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**Examining Personality and Performance in Extreme Environments**

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# Examining Personality and Performance in Extreme Environments

Ph.D. Thesis

Thomas L. du Preez  
January 2017

Thesis submitted to Bangor University in fulfilment of the requirements for the degree of Doctor of Philosophy at the School of Sport, Health and Exercise Sciences.

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## **Thesis Summary**

The military is a multifaceted organisation consisting of an extremely diverse workforce where multiple individual differences are found among personnel. Therefore, possessing knowledge of personality characteristics that are adaptive along with those that are maladaptive in training and combat situations would be very advantageous for the military, especially when recruiting and training new recruits. The present thesis contains five chapters with the intent to first explore individual differences that could account for recruits who pass or fail military basic training (MTB). A second purpose of the thesis was to develop a deeper understanding of the personality profiles of courageous actors who have been decorated for their acts of bravery.

Chapter 1 offers brief empirical reviews on personalities and their relationship with performance in the military environment and identify certain gaps in the literature that needs to be addressed. In particular: (i) limited current empirical research is available on the effect that military basic training (MBT) may have on the personality of recruits under training; (ii) limited empirical evidence is available exploring the positive adaptation and functioning of psychoticism and psychopathy personality types within the military environment; (iii) limited research is available that explore the relationship between courageous soldiers and psychopathy; and (iv) limited empirical evidence is available on the positive effect of psychological attributes (i.e., punishment and reward sensitivity, mental toughness, effortful control, internalisation of core values) on performance of military recruits under training. The chapter concludes by proposing that the military creates an environment where individuals with some measure of psychoticism (Eysenck & Eysenck, 1976) and psychopathy (Lilienfeld & Widows, 2005) may flourish, provided that they are given appropriate training.

The focus of Chapter 2 falls on psychological attributes and behaviours that British male Infantry recruits bring to the start of MBT and how those attributes influence retention

and performance outcomes. Results indicated that at that start of MBT, high levels of psychoticism, mental toughness (MT), activation control and attention control, and low levels of neuroticism and punishment sensitivity successfully differentiated between recruits who successfully completed MBT first time from recruits who did not complete MBT first time. The results and theoretical implications are discussed in terms of what the Army may do to improve recruitment and retention.

Chapter 3 is longitudinal in nature and explored the effect MBT has on the psychological attributes of military recruits during a 26 week MBT training programme. The same psychological attributes that were explored within Chapter 2 were investigated in Chapter 3. With relevance to personality, results indicated a significant increase in extraversion across training, whereas neuroticism and punishment sensitivity significantly decreased during MBT. With relation cognitive variables, only external regulation levels significantly decreased during MBT. The results and theoretical implications are discussed in terms of how training may (or may not) influence some deep-rooted characteristics of the recruit.

Chapter 4 examines the ultimate expression of military performance; namely, the decorated courageous soldier. The chapter followed a multi-methodological approach involving qualitative and quantitative methods to explore the personality of courageous soldiers with specific reference, but not limited to: psychopathy, cognitive processes, motivation and behaviours. Findings indicated that decorated courageous soldiers are not psychopathic; however, decorated courageous soldiers share certain characteristics with psychopaths. The findings from Chapter 4 further suggest that courageous acts were performed as a result of the right person, with the right genetic-makeup, being in the right situation when it mattered. The results and theoretical implications are discussed in terms of individual differences in personality, behaviour, cognitions and motivation.

Chapter 5 concludes the thesis by providing a summary of the empirical chapters, followed by a discussion of theoretical points of interest and applied implications. Some limitations and strengths of the thesis are highlighted; whereafter the thesis is concluded by forwarding future research questions in order to further understand personalities and their performance within the military environment.



# **Chapter 1**

## **General Introduction**

The Army is a high-risk occupation that relies on effective training programmes in order to develop and improve the performance of soldiers within a variety of challenging environments (Krueger, 1991; Olson, Walker, & Phillips, 2010). Although the aim of effective training is desirable for both the Army and professional civilian organizations, the practical costs of ineffective personnel training are considerably more tangible for the Army. For example, the Army is primarily and fundamentally a combat Arms of Service that requires soldiers to engage in and eliminate threat, even if it impels the soldier to kill another human being. However, when a soldier breaks down during combat or exhibits an intense resistance to killing, the soldier not only endangers the lives of fellow comrades, but also jeopardizes the accomplishment of organizational outcomes. It is therefore apparent that the Army environment is unique, where killing another human being during combat as a ‘matter of cause’, is very distinctive from ‘normal’ civilian life. Subsequently, one might expect to encounter an accumulation of ‘natural killers’ in combat units, where recruits exhibit resilient personality characteristics with a predisposition towards aggression and killing. Hence, the Army environment seems a worthy environment where the darker side of personality traits and human functioning can be explored.

Major Pierson (1999) wrote an enlightening article describing characteristics of United States Army soldiers who have a predisposition to killing. Pierson (1999) noted that these ‘natural killers’ have above-average intelligence and a satiric sense of humour, enjoy contact sport, engaged in frequent fights as a child, lack social emotions (e.g., empathy, love, and remorse) and have the ability to usurp authority in a crisis. It is therefore not difficult to see how a soldier exhibiting all or a configuration of these characteristics may be perceived by non-combatants as being authoritarians, aggressive, sensation seeking and lacking in empathy. Notably, the aforementioned characteristics are also associated with personality types such as psychoticism and psychopathy. For example, high levels of psychoticism are

associated with authoritarianism, sensation seeking, and aggression (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950; Eysenck & Eysenck, 1976; Zuckerman & Glicksohn, 2016); whereas high levels of psychopathy is associated with sensation seeking, deficiency in empathy and aggression (Hare & Neumann, 2008; Lilienfeld & Widows, 2005; Lykken, 1995).

It takes little imagination to connect both psychoticism and psychopathy personality types to criminal intent. In a comprehensive review of the biological and psychological mechanisms behind the formulation of criminality, Eysenck and Gudjonsson (1989) noted that high levels of psychoticism provide individuals with a propensity towards criminality such as delinquency, through its association with lack of empathy and anti-social traits (e.g., impulsivity, sensation seeking). With relevance to psychopathy, the psychopath is linked to violent and aggressive criminal behaviours, which involve anti-social behaviours, impulsivity and unstable lifestyles (Hare, Hart, & Harpur, 1991; Widiger, 2007). Nevertheless, there appears to be a functional side to these personality types within combat environments. For instance, studying the development and characterization of combat exhaustion (i.e., combat neuroses) in soldiers who took part in the assault on Normandy, Swank and Marchand (1946) observed that almost all Infantry soldiers experienced combat exhaustion after continuous and prolonged exposure to combat related stressors. Interestingly, it was a small group of combat soldiers (less than 2%) with aggressive psychopathic characteristics that seemed capable to withstand prolonged exposure to combat stressors and function effectively within the combat environment. Despite the apparent negative connotations associated with psychoticism and psychopathy personality types, the above literature (Pierson, 1999; Swank & Marchand, 1946) implies that military training may bring about positive changes, enabling ‘dark’ personality types to function effectively in a pro-social manner within the military environment. Therefore, it appears that there is a gap in the literature that needs to be

addressed with regards to the positive adaptation and functioning of psychoticism and psychopathy personality types within combat units.

### **1.1. Military Training**

The overarching objective of attaining maximum defence effectiveness and the fulfilment of extreme operational demands compel the military to recruit, train and allocate the correct person to a position that is fitting to his or her skills and character (Steege & Fritscher, 1991). The military fulfils its responsibility of preparing recruits through an extensive training programme, thereby developing recruits physically and mentally and thus by extension developing personality characteristics.

As far as it could be established, only three studies directly investigated whether military training changes the personality of the recruit. The first study (Ekman, Friesen, & Lutzker, 1962) was concerned with the influence of an eight week MBT (Military Basic Training) programme on recruits under training. The effect of MBT on the recruits' personality was assessed by administering the Minnesota Multiphasic Personality Inventory (MMPI; Schiel, Baker, & Hathaway, 1943) to 93 recruits during weeks 1, 4 and 8 of MBT. Results indicated small yet significant increases in hypochondriasis, psychopathic deviate and hypomania. Ekman et al. (1962) interpreted these results as recruits becoming manipulative, aggressive and impulsive during training. Therefore, MBT had no beneficial effect on the psychology of recruits.

Noticing the difference between the impression that MBT brings about positive changes in recruits and the negative empirical evidence presented by Ekman et al. (1962), Vickers, Hervig, Paxton, Kanfer, and Ackerman (1996) conducted a follow-up study to define the effect of a 7 week MBT programme on the personality of recruits under training. Vickers et al. (1996) administered the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) to naval recruits during weeks 1 and 7 of MBT. Results indicated that

recruits became significantly more conscientious, but less neurotic during MBT. No other significant changes were observed on the remaining NEO-FFI personality traits. Vickers et al. (1996) linked the combination of high conscientiousness and low neuroticism levels to better behaviours, i.e. lower levels of substance abuse and absenteeism. It was concluded that MBT brings about positive personality changes within recruits, resulting in recruits becoming more effective service members.

More recently, Jackson, Thoemmes, Jonkmann, Lüdtkke, and Trautwein's (2012) longitudinal study explored the relationship between military experience and the development of personality traits within a German male sample. German conscription law compels males to complete either 9 months of civilian community service or 9 months military service. The sample consisted of 1261 male participants, of which 1016 chose to perform civilian community service, and 245 males performed military service. Military service consists of 3 months of combat training and 6 months at an assigned post. Personality was assessed by administering the German version of the NEO-FFI (Borkenau & Ostendorf, 1993) to participants at four time points over a 6-year period. Findings indicated that individuals who enlisted in the military tested significantly lower on agreeableness after military service than individuals who performed civilian community service. These changes persisted, even after 5 years of military service. Interpreting the results, Jackson et al. (2012) argued that lower levels of agreeableness may be beneficial within the military environment, since low levels of agreeableness are associated with aggression, aggressive behaviour and aggression related skills (e.g., marksmanship). With relevance to the current thesis, aggression has also been positively associated with psychoticism (Eysenck & Eysenck, 1976; Zuckerman, 2008), where psychoticism may be a predictor of successful completion of MBT.

## 1.2. Psychoticism

Performing factor analysis on a variety of personality traits of male soldier psychiatric patients, Eysenck (1947) initially identified two dimensions of personality: extraversion (vs. introversion) and neuroticism (vs. emotional stability). Individuals occupying the high end of the extraversion dimension are characterised as energetic, talkative and active; whereas individuals on the low end of the dimension (i.e., introverts) are quiet and reserved. In addition, individuals on the high end of the neuroticism dimension are characterised as anxious, moody and nervous; as opposed to individuals on the low end of the spectrum (stability) who are emotionally stable and relaxed (Eysenck, 1947; Eysenck & Eysenck, 1985). A third personality dimension, psychoticism (vs. normality), was later added by Eysenck in order to measure psychotic personality traits (e.g., psychosis)<sup>1</sup> within the normal population (Eysenck & Eysenck, 1976).

It was originally hypothesised that psychoticism exists on a continuum of abnormality, ranging from selfless, altruistic and empathic behaviour on the lower end of the spectrum, through average, aggressive and psychopathy behaviour, to psychotic behaviour (e.g., psychosis, schizophrenia) on the extreme high-end of the spectrum (Eysenck, 1992; Eysenck & Eysenck, 1976). The psychoticism scale was never intended to be a measure of clinically diagnosed psychiatric traits (i.e., chronic schizophrenia and bipolar manic depression); therefore, the typical symptoms associated with these traits were excluded from the scale (Eysenck & Eysenck, 1976). It was Costa and McCrae's (1992) view that the psychoticism scale measured a lack of conventional socialisation, as opposed to measuring a predisposition to psychotic disorders as originally intended by the Eysencks. However, Costa

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<sup>1</sup> In light of the distinction between psychosis and psychoticism, Eysenck subscribed to the diathesis-stress theory of mental disorder, with psychoticism being the diathesis which, when augmented by stress while present in the appropriate environmental conditions will produce the psychosis state (Eysenck, 1977). Psychosis can be described as a dimensional phenotype that is manifested on a continuum that stretches from normality through depressive illness, to clinically defined psychosis and schizophrenia at the extreme end of the continuum (Van Os et al., 1999).

and McCrae (1992) were not the only critics arguing that the high end of the scale does not measure psychotic behaviour (e.g., schizophrenia, psychosis). For example, Chapman, Chapman and Kwapił (1994) conducted a longitudinal study in an effort to determine if Eysenck's psychoticism scale is a viable measure to determine an individual's predisposition to psychosis. A sample of non-psychotic College students was re-assessed after 10 years for indicators of risk for psychosis as well as for the presence of clinical psychosis. Results revealed that those individuals who scored high on the psychoticism scale were not at an elevated risk for psychosis. Instead, when compared to individuals low on the psychoticism spectrum, individuals on the high-end of the spectrum exhibited higher engagement in antisocial behaviours (e.g., drug and alcohol abuse) and also had higher arrest records (Chapman et al., 1994). This finding supported earlier concerns voiced by Block (1977), who believed that the psychoticism scale was an inadequate measure of differentiating psychotics from normals. Instead, Block (1977) was of opinion that high psychoticism represented an individual with conscienceless, impulsive and aggressive traits which can be found in criminal or psychopathic people.

Support for Block's (1977) concern about what psychoticism actually measures came from a series of comparisons conducted by Hare (1982) to determine the relationship between Eysenck Personality Questionnaire scales (EPQ; Eysenck & Eysenck, 1975) and psychopathy. Hare (1982) administered the EPQ (Eysenck & Eysenck, 1975) to male incarcerated inmates, and compared it to the inmates' psychopathy score that was obtained using the Psychopathy Checklist (PCL; Hare, 1980; Hare & Frazelle, 1980). Results indicated that psychoticism was significantly correlated with the global total score of psychopathy as measured by the PCL-R, as well as with factors related to antisocial behaviour and impulsive non-planfulness, thereby providing evidence that psychoticism and psychopathy are related.

### 1.3. Psychopathy

In his ground-breaking monologue “*The Mask of Sanity*”, Cleckley (1955) characterised psychopathy with interpersonal, emotional and behavioural traits such as lack of remorse and empathy, absence of nervousness, superficial charm and impulsivity. Despite the large amount of empirical literature available on psychopathy, it is not recognised as a stand-alone personality disorder in the Diagnostic and Statistical Manual of Mental Disorder – fifth edition (DSM-5; APA, 2013; Miller & Lynam, 2015). Instead, psychopathy is characterised in the DSM-5 incorporated within Antisocial Personality Disorder, which in turn has been criticised for not being able to encapsulate psychopathy (Crego & Widiger, 2015; Wygant et al., 2016). Arguably, the gold-standard measure to assess psychopathy is the Psychopathy Checklist Revised (PCL-R; Hare, 1991; 2003) that was developed for use in clinical and forensic environments.

The PCL-R differentiates between four psychopathy dimensions nested within two factors (Neumann, Hare, & Newman, 2007). Factor 1 draws on interpersonal and affective deficits of psychopathy and consists of: (a) Interpersonal dimensions such as superficial charm, grandiosity, lying, cunningness and glibness; (b) Affective dimensions such as lack of empathy, shallow affect, inability to accept responsibility for own actions and lack of remorse. Factor 2 draws on anti-social and irresponsible behaviours and consists of: (a) Lifestyle dimensions such as proneness to boredom, impulsive behaviour, irresponsibility, lack of long-term goals and parasitic lifestyle; (b) Antisocial dimensions such as early behavioural problems, juvenile delinquency, poor behavioural control and criminal versatility. However, to be able to assess psychopathy traits and behaviours using the PCL-R, one needs to conduct a semi-structured interview with the subject and have access to additional and supporting information. Therefore, the PCL-R is more appropriate for clinical and forensic environments. As more researchers became intrigued by psychopathy and its



associated traits, emotions and behaviours within the ‘normal’ population, various conceptualizations and measures were developed to assess this construct. The interested reader is referred to Lilienfeld and Fowler (2006) for a thorough discussion on various psychopathy self-report measures.

Due to the various conceptualisations and variety of evaluative measures of psychopathy available, Crego and Widiger (2015) suggested use of the psychopathy measure that best represents the like-mindedness within the particular field of research (e.g., forensic, clinical, normal population). Thus our attention is drawn to the Revised Psychopathic Personality Inventory (PPI-R; Lilienfeld & Widows, 2005). The PPI-R is a well validated self-report measure of psychopathy that concentrates on the core interpersonal and affective traits, as well as the anti-social behaviours of the construct. The PPI-R consists of three higher-order factors: Fearless Dominance, Self-Centred Impulsivity, and Coldheartedness (Benning, Patrick, Hicks, Blonigen, & Kreuger, 2003; Lilienfeld & Andrews, 1996; Lilienfeld & Widows, 2005). The Fearless Dominance factor reflects a tendency towards lack of anticipatory physical and social anxiety, low harm avoidance and high levels of interpersonal dominance and is made up by three subscales: Fearlessness, Social Influence and Stress Immunity. The Self-Centred Impulsivity factor reflects a tendency towards taking advantage of others, being impulsive, blaming others for one’s mistakes and self-centredness. The factor contains four subscales, namely: Rebellious Nonconformity, Machiavellian Egocentricity, Carefree Nonplanfulness, and Blame Externalization. The third factor, Coldheartedness, reflects guiltlessness, lovelessness and lack of empathy. Unlike the Fearless Dominance and Self-Centred Impulsivity factors, Coldheartedness does not contain any subscales.

