non-combat stressors. The simple slopes analysis revealed a significant positive association between combat stressors and PTSD symptoms when non-combat stressors were high ($p < .01$), and medium ($p < .05$), but not when non-combat stressors were low ($p = .40$). This result indicates that experiencing combat stressors on deployment is predictive of experiencing PTSD symptoms post-deployment, but that experiencing considerable (medium to high) levels of non-combat stressors in addition to experiencing combat stressors is likely to result in exacerbated levels of PTSD symptoms for service personnel upon their return home.

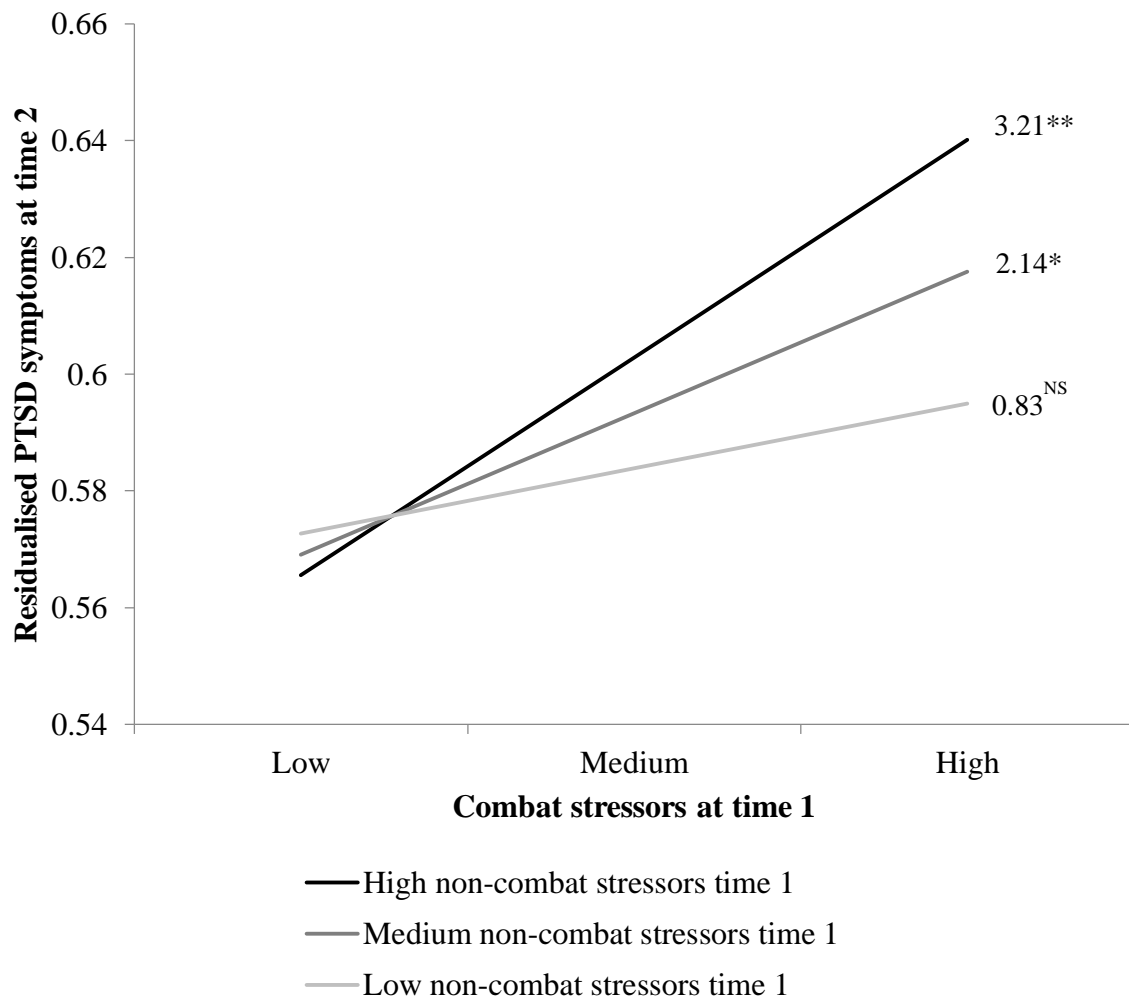


Figure 2. Moderation of the effect of combat stressors (time 1) on residualised PTSD symptoms (time 2) by non-combat stressors (time 1).

Changes in psychological distress over time. Hypothesis 5 predicted that the level of psychological distress would be significantly higher at time 1 than at time 2. Paired samples *t* tests were used to examine this hypothesis by comparing the time 1 ($M = 1.47$, $SD = .50$) and time 2 ($M = 1.31$, $SD = .38$) *Kessler Psychological Distress Scale* scores (K10). On average, respondents' K10 scores were .16 points higher at time 1 than at time 2, 95% CI [.13, .18]. This difference was statistically significant, indicating that psychological distress decreased from time 1 to time 2; $t(1433) = 11.80$, $p < .001$. Cohen's *d* for this paired samples

t-test was .36, which can be described as small to medium in size (Cohen, 1988). This result shows that symptoms of psychological distress decreased as the time since deployment increased (i.e. from immediately post-deployment to six months post-deployment). This finding illustrates the resilience of service personnel as their psychological wellbeing begins returning to a healthy equilibrium following the stress and potential trauma of deployment.

The comorbid relationship between posttraumatic stress disorder symptoms and psychological distress. Hypothesis 6 postulated that PTSD symptoms at time 1 would predict psychological distress longitudinally at time 2. Longitudinal hierarchical multiple regression was used to analyse this hypothesis.

The first step of the regression (Model 1) analysed the effects of demographic variables alone on psychological distress at time 2, the demographics included gender, ethnicity, age, service, engagement, rank, and deployment experience. In order to residualise psychological distress, Model 2 accounted for the effect of psychological distress at time 1 on psychological distress at time 2. Finally, Model 3 analysed the effect of the remaining five time 1 variables on residualised psychological distress, and these included non-combat stressors, combat stressors, PTSD symptoms, anticipated adjustment difficulty, and PTG.

Table 6 includes the results of the hierarchical longitudinal multiple regression. At step one (Model 1), demographic variables accounted for a significant 2.1% of the variance in psychological distress at time 2, $R^2 = .021$, adjusted $R^2 = .010$, $F(14, 1244) = 1.899$, $p < .05$. At step two (Model 2) psychological distress at time 1 was added to the equation and accounted for an additional 10.4% of the variance in psychological distress at time 2, $\Delta R^2 = .104$, $\Delta F(1, 1243) = 147.374$, $p < .001$. Finally, at step three (Model 3) the set of five time 1 variables was added to the equation and accounted for an additional 4.1% of the variance in psychological distress at time 2, $\Delta R^2 = .041$, $\Delta F(5, 1238) = 12.159$, $p < .001$. Together the predictor variables explained 16.6% of the variance in psychological distress at

time 2, $R^2 = .166$, adjusted $R^2 = .152$, $F(20, 1238) = 12.292$, $p < .001$, with a medium effect size $f^2 = .199$.

Consistent with Hypothesis 6, PTSD symptoms at time 1 significantly predicted psychological distress at time 2 ($\beta = .200$, $p < .001$). In the final regression model, none of the remaining time 1 variables or any of the demographic variables were significant predictors of psychological distress at time 2.

Table 6

Multiple Regression Analysis for Predictors of Psychological Distress

	Model 1					Model 2					Model 3				
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>sr</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sr</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sr</i> ²
Gender (1, female; 0 male)	.07	.03	.07	2.43*	.00	.05	.03	.05	1.91	.00	.04	.03	.04	1.36	.00
<i>Ethnicity</i>															
NZ European (1, yes; 0, no)	-.00	.05	-.00	-.04	.00	.01	.05	.01	.12	.00	.00	.05	.00	.02	.00
Maori (1, yes; 0, no)	-.03	.06	-.03	-.46	.00	-.02	.06	-.02	-.37	.00	-.03	.06	-.03	-.48	.00
Asian (1, yes; 0, no)	.04	.11	.01	.32	.00	-.01	.11	-.00	-.13	.00	-.01	.10	-.00	-.11	.00
Other European (1, yes; 0, no)	.04	.08	.02	.43	.00	.02	.08	.01	.20	.00	.01	.08	.00	.07	.00
Pacific Islander (1, yes; 0, no)	.00	.08	.00	.01	.00	-.00	.07	-.00	-.03	.00	-.01	.07	-.01	-.16	.00
Age	.01	.01	.03	.68	.00	.01	.01	.05	1.30	.00	.01	.01	.04	1.03	.00
<i>Service</i>															
Navy (1, yes; 0, no)	.13	.03	.15	3.89***	.01	.06	.03	.07	2.07*	.00	.04	.03	.04	1.21	.00
Army (1, yes; 0, no)	.05	.03	.07	1.94	.00	.03	.03	.05	1.33	.00	.02	.03	.02	.62	.00
Engagement (1, Regular; 0, Reserve)	.08	.08	.03	1.01	.00	.04	.08	.02	.56	.00	.05	.08	.02	.70	.00
<i>Rank</i>															
Junior Other Rank (1, yes; 0, no)	.04	.04	.05	.95	.00	.02	.04	.03	.55	.00	.04	.04	.05	.94	.00
Senior Other Rank (1, yes; 0, no)	.01	.04	.01	.17	.00	.01	.04	.02	.37	.00	.04	.04	.05	1.08	.00
Junior Officer (1, yes; 0, no)	.04	.04	.04	.90	.00	.04	.04	.04	.92	.00	.05	.04	.05	1.35	.00
Deployment experience (1, 2+; 0, 1)	-.00	.03	-.01	-.14	.00	-.00	.03	-.00	-.11	.00	-.00	.03	-.00	-.06	.00
Psychological distress time 1						.25	.02	.33	12.14***	.10	.14	.02	.19	5.87***	.02
Non-combat stressors											.02	.02	.03	.84	.00
Combat stressors											-.00	.03	-.00	-.02	.00
PTSD symptoms											.26	.04	.20	6.05***	.02
Anticipated adjustment difficulty											.04	.02	.06	1.92	.00
Posttraumatic growth											.01	.01	.04	1.35	.00
Constant	1.13	.11		9.99***		.82	.11		7.46***		.58	.12		4.96***	
<i>R</i> ²	.02					.13					.17				
<i>Adjusted R</i> ²	.01					.11					.15				
ΔR^2	.02					.10					.04				

* $p < .05$. ** $p < .01$. *** $p < .001$.