***Positive Benefits of Negative Personality Traits:*** However, individuals with psychopathic traits are not always predisposed towards criminality. Some manage to adapt

and function well within ‘normal’ society. Researchers have even hypothesised that ‘successful’ psychopaths function within society as law enforcers, politicians, or even as businessmen (e.g., Hall & Benning, 2006; Lykken, 1995). In a recent study, Lilienfeld, Latzman, Watts, Smith, and Dutton (2014) investigated the association between psychopathic traits occupational choice in relation to everyday functioning within a sample of 3388 members of the general population. Results revealed that psychopathic traits associated with Fearless Dominance were related to individuals selecting high-risk occupations (e.g., police, fire fighters). In addition, psychopathic traits associated with Fearless Dominance were also related to occupying management and leadership positions, thus providing some support for Lykken’s (1995) low-fear hypothesis. Lykken (1995) hypothesised that with proper socialization, psychopaths with high levels of fearlessness may actually be predisposed towards daring leadership and courageous behaviours.

#### **1.4. Psychopathy and Courage**

There is some support of Lykken’s (1995) low-fear hypothesis in recent research studies. Patrick, Edens, Poythress, Lilienfeld, and Benning (2006) investigated Fearless Dominance and Impulsive Antisocial factors of the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) on male incarcerated inmates. Findings indicated that the Fearless Dominance scores of participants were significantly and positively associated with self-reported everyday heroism (e.g., resuscitating a stranger who had stopped breathing, rescuing a stranger from drowning), whereas the Impulsive Antisocial factor was significantly and negatively correlated with everyday heroism. More recently, Smith, Lilienfeld, Coffey, and Dabbs (2013) examined the relationship between Fearless Dominance and heroic behaviour within four samples: two undergraduate samples, a community sample and a sample of 42 U.S. presidents. Their results indicated a positive association between Fearless Dominance and everyday heroism (as measured by the Activity Frequency

Inventory; Lilienfeld, 1998). Findings further revealed a positive association between Fearless Dominance and altruism towards strangers. This finding was credited to the lack of social and physical anxiety experienced by individuals high on Fearless Dominance. An interesting yet unexpected result was that Blame Externalization (i.e., propensity to blame others for one's own troubles) was a predictor of everyday heroism within both undergraduate and the community sample. Smith et al. (2013) argued that this result may reflect the relative disregard for social norms found among individuals who score high on the Blame Externalisation subscale. Lastly, Smith et al. (2013) reported that Fearless Dominance was also positively associated with war heroism within the U.S. presidential sample.

### **1.5. Courage within the Military**

The combat environment provides the soldier with many opportunities to act courageously. Courage during battle is an expression of the soldier's commitment towards his fellow comrades and is performed by a soldier unrelated to rank. Sometimes the soldier performing the courageous act pays the ultimate price for his selfless act. Thus it can be argued that the ultimate expression of 'soldiering' is the courageous actor. Courage proves to be a complex and multidimensional construct (Rate, Clarke, Lindsay, & Sternberg, 2007). This becomes apparent when examining the various conceptualisations of courage by different researchers. Some researchers view courage as a disposition that includes emotional character strengths such as vitality, bravery, integrity and persistence (Peterson & Seligman, 2004), where some (e.g., Gould, 2005) view courage as having three dimensions i.e., fear, appropriate action and higher purpose. Consistent with our view, Rate (2010) proposed that courage is made up of three dimensions: *motivation towards excellence*, *external circumstances*, and *volition*. The first dimension, *motivation towards excellence*, suggests that the act is motivated to bring about a morally worthy or noble good purpose, while the *external circumstances* dimension specifies that there must be a substantial risk or danger to

the actor. The third dimension, *volition*, indicates that the act must have been performed of the actor's own will. Each dimension on its own is insufficient to define courage, thus all three dimensions need to be present (Rate, 2010). For the purpose of this thesis, we define an act as courageous when: "... (a) the action was freely chosen, (b) the actor seeks to bring about a noble purpose, and (c) the act is attempted or accomplished at substantial risk to the actor" (Rate, 2010, p.61).

## **1.6. Characteristics of Courageous Soldiers**

***Fear / Fearlessness:*** A characteristic that is most often considered synonymous to courage is fearlessness. However, different views exist as to whether fearlessness should be a characteristic of a courageous soldier. Very few researchers actually argue for the notion that courageous soldiers are fearless. Walton (1986) is one of the few who supports the view that courageous acts performed without fear are still courageous, but he was also of opinion that not all fearless acts can be viewed as courageous. For example, Walton (1986) argued that when a fearless individual rushes into a dangerous situation without bringing about a noble purpose, the act cannot be viewed as being courageous. In partial support, Rachman (1983; 1991) acknowledged the existence of a few exceptional soldiers who are impervious to fear, however, he did argue that the purest form of courage was when an individual acted and persevered despite experiencing fear, as such an action required greater effort and endurance. Rachman (1983) further argued that soldiers' fears decreased as a result of adequate training and continual successful completion of dangerous assignments. As a consequence, soldiers undergo a transition from being courageous to becoming fearless. The transition from courageous to fearless is attributed to realistic training, as it reduces one's appraisal of danger and enhances self-confidence (Rachman, 1983).

***Self-Confidence:*** Self-confidence has been found to be a central element of courageous behaviour within combat environments (Rachman, 1996). Self-confidence helps

individuals to persevere through difficult endeavours, helps to transform threats into challenges and develops and maintains courage (Finfgeld, 1999). A micro-level approach to self-confidence is self-efficacy, which is a cognitive approach to explain situation specific self-confidence (Bandura, 1977; 1982). Soldiers with high perceived self-efficacy are less susceptible to combat stress reactions than soldiers with low perceived self-efficacy. For example, Ginzburg, Solomon, Dekel, and Neria (2003) have shown that decorated courageous war veterans have higher ratings of perceived self-efficacy than combat stress reaction casualties and combat veterans. Explaining their results, Ginzburg et al. (2003) argued that the high perceived self-efficacy may have predisposed the decorated soldiers towards courageous behaviour. On the other hand, a low sense of self-efficacy may cause combat stress reaction casualties to doubt their abilities to function effectively when encountering similar combat threats in the future, thus affecting their coping and long term adjustment to combat-induced stressors (Solomon, 1993).

***Sensation Seeking:*** A further characteristic that has been ascribed to contribute towards courageous behaviour and long-term adjustment to combat related traumatic events is sensation seeking. Courageous soldiers have been attributed with a heightened sense of adventurousness (London, 1970) and to engage in sensation seeking behaviours (Harvey, Erdos, & Turnbull, 2009). Sensation seeking is viewed as a trait, characterised by the willingness to take risks (i.e., physical, financial, legal, and social) in search for novel, complex, varied and intense sensations and experiences (Zuckerman, 1994). Sensation seeking behaviour is not necessarily undesirable, especially when it is linked to positive outcomes such as courageous behaviour and long term adjustment after traumatic combat events within the military. Neria, Solomon, Ginzburg, and Dekel (2000) explored sensation seeking and its implications for combat performance and long term adjustment within a sample of Israeli war veterans of the Yom Kippur War. The sample of war veterans consisted

of courageous soldiers who received decorations for their courageous acts; veterans who were treated for combat stress reaction during the war; and a control group of combat veterans who participated in the war. Findings showed that the courageous soldiers were higher sensation seekers than both the combat stress reaction casualties and the control group. The high sensation seekers (i.e., courageous soldiers) exhibited less symptoms of Post-Traumatic Stress Disorder (PTSD) than low sensation seekers, and they exhibit less combat related intrusion and avoidance tendencies (Neria et al., 2000). In addition to the above personality characteristics, there are other factors and behaviours that are thought to contribute towards courageous actions, for example: altruism (Kelly & Dunbar, 2001), self-sacrifice and leadership (Gal, 1987), impulsivity (Harvey et al., 2009), training and group cohesion (Rachman, 1995), social cohesion (Riemer, 1998), persistence, prior exposure to models of moral behaviour (Jayawickreme & Di Stefano, 2012) and possession of the appropriate skills (Rachman, 1995).

### **1.7. Characteristics Contributing to Successful Training Outcomes**

The present thesis also examines other characteristics that may contribute to the successful training outcomes in army recruits, namely punishment and reward sensitivity, mental toughness, internalisation of military core values and effortful control.

***Punishment and Reward Sensitivity:*** During MBT, instructors use training strategies containing implicit and explicit contingencies, such as rewards and punishment, to aid recruits to adapt to the military environment (Elder, Gimbel, & Ivie, 1991; Wintre & Ben-Knaz, 2000). These punishment and reward strategies are applied in an attempt to modify the recruits' behaviour to ensure they conform to the prescribed military rules and conduct. Conformity to prescribed rules and military conduct results in recruits being rewarded, which in turn motivates approach behaviours; whereas failure to conform to prescribed rules and military conduct results in punishment, thus motivating avoidance or escape behaviours

(Gray, 1975; Jackson et al., 2012). The implementation of appropriate punishment (i.e., punishment that is coupled to a specific transgression) during military training has shown to have a positive effect upon the improvement of recruits' self-esteem and satisfaction (Arthur, Hardy, & Wagstaff, 2010). This indicates that as long as the external contingencies of reward and punishment are in place and individuals keep responding to these contingencies, appropriate behaviours are maintained (Caspi & Roberts, 1999). The impact of reward and punishment may however be mediated by personality. A Personality Theory that can help understand individual differences in sensitivity towards reward and punishment contingencies within the military environment, are the revised reinforcement sensitivity theory (r-RST; Gray & McNaughton, 2000; McNaughton & Corr, 2004).

The r-RST has become a prominent biologically inspired approach in understanding emotion, motivation and personality and their relevance within human behaviour (Corr, 2008). The r-RST (Gray & McNaughton, 2000; McNaughton & Corr, 2004) asserts three neuropsychological systems that motivate behaviour: The fight-flight-freeze system (FFFS); the behavioural inhibition system (BIS) and the behavioural activation system (BAS). Reinforcement sensitivity theory assumes that the fundamental foundations of major personality dimensions stem from the sensitivities of the reward and punishment systems (Pickering, 2008).

Reward sensitivity is underpinned by the BAS and is activated by appetitive (rewarding) stimuli. The BAS is responsible for goal-focused approach behaviours and mediates the emotion of anticipatory pleasure. Punishment sensitivity, on the other hand, is underpinned by two parallel systems, namely the FFFS and BIS. The FFFS is activated by aversive (punishing) stimuli, is responsible for active avoidance/escape behaviour and mediates the emotion of fear (Gray & McNaughton, 2000; McNaughton & Corr, 2004). The BIS is activated by goal conflict situations of all kinds (i.e., approach-avoidance; approach-

approach; avoidance-avoidance), as well as passive avoidance behaviours and mediates the emotion of anxiety. Reward sensitivity has been positively associated with job satisfaction and involvement within an occupational setting (Van der Linden, Taris, Beckers, & Kindt, 2007), as well as with high levels of performance in military combat training (Perkins, Kemp, & Corr, 2007). Conversely, punishment sensitivity is negatively associated with stress and fatigue (Van der Linden et al., 2007), has shown to have a negative impact on individuals' ability to deal with pain (Muris, Meesters, Van den Hout, Wessels, Franken, & Rassin, 2007) and is negatively associated with performance during combat simulations (Perkins et al., 2007).

***Mental Toughness:*** Mental toughness (MT) is a construct that has been described as “the ability to achieve personal goals in the face of pressure from a wide range of different stressors” (Hardy, Bell, & Beattie, 2014, p.2). Mental toughness has been associated with hardiness and resilience, both concepts that have been the focus of research into the adaptability of individuals in stressful situations within the military environment (Pickering, Hammermeister, Ohlson, Holliday, & Ulmer, 2010).

The role of MT within the military has recently been linked to successful adjustment and performance of military personnel undergoing training. For example, MT proved to be a predictor of workplace attitude in Canadian Forces recruits undergoing MBT (Godlewski & Kline, 2012). Godlewski and Kline (2012) developed and tested a voluntary turnover model to investigate the attrition rate of military recruits in the Canadian Forces. The model tested recruits' post-entry work attitudes and intentions, actual turnover behaviour and pre-entry individual characteristics (i.e., desire for military career, pre-entry normative commitment, MT). Results indicated that MT, as derived from the 18-Item Mental Toughness Questionnaire (MT18; Clough, Earle, & Sewell, 2002), positively predicted effective commitment (i.e., involvement and identification with the organization), and newcomer



adjustment. In addition, MT has also been found to be of value for the sustainment of high levels of performance over a prolonged period (Gucciardi, Hanton, Gordon, Mallett, & Temby, 2014). In their study, Gucciardi et al. (2014) tested the predictive ability of their newly developed 8-item Mental Toughness Inventory (MTI) on candidates completing a 6-week selection test for entry into the Australian Special Forces. Their findings not only revealed that MT was significantly associated with successful completion of the selection test, but also suggested that MT is of high importance for sustaining prolonged performance.

Research on MT within the military environment is predominantly shaped by findings derived from quantitative measures that conceptualise and measure MT as a set of psychological characteristics, such as: control, commitment, challenge and confidence (e.g., Godlewski & Kline, 2012; Hammermeister, Pickering, & Lennox, 2011). The important contributions from these studies that helped shape the current understanding of MT within the military environment stand without question. However, these studies differ from our view of MT in one important aspect: we interpret MT as being behaviour-based. In line with our conceptualisation of MT, Arthur, Fitzwater, Hardy, Beattie, and Bell (2015) developed the six-item Military Mental Toughness Inventory (MTMTI) as an informant-rated behavioural based measure, to assess mentally tough behaviours of military personnel within the training environment. During the validation process of the MTMTI, Arthur et al. (2015) have shown that mentally tough behaviour not only predicted performance of recruits undergoing MBT, but MT was also able to predict the individual performance of recruits undergoing strenuous and physically demanding selection tests for the Parachute Regiment.

***Effortful Control:*** Effortful control refers to a temperament system that reflects self-regulatory skill with the ability to suppress a dominant response, in order to perform a less dominant action, i.e. to detect errors and engage in planning (Rothbart & Bates, 2006; Rothbart, Derryberry, & Posner, 1994; Rothbart, Ellis, & Posner, 2011). The broad domain of

effortful control includes sub-factors such as activation control (i.e., ability to execute an action when there is a propensity to avoid it), inhibitory control (i.e., ability to inhibit inappropriate behaviour) and attentional control (i.e., ability to shift attention when required to do so), that can be used to manage emotions and behaviour (Evans & Rothbart, 2007). Effortful control is not exclusively about restraining approach behaviour; at times it can be activated to override the tendency towards inaction (Carver, Johnson, & Joorman, 2008). Effortful control also performs a role in the self-regulation of emotion (Eisenberg, Smith, & Spinrad, 2010) and contributes to psychological and social adjustment in adulthood (Meehan, De Panfilis, Cain, & Clarkin, 2013). The abilities described above have reference to temperamental control mechanisms such as attentional self-regulatory capacities and fearful inhibition (Rothbart, Ellis, Rueda, & Posner, 2003).

***Internalisation of Core Values:*** Core values can be described as a set of essential and guiding principles of an organization that hold intrinsic value and importance to those inside the organization (Collins & Porras, 1996). According to the Organismic Integration Theory (Deci & Ryan, 1985), motivation for a recruit to commit and internalise the core values of the military will depend on the extent that they feel supported in competence, relatedness and autonomy. If these three psychological needs are met, it would enhance intrinsic motivation, but when these psychological needs are not met, intrinsic motivation would be undermined (Ryan & Deci, 2007). Self Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000) posits three broad classes of motivation: intrinsic motivation; extrinsic motivation (i.e., integrated regulation, identified regulation, introjected regulation and external regulation) and amotivation. Intrinsic motivation refers to behaviour motivated to actively engage in new activities with the absence of external rewards. Extrinsic motivation refers to behaviour motivated by expected outcomes and contingencies not inherent to the activity. Amotivation refers to the lack of motivation to participate in the activity (Ryan &

Deci, 2007). Intrinsic related motivation can result in long-term commitment; whereas extrinsic related motivation creates a feeling of pressure to act and long-term commitment is less probable (Markland & Ingledew, 2007). Once military ethics (i.e., values, moral principles and behavioural standards) are internalised, it functions as a means of motivation and self-control (Jennings & Hannah, 2011). In other words, instead of following the values blindly because it is the 'right' thing to do, these values become an integral part of the recruit.

### **1.8. Purpose of the Thesis**

The military is a diverse and high risk environment, and requires soldiers to make big personal changes and sacrifices in order to adapt and to be able to perform optimally within the organization. Literature indicates that some characteristics that describe soldiers (e.g., aggressive, tough-minded, impulsive, sensation seeking) point in the direction of psychoticism and psychopathy. The adaptive characteristics, emotions and behaviours of psychopathy suggest that it may contribute to the adaptability and functionality of soldiers during high-risk situations such as combat. The above research further suggests that the Army is an environment where individuals with some measure of psychoticism and psychopathy may flourish, provided that they are given appropriate training.

The purpose of this thesis is therefore to investigate a possible positive side to psychoticism and psychopathy by focussing on personality and their relationship with optimal performance in the military environments. This thesis has three objectives: (a) investigate what the successful army recruit who completed military basic training first time looks like; (b) explore how military basic training might bring about changes in personality; and (c) explore the ultimate expression of military performance; namely, decorated courageous soldiers.

The thesis was written and structured as a collection of three separate papers and as a result, some of the detailed content in the general introduction may be repeated in the

empirical chapters. However, in order to minimise this, detailed reviews of secondary constructs that may also be relevant to successful MBT are explained in the ensuing chapters. The thesis consists of a general introduction (the present chapter), followed by three empirical chapters and concludes with a general discussion. The methods used in the three studies are quite different and range from qualitative interview based methods to relatively sophisticated pattern recognition analyses.

## **Chapter 2**

# **Identifying Psychological Attributes that can Differentiate Successful from Unsuccessful Recruits starting Military Basic Training**

## **Abstract**

The purpose of the study was to explore the psychological attributes and behaviours that military recruits bring to the start of military basic training (MBT), and how those attributes may influence retention and performance outcomes. In the present study, 204 UK male Infantry recruits undergoing a 26-week Combat Infantryman's Course were assessed on personality (i.e., psychoticism, neuroticism, extroversion, punishment and reward sensitivity) and a set of relevant cognitions (i.e., mental toughness, effortful control and the internalisation level of military core values). Multivariate analysis of variance (MANOVA) and pattern recognition analyses were performed to determine which psychological attributes and behaviours at the start of MBT can successfully differentiate between recruits who successfully complete military basic training first time and recruits that are unable to complete military basic training first time. Results from both MANOVA and pattern recognition analyses produced similar results. Findings indicated that recruits who successfully completed MBT first time were significantly higher on psychoticism, mental toughness, effortful activation control and effortful attention control, and significantly lower on neuroticism and punishment sensitivity than those recruits who failed to complete MBT first time. Together with standing recruitment tests, psychological tests identified in the present study can help recruitment officers identify primary candidates that will be successful in completing basic military training first time.

## **KEYWORDS**

personality, psychoticism, punishment sensitivity, mental toughness, effortful control, military core values, military

## 2.1. Introduction

The overarching objective of military organisations is to attain maximum defence effectiveness. This would only be achievable if the right person is allocated to a position that is fitting to his or her skills and character (Steege & Fritscher, 1991). Therefore, military basic training (MBT) plays an important role, as it is ultimately responsible for the formation and preparation of new recruits for their new roles within military organisations. New recruits start MBT displaying a wide range of psychological attributes, behaviours and experiences that have the potential to positively or negatively influence their adaptation and commitment to the military. Some recruits find the transition and adaptation process to the military culture strenuous, as basic training is not only stressful and hazardous, but it is also physically and mentally demanding (Van Orden & Nice, 2006; Wintre & Ben-Knaz, 2000). This may result in some recruits experiencing difficulty to fully integrate and adjust to the military environment, as they may find their own normative behaviour and value system to be incongruent with that of the military. As a consequence, individuals may drop out before completing basic training. Attrition during training proves to be a cumbersome problem for the military, as training establishments not only have to invest more time and resources to recruit a replacement, but they have also lost any potential return investment in terms of cost and operational aims from the individual who departed before completing their full term of enlistment (White, Rumsey, Mullins, Nye, & LaPort, 2014).

The overarching aim of the present study is to explore which psychological attributes and behaviours British main-line Infantry recruits bring to the start of basic military training, and how those attributes may influence retention and performance outcomes. Of particular interest were individual differences on psychological attributes such as: personality, mental toughness, effortful control and the internalisation level of values.

### **2.1.1. Personality**

Eysenck conceptualised personality into three super-factors: psychoticism, extraversion and neuroticism (Eysenck & Eysenck, 1985). Psychoticism is defined by two big five factors, low agreeableness and low conscientiousness (Eysenck, 1991; Goldberg & Rosolack, 1994). High levels of psychoticism are associated with characteristics such as tough-mindedness, impulsiveness and aggressiveness; whereas low levels of psychoticism are associated with altruism and empathy. Individuals high in extraversion are associated with sensation seeking and are active and sociable; in contrast, individuals with low levels of extraversion are associated with quietness and introspectiveness. Lastly, individuals high on neuroticism are characterised with higher levels of anxiety, depression and instability; where individuals with low neuroticism are generally calm and emotionally stable (Eysenck & Eysenck, 1976; Eysenck & Eysenck, 1985).

In military settings, personality profiles have been linked to performance outcomes during training. However, compared to research on personality profiles of candidates undergoing selection or training for high-risk units, research on the personality profile of main-line infantry recruits is very limited. For example, Chappelle, McDonald, Teachout, and Salinas (2011) pointed out that specialised soldiers have unique personality profiles and are distinct from other military personnel whose positions require high performance, but involves less rigorous occupational challenges and more risk to personal safety. Therefore, understanding the personality profiles of high risk personnel is vital, as improvements in the screening process for the most suitable candidate can reduce unnecessary costs and improve retention. However, research in personality dimensions of main-line Infantry recruits has received limited attention. An explanation might be that the military is a large organisation that focuses more on structure and functioning, as opposed to individual differences (Milgram, 1991). The current study aims to explore this gap in the literature.



Studies investigating personality profiles of personnel during military selection or training programmes, include, but are not limited to, the following research: Bartram and Dale (1982) showed that stability (reversed neuroticism) and extraversion both correlated positively with success in military pilot training. McDonald, Northon, and Hodgdon (1990) illustrated that successful candidates of U.S. Naval Special Forces training differed from unsuccessful candidates on two personality dimensions at pre-test measurement. That is, successful candidates were more emotionally stable and likeable (agreeableness) than unsuccessful candidates. Picano, Roland, Rollins, and Williams (2002) found that straightforwardness (a facet of agreeableness) and activity (a facet of extraversion) significantly discriminated between successful and unsuccessful candidates of a selection program for non-routine missions under hazardous and demanding conditions. Where, Dean, Conte, and Blankenhorn (2006) showed that openness to experience, conscientiousness and extraversion predicted U.S. Marine recruits' performance on simulation-based training criteria.

While conducting research on military personnel to determine the personality profile of bomb-disposal and anti-terror operatives, Glicksohn and Bozna (2000) found that bomb-disposal and anti-terror operatives reported low neuroticism and psychoticism scores, confirming that these high-risk operatives are emotionally stable and non-impulsive. In a follow up study, Glicksohn and Rechtman (2011) found that professional bodyguards responsible for the protection of Israeli dignitaries were also low on neuroticism and suggested that low levels in neuroticism will increase retention.

Even though the findings above do vary across different military units, there are some noticeable trends. Military personnel passing selection or hazardous training programs tend to be higher in extraversion (e.g., Bartram & Dale, 1982; Picano et al., 2002) and have more emotional stability (e.g., Glicksohn & Bozna, 2000; Glicksohn & Rechtman, 2011). The

personality dimension agreeableness appears to be more prominent within Special Forces candidates (e.g., McDonald et al., 1990; Picano et al., 2002). Both openness to experience and conscientiousness on the other hand, do not appear to be prominent personality dimensions in the above research. Although the broad dimensions of personality are helpful in differentiating between successful and unsuccessful candidates, unique personality attributes can also contribute towards understanding performance within the military environment. For example, Picano, Williams, and Roland (2006) identified that candidates for high demand positions differed from the normative population on, but not limited to, attributes such as: dominance, resilience, vitality and tough-mindedness. Tough-mindedness has been described as an important trait of a successful soldier (Matthews, 2014) and is associated with high levels of psychoticism from the EPQ-RS measure (Eysenck & Eysenck, 1976; 1985). High levels of psychoticism have also been associated with aggression (Eysenck & Eysenck, 1976).

Contrary to Glicksohn and Bozna's (2000) findings that bomb-disposal and anti-terror operatives have low levels of psychoticism, we expect to find that recruits who successfully complete Infantry MBT first time will have higher levels of psychoticism and extraversion (i.e., be more tough-minded and aggressive) than unsuccessful candidates at the start of training. Infantry troops are typically trained to be more aggressive and react to threats immediately, whereas bomb-disposal operators are trained to carry out defensive duties and not react impulsively (i.e., low psychoticism) when rendering safe explosive devices. In addition, it is also expected that successful recruits will have more emotional stability when compared to unsuccessful recruits.

*Hypothesis 1: Compared to recruits who will be unsuccessful in completing military basic training first time, recruits who will pass military basic training first time will:*

*a. Have significantly higher psychoticism scores.*

*b. Have significantly higher extraversion scores.*

*c. Have significantly lower neuroticism scores.*

### **2.1.2. Punishment and Reward Sensitivity**

During MBT, training instructors apply reward and punishment strategies in an attempt to modify the behaviour of recruits to ensure they conform to the prescribed military rules and conduct (Elder, Gimbel, & Ivie, 1991; Wintre & Ben-Knaz, 2000). Compliance to military rules and conduct results in recruits being rewarded, thereby motivating approach behaviours; whereas failure to conform results in punishment, thus motivating avoidance or escape behaviours (Gray, 1975). These individual differences in sensitivity towards reward and punishment contingencies within the military environment can be explained by the revised reinforcement sensitivity theory (r-RST; Gray & McNaughton, 2000; McNaughton & Corr, 2004), as RST presupposes that the fundamental foundations of major personality dimensions stem from the sensitivities of the reward and punishment systems (Pickering, 2008). The r-RST (Gray & McNaughton, 2000; McNaughton & Corr, 2004) asserts three neuropsychological systems that motivate behaviour: The behavioural activation system (BAS); the behavioural inhibition system (BIS) and the fight-flight-freeze system (FFFS).

The BAS underpins reward sensitivity which is activated by appetitive (rewarding) stimuli, and is responsible for goal-focused approach behaviours. On the other hand, both the FFFS and BIS systems underpin punishment sensitivity, which is activated by aversive (punishing) stimuli, and is responsible for active avoidance/escape behaviour (Gray & McNaughton, 2000; McNaughton & Corr, 2004). Reward sensitivity has been positively associated with job satisfaction and high levels of performance in military combat training (Perkins, Kemp, & Corr, 2007; Van der Linden, Taris, Beckers, & Kindt, 2007). Equally, punishment sensitivity has been negatively associated with stress and fatigue (Van der Linden et al., 2007), the ability to deal with pain (Muris, Meesters, Van den Hout, Wessels, Franken,

& Rassin, 2007) and with performance during combat simulation (Perkins et al., 2007).

Recent research (Hardy, Bell, & Beattie, 2014) has shown that high levels of punishment sensitivity and low levels of reward sensitivity are positively associated with mentally tough behaviour in high-level cricketers. Explaining their results, Hardy et al. (2014) suggested that the high levels of PS and low levels of RS enabled the high-level cricketers to identify threatening stimuli early, enabling them to plan an effective response to the stressful environment (if they possess the cognitive strategies to do so). More recently, Beattie, Alqallaf, and Hardy (in press) linked r-RST to actual swim performance. Examining whether PS and RS can predict MT behaviour and performance in competitive swimmers, Beattie et al. (in press) found significant interactions demonstrating that when RS was low, both MT and swimming race times improved as PS increased. We expect therefore to find that recruits who start MBT with low levels of RS and high levels of PS, will be able retain high levels of performance despite the stressors associated with MBT (e.g., sleep deprivation, punishment for any transgressions incurred). Such recruits will be able to identify and effectively deal with the potential stressors in advance and as a consequence maintain high levels of performance. As a result, such recruits will complete MBT first time.

*Hypothesis 2: Compared to recruits who will be unsuccessful in completing military basic training first time, recruits who will pass military basic training first time will:*

*a. Exhibit lower levels of RS.*

*b. Exhibit higher levels of PS.*

### **2.1.3. Mental Toughness**

The stresses of MBT on recruit performance and adaptation can be significant. A growing body of research focuses on the role of mental toughness (MT) in performance and adaptation to military environments. For example, MT proved to be a predictor of workplace attitude, commitment and successful adjustment in Canadian Forces recruits undergoing

MBT (Godlewski & Kline, 2012). Due to growing concerns about attrition rates of military recruits in the Canadian Forces, Godlewski and Kline (2012) developed a voluntary turnover model to test recruits' post-entry work attitudes and intentions, actual turnover behaviour and pre-entry individual characteristics (i.e., desire for military career, pre-entry normative commitment, MT).

Results derived from the 18-Item Mental Toughness Questionnaire (MT18; Clough, Earle, & Sewell, 2002), indicated that MT positively predicted effective commitment (i.e., involvement and identification with the organization), and newcomer adjustment. Recent research by Gucciardi, Hanton, Gordon, Mallett, and Temby (2014) also found MT to be of value for the sustainment of high levels of performance over a prolonged period. The predictive ability of a newly developed 8-item Mental Toughness Inventory (MTI; Gucciardi et al., 2014) was tested on candidates completing a 6-week selection test for entry into the Australian Special Forces. Findings not only revealed that MT was significantly associated with successful completion of the selection test, but also suggested that MT is of high importance for sustaining prolonged performance.

In the present study we construe that MT is behaviour based and can be viewed as the ability to maintain goal directed behaviour and perseverance despite various stressors (Hardy et al., 2014). In line with Hardy et al.'s (2014) conceptualisation, Arthur, Fitzwater, Hardy, Beattie, and Bell (2015) developed an informant-rated six-item Military Mental Toughness Inventory (MTMTI) to assess mentally tough behaviours of military personnel within a training environment. The predictive validity of the MTMTI was supported by two different training cohorts of military recruits. Arthur et al. (2015) found that MT predicted performance of recruits undergoing MBT, as well as individual performances of recruits undergoing selection tests for the Parachute Regiment.

Given the stressful nature of MBT, it is expected to see that those recruits who are perceived to be mentally tough as rated by the training instructors at the start of MBT, will also be the ones who will persevere and continue the hardship regardless of the stressors imposed on them during MBT.

*Hypothesis 3: Recruits who will successfully complete MBT first time will start training exhibiting higher mentally tough behaviours as compared to those who failed to complete military training first time.*

#### **2.1.4. Effortful Control**

Effortful control behaviours may play an important role in the successful performance of recruits during training. Effortful control refers to a self-regulatory skill with the ability to suppress a dominant response, in order to perform a less dominant action, i.e. to detect errors and engage in planning (Rothbart & Bates, 2006; Rothbart, Derryberry, & Posner, 1994; Rothbart, Ellis, & Posner, 2011). Evans and Rothbart (2007) divided effortful control into three facets that can be used to manage emotions and behaviour: i.e., attentional control (i.e., ability to shift attention when required to do so); inhibitory control (i.e., ability to inhibit inappropriate behaviour); and activation control (i.e., ability to execute an action when there is a propensity to avoid it).

During MBT, recruits may find the ability to maintain focus, mental control and energetic levels more difficult when under stress (e.g., exposed to sleep deprivation) or when emotions are running high (e.g., fear, anxiety and anger). To this extent, maintaining focus and attentive control of action is the key to successful performance under such stressful conditions (Gaillard, 2008). Consequently, recruits may require more effortful-control skills in order to adapt successfully into the military. For example, compared to recruits with low inhibition control capacities, recruits with high inhibition control will have a bigger capacity to detect errors, engage in planning and as a result inhibit dominant responses to perform

subdominant responses (Rothbart & Rueda, 2005). Whereas, high levels of attentional control may provide recruits with the capacity to refocus their attention from negative and threatening stimuli, to more neutral or positive thoughts (Eisenberg, Smith, & Spinrad, 2010). In addition, recruits with high levels of activation control may have the capacity to activate behaviours that otherwise would not have been performed, i.e., performing a task when the recruit does not feel like trying (Rothbart, Sheese, & Posner, 2014). We expect to see that those recruits who will pass military basic training first time will start the course having higher effortful control strategies, as they will be able to voluntarily or wilfully activate, change or inhibit their behaviour and attention to adapt to the military environment.

*Hypothesis 4: Compared to recruits who will be unsuccessful in completing military basic training first time, recruits who successfully complete military basic training first time will test significantly higher on all three effortful control sub-scales (i.e., inhibition control, activation control and effortful attention) at the start of training.*

#### **2.1.5. Core Values**

According to Pathak, Rani, and Goswami (2016) soldiers have two sets of values which are essentially not very different from each other (i.e., personal core values and military core values). Military values can be described as a set of essential and guiding principles of an organization that hold intrinsic value and importance to those inside the organization (Collins & Porras, 1996). However, differences between personal and military values can result in job dissatisfaction, resulting in the soldier investing less effort. Therefore, Pathak et al. (2016) highlighted the importance of aligning both personal and military values of soldiers as soon as possible.

Motivation to internalise core values will largely depend on the extent to which recruits feel supported in relatedness, autonomy and competence (Deci & Ryan, 1985).

Intrinsic motivation will be enhanced if these three psychological needs are met, if not, intrinsic motivation would be undermined (Ryan & Deci, 2007). Self Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000) classifies motivation as: amotivation; extrinsic motivation (i.e., integrated regulation, identified regulation, introjected regulation and external regulation); and intrinsic motivation. Amotivation refers to the lack of motivation to participate in the activity. Extrinsic motivation refers to behaviour motivated by expected outcomes and contingencies not inherent to the activity, and intrinsic motivation refers to behaviour motivated to actively engage in new activities with the absence of external rewards (Ryan & Deci, 2007). Intrinsic related motivation can result in long-term commitment (Markland & Ingledew, 2007), therefore training instructors should motivate and support recruits to ensure intrinsic motivation is enhanced by making sure recruits feel competent, related and have autonomy.

According to Collins and Porras (1996) organizations with clear and affirmed core values will attract and retain individuals with compatible personal values, whereas those with incompatible personal values will be repelled. The above literature suggests that recruits who enter the military with similar values to those of the military core values, will not only be committed to the ideology of the organisation, but internalisation of those core values will help to improve performance and retention.