Hypothesis 7 predicted that the longitudinal relationship between PTSD at time 1 and residualised psychological distress at time 2 would have a curvilinear component. This hypothesis was designed to examine whether the quadratic term would explain significant new variance above and beyond the variance explained by the linear term (see Table 6). Curvilinear regression analysis was conducted by creating a quadratic term for PTSD symptoms and adding it on the step after the linear term. A significant longitudinal curvilinear relationship was found between PTSD symptoms at time 1 and residualised psychological distress at time 2 ($\beta = .226$, $\Delta R^2 = .003$, $p = .020$), and Figure 3 depicts the obtained result. The pattern of the curve suggests that as PTSD symptoms increased, there was an acceleration in the increase of psychological distress at time 2.

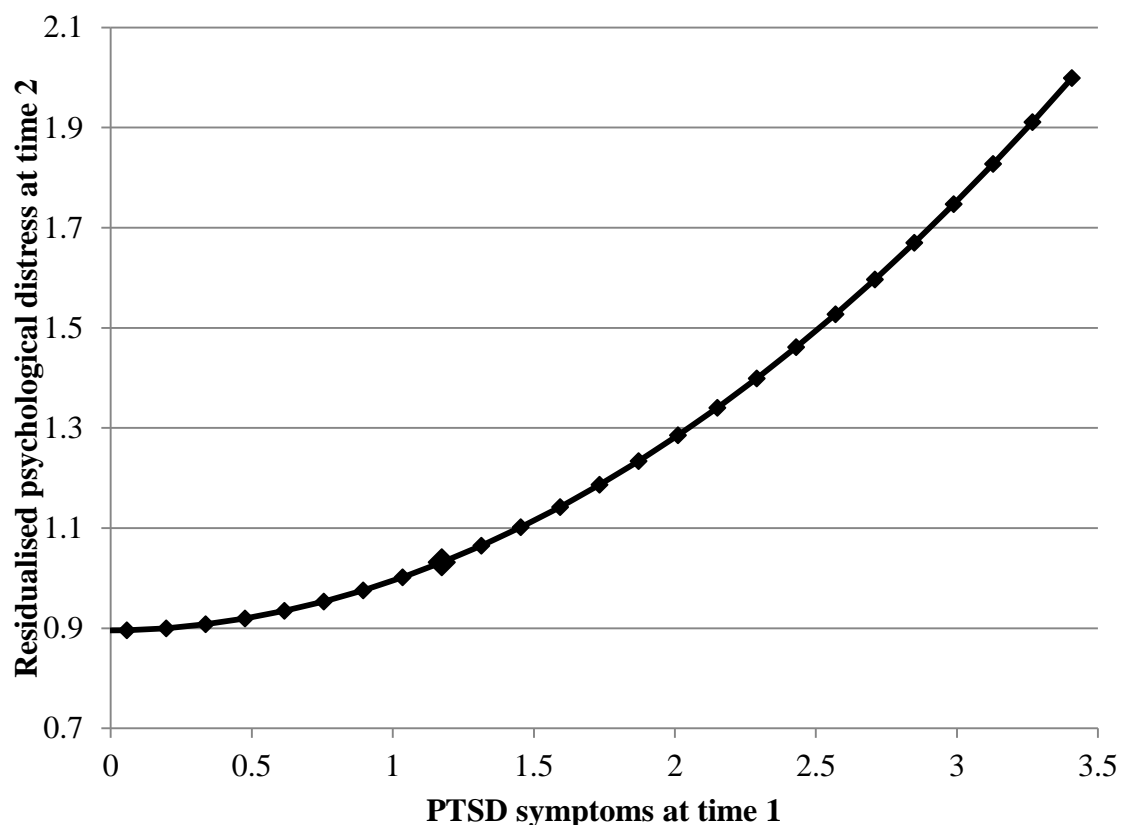


Figure 3. Quadratic relationship between PTSD symptoms at time 1 and residualised psychological distress at time 2.

Teasing out the relationships between combat stressors, posttraumatic stress disorder symptoms, and psychological distress. Hypothesis 8 predicted that PTSD symptoms would mediate the effect of combat stressors on the outcome of psychological distress. A two-wave longitudinal mediation analysis was conducted in order to examine this hypothesis (Jose, 2013). For this analysis the mediation model included combat stressors (time 1) as the independent variable, PTSD symptoms (time 1 and time 2) as the mediating variable, and psychological distress (time 2) as the dependent variable. This mediation analysis was conducted using IBM SPSS Amos 22 and the model is depicted in Figure 4 in order to help with interpretation. As Figure 4 shows, the *a* path was estimated between combat stressors (time 1) and PTSD symptoms (time 2), and the *b* path was estimated between PTSD symptoms (time 1) and psychological distress (time 2). The time 2 variables of PTSD symptoms and psychological distress were residualised.

The analysis conducted in IBM SPSS Amos 22 stipulated 2000 boot-strapped iterations, a 95% bias-corrected confidence interval, and a Monte Carlo estimation for the *p*-value. A significant mediation was identified for the proposed pathway from combat stressors to PTSD symptoms to psychological distress: indirect effect = .024, SE = .006, 95% CI = [.013, .038], *p* = .001. This result suggests that combat stressors predicted an increase in PTSD symptoms, which, in turn, predicted an increase in psychological distress. Estimation of the size of the indirect effect using the ratio index (indirect/total) indicated that the indirect effect explained about 60% of the total effect, which suggests that about one third of the impact on psychological distress was direct and about two thirds of the impact occurred through the indirect effect of PTSD symptoms.

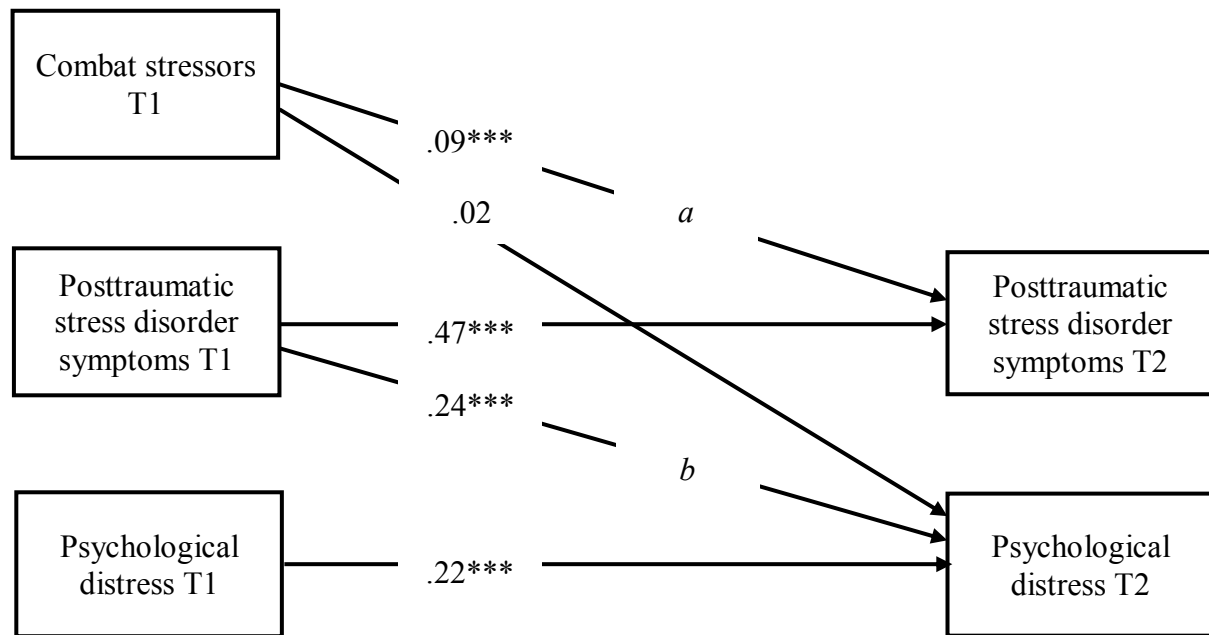


Figure 4. A mediation model depicting the relationship between combat stressors, PTSD symptoms, and psychological distress.

Who is Most Vulnerable to the Development of Psychopathology Post-Deployment?

Numerous possible pre-deployment risk factors for the development of PTSD symptoms and subsequent psychological distress symptoms were considered. These pre-deployment risk factors are categorised as either socio-demographic factors (Hypothesis 9, parts a-d) or military factors (Hypothesis 10, parts a-d).

Gender and posttraumatic stress disorder symptoms. An independent samples *t* test was used to analyse Hypothesis 9a, namely that females would report significantly greater levels of PTSD symptoms post-deployment than males (Table 7). The *t* test was statistically significant, $t(276.48) = -2.93, p < .01$, two-tailed, $d = .25$, with females ($M = 1.23$, $SD = .34$) reporting .07 points higher PTSD on the PCL-C at time 1, 95% CI $[-.12, -.02]$, than males ($M = 1.16$, $SD = .27$). This finding supports Hypothesis 9a.

Table 7

Comparison between Male and Female Mean PTSD Symptoms

Gender	<i>N</i>	<i>M</i>	<i>SD</i>
Male	1187	1.16	.27
Female	223	1.23	.34

Gender and psychological distress. An independent samples *t*-test was used to analyse Hypothesis 9b, namely that females would report significantly greater levels of psychological distress post-deployment than males (Table 8). The *t* test was statistically significant, $t(292.44) = -3.39, p < .01$, two-tailed, $d = .27$, with females ($M = 1.58, SD = .54$) reporting .13 points higher psychological distress on the K10 at time 1, 95% CI [- .21, -.06], than males ($M = 1.45, SD = .49$). This finding supports Hypothesis 9b.