*Hypothesis 5: Recruits who successfully complete basic military training will have significantly higher integrated regulation compared to unsuccessful recruits.*

## **2.2. Method**

### **2.2.1. Participants**

A total of 271 male infantry recruits ( $M_{age} = 20.72$  years,  $SD = 3.05$ ) that started the Combat Infantryman's Course (CIC) took part in the study. Of the complete sample, 29 recruits failed to complete the CIC due to medical reasons and as a result were omitted from



further analyses. Data from 38 recruits were omitted as a consequence of deviant responding or having submitted incomplete data sets. The final sample size used for statistical analyses were 204 ( $M_{age} = 20.69$  years,  $SD = 3.12$ ) male Infantry recruits. The CIC lasts 26 weeks and enables recruits to make the initial transition from being a civilian to becoming a soldier. The CIC consists of arduous training with the purpose to equip recruits with the necessary knowledge and skills that will be required of them in order to achieve high levels of performance in military tasks and combat operations within a variety of environments. Of the total sample, 153 recruits ( $M_{age} = 21.01$ ;  $SD = 3.17$ ) successfully passed CIC training first time, whereas 51 recruits ( $M_{age} = 19.76$  years;  $SD = 2.78$ ) were unsuccessful in completing the CIC training first time.

### **2.2.2. Measures**

**Personality:** The Eysenck Personality Questionnaire – Revised Short version (EPQ-RS; Eysenck, Eysenck, & Barrett, 1985) is a 48 item self-report measure of the personality dimensions: Psychoticism (12 items), extraversion (12 items) and neuroticism (12 items). In addition to the personality dimensions, the EPQR-S also contains a Lie (L) scale (12 items) that measures social desirability responses (e.g., “Have you ever said anything bad or nasty about anyone?”). In particular, the psychoticism (P) scale draws on facets such as lack of empathy, hostility and cruelty (e.g., “Do you try not to be rude to people?”). The extraversion (E) scale draws on facets such as sociability and dominance (e.g., “Do you enjoy meeting new people?”), whereas the neuroticism (N) scale draws on facets such as depression, anxiousness and moodiness (e.g., “Would you call yourself a nervous person?”). Each item has a dichotomous response that can be answered ‘yes’ or ‘no’ and was scored 1 or 0 respectively. Each scale has a minimum possible score of zero or a possible maximum score of 12. Eysenck et al. (1985) reported acceptable coefficient alpha for each of the scales

contained in the EPQ-RS measure for males and females respectively (P:  $\alpha = .62$  and  $0.61$ ; E:  $\alpha = .88$  and  $0.84$ ; N:  $\alpha = .84$  and  $0.80$ ; L:  $\alpha = 0.77$  and  $.73$ ).

***Punishment and Reward Sensitivity:*** Recruits' punishment and reward sensitivity were measured using Corr's (2001) transformation of the psychoticism (P), extraversion (E) and neuroticism (N) scales coming from the EPQ-RS (Eysenck et al., 1985). Corr's (2001) transformations of the EPQ-RS personality scales included: reward sensitivity =  $((E \times 2) + N + P)$  and punishment sensitivity =  $((12 - E) + (N \times 2) - P)$ . Reward sensitivity scores range from 0 to 48, where punishment sensitivity scores range from -12 to 36.

***Mental Toughness:*** Mental toughness of recruits was measured by means of the informant-rated 8-item Military Training Mental Toughness Inventory (MTMTI) which is an extension of the 6-item MTMTI (Arthur et al., 2015) with two additional questions. See Table 2.1 for item descriptive and standardised factor loadings. The 8-item MTMTI contains items which focus on military personnel's performance under pressure situations. Section commanders were asked to evaluate how well each recruit under his command was able to maintain a high level of performance when faced with demanding situations during training (e.g., Item 7: "*when he is suffering from fatigue*"). The responses were scored on a 7-point Likert scale, anchored by 1 (never) to 7 (always). In order for the section commanders to evaluate each recruit's MT accurately at the start of training, the recruit had to spend a minimum of 4 weeks under the section commander's command. The internal consistency (Chronbach's  $\alpha$ ) for the 8-item MTMTI was .92.

**Table 2.1**

Means, Standard Deviations and Standardised Factor Loadings for 8 Item Military Training Mental Toughness Inventory

<i>Item</i>	<i>M(SD)</i>	<i>FL</i>
1. His recent performances have been poor.	3.95 (1.41)	.72
2. He is in pain (e.g., associated with high levels of physical effort).	3.94 (1.49)	.78
3. The conditions are difficult (e.g., on exercise).	4.18 (1.32)	.78
4. He has been reprimanded / punished.	3.98 (1.48)	.76
5. He has not had much sleep.	3.78 (1.44)	.77
6. He is under pressure to perform well (e.g., assessments, test conditions).	4.15 (1.35)	.86
7. He is suffering from fatigue.	3.95 (1.37)	.83
8. It is an important team/section event.	4.41 (1.39)	.68

Note. FL = Standardised Factor Loading.

$N = 251$

***Effortful Control:*** Effortful control was measured by using the effortful control factor scale from the Adult Temperament Questionnaire – Short Form (ATQ-S; Evans & Rothbart, 2007). The effortful control factor is a broad temperament construct based on the executive attention system (Rothbart & Rueda, 2005) and includes 3 sub-scales: activation control (7 items), attentional control (5 items) and inhibitory control (7 items). The activation control scale measures the ability to act when there is a strong tendency to avoid the action (e.g., “I can keep performing a task even when I would rather not do it”), the attentional control scale measures the ability to focus or shift attention when necessary (e.g., “It’s often hard for me to alternate between two different tasks”) and the inhibitory control scale measures the ability to inhibit inappropriate behaviour (e.g., “it is easy for me to inhibit fun behaviour that would be inappropriate”). Each item was scored on a 7-point Likert scale anchored by 1 (extremely untrue of you) to 7 (extremely true of you). Cronbach’s  $\alpha$  reliability coefficients reported by Evans and Rothbart (2007) for the 19 item Effortful Control factor is .78, where reliability for each of the sub-scales was reported as: activation control scale:  $\alpha = .69$ , attentional control scale:  $\alpha = .73$  and inhibitory control scale:  $\alpha = .60$ .

***Internalisation of Core Values:*** The level of internalisation of recruits’ value system was assessed by administering the General Core Value (GCV) scale coming from the Core

Values Scale (Hardy & Arthur, 2010). The GCV contains 15 items that measures the degree to which recruits have internalised the core values of the British Army. The GCV measures 3 levels of internalisation: external regulation (5 items), introjected regulation (5 items) and integrated regulation (5 items). External regulation is where the motivation to internalise the core values is dependent on external rewards and punishments (e.g., *“I have to show the core values because if I don’t people will think I’m not a good soldier”*). Introjected regulation refers to motivation where the recruit governs himself with internalised contingencies of reward and punishment (e.g., *“I should try to show the core values because I would feel dishonourable if I didn’t”*). Integrated regulation is where motivation and behaviours become imbedded within the personality and becomes autonomous (e.g., *“The core values are an essential part of being a good soldier”*). Each item was scored on a 7-point Likert scale, anchored by 1 (not at all true) to 7 (very true). Hardy and Arthur (2010) reported good internal Cronbach’s  $\alpha$  for the three scales: External regulation ( $\alpha = .79$ ); Introjected regulation ( $\alpha = 0.87$ ); and Integrated regulation ( $\alpha = 0.84$ ).

**Performance Outcome:** Performance data for recruits was obtained at the end of the CIC training at week 26. Every successful recruit received a performance grade on completion of CIC training, which indicated how well the recruit performed during training. Performance grades for the recruits in the present study that successfully passed CIC training ranged from A, indicating the highest pass performance grade, to D being the lowest pass performance grade.

### 2.2.3. Procedure

After obtaining University ethical approval, British Infantry instructors and recruits starting week 1 of the CIC were approached to participate in the study. Both recruits and instructors were briefed on the purpose of the study, as well as on the measures that would be used throughout the research. Instructors and recruits were assured about the confidentiality

of data and that their responses will only be used for research purposes and will have no effect on their military career. It was emphasised that their responses would not be discussed with training staff and that no military personnel would see the completed questionnaires. It was also made clear that no individual recruit or training personnel would be identifiable in the final report. Recruits and instructors were informed that the research was voluntary and that they did not have to participate and could withdraw at any time. Informed consent was obtained from recruits and instructors before the start of the study.

Self-report data from recruits as well as informant-rated MT data from training instructors were collected at two time points during CIC training. Self-report measurements consisted of the EPQ-RS (Eysenck et al., 1985), Effortful Control scale (Evans & Rothbart, 2007) and the GCV scale (Hardy & Arthur, 2010). Self-report measures were administered to recruits on the Thursday in week 1 (T1) of the CIC. Informant-rated MT data was collected from the training instructors at week 4 of training. Week 4 was felt to be the earliest time-point to collect informant rated MT data, as this would have given the instructors an opportunity to observe and get to know the recruits for at least four weeks during training. Performance data for recruits was obtained at the end of the CIC at week 26.

#### **2.2.4. Data Analysis**

Multivariate analysis of variance (MANOVA) analysis using SPSS software (Version 22.0; IBM Corp. 2013) was used to test several hypotheses that there would be significant differences across multiple psychological variables between recruits who have passed CIC training successfully first time and those recruits who were unsuccessful in completing CIC training first time. The option to analyse all 12 dependent variables separately by performing multiple univariate analysis of variance (ANOVA) analyses was discarded, as multiple results would have increased the probability of type 1 error rate (i.e., erroneous rejection of the null hypothesis when it is in fact true; Stevens, 2009). It could be argued that one can apply the

Bonferroni correction to correct for the inflated *α priori* level when performing multiple tests by multiplying the *α priori* level by the total number of tests. However, in the present study, the new adjusted *α priori* level would have been  $\alpha < .0041$  (.05/12). Such a deflated *α priori* level as low as .004 can lead to a type 2 error (i.e., accepting the null hypothesis when it is indeed false) thus reducing the power to observe any significant effects (Gelman, Hill, & Yajima, 2012). It was therefore decided to compare the successful and unsuccessful groups on the 12 dependent variables simultaneously using multivariate analysis of variance (MANOVA) analysis. The 12 dependent variables in the analysis were MT, PS, RS, psychoticism, extraversion, neuroticism, activation effortful-control, attention effortful-control, inhibition effortful-control, externalisation of core values, introjection of core values and internalisation of core values; where, *successful* and *unsuccessful* groups comprised the independent variable. The *α priori* level of significance was set at .05.

## 2.3. Results

### 2.3.1. Performance Outcome

Recruits' end of course performance grades were collected at the end of CIC. Performance grades ranged from *A*, indicating the highest pass performance grade, to *D* being the lowest pass performance grade. Those recruits who successfully completed MBT first time (successful group) were divided into three performance groups based on the overall individual performance grades that they had received at the end of CIC training: i.e., top performance group ( $n = 29$ ) with performance grades ranging from *A* to *B-* grading; middle performance group ( $n = 56$ ) consisted of recruits with a *C+* grading; whereas, the bottom performance group ( $n = 68$ ) consisted of recruits with performance grades ranging from *C* to *D*. Those recruits who failed to complete MBT first time (unsuccessful group) were divided into one of three categories: i.e., those recruits who were discharged as they were deemed unfit to continue with military service ( $n = 18$ ); recruits who were back-squaded ( $n = 14$ ); and

recruits who were discharged from the military as of own right ( $n = 19$ ). Recruits' performance was either defined as *successful* or as *unsuccessful* completion of training. The recruits' performance grades were transformed from alphabetical to numerical values. The highest alphabetical performance grade obtained by recruits (i.e., A) was assigned the numerical value of 1; whereas, the lowest alphabetical performance grade obtained by recruits (i.e., D) was assigned the numerical value of 10.

### **2.3.2. Results for recruits who successfully completed CIC training first time ( $n = 85$ ) vs. recruits who were unsuccessful in completing CIC training first time ( $n = 51$ ).**

To be able to accurately identify the psychological variables that differentiate between recruits who were successful in passing the CIC first time and those who were unsuccessful in completing the CIC first time, it was decided to omit recruits from the successful group with low performance grades ranging from *C* to *D* ( $n = 68$ ) from further analysis. This decision was based on the premise that recruits with low performance grades and recruits from the unsuccessful group may have overlapping psychological characteristics, which may affect the accuracy of the interpretation of the results.

Means, standard deviations and Pearson's Correlations for all variables across 136 recruits are presented in Table 2.2. Mental toughness was significantly and positively correlated to performance outcome,  $r = .19, p < .05$ . This finding is in line with Arthur et al. (2015) who have shown that mentally tough behaviour was positively and significantly

**Table 2.2**

Means, Standard Deviations and Intercorrelations Among Variables

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 Mental Toughness	4.09	1.22	-											
2 RS	26.63	5.63	-.13											
3 PS	9.15	7.45	.01	-.25**										
4 Psychoticism	2.51	1.82	.07	.14	-.14									
5 Extraversion	9.71	3.00	-.13	.82**	-.63**	-.19*								
6 Neuroticism	4.60	2.90	-.04	.15	.91**	.04	-.36**							
7 GCV Externalisation	5.40	1.07	-.06	.08	-.07	-.04	.11	-.05						
8 GCV Introjection	4.75	1.48	.01	-.02	.09	-.28**	.05	.06	.56**					
9 GCV Integrated	6.09	.90	-.03	.14	-.01	-.25**	.20*	.02	.50**	.64**				
10 Eff Cntl Activation	5.01	.94	-.04	.07	-.42**	-.20*	.33**	-.44**	.13	.19*	.21			
11 Eff Cntl Attention	4.45	1.09	-.01	-.12	-.47**	-.02	.15	-.53**	-.02	-.07	.02	.52**		
12 Eff Cntl Inhibition	4.22	.81	-.06	-.31**	-.02	-.08	-.19*	-.15	-.15	.04	-.03	.28**	.33**	
13 Performance	7.73	3.46	.20*	.01	-.23**	.22*	.04	-.21*	.03	-.02	.08	.18*	.20*	.01

Note. \*\* $p < .01$ , \* $p < .05$ ; RS = Reward Sensitivity, PS = Punishment Sensitivity, GCV = General Core Value, Eff. Cntl. = Effortful Control.

N = 136



associated with Infantry recruits' final course grade. The present finding proposes that MT behaviour of recruits played a role in the successful completion of MBT first time.

***Multivariate Analysis of Variance (MANOVA):*** Results from the MANOVA indicated statistical significant mean differences across multiple dependent variables between recruits who have successfully passed CIC training first time and those recruits who were unsuccessful in completing CIC training first time. The multivariate result was statistical significant, Pillai's trace ( $V = 0.17$ ,  $F(10,125) = 2.60$ ,  $p < .05$ ), indicating that the multivariate combination of dependent variables affected whether the recruit successfully passed or failed to complete CIC training first time. The effect size was estimated at .172, indicating that the independent variable and multivariate combination of dependent variables shared 17.2% of their variance.

The statistical significant MANOVA was followed up with a series of ANOVAs on each of the dependent variables. Univariate means, standard deviations and standardised discriminant function coefficients are presented in Table 2.3. Examination of Levene's  $F$  tests revealed that the homogeneity of variance assumption for all outcome variables was considered satisfied, even though Levene's  $F$  test for Punishment Sensitivity scale was statistical significant ( $p = .046$ ). Inspection of the standard deviations for punishment sensitivity (See Table 2.3) showed that the larger standard deviation was not four times than that of the smaller standard deviation, indicating that the ANOVA would still be robust (Howel, 2002). Six of the ANOVA's were statistically significant indicating significant differences between the successful and unsuccessful groups at the start of training. Effect sizes ranged from .033 (effortful control activation) to .053 (punishment sensitivity).

ANOVA results indicated a statistical significant difference between the successful group and the unsuccessful group on psychoticism ( $F(1, 134) = 6.79$ ,  $p < .01$ ,  $\eta_p^2 = .048$ ) and neuroticism ( $F(1, 134) = 6.09$ ,  $p < .05$ ,  $\eta_p^2 = .044$ ) personalities. There was no

**Table 2.3**

Means, Standard Deviations and Discriminant Function Coefficients for Successful and Unsuccessful Groups on Study Variables at the Start of Military Basic Training

Dependent Variable	Class	<i>M</i>	<i>SD</i>	$\omega_s$
Mental Toughness	All	4.09	1.22	.453
	Successful	4.27	1.07	
	Unsuccessful	3.78	1.38	
Reward Sensitivity	All	26.63	5.63	-.203
	Successful	26.64	5.47	
	Unsuccessful	26.60	5.93	
Punishment Sensitivity	All	9.15	7.45	-.300
	Successful	7.82	6.45	
	Unsuccessful	11.37	8.49	
Psychoticism	All	2.51	1.82	.669
	Successful	2.82	1.97	
	Unsuccessful	2.00	1.41	
Extraversion	All	9.71	3.00	-
	Successful	9.80	2.82	
	Unsuccessful	9.56	3.31	
Neuroticism	All	4.60	2.90	-
	Successful	4.22	2.64	
	Unsuccessful	5.36	3.17	
GCV Externalisation	All	5.40	1.07	-.093
	Successful	5.42	1.01	
	Unsuccessful	5.36	1.18	
GCV Introjection	All	4.75	1.48	-.118
	Successful	4.74	1.49	
	Unsuccessful	4.78	1.48	
GCV Integrated	All	6.09	.90	.456
	Successful	6.15	.81	
	Unsuccessful	6.00	1.04	
Eff. Cntl. Activation	All	5.01	.94	.379
	Successful	5.13	.84	
	Unsuccessful	4.80	.94	
Eff. Cntl. Attention	All	4.45	1.09	.197
	Successful	4.62	1.03	
	Unsuccessful	4.17	1.13	
Eff. Cntl. Inhibition	All	4.22	.81	-.119
	Successful	4.23	.88	
	Unsuccessful	4.21	.68	

Note. All (N = 136); Complete (N = 85); Non-Complete (N = 51);

$\omega_s$  = coefficients from standardised discriminant function; GCV = General Core Value; Eff.Cntl. = Effortful Control.

significant difference between the successful and unsuccessful groups on extraversion ( $F(1,$

134) = .188,  $p = .666$ ,  $\eta_p^2 = .001$ ). These findings support the hypothesis predicting that

recruits in the successful group would start MBT being higher on the personality dimension of psychoticism ( $M = 2.82$ ,  $SD = 1.97$ ) than the unsuccessful recruits ( $M = 2.00$ ,  $SD = 1.41$ ). Further, the findings also provided support for the hypothesis predicting that the successful group will be significantly lower ( $M = 4.22$ ,  $SD = 2.64$ ) than the unsuccessful group ( $M = 5.47$ ,  $SD = 3.17$ ) on the neuroticism personality dimension. The successful group ( $M = 9.56$ ,  $SD = 3.31$ ) and the unsuccessful group ( $M = 9.80$ ,  $SD = 2.82$ ) started MBT with similar mean scores on the extraversion scale.