Table 8

Comparison between Male and Female Mean Psychological Distress

Gender	<i>N</i>	<i>M</i>	<i>SD</i>
Male	1187	1.45	.49
Female	223	1.58	.54

Marital status and posttraumatic stress disorder symptoms. An independent samples *t* test was used to analyse Hypothesis 9c, namely that those individuals who were single would report significantly higher levels of PTSD symptoms post-deployment than those who were in a relationship (i.e. coupled) (Table 9). The *t* test was statistically significant, $t(620.14) = 2.31, p < .05$, two-tailed, $d = .15$, with those who were single ($M = 1.21, SD = .32$). reporting .04 points higher PTSD on the PCL-C at time 1, 95% CI [.01, .08] than those in a relationship ($M = 1.16 SD = .27$). This finding supports Hypothesis 9c.

Table 9

Comparison between Single and Coupled Service Personnel Mean PTSD Symptoms

Marital status	<i>N</i>	<i>M</i>	<i>SD</i>
Single	381	1.21	.32
Coupled	898	1.16	.27

Marital status and psychological distress. An independent samples *t* test was used to analyse Hypothesis 9d, namely that those individuals who were single would report significantly higher levels of psychological distress post-deployment than those who were in a relationship (i.e. coupled) (Table 10). The *t* test was statistically significant, $t(634.91) = 3.31, p < .01$, two-tailed, $d = .21$, with those who were single ($M = 1.55, SD = .56$) reporting .11 points higher psychological distress on the K10 at time 1, 95% CI [.04, .17], than those in a relationship ($M = 1.44, SD = .49$). This finding supports Hypothesis 9d.

Table 10

Comparison between Single and Coupled Service Personnel Mean Psychological Distress

Marital status	<i>N</i>	<i>M</i>	<i>SD</i>
Single	381	1.55	.56
Coupled	898	1.44	.49

Ethnicity and posttraumatic stress disorder symptoms and psychological distress. Hypotheses 9e and 9f, postulated that service personnel of ethnic minorities (Asian, Maori, Other, Other European, and Pacific Islander) would show significantly higher levels of PTSD and distress post-deployment than service personnel who identify as the New Zealand ethnic majority (New Zealand European). Both ANOVA analyses were statistically non-significant, indicating that there were no differences in the experiences of either PTSD symptoms at time 1 ($F(5, 1380) = .44, p = .82$, partial $\eta^2 = .001$) or psychological distress at time 1 ($F(5, 1380) = 2.11, p = .06$, partial $\eta^2 = .004$.) between ethnic groups. These findings do not support Hypotheses 9e or 9f.

Age and posttraumatic stress disorder symptoms. A one-way analysis of covariance (ANCOVA) with Bonferroni confidence interval adjustment was used to analyse Hypothesis 9g, namely that younger personnel would report significantly greater PTSD symptoms post-deployment than older personnel. Rank was included as a covariate in order to partial out its effects from the analysis. After controlling for rank, there was no significant effect of age on reports of PTSD symptoms at time 1, $F(6, 1245) = 1.96, p = .07$, partial $\eta^2 = .009$. This finding does not support Hypothesis 9g.

Age and psychological distress. A one-way analysis of covariance (ANCOVA) with Bonferroni confidence interval adjustment was used to analyse Hypothesis 9h, namely that younger personnel would report significantly greater psychological distress post-deployment than older personnel (Table 11). Rank was included as a covariate in order to partial out its effects from the analysis. After controlling for rank, a significant effect of age on reports of psychological distress at time 1 was found, $F(6, 1245) = 3.92, p < .01$, partial $\eta^2 = .019$. Post-hoc tests with Bonferroni confidence interval adjustment ($\alpha = .05$) were conducted to analyse pairwise differences between psychological distress means after these were adjusted for the effects of the covariate (rank). The follow-up tests indicated that – the youngest age group – those aged 17-24 years ($M = 1.58$) reported significantly greater psychological distress at time 1 than those aged 35-39 years ($M = 1.38$), 45-49 years ($M = 1.35$), and 50 or more years ($M = 1.25$). The effect sizes for these three significant adjusted mean differences were .35, .41, and .59, respectively. The remaining pairwise comparisons were not significant. This finding supports Hypothesis 9h.

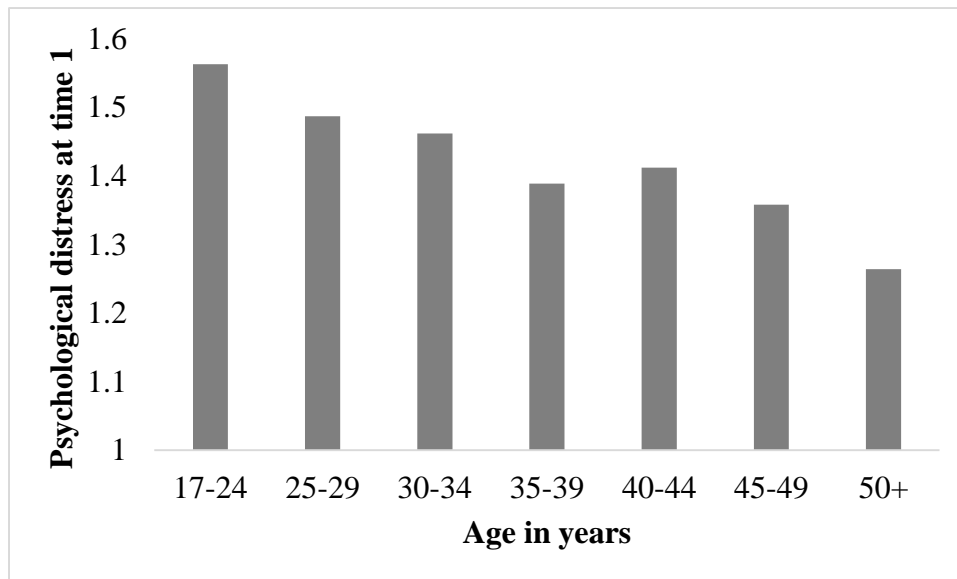


Figure 5. The estimated marginal means of psychological distress for all age groups.

Table 11

Comparisons of Psychological Distress by Age Group

Age	N	M	SD	Adj M	SE	17-24	25-29	30-34	35-39	40-44	45-49
17-24	329	1.58	.53	1.56	.03						
25-29	317	1.49	.56	1.49	.03	-.08					
30-34	219	1.45	.52	1.46	.04	-.10	-.03				
35-39	135	1.38	.42	1.39	.04	-.17*	-.10	-.07			
40-44	113	1.40	.44	1.41	.05	-.15	-.07	-.05	.02		
45-49	86	1.35	.46	1.36	.06	-.21*	-.13	-.10	-.03	-.05	
50+	54	1.25	.27	1.26	.07	-.30*	-.22	-.20	-.13	-.15	-.09

Note: Adj M = Adjusted mean.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Deployment experience and posttraumatic stress disorder symptoms and psychological distress. Hypotheses 10a and 10b predicted that service personnel with greater deployment experience would show significantly higher levels of PTSD symptoms and psychological distress post-deployment than service personnel with less deployment experience. Both ANOVA analyses were found to be statistically non-significant, indicating that there were no differences in the experiences of either PTSD symptoms at time 1 ($F(4,$

1263) = 1.69, $p = .15$, partial $\eta^2 = .005$) or psychological distress at time 1 ($F(4, 1263) = 1.23$, $p = .30$, partial $\eta^2 = .008$.) between levels of deployment experience (1, 2, 3, 4, 5+ deployments). These findings do not support Hypotheses 10a and 10b.

Rank and posttraumatic stress disorder symptoms. A one-way analysis of covariance (ANCOVA) was used to analyse Hypothesis 10c, namely that lower ranked personnel would report significantly greater PTSD symptoms post-deployment than higher ranked personnel, in particular other rank personnel would report greater PTSD than officers (Table 12). Age was included as a covariate in order to partial out its effects from the analysis. After controlling for age, a significant effect of rank on reports of PTSD symptoms at time 1 was identified, $F(3, 1248) = 3.99$, $p < .01$, partial $\eta^2 = .009$. Post-hoc tests with Bonferroni confidence interval adjustment ($\alpha = .05$) were conducted to analyse pairwise differences between PTSD symptom means after these were adjusted for the effects of the covariate (age). The follow-up tests indicated that Senior Officers ($M = 1.25$) reported significantly greater PTSD symptoms at time 1 than Senior Other Ranks ($M = 1.15$). The effect size for this significant adjusted mean difference was .34, which is considered to be large. The remaining pairwise comparisons were not significant. This finding does not support Hypothesis 10c. In fact, this finding indicates that service members of higher ranks (senior officers) are experiencing more PTSD symptoms than service members of relatively lower rank (senior other ranks).

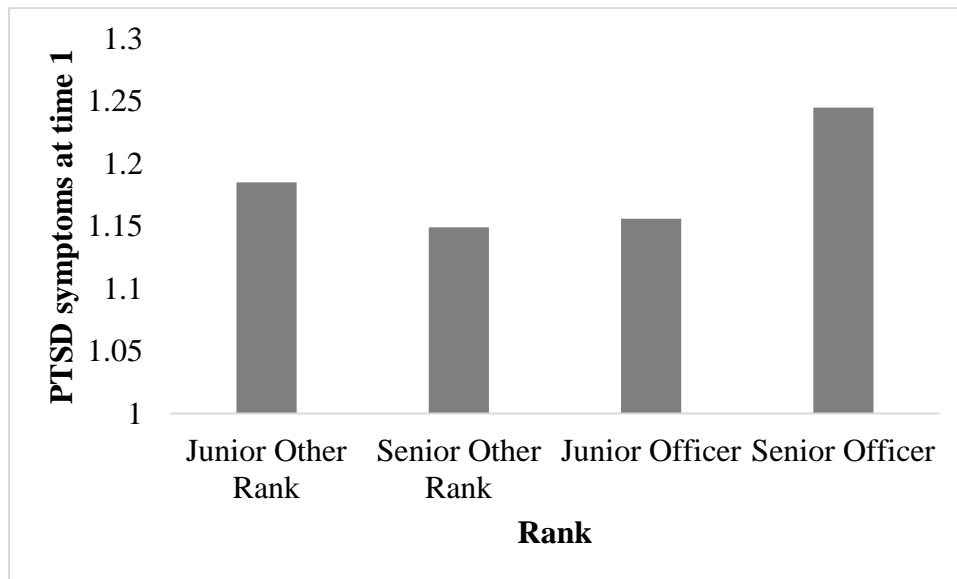


Figure 6. The estimated marginal means of PTSD symptoms for all rank groups.