ANOVA results provided no support for the hypothesis predicting that the successful group will start MBT being less sensitive to reward stimuli when compared to the unsuccessful group,  $F(1, 134) = .002$ ,  $p = .969$ ,  $\eta_p^2 = .000$ . Closer inspection of the data indicated that the successful group ( $M = 26.64$ ,  $SD = 5.47$ ) and the unsuccessful group ( $M = 26.60$ ,  $SD = 5.93$ ) were equally sensitive to reward stimuli at the start of training. Further, ANOVA results indicated that the successful group and unsuccessful group differed significantly on punishment sensitivity at the start of MBT,  $F(1, 134) = 7.56$ ,  $p < .01$ ,  $\eta_p^2 = .053$ . Closer inspection of the data showed that the significant difference between the successful group ( $M = 7.82$ ,  $SD = 6.45$ ) and unsuccessful group ( $M = 11.37$ ,  $SD = 8.49$ ) were opposite to our predictions. The successful group started MBT being less sensitive to punishment stimuli than the unsuccessful group.

The ANOVA result indicated that there was a significant difference in MT between the successful and unsuccessful groups at the start of training,  $F(1, 134) = 5.28$ ,  $p < .05$ ,  $\eta_p^2 = .038$ , thus providing support for hypothesis 3. Recruits in the successful group were perceived to be higher on MT ( $M = 4.27$ ,  $SD = 1.07$ ) by the section commanders than those recruits in the unsuccessful group ( $M = 3.78$ ,  $SD = 1.38$ ) at the start of MBT.

ANOVA results provided partial support for the hypothesis predicting that successful recruits will have higher effortful control capacities than unsuccessful recruits at the start of

training. Significant differences between the two groups were found on effortful control activation ( $F(1, 134) = 4.58, p < .05, \eta_p^2 = .033$ ) and effortful control attention ( $F(1, 134) = 5.71, p < .05, \eta_p^2 = .041$ ) scales. However, there was no significant differences between the two groups on inhibition control ( $F(1, 134) = .02, p = .887, \eta_p^2 = .00$ ). Inspection of the data showed that these significant differences indicated that successful recruits had greater capacity to implement effortful control activation strategies ( $M = 5.13, SD = .84$ ) at the start of training than the unsuccessful recruits ( $M = 4.80, SD = .94$ ). In addition, the successful group also scored higher on effortful control attention strategies ( $M = 4.62, SD = 1.03$ ) compared to the unsuccessful group ( $M = 4.17, SD = 1.13$ ). Results further revealed that recruits in both the successful group ( $M = 4.21, SD = .689$ ) and the unsuccessful group ( $M = 4.23, SD = .884$ ) had similar mean scores on inhibition control at the start of MBT.

Results from the ANOVA showed no statistical support for the hypothesis predicting that recruits in the successful group will have a significantly higher integrated value system at the start of training compared to the unsuccessful group ( $F(1, 134) = .879, p = .350, \eta_p^2 = .007$ ). Results further revealed no significant differences between the two groups on introjected regulation of core values ( $F(1, 134) = .32, p = .859, \eta_p^2 = .000$ ) and external regulation of core values ( $F(1, 134) = .124, p = .726, \eta_p^2 = .001$ ). As can be seen in Table 2.3, both the successful group and the unsuccessful group had similar group means across the different levels of internalisation. Interestingly, both groups started basic military training having a higher integrated value system.

***Discriminant Function Analysis:*** In addition to the above ANOVA follow-up tests, the significant MANOVA was also followed-up with a discriminant function analysis. According to Borgen and Seling (1978) the discriminant analysis provides each predictor's contribution to group membership, whereas ANOVA specify the contribution of each outcome variable to group separation. Results showed that the discriminant analysis

accounted for 17% ( $R^2 = .17$ ) of the total relationship between the independent variables and groups; in addition, the discriminant analysis significantly differentiated the successful group from the unsuccessful group, Wilks's  $\lambda = .82$ ,  $X^2(10) = 24.40$ ,  $p < .05$ .

The standardised canonical discriminant function coefficients for each of the predictors are displayed in Table 2.3. Both extraversion and neuroticism scales were excluded from the analysis as they failed to obtain the minimum tolerance level of .001. The best psychological discriminators between the successful recruits and unsuccessful recruits were: psychoticism (.669), integration of core values (.456), MT (.453), effortful control activation (.379), punishment sensitivity (-.30)<sup>2</sup>, reward sensitivity (-.20), effortful control attention (.197), effortful control inhibition (-.119), introjections of core values (-.118), external regulation of core values (-.09).

The average discriminant scores (group centroids) for the successful group and unsuccessful group were .351 and -.585 respectively. The discriminant analysis classified 71% of the group cases correctly. Results indicated that 85% of the successful group have been correctly classified, whereas 49% of the unsuccessful group have been correctly classified. These results indicated that the predictor variables were more accurate in predicting whether a new recruit will successfully complete basic military training first time than fail to complete basic military training first time.

### **2.3.3. Results for top ranking recruits who successfully completed CIC training first time ( $n = 29$ ) vs. recruits who left the military before completing CIC training first time ( $n = 37$ ).**

We further investigated whether there were any significant differences between the top performing recruits and recruits who left the military prior to completing basic military training, on all psychological attributes. The top performing group ( $n = 29$ ) consisted of

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<sup>2</sup> Performance outcome had been coded as either 0 or 1, where 0 = recruits that were unsuccessful in completing MBT first time and 1 = recruits that successfully completed MBT first time. The negative value indicates that the successful recruits are lower on the variable than unsuccessful recruits.

recruits who obtained high grade performance outcome classification scores at the end of CIC training (i.e., “A” – “B-“ grade classification). The early leaver group ( $n = 37$ ) consisted of recruits who were dismissed from military service ( $n = 18$ ), or who left military training out of their own volition ( $n = 19$ ) before completing basic military training. Recruits who were back-squaded ( $n=14$ ) were omitted from the sample as they would still remain within the military, only to continue with training but complete CIC after they received the necessary remedial training.

Results from the MANOVA indicated that there were statistical significant mean differences across multiple dependent variables between the top performing recruits and the early leaver group. The multivariate result was statistically significant, Pillai’s trace ( $V = .322$ ,  $F(10,55) = 2.61$ ,  $p < .05$ ), indicating that the multivariate combination of dependent variables affected whether recruits successfully completed basic military training first time or left the military before completing CIC training. The effect size was estimated at .322, which indicated that the independent variable and multivariate combination of dependent variables shared 32.2% of their variance.

To fully understand and interpret the data, the statistical significant MANOVA was followed up with a series of ANOVAs on each of the dependent variables, as well as with a discriminant function analysis. Univariate means, standard deviations and standardised discriminant function coefficients are presented in Table 2.4. Examination of Levene’s  $F$  tests revealed that the homogeneity of variance assumption for all outcome variables was considered satisfied, except the Levene’s  $F$  test for neuroticism scale, which was statistically significant ( $p = .046$ ). Inspection of the standard deviations for neuroticism (See Table 2.4) showed that the larger standard deviation was not four times than that of the smaller standard deviation, indicating that the ANOVA would still be robust (Howel, 2002).

**Table 2.4**

Means, Standard Deviations and Discriminant Function Coefficients for Top Performers and Early Leavers on Study Variables at the Start of Military Basic Training

Dependent Variable	Class	M	SD	$\omega_s$
Mental Toughness	All	4.09	1.44	.447
	Top Performers	4.61	1.18	
	Early Leavers	3.68	1.51	
Reward Sensitivity	All	26.25	6.49	-.357
	Top Performers	26.10	5.38	
	Early Leavers	26.37	6.49	
Punishment Sensitivity	All	9.89	7.42	-.503
	Top Performers	7.20	5.40	
	Early Leavers	12.00	8.14	
Psychoticism	All	2.34	1.68	.624
	Top Performers	2.96	1.80	
	Early Leavers	1.86	1.45	
Extraversion	All	9.51	2.94	-
	Top Performers	9.62	2.22	
	Early Leavers	9.43	3.42	
Neuroticism	All	4.87	2.95	-
	Top Performers	3.89	2.30	
	Early Leavers	5.64	3.20	
GCV Externalisation	All	5.48	1.14	-.269
	Top Performers	5.46	1.17	
	Early Leavers	5.50	1.14	
GCV Introjected	All	4.76	1.46	-.160
	Top Performers	4.64	1.41	
	Early Leavers	4.85	1.51	
GCV Integrated	All	6.11	.92	.758
	Top Performers	6.24	.71	
	Early Leavers	6.00	1.06	
Eff. Cntl. Activation	All	4.97	.94	.242
	Top Performers	5.14	.98	
	Early Leavers	4.83	.90	
Eff. Cntl. Attention	All	4.41	1.27	-.072
	Top Performers	4.69	1.31	
	Early Leavers	4.19	1.21	
Eff. Cntl. Inhibition	All	4.24	.79	-.134
	Top Performers	4.23	.90	
	Early Leavers	4.24	.70	

Note. All (N = 66); Top Performers Group (N = 37); Early Leavers Group (N = 29);  $\omega_s$  = coefficients from standardised discriminant function; GCV = General Core Value; Eff.Cntl. = Effortful Control.

Four of the ANOVA's were statistical significant, indicating significant differences between the top performers and recruits who left basic military training before completion.

The four statistical significant ANOVA's included: psychoticism,  $F(1, 64) = 7.35, p < .01, \eta_p^2 = .105$ ; neuroticism,  $F(1, 64) = 6.15, p < .05, \eta_p^2 = .088$ ; punishment sensitivity,  $F(1, 64) = 7.45, p < .01, \eta_p^2 = .104$ ; and MT,  $F(1, 64) = 7.37, p < .01, \eta_p^2 = .103$ . Closer inspection of the psychological variables indicated that at the start of MBT, the top performers were higher on psychoticism ( $M = 2.96, SD = .30$ ) than the early leaver group ( $M = 1.86, SD = .266$ ). In addition, recruits in the top performing group ( $M = 3.89, SD = .529$ ) had lower neuroticism scores compared to the early leaver group ( $M = 5.64, SD = .468$ ) at the start of MBT. Further, findings in the present study indicated that the top performers were less sensitive to punishment cues ( $M = 7.20, SD = 1.31$ ) than the early leaver group ( $M = 12.00, SD = 1.16$ ). Lastly, results revealed that the top performing recruits ( $M = 4.61, SD = .256$ ) were more mentally tough than the early leaver group ( $M = 3.68, SD = .227$ ) at the start of CIC training.

In addition to the above ANOVA follow-up tests, the significant MANOVA was followed-up by performing a discriminant function analysis. The discriminant analysis explained 100% of the between group variance, canonical  $R^2 = .32$ , thus accounting for 32% of the total relationship between the independent variables and groups; in addition, the discriminant analysis significantly differentiated the top performers from the early leaver group, Wilks's  $\lambda = .678, X^2(10) = 22.95, p < .05$ . The standardised canonical discriminant function coefficients for each of the predictors are displayed in Table 2.4. Both Extraversion and neuroticism were excluded from the analysis as they failed to obtain the minimum tolerance level of .001. The best psychological discriminators between the top performers who have completed military basic training first time and the early leaver group included: integration of core values (.759), psychoticism (.624), punishment sensitivity (-.503), MT (.447), reward sensitivity (-.357), external regulation of core values (-.296), effortful control activation (.242), introjections of core values (-.160), effortful control inhibition (-.134) and



effortful control attention (-.072). The average discriminant scores (group centroids) for the top performers and early leaver groups were .766 and -.601 respectively. The discriminant analysis classified 74.2% of the group cases correctly. Results indicated that 78% of the early leaver group have been correctly classified, whereas 69% of the top performers group have been correctly classified. These results indicated that the psychological predictor variables were more accurate in predicting whether a new recruit will leave military service before completing MBT, than successfully complete MBT in the top performing group.

#### **2.3.4. Pattern Recognition Analysis**

Pattern recognition analysis was performed in order to identify important attributes in the data that would enable differentiation between recruits who passed military basic training first time and recruits who were unable to complete MBT first time. In order to extrapolate these differentiating variables from the data, we used Waikato Environment for Knowledge Analysis (Weka; Hall, Frank, Holmes, Pfahringer, Reutemann, & Witten, 2009). Unlike discriminant function analysis that predicts group membership based on linear functions on a set of variables, Weka is a machine learning workbench that uses algorithms and data pre-processing tools for predictive modelling and data analysis (Witten, Frank, & Hall, 2011). To evaluate both the accuracy of the predictive model and the weight of each attribute, we used three learning classification algorithms (i.e., nearest neighbour classifier: Lazy, IB1; decision tree: J48; and Support Vector Machine: SMO) for the pattern recognition analyses. The error rate of each classification algorithm was predicted by using a stratified tenfold cross-validation model. Our data contained two classes (i.e., successful and unsuccessful), representing recruits who successfully completed CIC basic training first time and those who were unsuccessful in completing CIC training first time. See Appendix A for supplementary material on pattern recognition analyses performed.

***Pattern Recognition results for recruits who successfully completed CIC training first time (n = 85) vs. recruits who were unsuccessful in completing CIC training first time (n = 51):*** Accuracy differences between the three learning algorithms used in the analyses are displayed in Table 2.5. Results indicated that the SVM (SMO) algorithm had the highest accuracy amongst the tree learning algorithms, correctly classifying 63.97% of instances and incorrectly classifying 36.02% of the instances. As the SVM (SMO) algorithm displayed the highest accuracy predictions amongst the three learning algorithms, both the nearest neighbour (IB1) and decision tree (J48) classifying algorithms were omitted from further analysis. The predictive performance accuracy percentage of the SVM (SMO) classifier for true positive rate (TPR) class was 87.1% and 25.5% for the true negative rate (TNR). This indicated that 87.1% of recruits who were classified to be in the successful class and 25.5% of recruits who were classified to be in the unsuccessful class belonged to those specific classification classes. The results indicated that the SVM (SMO) classification algorithm was able to classify new recruits who will pass military basic training more accurately, than classifying new recruits who will not complete military basic training first time.

To determine if the accuracy of the model could be improved, individual features from the model were visually inspected and features with low weightings were removed. As a result, six features were removed whereafter the SVM (SMO) classifying algorithm was re-run with the reduced sub-set of features. The six features removed were: reward sensitivity;

**Table 2.5**  
Accuracy Predictions of the Three Learning Classification Algorithms

	Algorithm		
	Nearest Neighbour (Lazy: IB1)	Decision (Tree J48)	SVM (SMO)
Total Number of Instances	136	136	136
Total number of Attributes	14	14	14
Correctly Classified Instances % Accuracy	44.11	55.88	63.97
Incorrectly Classified Instances % Accuracy	55.88	44.11	36.02

extraversion, lie scale, GCV external regulation, introjected regulation and effortful control inhibition. Results from the reduced sub-set indicated that accuracy of the correctly classified instances increased from 63.9% to 66.9%, whereas the percentage of the incorrectly classified instances decreased from 36.02% to 33.08%. Within the confusion matrix of the reduced sub-set (See Table 2.6), there were 78 true positive, 13 true negative, 7 false negative and 38 false positive compounds. Compared to the full subset, the predictive performance accuracy percentage of the TPR in the reduced subset improved from 87.1% to 91.8%. The predictive performance accuracy percentage of the TNR stayed unchanged at 25.5%. The predictive performance accuracy percentages indicated that 91.8% of recruits who were classified to be in the successful class and 25.5% of recruits who were classified in the unsuccessful class were in actual fact recruits who belonged to those specific classes.

**Table 2.6**

Confusion Matrix of Reduced Subset of SVM (SMO) Algorithm

		Predicted Class	
		Successful	Unsuccessful
Actual Class	Successful	78	7
	Unsuccessful	38	13

Number of Instances = 136

Individual feature weightings before, as well as after the features with low weightings were extracted and the SVM (SMO) algorithm was re-run, are displayed in Table 2.7.

Individual feature weightings close to 0 indicate that those features are not very strong predictors, whereas larger weightings (either positive or negative) indicate that those features are strong predictors. Individual feature weightings of the reduced subset revealed that psychoticism, MT and integration of core values had the highest weightings; followed by neuroticism, punishment sensitivity, effortful control attention and effortful control activation. Thus, these seven features can be regarded as good psychological predictors to identify recruits who will be successful in completing CIC training first time.

**Table 2.7**

Individual Feature Weightings Before and After Features with Low Weightings were Removed

Feature	Weighting Before Extraction	Weightings After Extraction
Mental Toughness	-1.09	-1.15
Reward Sensitivity*	.11	-
Punishment Sensitivity	.85	.79
Psychoticism	-1.69	-1.71
Extraversion*	.35	-
Neuroticism	.83	.98
Lie-Scale*	.17	-
GCV Externalisation*	-.02	-
GCV Introjection*	.19	-
GCV Integrated	-1.07	-.98
Eff. Cntl. Activation	-.91	-.58
Eff. Cntl. Attention	-.80	-.66
Eff. Cntl. Inhibition*	.43	-

Number of Instances = 136

GCV = General Core Values; Eff. Cntl. = Effortful Control

\* Features removed due to low weightings.

***Pattern Recognition results for top ranking recruits who were successful in completing CIC training first time (n = 29) vs. recruits who left the military before completing CIC training first time (n = 37):*** We further investigated whether psychological attributes were able to accurately differentiate between the top performing recruits (n = 29), and/or recruits who left the military before completing the CIC training cycle (n = 37). The top performing group consisted of recruits who were successful in completing CIC training first time and who obtained high grade outcome classification scores at the end of CIC training (i.e., “A” to “B-“grade classification), whereas the early leaver group consisted of recruits who were discharged from military service (n = 18), or who left military training out of their own volition (n = 19).

Recruits who were back-squaded (n=14) were omitted from the sample as they would still continue with training, but complete CIC after receiving the necessary remedial training. The same pattern recognition evaluative procedure as described above was used to determine the accuracy of the predictive model of the reduced sample set. The data contained two

classes (i.e., top performers, early leavers) representing recruits who have successfully completed military basic training first time, and those recruits who left the military before completing the CIC training first time.

Accuracy differences between the three learning algorithms used in the analyses are displayed in Table 2.8. Results indicated that the SVM (SMO) algorithm had the highest accuracy amongst the tree learning algorithms, correctly classifying 65.15% of instances and incorrectly classifying 34.84% of the instances. As the SVM (SMO) algorithm displayed the highest accuracy predictions amongst the three learning algorithms, both the nearest neighbour (IB1) and decision tree (J48) classifying algorithms were omitted from further analysis. The predictive performance accuracy percentage of the SVM (SMO) classifier for true positive rate (TPR) class was 55.2% and 73% for the true negative rate (TNR). This indicated that 55.2% of recruits who were classified to be in the top performer class and 73% of recruits who were classified to be in the early leaver class were in actual fact recruits who belonged to those specific classes. The results indicated that the SVM (SMO) classification algorithm was able to classify new recruits who will leave the military before completing CIC training more accurately than classifying new recruits who will complete military basic training first time.

To determine if the accuracy of the model could be improved, individual features from the model were visually inspected and features with low weightings were removed. As

**Table 2.8**  
Predictive Accuracy of the Three Classifier Algorithms

	Nearest Neighbour (Lazy: IB1)	Algorithm Decision (Tree J48)	SVM (SMO)
Total Number of Instances	66	66	66
Total number of Attributes	14	14	14
Correctly Classified Instances % accuracy	48.48	48.48	65.15
Incorrectly Classified Instances % accuracy	51.51	51.51	34.84

re-run with the reduced sub-set of features. The seven features that were removed included: reward sensitivity, extraversion, lie scale, GCV external regulation, GCV introjected regulation, effortful control attention and effortful control inhibition. Results from the reduced sub-set indicated that accuracy of the correctly classified instances increased from 65.15% to 68.18%, whereas the percentage of the incorrectly classified instances decreased from 34.84% to 31.81%. Within the confusion matrix of the reduced sub-set (See Table 2.9), there were 18 true positive, 27 true negative, 11 false negative and 10 false positive compounds.

**Table 2.9**

Confusion Matrix of Reduced Subset of SVM (SMO) Algorithm

			Predicted Class	
			Pass	Non-Completion
SVM (SMO)	Actual Class	Top Performers	18	11
		Withdrawal	10	27

Number of Instances = 66.

Compared to the full subset, the predictive performance accuracy percentage of the TPR in the reduced subset improved from 55.2% to 62.1%. The predictive performance accuracy percentage of the TNR as it was unchanged at 73%. The predictive performance accuracy percentages indicated that 62.1% of recruits who were classified to be in the top performers' class and 73% of recruits who were classified in the early leaver class were in actual fact recruits that belonged to those specific classification classes.

Individual feature weightings before, as well as after the features with low weightings were extracted and the SVM (SMO) algorithm re-run are displayed in Table 2.10. Individual feature weightings close to 0 indicate that those features are not very strong predictors, whereas larger weightings (either positive or negative) indicate that those features are strong predictors. Individual feature weightings of the reduced subset revealed that psychoticism, MT and integration of core values had the highest weightings, followed by effortful control activation, punishment sensitivity and neuroticism. Thus, these six features can be regarded

**Table 2.10**

Individual Feature Weightings Before and After Features with Low Weightings were Removed

Feature	Weightings Before Extraction	Weightings After Extraction
Mental Toughness	-1.32	-1.28
Reward Sensitivity*	.01	-
Punishment Sensitivity	.77	.83
Psychoticism	-2.13	-1.98
Extraversion*	.34	-
Neuroticism	.64	.78
Lie-Scale*	.33	-
GCV Externalisation*	-.52	-
GCV Introjection*	.27	-
GCV Integrated	-1.57	-1.23
Eff. Cntl. Activation	-1.03	-1.03
Eff. Cntl. Attention*	-.28	-
Eff. Cntl. Inhibition*	.32	-

Number of Instances = 66

GCV = General Core Values; Eff. Cntl. = Effortful Control

\* Features removed due to low weightings.

as good psychological predictors to identify recruits who will leave the military before completing CIC training first time.

Results from both the full and narrowly selected group sets indicated that the predictive performance accuracy of the SVM (SMO) algorithm was the most accurate of the three classifying algorithms used. After extracting individual attributes with low weightings, the results indicated that both group sets shared the same differentiating psychological factors. The only exception was noted in the results from the narrowly selected group, as the effortful control attention scale was not identified as a differentiating psychological factor. The accuracy percentage for the full sample data set once individual factors with low weightings were removed was 66.1% and for the narrowly selected sample set 68.18%. The difference between the two data sets is the classification of recruits. The full sample data set was more able to correctly classify those recruits who have successfully completed CIC training first time, whereas the narrowly selected data set was more able to correctly classify those recruits who will leave the military before completing CIC training. It should be noted

that feature selection tests were performed on both the data sets, focusing on Fast Correlation-Based Filter (FCBF), Relief-F and SVM tests. The FCBF test failed to produce any results; however, results from the SVM tests suggested the same set of predictors as those who were identified during our heuristic approach where attributes were clustered according to their individual weightings. Both the MANOVA and pattern recognition approach delivered similar results.

## **2.4. Discussion**

The purpose of the present study was to explore and identify psychological attributes and behaviours that infantry recruits bring to the start of MBT and to determine if these attributes can accurately differentiate recruits who will pass basic military training first time from those who will fail to complete MBT first time. The present study delivered mixed support for our hypotheses. Collectively the results indicated that when compared to recruits who failed to complete MBT first time, recruits who successfully completed MBT first time were significantly higher at the start of MBT on psychological attributes such as: psychoticism, MT, effortful activation control and effortful attention control. In contrast, compared to the unsuccessful recruits at the start of MBT, successful recruits were lower on psychological attributes such as neuroticism and punishment sensitivity. Results in the present study did not show any significant differences between the two groups on extraversion, reward sensitivity or any of the three general core value scales.

Specifically, as expected, compared to recruits who failed to complete MBT first time, recruits who successfully completed MBT first time started training with higher levels of psychoticism and lower levels of neuroticism. Similar results were also found when the sample was divided between top performing recruits and an early leaver group. Even though results in the present study supported the hypothesis that successful recruits would be higher in psychoticism when compared to unsuccessful recruits, the reasoning for the hypothesis



may have been misguided. The original argument was founded on the reasoning that high psychoticism is related to tough mindedness (Eysenck & Eysenck, 1976). Results in the present study however showed no significant correlation between psychoticism and MT. A possible explanation for our finding is that those recruits with high psychoticism scores may actually be sensation seekers (See Zuckerman, 2008).

Both Zuckerman and Eysenck were in agreement that psychoticism and extraversion are correlated with sensation seeking (Eysenck, 1991; Zuckerman, 1994; Zuckerman & Glicksohn, 2016). According to Zuckerman (1994), sensation seeking is more related to psychoticism than extraversion. The military is a high risk vocation and provides an environment for sensation seekers to flourish. For example, Hobfoll, Rom, and Segal (1989) argued that Israeli youth high on sensation seeking were more likely to volunteer for combat units when performing their required military service. Sensation seeking is also positively related to performance in the military. For example, Neria, Solomon, Ginzburg, and Dekel (2000) have shown that high sensation seeking is a trait that can act as a marker of resilience to stress. For example, high sensation seekers suffer less from post-traumatic stress disorder when compared to low sensation seekers. In addition, it was shown that high sensation seeking was related to courageous behaviour. Sensation seekers are therefore more likely to choose and stay within a profession that offers them an environment to engage and act on their sensation seeking behaviours.

Further, as expected, results indicated that the successful and top performing recruits reported lower levels of neuroticism at the start of MBT, indicating that they were more emotionally stable and less anxious than their counterparts at the start of MBT. This result supports the findings of previous research where successful candidates of high risk military training programs were more emotionally stable than unsuccessful candidates (e.g., Bartram & Dale, 1982; McDonald et al., 1990). Being emotionally stable at the start of MBT proved

to be advantageous for successful performance and retention for infantry recruits. Individuals who are emotionally stable (low neuroticism) tend to be more secure, stable and confident and it is positively related to job satisfaction (Judge & Bono, 2001; Judge, Heller, & Klinger, 2008). Whereas, individuals who are less emotionally stable (high neuroticism) tend to experience more negative effects, which in turn negatively relates to job satisfaction (Brief, 1998; McCrae & Costa, 1991). Additionally, research also suggests that individuals with low levels of neuroticism (i.e., high emotional stability) are more likely to remain within high risk occupations (Glicksohn & Rechtman, 2011). A possible explanation for this finding might be that emotionally stable individuals (low neuroticism) tend to pursue goals for intrinsic reasons (Elliot & Sheldon, 1998). We therefore suggest that recruits who successfully completed MBT first time were actually individuals who intend to make the military a career and are consequently pursuing their goals.

Contrary to our predictions, the results within the present study indicated that successful and unsuccessful recruits did not significantly differ from one another on extraversion at the start of MBT. This finding stands in contrast with research that has shown that extraversion as a personality dimension predicted performance in selection and training programs for specialised military units (Bartram & Dale, 1982; Dean et al., 2006; Picano et al., 2002). Barrick and Mount (1991) conducted a meta-analysis where they examined the relation of the Big Five personality dimensions to training proficiency for five occupational groups (i.e., police, skilled/semi-skilled, managers, sales and professionals). Findings from the meta-analysis indicated that extraversion as a personality dimension predicted training proficiency for two occupations, sales and managers, whereas extraversion was less a predictor for training proficiency for skilled/semi-skilled and professionals (Barrick & Mount, 1991). The present findings suggest that the extraversion personality dimension is not an important predictor of successful performance of infantry MBT.

Findings in the present study showed no support for the hypothesis predicting that successful recruits would start MBT testing higher than unsuccessful recruits on reward sensitivity. Results indicated that there was no significant difference between the two groups on reward sensitivity, suggesting that both groups' behaviours were equally reinforced by positive stimuli at the start of MBT.

In addition, the results in the present study contradict the hypothesis predicting that successful recruits would be more sensitive to punishment stimuli than unsuccessful recruits at the start of MBT. Findings indicated that when compared to unsuccessful recruits, successful recruits were less sensitive to punishment stimuli at the start of MBT. This is in line with previous research that has shown that high punishment sensitivity is negatively related with performance during combat simulations (Perkins et al., 2007). High levels of punishment sensitivity are accompanied by emotions of worry, anxiety and rumination (Gray, 1991). These emotions support behaviours which include a tendency of cautious approach or withdrawal (Van Der Linden, Beckers, & Taris, 2007). Thus the present findings suggest that successful recruits started MBT being less anxious than unsuccessful recruits. Successful recruits may have worried and ruminated less and perceived high-stress situations to be less threatening, therefore enabling successful recruits to continue to approach high-stressful circumstances whilst maintaining their level of performance.

As expected, results in the present study revealed that being mentally tough at the start of MBT predicted performance. Findings showed that recruits who completed MBT first time were perceived to be more mentally tough at the start of training than recruits who failed to complete MBT first time. Results further indicated that mentally tough behaviour was significantly and positively correlated to performance outcome ( $r = .19, p = .023$ ). These results support previous findings by Arthur et al. (2015), where MT predicted performance in British Infantry recruits, as well as recruits undergoing Parachute Regiment selection. Thus,

starting MBT being MT enabled recruits to maintain goal focus whilst facing different stressors and therefore was able to perform to a higher standard. This confirms the utilization of MT as a predictor of retention and performance in military recruits. Visual inspection of the results indicate that most of recruits who are discharged from the military, being it out of own volition or being classified as unfit for service, will be low in MT. Suggesting, unsuccessful recruits with low levels of MT lack the perseverance to continue when faced with challenging situations.

In terms of effortful control capacities, results in the present study revealed only partial support for the hypothesis predicting that successful recruits would be significantly higher than unsuccessful recruits on all three facets of effortful control (i.e., inhibition control, activation control and effortful control). In particular, the findings revealed that both the successful and unsuccessful recruits started MBT with no significant difference on inhibitory control. Indicating, both groups of recruits were equally able to inhibit dominant responses to perform subdominant responses at the start of MBT (e.g., acting out of anger when being punished for a transgression committed). This finding suggests that both successful and unsuccessful recruits had the same capacity to engage in planning and to detect errors (Rothbart & Rueda, 2005) when they started training. Results further revealed that recruits in the successful group were significantly higher than recruits in the unsuccessful group on activation control and attention control at the start of training. The successful group started training having significantly higher capacities to implement both activation control and attention control strategies when required. Suggesting that the successful recruits were better equipped than unsuccessful recruits with the ability to perform an action, when in normal circumstances one was inclined to avoid such an action. The higher levels of attention control observed in the successful group could have given them the capacity to refocus their attention away from threatening stimuli to more positive or neutral thoughts

(Eisenberg et al., 2010). For example, maintaining focus on a task at hand even though the recruit may show signs of fatigue as a result of sleep deprivation. The higher levels of activation control may have provided the recruits in the successful group with the capacity to perform or engage in a task that they would not have normally performed (Rothbart et al., 2014). For example, a recruit scaling high obstacles on the assault course even though the individual may have a fear of heights. Taken together, the results suggest that being higher in both activation and attention control facets enabled the successful recruits to be more flexible and able to maintain their focus when they approach stressful situations.

The hypothesis predicting that successful recruits will have significantly higher integrated regulation than unsuccessful recruits at the start of training was not supported. Results revealed that both groups had comparable means across all three motivation regulators. Compared to externalisation and introjection regulations, successful and unsuccessful groups both scored higher on integrated regulation. We offer two possible explanations for the lack of a significant difference in internalisation of core values between the successful and unsuccessful recruits at the start of training. First, it is suggested that internalisation of core values are developed during training. Arthur, Hardy, and Wagstaff (2010) established that internalisation of core values only increased from week 3 onwards for soldiers under training during standard entry phase 1 Army training. The present data was collected during week 1 of MBT, which may be too early to notice any significant internalisation of core values. Second, the recruits may have felt that their training instructors did not support their psychological needs (i.e., autonomy, need for competence and relatedness). The three psychological needs are essential to internalisation (Ryan & Deci, 2004). For example, for integrated regulation to occur, an individual needs to feel autonomous. Introjected regulation will occur when a recruit feels his training instructor supports his need for competence and relatedness. Lastly, for external regulation to occur, a

recruit needs to feel competent (Ryan & Deci, 2004). Therefore, it is no surprise that there was no significant difference between the two groups at the start of MBT with regards to internalisation of core values. Especially within the first week of MBT, where recruits have no freedom over personal movement or actions (no autonomy), they are viewed as recruits who still need to prove their worth (lack of relatedness) and will be without any soldiering skills (not feeling competent).

Results obtained from the top performers and early leaver group analyses revealed similar results to that of the successful and unsuccessful groups. Specifically, top performing recruits were significantly higher than the early leaver group on psychoticism, neuroticism, punishment sensitivity and MT. However, unlike the differences found between the successful and unsuccessful groups, no significant differences were observed between the top performing recruits and early leaver recruits at the start of training on both attention control and activation control facets of the effortful control scale. This finding comes as a surprise, as one would have expected to notice a more profound difference between the top performers and the early leaver group. These finding may be explained by the observable differences between the groups on MT and punishment sensitivity. Compared to recruits within the early leaver group at the start of MBT, the top performers were higher on MT and lower on punishment sensitivity. Individuals with low punishment sensitivity are less anxious, as opposed to individuals with high punishment sensitivity who are more anxious (Gray, 1991). In addition, punishment sensitivity is a dispositional source of work stress, indicating that individuals with high punishment sensitivity will experience more stress than others when job stressors become more prevalent (Van der Linden et al., 2007). The combination of low punishment sensitivity and high MT may have resulted in the top performers perceiving the stressors experienced during MBT (e.g., sleep deprivation) as a challenge. As a consequence, the top performers may have employed limited effortful control strategies to maintain high

levels of performance. This suggests that recruits in both the middle performance bracket and recruits who were back-squaded (i.e., recruits who were omitted from the top performers and early leaver sample), were the individuals who made the most use of effortful control strategies in order to enhance their performance to a satisfactory level (because they have lesser processing strategies).