Table 12

Comparisons of PTSD Symptoms by Rank Group

Rank	<i>N</i>	<i>M</i>	<i>SD</i>	Adj <i>M</i>	<i>SE</i>	J OR	S OR	J OFF
J OR	556	1.19	.30	1.19	.01			
S OR	338	1.14	.25	1.15	.02	-.04		
J OFF	236	1.16	.23	1.16	.02	-.03	.01	
S OFF	123	1.24	.36	2.25	.03	.06	.10*	.09

Note. J OR = Junior Other Rank, S OR = Senior Other Rank, J OFF = Junior Officer, S OFF = Senior Officer, Adj *M* = adjusted mean.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Rank and psychological distress. A one-way analysis of covariance (ANCOVA) was used to analyse Hypothesis 10d, namely that lower ranked personnel would report significantly greater psychological distress post-deployment than higher ranked personnel, in particular other rank personnel would report greater distress than officers. Age was included as a covariate in order to partial out its effects from the analysis. After controlling for age, no significant effect of rank on reports of psychological distress at time 1 was found, $F(3, 1248) = 2.45$, $p = .06$, partial $\eta^2 = .006$. This finding does not support Hypothesis 10d.

Service and posttraumatic stress disorder symptoms. A one-way between groups analysis of variance (ANOVA) was conducted to analyse Hypothesis 10e, which specified that Army personnel would show significantly higher levels of PTSD symptoms post-deployment than Navy and Air Force personnel (Table 13). The ANOVA yielded a statistically significant effect, indicating that members of the three services experienced different levels of PTSD symptoms at time 1, $F(2, 1403) = 22.52, p < .001$, partial $\eta^2 = .03$. Games-Howell post-hoc analyses revealed that Navy personnel ($M = 1.25, SD = .36$) reported significantly higher levels of PTSD symptoms at time 1 than both Army ($M = 1.16, SD = .24$) and Air Force personnel ($M = 1.12, SD = .21$). Additionally, Army personnel reported significantly higher levels of PTSD symptoms at time 1 than Air Force personnel. The effect sizes for these three significant mean differences were .23, .33, and .15, respectively, falling in the medium to large range. This finding provides some support for Hypothesis 10e, as Army personnel showed significantly greater PTSD symptoms than Air Force personnel, however it was surprising – and in contrast to Hypothesis 10e – that overall Navy showed significantly higher PTSD symptoms than both other services.

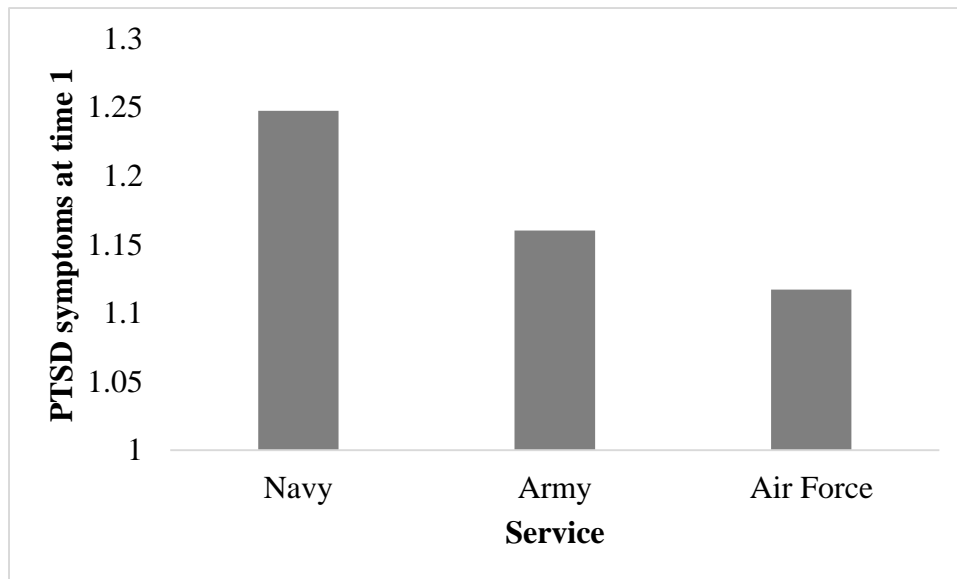


Figure 7. The mean PTSD symptoms for service groups Navy, Army, and Air Force.

Table 13

Comparisons of PTSD Symptoms by Service Group

Service	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SE</i>	Navy	Army
Navy	414	1.25	.36	.02		
Army	654	1.16	.24	.01	-.09*	
Air	338	1.12	.21	.01	-.13*	-.04*

* $p < .05$. ** $p < .01$. *** $p < .001$.

Service and psychological distress. A one-way between groups analysis of variance (ANOVA) was conducted to analyse Hypothesis 10f, which specified that Army personnel would show significantly higher levels of psychological distress post-deployment than Navy and Air Force personnel (Table 14). The ANOVA yielded a statistically significant effect, indicating that members of the three services experienced different levels of psychological distress at time 1, $F(2, 1403) = 25.07, p < .001$, partial $\eta^2 = .03$. Games-Howell post-hoc analyses revealed that Navy personnel ($M = 1.61, SD = .50$) reported significantly higher distress levels at time 1 than both Army ($M = 1.44, SD = .50$) and Air Force personnel ($M = 1.37, SD = .47$). The effect sizes for these two significant mean differences were .29 and .36,

respectively, which can be considered large. However, there was no significant difference in distress levels at time 1 between Army and Air Force personnel. This finding does not support Hypothesis 10f, as Navy service personnel showed significantly greater levels of distress than both services, and Army and Air Force were not significantly different in their experiences of psychological distress.

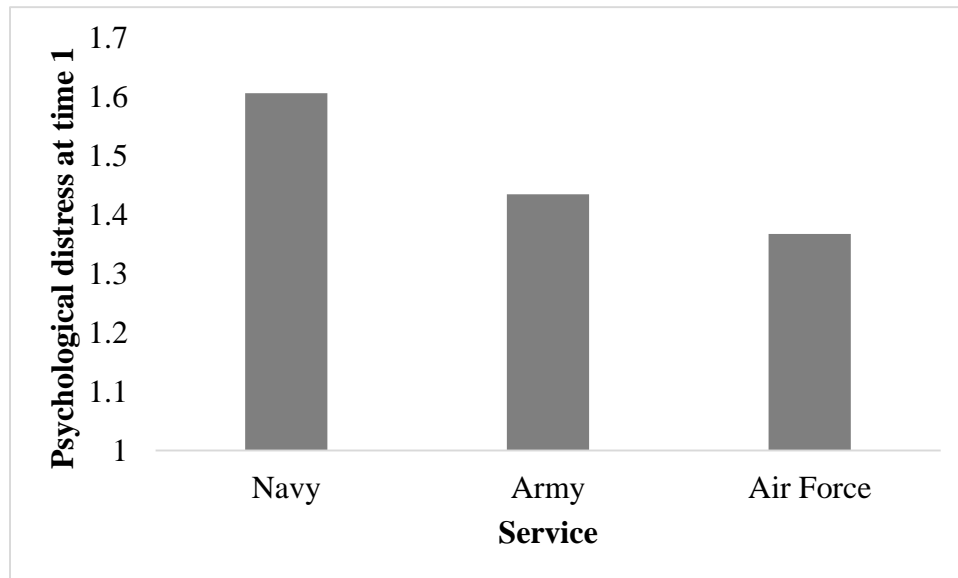


Figure 8. The mean psychological distress for service groups Navy, Army, and Air Force.

Table 14

Comparisons of Psychological Distress by Service Group

Service	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SE</i>	Navy	Army
Navy	414	1.61	.50	.02		
Army	654	1.44	.50	.02	-.17*	
Air	338	1.37	.47	.03	-.24*	-.07

* $p < .05$. ** $p < .01$. *** $p < .001$.

Can Deployment-Related Trauma Facilitate Personal Growth?

Predictors of posttraumatic growth. Hypothesis 11a stipulated that PTSD symptoms at time 1 would predict PTG longitudinally at time 2, whereas Hypothesis 11b

proposed that combat stressors would not predict PTG longitudinally at time 2. Longitudinal hierarchical multiple regression was used to test these two hypotheses.

The first step of the regression (Model 1) analysed the effects of demographic variables alone on PTG at time 2, the demographics included gender, ethnicity, age, service, engagement, rank, and deployment experience. In order to residualise PTG, Model 2 accounted for the effect of PTG at time 1 on PTG at time 2. Finally, Model 3 analysed the effect of the remaining five time 1 variables on residualised PTG, and these included psychological distress, non-combat stressors, combat stressors, PTSD symptoms, and anticipated adjustment difficulty.

Table 15 includes the results of the hierarchical longitudinal multiple regression. At step one (Model 1), demographic variables accounted for a significant 11.9% of the variance in PTG at time 2, $R^2 = .119$, adjusted $R^2 = .109$, $F(14, 1244) = 11.994$, $p < .001$. At step two (Model 2), PTG at time 1 was added to the equation and accounted for an additional 34.7% of the variance in PTG at time 2, $\Delta R^2 = .347$, $\Delta F(1, 1243) = 807.867$, $p < .001$. Finally, at step three (Model 3) the set of five time 1 variables was added to the equation and accounted for an additional 1.5% of the variance in PTG at time 2, $\Delta R^2 = .015$, $\Delta F(5, 1238) = 6.996$, $p < .001$. Together the predictor variables explained 48.1% of the variance in PTG at time 2, $R^2 = .481$, adjusted $R^2 = .472$, $F(20, 1238) = 57.292$, $p < .001$, with a very large effect size $f^2 = .927$.

Contrary to Hypothesis 11a, PTSD symptoms ($\beta = .042$, $p = .108$) did not significantly predict PTG at time 2. In support of Hypothesis 11b, combat stressors did not significantly predict PTG at time 2 ($\beta = .008$, $p = .738$). Additionally, anticipated adjustment difficulty ($\beta = .068$, $p < .01$) was seen to predict increased PTG at time 2. In the final regression model, being female ($\beta = .045$, $p < .05$) and a Reserve Force member ($\beta = -.043$, $p < .05$) were each significant predictors of increased PTG at time 2.