The discriminant function analysis from the data of successful and unsuccessful recruits revealed that 71% of group cases were classified correctly. The best four psychological discriminators between the successful recruits and unsuccessful recruits were psychoticism, integrated regulation, MT and effortful activation control. The discriminant function analysis from the data of the top performing group and early leaver group showed that 74% of group cases were correctly classified. The greatest four discriminators between the top performers and early leaver group were: integrated regulation, psychoticism, punishment sensitivity and MT. A notable difference between the two group cases is the differentiation between recruits. The successful vs. unsuccessful group data set was more able to accurately discriminate (71%) whether a new recruit will successfully complete MBT first time, than not complete MBT first time. The top performers vs. early leaver group data set was more able to accurately discriminate (74%) between a recruit who will be discharged before completing MBT, than completing military training first time as a top performer.

An important and novel aspect of the present study is the use of pattern recognition analysis to identify important psychological attributes that could accurately differentiate between successful and unsuccessful recruits, as well as between top performing recruits and early leaver group. Findings indicated that the group set consisting of successful and unsuccessful recruits, as well as the group set consisting of the very top performing recruits and early leaver group shared very similar differentiating psychological factors (i.e., psychoticism, MT, integrated regulation, neuroticism, punishment sensitivity, attention

control and effortful activation). The only exception was that attention control was not identified as a differentiating psychological factor within the very top performers vs. early leaver group. The fact that extraversion, external regulation, inhibition control and reward sensitivity were not identified as differentiating factors within the two group sets does not come as a surprise, as no significant differences within the group sets on these the four factors were reported. The accuracy percentages reported for the successful vs. unsuccessful group set was 66.1%, whereas it was 68.18% for the top performers vs. leaver group set. Differences between the two group data sets in relation to classification of recruits are similar to that reported for the discriminant analyses.

Findings from the statistical discriminant function analyses and pattern recognition analyses within the present study yielded slightly different results with regards to the accuracy percentages of the predictive models. For example, from the statistical discriminant function analysis, the classification accuracy percentage obtained from the successful and unsuccessful group was 71%. Where, the classification accuracy percentage from the pattern recognition analysis was 66%. For the top performing and early leaver group, the classification accuracy percentages obtained from the statistical discriminant function analysis and the pattern recognition analysis were respectively 74% and 68%. The difference between the two types of statistical analyses may be because, unlike the discriminant function analysis that predicts group membership based on linear functions on a set of variables, pattern recognition uses algorithms and data pre-processing tools for predictive modelling and data analysis (Witten et al., 2011).

## **2.5. Limitations and Future Directions**

An advantage of the present study is the use of an informant rated measure to obtain MT data. McDonald (2008) highlighted that behavioural data presents significant value to personality psychology, as personality traits are expressed through behaviour. Future research



should explore the use of multiple methods (i.e., self-report and informant report) to assess mentally tough behaviour of recruits. Utilising multiple methods to assess MT can provide rich information of behaviours as well as increase the validity of the assessment (Vazire, 2006). The advantage of using a multiple method approach is that informant-rated measures offer a perspective of the personality from the outside; whereas self-report measures provide information others may not be aware of (Hogan, 1998; Paulhus & Vazire, 2007).

The present study is not without limitations. First, the findings of this study are based on psychological attributes of male infantry recruits at the start of MBT. As a result, it may have limited applicability to female recruits entering military service. Future research should investigate if the results in the present study are still relevant across gender, or applicable to other arms of service (e.g., Navy, Air Force) or law-enforcement agencies (e.g., fire-services, police). Future research should explore the effect MBT has on the psychological attributes recruits bring to basic military training. This would allow a more in-depth understanding of the retainment and transformation process of a recruit into a combat soldier.

## **2.6. Conclusion**

In summary, we were able to identify psychological attributes that can differentiate with a high level of accuracy between recruits who would successfully complete basic military training first time and recruits who would be unsuccessful in completing basic military training first time (i.e., psychoticism, neuroticism, punishment sensitivity, MT, integrated regulation, attention control and effortful activation control). Similar differentiating attributes were identified between recruits who were discharged from military service prior to completion of basic military training and top performing recruits. Together with standing recruitment tests, the psychological tests identified in the study can help the recruitment officer identify primary candidates that will be successful in completing basic

military training first time. This will help increase retention and result in higher return investment from those individuals.

## **Chapter 3**

# **The Effect of Military Basic Training on Psychological Attributes of Recruits**

## **Abstract**

Understanding the effect that military basic training (MBT) has upon psychological attributes may help the military to retain and prepare recruits to perform more effectively within hazardous environments. Surprisingly, there is limited research examining the effect of MBT on psychological attributes of military recruits. The aim of the present research was to address the gap in the literature by examining 132 UK male Infantry recruits undergoing a 26 week Combat Infantryman's Course on psychological attributes such as: personality (i.e., psychoticism, neuroticism, extroversion, punishment and reward sensitivity) and cognitions (i.e., mental toughness, effortful control and the internalisation level of military core values). Results from a repeated measures MANOVA test noted a significant increase in extraversion levels, and a significant decrease in neuroticism, punishment sensitivity, and external regulation levels across the 24-week period. The results found that MBT significantly influences personality and cognitions within a relatively small time frame (i.e., 24 weeks).

## **KEYWORDS**

personality, punishment sensitivity, military core values, military basic training

### 3.1. Introduction

Military basic training is a well-structured and standardised training programme with two distinct objectives in mind. The first objective is to change new recruits' attitudes and behaviours in order for them to adopt and internalise military culture, discipline and value systems (Barron & Ogle, 2014). The second objective of MBT is to equip new recruits with the necessary skills and capabilities, enabling them to function effectively within a combat environment as part of a unit (Clum, Hoiberg, & Kole, 1969). However, not all new recruits have the physical or psychological strength to adapt successfully into the military environment, causing dropout and a loss of training investment. Thus, in order for the military to minimise attrition rates, it is vital to select individuals with physical and psychological attributes that will enable them to successfully adapt to the military, as well as function effectively as an integral part of a unit. Chapter 2 of this thesis identified that recruits who successfully completed MBT first time tested significantly higher at the start of MBT on psychological attributes such as psychoticism, mental toughness (MT), effortful activation control and effortful attention control and lower on psychological attributes such as neuroticism and punishment sensitivity than non-successful recruits.

Understanding the effect MBT has upon psychological attributes may help the military to prepare recruits to perform more effectively within hazardous environments. Surprisingly, there is limited research examining the effect of MBT on psychological attributes of military recruits. Therefore, the present study examined the effects that MBT had on the psychological attributes identified in Chapter 2, which differentiated between recruits who completed military basic training first time and recruits who failed to complete military training first time.

### 3.1.1. Personality

Although research has shown that MBT may have an effect upon personality across time, as far as could be established, only three studies investigated this effect directly. For example, Ekman, Friesen, and Lutzker (1962) investigated whether an eight week MBT program had a positive influence on recruits' personality. The results indicated a significant yet small increase in personality as assessed by the Minnesota Multiphasic Personality Inventory (MMPI; Schiele, Baker, & Hathaway, 1943). These increases included hypochondriasis (HS), psychopathic deviate (PD) and hypomania (MA). The changes in the MMPI scales suggested that recruits became more manipulative, aggressive and impulsive during training. According to Ekman et al. (1962), their findings demonstrated that military basic training had no beneficial effect on recruit's personalities; instead there was a small increase in some mild symptoms of psychopathology.

In a more recent study, Vickers, Hervig, Paxton, Kanfer, and Ackerman (1996) found a more positive change in personality traits with Naval recruits during a seven week MBT programme. Results from the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) indicated that recruits became significantly more conscientious and less neurotic during a seven week MBT programme. In addition, recruits' extraversion levels increased between data capturing time-points during MBT. However, the increase was non-significant and the effect size reported was below Cohen's (1988) lower bound for small effect sizes (i.e., .20). No other significant changes were observed on the remaining NEO-FFI personality traits. Vickers et al. (1996) established that a combination of high conscientiousness and low neuroticism levels were linked to better behaviours such as lower substance abuse and absenteeism.

More recently, Jackson, Thoemmes, Jonkmann, Lüdtke, and Trautwein (2012) conducted a longitudinal study to explore the relationship between military training and

development of personality traits within a German male sample. German military conscription is for 9 months, of which 3 months consist of combat training and 6 months at an assigned post. Personality was assessed by administering the German version of the NEO-FFI (Borkenau & Ostendorf, 1993) to participants at four time points. The first assessment (Time 1) occurred in the participants' final year of high school prior to conscription. The participants were then reassessed 2 years later (Time 2). Thereafter, participants were reassessed at two additional time-points (Time 3 and 4), the third assessment taking place approximately two years after time 2. Findings indicated that extraversion increased between time-points (Time 1 and 2); however, the results were non-significant with an effect size below Cohen's (1988) lower bound for small effect sizes (i.e., .20). In addition, individuals who enlisted into the military tested lower on agreeableness after training than those individuals who performed civilian community service. Participants were re-assessed 4 years after military training (Time 4) where the changes persisted even after participants entered the work force or college. Jackson et al. (2012) suggested that lower levels of agreeableness may be beneficial within the military environment, since low levels of agreeableness are associated with higher levels of aggression, aggressive behaviour and aggression related skills (e.g., marksmanship). Thus, compared to individuals high in agreeableness, those low in agreeableness may react more quickly in combat situations.

As the present study is interested in the effect of training on the personality factors identified in Chapter 2, the present study continued to view and measure personality as conceptualised by Eysenck, Eysenck, and Barrett, (1985). Eysenck et al. (1985) viewed personality as consisting three super-factors: i.e., psychoticism, extraversion and neuroticism (Eysenck & Eysenck, 1985). Psychoticism refers to a cluster of traits that reflect Impulsive Antisocial Sensation Seeking (ImpASS: Pickering, 2004). The psychoticism factor equates to two Big Five Factors, namely low agreeableness and low conscientiousness (Eysenck,

1991; Goldberg & Rosolack, 1994). The higher end of the psychoticism spectrum reflects characteristics such as aggressiveness, impulsiveness and tough-mindedness, whereas the lower end of the spectrum reflects characteristics such as empathy and altruism. Extraversion refers to individuals who are sociable and active. The higher end of the spectrum of extraversion reflects active and sociable behaviour. In contrast, the lower end of the spectrum reflects characteristics such as introspectiveness and quietness. Lastly, neuroticism reflects individual differences on degrees of emotional disturbances. Individuals on the higher end of the neuroticism spectrum reflect characteristics such as high levels of anxiety, depression and unstableness; whereas the lower end of neuroticism represents calmness and emotional stability (Eysenck & Eysenck, 1976; 1985).

Research (e.g., Jackson et al., 2012; Vickers et al., 1996) indicates that MBT has an influence on recruit's personality, as recruits become more aggressive and emotionally stable during this period. These changes may enhance the performance of recruits within hazardous environments. Consequently, in the present study the author expects to observe similar positive changes to manifest within the participating recruits during MBT. Firstly, it is expected that recruits will increase in psychoticism and by implication may become more aggressive (Jackson et al., 2012) and tough-minded (Eysenck & Eysenck, 1976; 1985) at the end of MBT. Tough-mindedness has been identified as an important trait of a successful soldier (Matthews, 2014). It is also expected that recruits will report lower levels of neuroticism at the end of MBT than at the start of training. Lower levels of neuroticism are associated with emotional stability (Eysenck & Eysenck, 1976; 1985) and by implication recruits are expected to become more emotionally stable during MBT. However, in their research, both Vickers et al. (1996) and Jackson et al. (2012) show that extraversion levels did not change during military training. It is therefore expected that extraversion levels will not increase, but remain stable throughout MBT.



*Hypothesis 1: During MBT recruits will increase in psychoticism.*

*Hypothesis 2: Recruits will decrease in neuroticism.*

*Hypothesis 3: MBT will have no significant effect on extraversion.*

### **3.1.2. Punishment and Reward Sensitivity**

A personality theory that might explain individual differences within the military environment is the revised Reinforcement Sensitivity Theory (r-RST; Gray & McNaughton, 2000; McNaughton & Corr, 2004). The r-RST attempts to understand emotion, motivation and personality and their relevance within human behaviour through a biological inspired approach (Corr, 2008). The r-RST (Gray & McNaughton, 2000; McNaughton & Corr, 2004) consists of three neuropsychological systems that motivate behaviour: namely, the behavioural activation system (BAS), the behavioural inhibition system (BIS) and the flight-flight-freeze system (FFFS). The BAS emphasizes reward sensitivity and is initiated by gratifying (rewarding) stimuli and is responsible for all goal-focussed approach behaviours. In contrast to the BAS, the FFFS is initiated by aversive (punishing) stimuli and is responsible for dynamic evasive / escape behaviour and mediates the emotion of fear. The BIS is activated in the presence of goal conflict situations (i.e., approach-approach, approach-avoidance and avoidance-avoidance) and also in addition to passive avoidance behaviours. The FFFS also mediates the emotion of anxiety (Gray & McNaughton, 2000; McNaughton & Corr, 2004).

Research has shown that reward sensitivity is positively related with job satisfaction and involvement in occupational settings (Van der Linden, Taris, Beckers, & Kindt, 2007), as well as high performance levels during military combat training (Perkins, Kemp, & Corr, 2007). Punishment sensitivity on the other hand, has shown a negative influence in recruits' ability to deal with pain (Muris, Meesters, Van den Hout, Wessels, Franken, & Rassin, 2007) and is negatively related with performance during combat simulations (Perkins et al., 2007).

In keeping with these findings, results from Chapter 2 show that recruits who successfully completed military basic training had lower levels of punishment sensitivity at the start of training, as compared to recruits who failed to complete military basic training first time, whereas no significant effect for reward sensitivity was found.

As mentioned earlier, one of the main objectives of MBT is to teach recruits to adapt to the military environment (Barron & Ogle, 2014). In order to accomplish this objective, training instructors may need to make use of contingencies, such as punishment and rewards to modify recruits' behaviour and attitudes. Recruits that align their behaviour and attitudes to conform to military rules and conduct may be rewarded for their actions, which in turn may lead to approach behaviours. In contrast, failure to align behaviour and attitudes to conform to that of the military may result in punishment, thus motivating avoidance or escape behaviours (Gray, 1975; Jackson et al., 2012). The appropriate use of punishment (i.e., punishment that is coupled to a specific transgression) during military training has shown to have a positive effect upon the improvement of recruits' self-esteem and satisfaction (Arthur, Hardy, & Wagstaff, 2010). Further, as long as recruits positively respond to appropriate punishment and reward contingencies, appropriate behaviours will be maintained (Caspi & Roberts, 1999).

However, desensitisation to punishment may occur, especially in circumstances where a continuous use of threats or commands is used to terminate certain behaviours. In this case, punishment becomes less effective (Kazdin, 2013; Phillips, Phillips, Fixsen, & Wolf, 1971). One would expect that the continuous threat of punishment by training instructors for any infraction a recruit may incur during military training would develop higher levels of punishment sensitivity. For example, Bell, Hardy, and Beattie (2013) investigated the effect of a Mental Toughness intervention, where the primary objective was to enhance the players' performance under pressure. The premise of the MT intervention focused around the repeated

exposure to punishment-conditioned stimuli in the training environment. The intervention was delivered in a transformational manner and participants were helped to develop individual coping strategies to deal with transgressions that led to punishment. In comparison with the control group, Bell et al. (2013) reported a significant improvement in coach-rated MT within the intervention group as a result of the punishment-based intervention. Explaining their results, Bell et al. (2013) posited that the repeated exposure to punishment-conditioned stimuli sensitised the cricketers to threats; as a result, players were more able to detect threatening cues in time to develop an appropriate response. Therefore, the continuous presence of threats and effective use of punishment during military basic training may either result in a desensitising effect, thus lowering punishment sensitivity, or it may have a sensitising effect, thus increasing punishment sensitivity.

*Hypothesis 4: The continuous exposure to punishment stimuli during MBT will have a desensitising effect on recruits, resulting in lower levels of punishment sensitivity...or it may have a sensitising effect, thus increasing punishment sensitivity.*

Research shows that rewarding recruits for good behaviour and practices is an effective way to help strengthen individual motivation to support organisational values and to maintain enthusiasm (Pathak, Rani, & Goswami, 2016). However it is expected that *reward sensitivity* levels will remain unchanged during MBT, as BAS (*reward sensitivity*) is presumed to be a stable trait over an individual's life span (Gray, 1991).

*Hypothesis 5: Military basic training will not significantly modify recruits' sensitivity to reward stimuli. Reward sensitivity levels of recruits will remain stable during military basic training.*

### **3.1.3. Mental Toughness**

Military basic training is a stressful phase for new recruits, as training requires recruits to maintain high levels of performance and focus whilst adapting to strict military

standards and value systems. One construct that stands out as an important factor determining whether a recruit will be able to maintain focus and performance during MBT, is MT (e.g., Arthur, Fitzwater, Hardy, Beattie, & Bell, 2015; Chapter 2; Gucciardi, Hanton, Gordon, Mallett, & Temby, 2014). For example, Arthur et al. (2015) developed a 6-item informant rated MT measure (MTMTI; Military Training Mental Toughness Inventory) to assess military personnel's MT behaviour within a military training environment. Arthur et al. (2015), report that high levels of MT predicted successful performance during selection for the British Parachute Regiment. Chapter 2 of this thesis used an 8-item informant rated adaptation of the MTMTI (Arthur et al., 2015). Results revealed that training instructors perceived successful recruits to be more MT at the start of training than recruits who failed to complete military basic training first time (Chapter 2). It can therefore be argued that being rated higher in MT at the start of training enabled recruits to effectively deal with stressors during military basic training.