Table 15

Multiple Regression Analysis for Predictors of PTG

	Model 1					Model 2					Model 3				
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>sr</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sr</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sr</i> ²
Gender (1, female; 0 male)	.33	.07	.13	4.62***	.02	.13	.06	.05	2.37*	.00	.12	.06	.05	2.13*	.00
<i>Ethnicity</i>															
NZ European (1, yes; 0, no)	.19	.13	.09	1.48	.00	-.01	.10	-.00	-.05	.00	-.00	.10	-.00	-.03	.00
Maori (1, yes; 0, no)	.60	.14	.24	4.21***	.01	.09	.11	.03	.77	.00	.11	.11	.04	.99	.00
Asian (1, yes; 0, no)	.73	.27	.08	2.73**	.01	.23	.21	.03	1.10	.00	.25	.21	.03	1.22	.00
Other European (1, yes; 0, no)	.21	.20	.04	1.03	.00	-.03	.16	-.01	-.19	.00	-.04	.15	-.01	-.23	.00
Pacific Islander (1, yes; 0, no)	.84	.18	.17	4.67***	.02	.01	.14	.00	.04	.00	.04	.14	.01	.30	.00
Age	-.03	.02	-.05	-1.36	.00	-.01	.02	-.02	-.73	.00	-.01	.02	-.02	-.75	.00
<i>Service</i>															
Navy (1, yes; 0, no)	.24	.08	.11	3.13**	.01	.03	.06	.01	.41	.00	-.02	.06	-.01	-.35	.00
Army (1, yes; 0, no)	.20	.06	.10	3.10**	.01	.02	.05	.01	.29	.00	-.02	.05	-.01	-.30	.00
Engagement (1, Regular; 0, Reserve)	-.48	.20	-.07	-2.42*	.00	-.28	.15	-.04	-1.82	.00	-.31	.15	-.04	-2.04*	.00
<i>Rank</i>															
Junior Other Rank (1, yes; 0, no)	.08	.10	.04	.80	.00	.03	.08	.02	.37	.00	.04	.08	.02	.52	.00
Senior Other Rank (1, yes; 0, no)	-.09	.09	-.04	-1.03	.00	-.01	.07	-.01	-.19	.00	.02	.07	.01	.27	.00
Junior Officer (1, yes; 0, no)	-.04	.10	-.02	-.35	.00	.06	.08	.03	.82	.00	.07	.08	.03	.85	.00
Deployment experience (1, 2+; 0, 1)	-.09	.06	-.05	-1.45	.00	.05	.05	.03	1.08	.00	.04	.05	.02	.88	.00
Posttraumatic growth time 1						.58	.02	.65	28.42***	.35	.55	.02	.62	26.00***	.28
Psychological distress											.02	.05	.01	.41	.00
Non-combat stressors											.09	.05	.05	1.95	.00
Combat stressors											.02	.06	.01	.34	.00
PTSD symptoms											.14	.09	.04	1.61	.00
Anticipated adjustment difficulty											.11	.04	.07	2.90**	.00
Constant	1.32	.27		4.87***		.01	.22		.05		-.29	.23		-1.24	
<i>R</i> ²	.12					.47					.48				
<i>Adjusted R</i> ²	.11					.46					.47				
ΔR^2	.12					.35					.02				

* $p < .05$. ** $p < .01$. *** $p < .001$.

Hypothesis 12 predicted that PTSD symptoms would mediate the effect of combat stressors on the outcome of PTG. A two-wave longitudinal mediation analysis was conducted in order to examine this hypothesis (Jose, 2013). For this analysis the mediation model included combat stressors (time 1) as the independent variable, PTSD symptoms (time 1 and time 2) as the mediating variable, and PTG (time 2) as the dependent variable. This mediation analysis was conducted using IBM SPSS Amos 22 and the model is depicted in Figure 9 in order to help with interpretation. As Figure 9 shows, the *a* path was estimated between combat stressors (time 1) and PTSD symptoms (time 2), and the *b* path was estimated between PTSD symptoms (time 1) and PTG (time 2). The time 2 variables of PTSD symptoms and PTG were residualised.

The analysis conducted in IBM SPSS Amos 22 stipulated 2000 boot-strapped iterations, a 95% bias-corrected confidence interval, and a Monte Carlo estimation for the *p*-value. A significant mediation was identified for the proposed pathway from combat stressors to PTSD symptoms to PTG: indirect effect = .021, SE = .007, 95% CI = [.009, .037], *p* < .001. This result suggests that combat stressors predicted an increase in PTSD symptoms, which, in turn, predicted an increase in PTG. Estimation of the size of the indirect effect using the ratio index (indirect/total) indicated that the indirect effect explained about 43% of the total effect, which suggests that just over half of the impact on PTG was direct and just under half of the impact occurred through the indirect effect of PTSD symptoms.

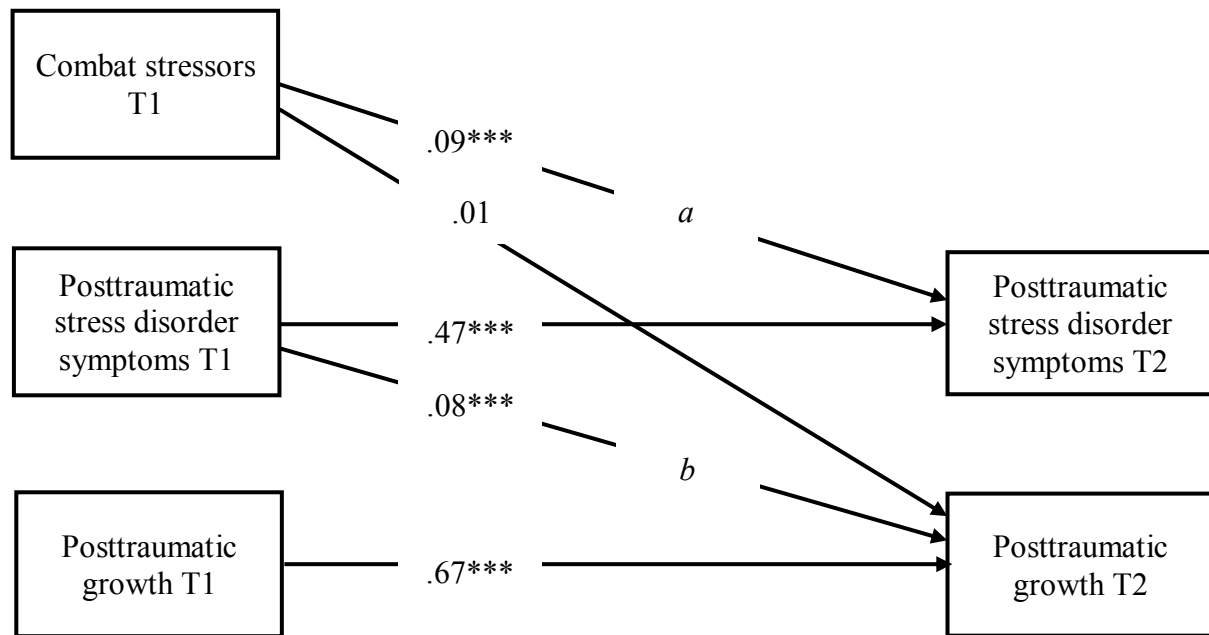


Figure 9. A mediation model depicting the relationship between combat stressors, PTSD symptoms, and PTG.

Hypothesis 13 predicted that the longitudinal relationship between combat events at time 1 and residualised PTG at time 2 would have a curvilinear component. This hypothesis was designed to examine whether the quadratic term would explain significant new variance above and beyond the variance explained by the linear term (see Table 15). Curvilinear regression analysis was conducted by creating a quadratic term for PTG symptoms and adding it on the step after the linear term. However, no evidence was found for a longitudinal curvilinear relationship between combat stressors at time 1 and PTG at time 2 ($\beta = .000$, $\Delta R^2 = .000$, $p = 1.00$).

Changes in posttraumatic growth over time. Hypothesis 14 predicted that the level of PTG would be significantly higher at time 1 than at time 2. Paired samples *t*-tests were used to examine this hypothesis by comparing the time 1 ($M = 2.42$, $SD = 1.06$) and time 2 ($M = 1.21$, $SD = .97$) *Posttraumatic Growth Inventory* scores (PTGI). On average, respondents' PTGI scores were 1.22 points higher at time 1 than at time 2, 95% CI [1.17,

1.26]. This difference was statistically significant, indicating that PTG decreased from time 1 to time 2; $t(1433) = 56.962, p < .001$. Cohen's d for this paired-samples t -test was 1.20, which can be described as very large (Cohen, 1988). This result shows that indicators of PTG decreased as the time since deployment increased (i.e. from immediately post-deployment to six months post-deployment). This finding indicates that higher levels of PTG were noted immediately following deployment at time 1 compared to six months later at time 2.

How Does This All Fit Together?

A longitudinal path model (Figure 10) was created to examine a number of important predicted relationships at the same time. Structural equation modelling (SEM), i.e. a longitudinal path model, is a crucial final step as co-occurring variables act as covariates for one another and this method allows one to look at all of the relationships in a complex and dynamic web (Kline, 2010). SEM also allows one to determine whether relationships demonstrated by regression analyses hold under more stringent and conservative conditions.

The subsequent path model was comprised of the three variables that were measured at both time 1 and time 2: psychological distress, PTSD symptoms, and PTG. Additionally, several variables that were only measured at one time point were included, namely combat stressors (time 1), non-combat stressors (time 1), anticipated adjustment difficulty (time 1), and transition stressors (time 2).

The stability coefficients – in bold – demonstrate that, for the three variables measured at both time points, significant stability was obtained (.21 to .65). Further, the model confirms the majority of relationships found by regression analyses: PTSD symptoms was predicted by both combat stressors and anticipated adjustment difficulty; psychological distress was predicted by PTSD symptoms; and PTG was predicted by anticipated adjustment difficulty. The path model also identified two new relationships which were not found in the

regression analyses, namely psychological distress was predicted by anticipated adjustment difficulty, and PTG was predicted by non-combat stressors.

Lastly, with the introduction of transition stressors (time 2) as an outcome variable, the path model revealed that transition stressors was predicted by the time 1 variables of PTSD symptoms, anticipated adjustment difficulty, and non-combat stressors. This finding provided some support for Hypothesis 15a, which postulated that higher PTSD symptoms and psychological distress at time 1 would predict higher transition stress at time 2. Additionally, the path model revealed that anticipating adjustment difficulty at time 1 predicted higher PTSD symptoms, psychological distress, and transition stressors at time 2. This finding supported Hypothesis 15b, which postulated that higher anticipation of adjustment difficulty at time 1 would predict higher transition stressors, PTSD symptoms, and psychological distress at time 2.

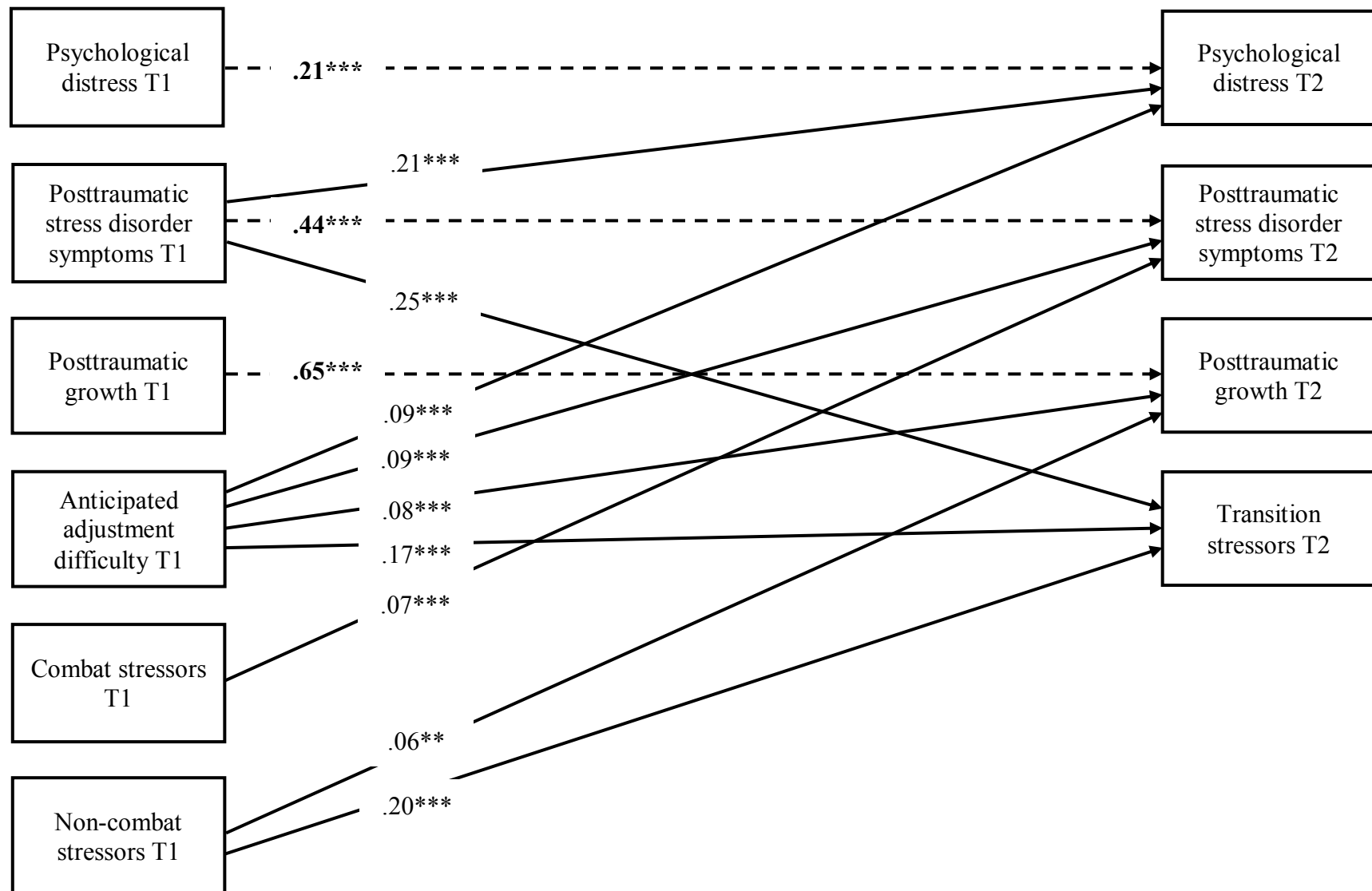


Figure 10. Path model showing significant associations between variables at T1 and T2.

Numbers represent standardised regression weights. * $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

The current study set out to investigate the impacts of operational deployment on the psychological wellbeing of NZDF service personnel. In doing so, this study sought to fill a gap as extant literature is dominated by research from the American and British militaries. Overall, there were four key findings of the current study. Firstly, PTSD appears to be the core psychopathology of a trauma response to combat exposure, and other symptomologies are secondary. Secondly, experiencing considerable levels of non-combat stressors in addition to combat stressors is likely to result in exacerbated levels of PTSD symptoms. Thirdly, being in the Navy, female, and not in a relationship were each risk factors for poorer psychological outcomes (both PTSD and distress). On the other hand, neither ethnicity nor deployment experience were empirically shown to be risk factors. Lastly, this study found evidence to suggest that PTSD symptomology may prompt some military personnel to make positive appraisals about traumatic deployment experiences and thereby facilitate personal growth. This study expands knowledge and understanding of how operational deployment affects the psychological wellbeing of NZDF service personnel, as well as contributing to the international literature. Implications of the current research lay in the potential for improvements to be made to the education, training, and support offered by the NZDF to their service personnel.

Summary of Results

There are several key findings of the current study, the first of which outlined the relationship between combat events (stressors), PTSD, and psychological distress. Specifically, combat stressors predicted PTSD, confirming the association-based and cross-sectional findings of Pietrzak et al. (2011) and Rona et al. (2009). This study also found that PTSD predicted distress, and that PTSD statistically explains at least some of the relationship between combat stressors and subsequent distress. These results suggest that psychological

distress is not inherently a result of exposure to combat stressors, but that, at least in some cases, the symptoms of PTSD seem to lead to reports of psychological distress. Our findings can be considered supporting evidence for the claim in extant literature that describes PTSD as the primary psychopathology of a trauma response, and other symptomologies, such as depression and anxiety, as secondary (Ginzburg et al., 2010; Koenen et al., 2003; Kessler et al., 1995). In support of a nascent finding of Adler et al. (2009), the current study showed that as combat stressors increased, there was an acceleration in PTSD symptomology, and similarly, as PTSD symptoms increased there was an acceleration in psychological distress.

Secondly, this study found that while non-combat stressors did not predict PTSD alone, when considerable non-combat stressors were experienced in addition to combat stressors the likely result was exacerbated levels of PTSD symptoms for service personnel. This finding provides support for the results of previous literature which suggested that home stressors in addition to combat exposure made for particularly worse PTSD symptomology post-deployment (Interian et al., 2014; Vasterling et al., 2010). Interian et al. (2014) and Vasterling et al. (2010) examined the impact of home stressors specifically, whereas the current study measured the impact of a mixture of home, work, interpersonal, and deployment stressors. The inclusion of different types of stressors in the current research indicates that it is not just home stressors that can lead to worse outcomes for military personnel. Importantly, many non-combat stressors can be ameliorated by the military organisation taking steps such as improving methods for communicating with family and friends at home, reducing workload, ensuring privacy in living quarters, and increasing support and communication from headquarters.

Thirdly, this study examined the relationship between a number of pre-deployment risk factors and the adverse psychological outcomes of PTSD symptomology and psychological distress. Overall, being in the Navy, female, and single were each found to be

risk factors for the development of symptoms of both PTSD and psychological distress. Being of younger age (17-24) was a risk factor for the development of psychological distress. Somewhat surprisingly, being a senior ranking service member (senior officer) was a risk factor for the development of PTSD symptoms. Whereas neither ethnicity nor deployment experience were risk factors for either negative psychological outcome.

One of the most notable results here was that, contrary to the hypothesis that Army personnel would be worse off, in our data, Navy personnel reported significantly higher levels of PTSD and distress than Army and Air Force personnel. This finding also counters the findings upon which our hypothesis was based; research conducted by Xue et al. (2015), Riddle et al. (2007), and Smith et al. (2008). It is possible that our unexpected result was due to an underestimation of the support and training required by Naval personnel, perhaps because the impact of Navy deployments on psychological wellbeing is much less researched and therefore much less understood. Overall, this divergent finding highlights a possible imbalance in support and training worth investigating, and subsequently a possible avenue for targeting future NZDF training and support.

Further, in support of research by Hourani et al. (2015), Polusny et al. (2014), Luxton et al. (2010), and Smith et al. (2008), this study found that being female was a risk factor for the development of both PTSD and distress. This finding is inconsistent with the findings of Cohen et al. (2015), Woodhead et al. (2012), Vogt et al. (2011), and Rona et al. (2007), each of whom found no evidence for significant gender differences.

Another risk factor for both PTSD and distress found in the current study was not being in a relationship (i.e. being single), and this finding aligns with extant research by Iversen et al. (2008), Smith et al. (2008), and Riddle et al. (2007). It is likely that being in a happy relationship is a protective factor by providing a source of positive thoughts, a reunion to look forward to, and much love and support.

The current study hypothesised based on extant research that younger age would be a risk factor for the development of PTSD symptoms (Booth-Kewley et al., 2010; Iversen et al., 2008; Riddle et al., 2007) and psychological distress (Riddle et al., 2007). Interestingly, the results revealed that younger age was risk factor for the development of distress, but not PTSD. The finding that younger personnel were *not* more vulnerable to developing PTSD was contrary to some literature and our prediction, but the finding does support the conclusions of a meta-analysis conducted by Xue et al. (2015). Given the highly comorbid nature of the relationship between PTSD and distress it is surprising that younger service members in our sample were more vulnerable to distress, but not PTSD. However, it is possible that the younger personnel experienced distress more directly related to non-combat stressors, than combat stressors. As age is a proxy for experience, perhaps the novelty of deployment-related stressors means that younger personnel are somewhat unprepared to cope with new and complex issues.

Contrary to existing research (Armenta et al., 2018; Blackburn & Owens, 2016; Jones et al., 2013; Seal et al., 2009; Iversen et al., 2008; Smith et al., 2008; Adler et al., 1996) and the subsequent hypothesis of the current study, the results revealed that higher ranked personnel (senior officers) were at greater risk of developing PTSD symptoms post-deployment than relatively lower ranked personnel (senior other ranks). As other rank (i.e. enlisted) status is considered a proxy for combat exposure (Seal et al., 2009), this may mean that the senior other rank service members (in comparison to senior officers) in our sample were better equipped and more mentally prepared to manage and cope with the emotional impacts of potentially traumatic events. Similarly, is it possible that due to relative novelty and lack of combat exposure the senior officers in our sample were more vulnerable to PTSD. Another possible reason for this contrary finding is that officers have a more significant role in decision-making (Blackburn & Owens, 2016) and communicating

commands to the unit, therefore they are conceivably more likely to feel responsible or morally conflicted by any actions taken by the unit that result in potentially traumatic events.

The current study found no significant ethnic group differences in reports of PTSD or distress, thus providing further support for existing research which also failed to find significant differences (Muralidharan et al., 2016; Friedman et al., 2004; Monnier et al., 2002; Trent et al., 2000). These findings, however, are not consistent with findings from another group of researchers (Kaczurkin et al., 2016; Koo et al., 2016; Smith et al., 2008; Ruef et al., 2000) who found that ethnic minority groups reported greater symptoms of mental illness following deployment than ethnic majority groups. These researchers questioned whether they were finding true differences or differences caused by cultural norms of displaying or reporting negative affect. The finding of the current study provides evidence in favour of no differences. In this study the analysis looked for statistical differences between the following two groups: (1) New Zealand European, (2) Maori, Asian, Pacific Islander, Other European, and Other. It is possible that the reason for the unexpected null finding is because the inclusion of Other Europeans in the minority group may have confounded the results, due to similarities brought about by a shared heritage between Other Europeans and the New Zealand Europeans.

Similarly, the literature is divided on whether deployment experience has a positive relationship (Kline et al., 2010; Polusny et al., 2009; Reger et al., 2009), a negative relationship (Adler et al., 2005; Martinez et al., 2000), or no relationship (Fear et al., 2010) with adverse psychological outcomes. The current study found that past deployment experience was not a risk factor for the development of either PTSD or psychological distress, thus supporting research which found the same (Fear et al., 2010).

The results of the current study also offer greater insight into the relationship between combat stressors, PTSD, and PTG. In accordance with PTG literature which demonstrates a

significant relationship between challenging life events and personal growth (Tedeschi & Calhoun, 2004; Tedeschi & Calhoun, 1996), the current study found that experiencing potentially traumatic combat stressors predicted subsequent PTG. The current study found that PTSD symptoms also predicted PTG, and therefore offers support for existing literature (Solomon & Dekel, 2007). Additionally, this study in a mediation analysis, revealed that PTSD explains a significant portion of the temporal relationship between combat stressors and PTG. This finding concurs with previous research which postulates that PTG occurs as a result of managing the negative psychological outcomes of traumatic events (Tedeschi & Calhoun, 1996). Together these PTG-related findings provide further evidence that it is the challenging psychological impact of combat stressors (PTSD symptoms) that prompts one to evaluate and appraise the deployment experience and, for some personnel, to subsequently experience personal growth.

Lastly, in support of research by Adler et al. (2011a), it was found that the difficulty that one anticipates experiencing upon returning home from deployment has a strong bearing on the subsequent levels of stress and wellbeing reported at time 2 (six months after deployment). Specifically, anticipating adjustment difficulties post-deployment predicted higher PTSD symptoms, psychological distress, and transition stressors six months later. These results suggest that personnel who expect poor outcomes largely obtain poor outcomes. This finding could be used to direct the provision of additional support to service personnel who, at time 1 (immediately following deployment), report high expectations of adjustment difficulties.

Practical Implications of the Current Study

The primary contribution of this study is to the NZDF and New Zealand by expanding on understanding of how operational deployment affects psychological adjustment of NZDF service personnel. Given the dearth of existing published research with New Zealand military

personnel, the present findings can offer guidance for improved services for NZDF personnel. The secondary contribution of this study is to the international literature on mental health responses to stressors experienced during (and after) military deployment. This study is particularly of benefit – both nationally and internationally – as current literature is largely based on American or British military samples, the nature of whose deployments and military training is substantially different to that of the NZDF. The nature of NZDF deployments are largely peacekeeping, UN missions, or training missions, whereas the American or British military forces are much more likely to be engaged in combat operations (Ministry of Defence, 2016). Subsequently, other nations with smaller militaries undertaking taskings akin to the NZDF could benefit from added breadth to the literature.

The practical implications of this research lays largely in the potential for improvements to be made to the education, training, and support offered by the NZDF to their service personnel. Firstly, as a result of the findings of this study, pre-deployment training may be amended to include more detailed education around what deploying personnel can expect in terms of stressors, experiences, and mental health outcomes, particularly for first time deployers. This new education segment could also include additional learning and awareness about mental health, stigma reduction, and support options available. Secondly, as a result of the findings of this study, the NZDF may consider including enhanced pre-deployment training on helpful methods of coping with stressors, such as benefit finding and positive attribution making, methods which may facilitate resilience and PTG. These new interventions could especially target the people who the findings of this study identified as being particularly vulnerable, for instance Navy personnel, females, or personnel who are single.

Lastly, there may also be implications for family members of NZDF service personnel, for external support services such as psychologists and doctors, as well as for

veteran support organisations such as the Royal New Zealand Returned and Services Association (RSA) and Veterans' Affairs New Zealand (VANZ). For families, the current study reveals that it is likely beneficial to communicate during the deployment, build anticipation for the service member of a positive transition home, and ultimately foster a supportive, understanding, and smooth reintegration. For external support agencies such as psychologists and doctors, it may be helpful to know that the majority of deploying NZDF personnel cope well, the effects of deployment are typically short-term (fading within six months following deployment), non-combat stress is an important exacerbating factor for PTSD and possibly distress, and that NZDF personnel are amenable to benefit finding. For veteran support organisations such as the RSA and VANZ, it could be beneficial to also know that the majority of NZDF members are resilient and the impacts of deployment are likely to fade across the first six months following deployment.

Limitations of the Current Study

This study was designed to be methodologically sound, however a few limitations are worth noting. Firstly, good research practice dictates that participants voluntarily take part in research, however the two questionnaires which provided the data for this study were compulsory for service personnel. NZDF policy requires recently deployed personnel to complete both the initial (IPQ) and follow-up (FPQ) return to New Zealand psychological questionnaires, for the purposes of delivering support, facilitating VANZ applications, and research. It is possible that service personnel who did not want to participate chose to respond misleadingly, perhaps with random, extreme, or contrary responses.

Secondly, it is possible that personnel underreported their negative experiences and symptoms due to the stigma around mental health issues in the military and the potential career-damaging ramifications. Specifically, service personnel are aware that their questionnaire responses will be linked to them personally for the purposes of post-

deployment briefing and mental health screening, and subsequently personnel who are not medically fit can be prevented from deploying and even medically discharged from the military. Therefore, participants may choose to be less honest in their responding in order to prevent any potential detriment to their careers. This design requirement means that the results of this study may not reflect the true extent of psychological distress and PTSD in the NZDF.

Thirdly, ideally for optimal longitudinal data analyses, a dataset would be comprised of three time points, for instance data collected at baseline (pre-deployment), immediately following deployment, and six months post-deployment. However, this study used data collected from only two time points and therefore one must be mindful of this limitation when drawing conclusions based on this dataset. Relatedly, there are other risk factors for psychological maladjustment that were not captured in this study and that could have been captured by a baseline data point. For instance, pre-deployment mental health state, previous mental health issues, difficulties at home, and previous experiences of trauma.

Directions for Future Research

Future research using a New Zealand military sample would advisedly involve taking a baseline measurement prior to deployment, in addition to the existing measures taken immediately post-deployment and six months post-deployment. Capturing the level of distress, mental health history, and previous traumatic experiences prior to deployment would facilitate the exploration of how these pre-deployment factors might influence post-deployment outcomes. This suggested study would be likely to determine additional risk factors to those identified in the current study. The inclusion of a baseline measure would be of further benefit given that there will be a group of personnel who have never deployed before and can therefore be considered a ‘control’ group. Similarly, future research might consider the inclusion of an additional point of data collection post-deployment beyond six

months, for instance at one year, 18 months, or even two years post-deployment. This additional data capture would allow greater understanding of the longer-term effects of operational deployment on wellbeing.

Another piece of future research with NZDF personnel could involve the collection of voluntary and anonymous data from personnel returning from deployment. Multiple data points could be collected to create a longitudinal dataset by including an anonymous research code which can be used to link an individual's data points together. An anonymous and voluntary study would encourage more honest responding and subsequently capture a truer picture of the impacts of deployment on the psychological wellbeing of NZDF members.

Future research with NZDF service members could use latent growth mixture modelling or latent class growth modelling to examine longitudinal operational deployment data for different wellbeing trajectories. A study utilising this methodology would be of considerable benefit given that statistical methods often treat individuals as homogenous and showing the same trajectory, when it is likely that individuals within a dataset will fall into several different trajectories. We risk oversimplifying multifaceted longitudinal data by treating individuals within a dataset as largely the same.

Conclusions

The current study has investigated a number of fine details of the relationship between operational deployment and psychological wellbeing. However, it is also important to reflect on the bigger picture. Firstly, the current study highlights the importance of not overlooking non-combat stressors, as these much less understood (relative to combat stressors) and seemingly benign issues have the potential to exacerbate negative psychological outcomes. Secondly, not everyone is adversely affected by potentially traumatic events, in fact the number of experiences of combat and non-combat stressors reported in this study is low. Further, the negative psychological effects of trauma typically fade, with the majority of

personnel soon bouncing back to a healthy and stable equilibrium. Thirdly, potentially traumatic events can lead to increased meaning-making in one's life and ultimately personal growth. These findings are not only of interest for investigations of the impact of operational deployment, but perhaps also for the exploration of other potentially traumatic or stressful events, such as victims of natural disasters or interpersonal violence.

The current study adds to a body of literature which is committed to increasing our understanding of the impact of military deployment on psychological wellbeing. It is important to continue researching this topic with a New Zealand sample given that post-deployment mental health will continue to be an issue, and our military will continue to play an important operational role on the international stage. The small size of our military – relative to our international allies – means that each year a large number of NZDF service personnel are exposed to some extraordinary and potentially harmful events and experience that have the potential to be detrimental both psychologically and physically. As the NZDF continues to deploy, the organisation has a duty of care to their service personnel to continuously prioritise and improve the mental health related education, training, and support. Ultimately, we must protect those who protect us.

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Appendix A

Initial Return to New Zealand Psychological Questionnaire

NZDF is committed to providing continuous support for the mental health and wellbeing of deployed personnel in order to sustain operational effectiveness and required NZDF outputs. This questionnaire is part of your Psychological Support to Deployment Programme (PSDP) put in place to assist with your transition back into New Zealand following operational service. This Initial RTNZ Psychological Questionnaire (IPQ) provides a current record of your emotional, mental and general health upon your transition from deployment back to New Zealand.

Completion of the IPQ is compulsory (DFO 3, Part 12, Chap 11) for all uniformed service personnel and serves to achieve three main purposes:

1. The first purpose of the IPQ is to provide NZDF Psychologists with information regarding your mental health in order to best provide support to you. Questions will be asked around your deployment experiences, perceptions of military service, current mental health and anticipated challenges you may face on RTNZ.
2. The secondary purpose of the IPQ is to provide records of your emotional, mental and general health following deployment, so that upon your request, information may be provided to support applications through Veterans' Affairs New Zealand (VANZ) or other such organisations.
3. The third purpose of the IPQ is to enable research allowing a better understanding, monitoring and management of the impacts of deployment on the mental health of our service personnel.

Completed questionnaires will not be released to any individual outside the NZDF Directorate of Psychology without your consent, and only used for the purposes as outlined above. Collated information may be used for reporting and research purposes, however no personally identifying information will be used, published or released.

All completed questionnaires will be scanned, and both electronically and manually stored in databased maintained by Joint Forces New Zealand. An electronic copy will also be entered onto the NZDF Medical Records database. The questionnaires will be stored as long as they are deemed relevant and disposed of IAW the Public Records Act 2005. Storage and security compliancy of the completed questionnaires will be met under the provisions of the Privacy Act 2003. Personal information will only be disclosed outside the NZDF in such circumstances where:

1. The information is relevant to administering the Defence Act 1990 or Armed Forces Discipline Act 1971 upon determining operational effectiveness of NZDF;
2. Disclosure would prevent harm to, or prevent endangering any person; or
3. There is legal authorisation, a legal requirement or a court order to disclose the information.

Except for as provided by law, the NZDF Directorate of Psychology will only disclose information outside the terms of this form once your consent has been gained.

If you have any questions or concerns regarding this process, please consult the present NZDF Psychology staff.

Acknowledgement

I acknowledge the terms of collection, storage, disclosure and use as outlined above. I have had the opportunity to discuss any concerns I have regarding the collection, storage, disclosure and use of my information with an NZDF Psychologist.

Full name:

Service Number:

Date:

Appendix B

Follow Up Return to New Zealand Psychological Questionnaire

NZDF is committed to providing continuous support for the mental health and wellbeing of deployed personnel in order to sustain operational effectiveness and required NZDF outputs. This questionnaire is part of your Psychological Support to Deployment Programme (PSDP) put in place to assist with your transition back into New Zealand following operational service. This Follow-Up RTNZ Psychological Questionnaire (FPQ) provides a current record of your emotional, mental and general health following your initial transition period from deployment back to New Zealand.

Completion of the FPQ is compulsory (DFO 3, Part 12, Chap 11) for all uniformed service personnel and serves to achieve three main purposes:

1. The first purpose of the FPQ is to provide NZDF Psychologists with information regarding your mental health in order to best provide support to you. Questions will be asked around your deployment experiences, perceptions of military service, current mental health and challenges you faced upon RTNZ.
2. The secondary purpose of the FPQ is to provide records of your emotional, mental and general health following deployment, so that upon your request, information may be provided to support applications through Veterans' Affairs New Zealand (VANZ) or other such organisations.
3. The third purpose of the FPQ is to enable research allowing a better understanding, monitoring and management of the impacts of deployment on the mental health of our service personnel.

Completed questionnaires will not be released to any individual outside the NZDF Directorate of Psychology without your consent, and only used for the purposes as outlined above. Collated information may be used for reporting and research purposes, however no personally identifying information will be used, published or released.

All completed questionnaires will be scanned, and both electronically and manually stored in databased maintained by Joint Forces New Zealand. An electronic copy will also be entered onto the NZDF Medical Records database. The questionnaires will be stored as long as they are deemed relevant and disposed of IAW the Public Records Act 2005. Storage and security compliancy of the completed questionnaires will be met under the provisions of the Privacy Act 2003. Personal information will only be disclosed outside the NZDF in such circumstances where:

1. The information is relevant to administering the Defence Act 1990 or Armed Forces Discipline Act 1971 upon determining operational effectiveness of NZDF;
2. Disclosure would prevent harm to, or prevent endangering any person; or
3. There is legal authorisation, a legal requirement or a court order to disclose the information.

Except for as provided by law, the NZDF Directorate of Psychology will only disclose information outside the terms of this form once your consent has been gained.

If you have any questions or concerns regarding this process, please consult the present NZDF Psychology staff.

Acknowledgement

I acknowledge the terms of collection, storage, disclosure and use as outlined above. I have had the opportunity to discuss any concerns I have regarding the collection, storage, disclosure and use of my information with an NZDF Psychologist.

Full name:

Service Number:

Date:

Appendix C

Kessler Psychological Distress Scale (K10)

The following questions inquire about how you have been feeling over the last four (4) weeks. Please read each question carefully and indicate the response that best describes how you have been feeling.

1	2	3	4	5
None of the time	A little of the time	Some of the time	Most of the time	All of the time

1. Tired for no good reason
2. Nervous
3. So nervous that nothing could calm you down
4. Worthless
5. Hopeless
6. Restless or fidgety
7. So restless that you could not sit still
8. Depressed
9. Everything was an effort
10. So sad that nothing could cheer you up

Posttraumatic Stress Disorder Checklist – Civilian (PCL-C)

Below is a list of problems and complaints people sometimes have to stressful experiences.

Please indicate if you have experienced the following:

1	2	3	4	5
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 '*super alert*' or watchful or on guard?
17. Feeling *jumpy* or easily startled?

Posttraumatic Growth Inventory – Short Form (PTGI-SF)

Deployments can be positive experiences for personnel and can lead to personal growth.

Using the scale provided, please rate the extent of change you have experienced for each factor as a result of your deployment:

1	2	3	4	5	6
Not at all	Very small	Small degree	Moderate	Great degree	Very great
	degree		degree		deal of change

1. I changed my priorities about what is important in life
2. I have a greater appreciation for the value of my own life
3. I am able to better do things with my life
4. I have a better understanding of spiritual matters
5. I have a greater sense of closeness with others
6. I established a new path for my life
7. I know better that I can handle difficulties
8. I have a stronger religious faith
9. I discovered that I am stronger than I thought I was
10. I learned a great deal about how wonderful people are

Non-combat stressors

Below is a list of issues that may cause distress for deployed personnel. Using the scale provided, indicate to what extent each issue caused you trouble or concern at any stage during your deployment.

1	2	3	4	5
No stress	Slight stress	Moderate stress	A lot of stress	Extreme stress

1. Overload of work
2. Periods of high activity then low/no activity
3. Living/working with the same people for extended periods of time
4. Isolation from other NZDF personnel
5. Threat of danger
6. Bad interpersonal relationships with team members
7. The overseas organisation
8. Boredom
9. Frustration with HQ JFNZ
10. Lack of privacy in living quarters
11. Language barriers
12. Being away from friends and family
13. Sorting out problems at home
14. Frustrations generally
15. Not being able to take leave
16. Concern about career management / future postings
17. Support for my family at home
18. General rules/regulations of deployment

Combat stressors

Please indicate if you were involved in any of the incidents listed below during your deployment.

1	2	3	4
0 times	1 time	2-4 times	5 or more times
1. Being attacked, ambushed or held captive			
2. Receiving small arms or sniper fire			
3. Seeing dead bodies or human remains			
4. Witnessing someone being seriously injured or killed			
5. Witnessing extreme poverty, starvation, malnutrition			
6. Experiencing hostile reactions from civilians			
7. Witnessing brutality, mistreatment or abuse of civilians/non-combatants			
8. Feeling responsible for the death, injury or abuse of a combatant or civilian			
9. Being in threatening situations and not being able to respond because of ROE			
10. Having a close call, was shot, hit or threatened but protective great or support protected you			

Anticipated adjustment difficulty

The following questions ask about concerns you may have about going home. Read each question carefully and indicate the response that best describes how you feel about returning home.

1	2	3	4
Never	Rarely	Often	All of the time

Do any of the following areas concern you about going home?

1. Thoughts of unpleasant events that happened during the deployment
2. Relationships (with family, friends, partner, etc.)
3. Settling down to normal life after the deployment
4. Returning to non-operational military duties

Transition stressors

Using the scale provided, please indicate to what extent each issue caused you trouble or concern at any stage during your transition from deployment.

1	2	3	4	5
No stress	Slight stress	Moderate stress	A lot of stress	Extreme stress

1. Still having unfinished business from the deployment
2. Changes at home that make it hard to transition back into
3. Relating to others who were not on my deployment
4. Being more irritable, frustrated, impatient than normal
5. Being more detached and distant to my family, friends and workmates
6. Being more reckless, impulsive and taking more risks
7. Getting back into a normal sleep routine since I have been home
8. Being more agitated and easily startled since I have been home
9. Being generally less motivated following my deployment