In summary, being MT at the start of military basic training may prove to be beneficial to the military recruit as it will assist the recruit to effectively deal with stressors during training. MT has also proved to be related to high levels of performance over a prolonged period of time. However, very little is known about the effect of MBT on the development of MT behaviours. One noteworthy study on MT development was that of Bell et al. (2013), who showed a significant improvement in elite young cricketers' MT as a consequence of the transformational delivery of a punishment-based intervention. Further, the implementation of punishment strategies that is coupled to a specific misdemeanour during military training has shown to have a positive effect upon the improvement of recruits' self-esteem and satisfaction (Arthur et al., 2010). In other words, as long as external contingencies of punishment and rewards are in place and individuals keep responding to these

contingencies, appropriate behaviours are maintained (Caspi & Roberts, 1999). One can therefore argue that MBT could be an ideal environment for recruits to develop MT.

*Hypothesis 6: MBT will have a positive effect on MT behaviour of recruits. It is hypothesised that recruits who successfully complete military basic training will show a significant increase in MT across time.*

### **3.1.4. Effortful Control**

During MBT, recruits may find it difficult to remain focused and exert mental control when under stress (e.g., due to sleep deprivation) or when emotions are running high (e.g., anger, anxiety and fear). In situations where performance is critical, recruits may require more effortful-control skills to remain focused under pressure to avoid any detriment to performance. Effortful control is a broad temperament construct based on the executive attention system that reflects self-regulatory capacity, with the ability to suppress a dominant response in order to perform a less dominant action, i.e. to detect errors and engage in planning (Rothbart & Bates, 2006; Rothbart, Derryberry, & Posner, 1994; Rothbart, Ellis, & Posner, 2011; Rothbart & Rueda, 2005). Effortful control is underpinned by activation control (i.e., ability to execute an action when there is a propensity to avoid it), effortful attention control (i.e., ability to shift attention when required to do so) and inhibitory control (i.e., ability to inhibit inappropriate behaviour) that can be used to manage emotions and behaviours (Evans & Rothbart, 2007). Effortful control is not entirely about limiting approach behaviour; it can also be used to override the tendency towards inaction (Carver, Johnson, & Joorman, 2008).

Effortful control has been developed to study temperament in children and adolescents and as a result not a lot of research is available on the development of effortful control in adults. In terms of early development, effortful control has proved to be longitudinally stable (Kochanska, Murray, & Coy, 1997). In the present study, it is expected

that recruits will develop higher self-regulation capacities in effortful scales, as new recruits will need to adopt new behaviours in order to adapt successfully into the military.

*Hypothesis 7: Recruits will develop higher effortful control levels during military basic training.*

### **3.1.5. Core Values**

Core values can be described as a set of essential and guiding principles of an organization that hold intrinsic value and importance to those who are part of the organization (Collins & Porras, 1996). According to the organismic integration theory (Deci & Ryan, 1985), the extent to which a recruit feels support for relatedness, competence and autonomy will determine the motivation to commit and internalise. All three psychological needs have to be met for intrinsic motivation to be enhanced, should these three psychological needs not be met, intrinsic motivation will be undermined (Ryan & Deci, 2007). Self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) posits three broad classes of motivation: amotivation, extrinsic motivation (i.e., integrated regulation, identified regulation, introjected regulation and external regulation) and intrinsic motivation. Amotivation refers to the lack of motivation to participate in an activity. Extrinsic motivation refers to behaviour motivated by expected outcomes and contingencies not inherent to the activity and intrinsic motivation refers to behaviour motivated to actively engage in new activities with the absence of external rewards (Ryan & Deci, 2007).

Soldiers typically possess two sets of values, i.e., military values and personal values that are essentially not much different from each other (Pathak et al., 2016). An imbalance between the two sets of values can result in job dissatisfaction, which in turn may result in lower effortful investment. Therefore, it is important to align both military and personal values of the soldier from the time of selection (Pathak et al., 2016). Once military ethics (i.e., values, moral principles and behavioural standards) are internalised, it functions as a

means of motivation and self-control (Jennings & Hannah, 2011). According to Pathak et al. (2016) a task well executed, backed by values, is superior to a task executed by just following orders. Measuring British Army recruits' levels of internalisation of core values during training, Arthur et al. (2010) reported that training had a positive impact on the internalisation of values. Their results revealed that transactional leader behaviours (i.e., active punishment, contingent reward) as well as valued based leader behaviours (i.e., fostering acceptance of group goals, appropriate role modelling inspiration motivation) were important in predicting the internalisation of core values.

Using the findings of Arthur et al. (2010) as a starting point, we predict that recruits will develop and start to identify the self with the military core values during training and as a consequence will report higher internalisation levels of core values. To be more specific, it is expected that recruits will develop higher levels of introjected regulation as continued training and practicing of skills and target behaviours will create a feeling of competence in recruits. Recruits will also feel more related to one another at the end of training, as they would have experienced hardship together. As a consequence of higher introjected regulation, it is expected that a decrease in external regulation levels during MBT will be observed. Furthermore, it is not expected to see an increase in integrated regulation, as recruits will not have full autonomy over their actions and behaviour, since they will still have to abide by military rules and behave in accordance with military conduct.

*Hypothesis 8: Recruits will start to act in a manner consistent with the values of the British Army at the end of MBT. Therefore, recruits will have significantly higher introjected regulation levels at the end of MBT. It is also hypothesised that external regulation levels will significantly decrease during MBT.*

## 3.2. Method

### 3.2.1. Participants

Participants consisted of 271 male infantry recruits ( $M_{age} = 20.72$  years,  $SD = 3.05$ ) that started the Combat Infantryman's Course (CIC) at the Infantry Training Centre, Catterick. Of the 271 recruits that consented to participate in the study, a total of 84 recruits were unable to complete the CIC first time and as a consequence were removed entirely from the sample. Data from four recruits were also removed as they provided incorrect identifiers during completion of the surveys and as a result their progress throughout training could not be monitored. In addition, data from 30 recruits were omitted for deviant responding or having submitted incomplete data sets. Finally, examination of construct measure scores resulted in the removal of 21 outlier cases that showed to have extreme but within-range scores, thus the final sample size for the present study was 132 male Infantry recruits ( $M_{age} = 20.99$  years,  $SD = 3.10$ ) that passed basic military training first time. The CIC is presented over 26 weeks during which basics of Infantry soldiering are taught to recruits. The CIC involves rigorous training in order to equip recruits with the necessary knowledge and skills that will be required to achieve high levels of performance in military tasks and combat operations within a variety of environments.

### 3.2.2. Measures

**Personality:** Recruits' personality dimensions were measured using the Eysenck Personality Questionnaire – Revised Short version (EPQ-RS; Eysenck et al., 1985). The EPQ-RS is a 48 item self-report measure assessing the personality dimensions of; psychoticism (12 items), extraversion (12 items) and neuroticism (12 items). In particular, the psychoticism (P) scale draws on facets such as lower anti-social behaviours, empathy, hostility and cruelty (e.g., Item 35 “*Do you try not to be rude to people?*”). The extraversion (E) scale draws on facets such as sociability and dominance (e.g., Item 11 “*Do you enjoy*



*meeting new people?*”), whereas the neuroticism (N) scale draws on facets such as depression, anxiousness and moodiness (e.g., Item 21 “*Would you call yourself a nervous person?*”). In addition to the personality dimensions, the EPQ-RS also contains a lie (L) scale (12 items) that measures social desirability responses (e.g., Item 29 “*Have you ever said anything bad or nasty about anyone?*”). Each item has a dichotomous response that can be answered ‘yes’ or ‘no’ and was scored 1 or 0 respectively. Each scale has a minimum possible score of zero or a possible maximum score of 12. Eysenck et al. (1985) reported acceptable Cronbach’s  $\alpha$  reliability coefficient for each of the scales contained in the EPQ-RS measure for males and females respectively (P:  $\alpha = .62$  and  $0.61$ ; E:  $\alpha = .88$  and  $0.84$ ; N:  $\alpha = .84$  and  $0.80$ ).

***Punishment and Reward Sensitivity:*** Recruits’ Punishment and Reward Sensitivity was measured using Corr’s (2001) transformation of the psychoticism (P), extraversion (E) and neuroticism (N) scales coming from the EPQ-RS (Eysenck et al., 1985). Corr’s (2001) transformations of the EPQ-RS personality scales included: reward sensitivity =  $((E \times 2) + N + P)$  and punishment sensitivity =  $((12 - E) + (N \times 2) - P)$ . Reward sensitivity scores range from 0 to 48, where punishment sensitivity scores range from -12 to 36.

***Mental Toughness:*** Mental Toughness of recruits was measured by the informant-rated 8-item Military Training Mental Toughness Inventory (MTMTI) which is an extension of the 6-item MTMTI (Arthur et al., 2015) with two additional items. The two additional items added were from the original MTMTI developed by Arthur et al. (2015). The 8-item MTMTI contains items which focus on military personnel’s performance under pressure in difficult situations. The section commanders were asked to evaluate how well each recruit under his command was able to maintain a high level of performance when faced with demanding situations during training (e.g., Item 7 “*when he is suffering from fatigue*”). The responses were scored on a 7-point Likert scale, anchored by 1 (*never*) to 7 (*always*). In order

for the Section Commanders to evaluate each recruit's MT accurately at the start of training, the recruit had to spend a minimum of 4 weeks under the section commander's command.

The structural integrity of the modified measure was confirmed in Chapter 2.

***Effortful Control:*** Effortful control was measured using the effortful control factor scale from the Adult Temperament Questionnaire – Short Form (ATQ-S; Evans & Rothbart, 2007). The Effortful control factor is a broad temperament construct based on the executive attention system (Rothbart & Rueda, 2005) and includes 3 sub-scales: (a) activation control (7 items); (b) attentional control (5 items); and (c) inhibitory control (7 items). The activation control scale measures the ability to act when there is a strong tendency to avoid the action (e.g., Item 7 “*I can keep performing a task even when I would rather not do it*”), the attentional control scale measures the ability to focus or shift attention when necessary (e.g., Item 2 “*It's often hard for me to alternate between two different tasks*”), and the inhibitory control scale measures the ability to inhibit inappropriate behaviour (e.g., Item 18 “*It is easy for me to inhibit fun behaviour that would be inappropriate*”). Each item was scored on a 7-point Likert scale anchored by 1 (*extremely untrue of you*) to 7 (*extremely true of you*).

Cronbach's  $\alpha$  reliability coefficients reported by Evans and Rothbart (2007) for the 19 item Effortful Control factor is .78, where reliability for the sub-scales was reported as: activation control scale:  $\alpha = .69$ ; attentional control scale:  $\alpha = .73$ ; and inhibitory control scale:  $\alpha = .60$ .

***Internalisation of Core Values:*** The recruits' level of internalisation of the Army's Core Values was assessed by administering the General Core Value (GCV) scale coming from the Core Values Scale (Hardy & Arthur, 2010). The GCV contains 15 items that measures the degree to which recruits have internalised the core values of the British Army. The GCV measures 3 levels of internalisation: (a) external regulation (5 items); (b) introjected regulation (5 items); and (c) integrated regulation (5 items). External regulation is where the motivation to internalise the core values is dependent on external rewards and

punishments (e.g., Item 7 “*I have to show the core values because if I don’t people will think I’m not a good soldier*”). Introjected regulation refers to motivation where the recruit governs himself with internalised contingencies of reward and punishment (e.g., Item 8 “*I should try to show the core values because I would feel dishonourable if I didn’t*”). Integrated regulation is where motivation and behaviours become imbedded within the personality and becomes autonomous (e.g., Item 3 “*The core values are an essential part of being a good soldier*”). Each item was scored on a 7-point Likert scale, anchored by 1 (*not at all true*) to 7 (*very true*). Hardy and Arthur (2010) reported good internal Cronbach’s  $\alpha$  reliability coefficients for the three scales: External regulation ( $\alpha = .79$ ); Introjected regulation ( $\alpha = 0.87$ ); and Integrated regulation ( $\alpha = 0.84$ ).

### **3.2.3. Procedure**

After obtaining University ethical approval, British Infantry instructors and recruits starting week 1 of the CIC were approached to participate in the study. Both recruits and instructors were briefed on the purpose of the study, as well as on the measures that would be administered throughout the research. Instructors and recruits were assured about the confidentiality of data and that their responses will only be used for research purposes and will have no effect on their military career. It was emphasised that their responses would not be discussed with training staff and that no military personnel would see the completed questionnaires. It was also made clear that no individual recruit or training personnel would be identifiable in the final report. Both recruits and instructors were informed that the research is voluntary and that they did not have to participate and could withdraw at any time. Informed consent was obtained from recruits and instructors before the start of the study.

Self-report data from recruits as well as informant-rated MT data from the instructors were collected at three time points during CIC training. Self-report measurements consisted of the EPQ-RS (Eysenck et al., 1985), Effortful Control scale (Evans & Rothbart, 2007) and

the GCV scale (Hardy & Arthur, 2010). Baseline measurement for the self-report data was collected on the Thursday in week 1 (T1) of CIC training, thereafter the self-report measures were administered to recruits during weeks 8 (T2) and 26 (T3) respectively. Baseline measurement for the informant-rated MT data was collected from the instructors at week 4 (T1) of training. Week 4 was felt to be the earliest time point to collect informant rated MT data, as this would have given instructors an opportunity to observe and get to know the recruits for at least four weeks during training. Subsequent informant-rated MT data were collected from the instructors during weeks 8 (T2) and 26 (T3) of the CIC respectively.

### **3.2.4. Data Analysis**

The effect of MBT on the psychological parameters tested within the present study was explored by conducting repeated-measures multivariate analysis of variance (MANOVA) test, using SPSS software (Version 22; IBM Corp. 2013). The repeated measures MANOVA was chosen above the traditional repeated measures analysis of variance (ANOVA), as the MANOVA approach is more robust and free of sphericity assumptions (O'Brien & Kaiser, 1985). Dependent variables were: EPQ-RS personality scales, punishment sensitivity, reward sensitivity, MT, effortful control subscales and general core values scales. The *a priori* level of significance was set at .05. A significant repeated measures MANOVA was followed up by separate univariate ANOVAs. Pair-wise comparisons with Bonferroni corrections were applied as a follow-up test to determine if the mean changes were significant.

## **3.3. Results**

### **3.3.1. Descriptive Statistics**

Pearson correlation was performed to determine the relationship between measured psychological variables. Descriptive statistics and correlations for all measured psychological variables at baseline measurement at week 1 are displayed in Table 3.1. Descriptive statistics

**Table 3.1**

Means, Standard Deviations and Intercorrelations of Psychological Parameters at Time-Point 1

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1 Mental Toughness	4.21	.92	-										
2 Psychoticism	2.61	1.75	-.054	-									
3 Extraversion	10.15	2.47	.051	-.04	-								
4 Neuroticism	4.37	2.89	-.071	.17	-.38**	-							
5 Reward Sensitivity	27.29	5.12	-.009	.40**	.74**	.26**	-						
6 Punishment Sensitivity	7.99	7.05	-.063	-.10	-.65**	.91**	-.15	-					
7 GCV External Regulation	5.49	1.08	-.025	-.07	.05	.01	.03	.01	-				
8 GCV Introjection	4.86	1.42	.109	-.11	-.03	.15	.02	.16	.71**	-			
9 GCV Integration	6.27	.72	.176*	-.19*	.07	.07	.04	.08	.46**	.64**	-		
10 Eff Cntl Activation	5.10	.84	.103	-.20*	.10*	-.45**	-.13	-.39**	.11	.04	.05	-	
11 Eff Cntl Attention	4.51	1.09	-.010	-.09	.12	-.46**	-.18*	-.40**	-.02	-.11	.02	.53**	-
12 Eff Cntl Inhibition	4.09	.79	-.068	-.09	-.11	-.28**	-.29**	-.17	-.07	-.05	.05	.41**	.41**

Note. \*\* $p < .01$ , \* $p < .05$ ; GCV = General Core Value, Eff. Cntl. = Effortful Control.

N = 132

and correlations for the psychological variables at time-points 2 and 3 are displayed in Appendix B and Appendix C respectively.

### 3.3.2. The effect of basic military training on measured psychological parameters

Results from the repeated measures MANOVA test indicated that there was a significant effect of MBT on the psychological attributes tested, Pillai's trace  $V = .406$ ,  $F(20, 112) = 3.82$ ,  $p < .01$ ,  $\eta^2 = .406$ . Follow-up univariate ANOVAs indicated that there was a significant effect of MBT on: psychoticism,  $F(2, 262) = 9.26$ ,  $p < .01$ ,  $\eta^2 = .06$ ; neuroticism,  $F(2, 262) = 8.78$ ,  $p < .01$ ,  $\eta^2 = .06$ ; extraversion,  $F(2, 262) = 9.06$ ,  $p < .01$ ,  $\eta^2 = .06$ ; punishment sensitivity,  $F(2, 262) = 14.633$ ,  $p < .01$ ,  $\eta^2 = .10$ ; reward sensitivity,  $F(2, 262) = 3.25$ ,  $p < .05$ ,  $\eta^2 = .02$ ; and external regulation,  $F(2, 262) = 3.59$ ,  $p < .05$ ,  $\eta^2 = .02$ .

**Hypothesis 1:** Only partial support was found for hypothesis 1, predicting that psychoticism levels will increase during MBT,  $F(2, 262) = 9.26$ ,  $p < .01$ ,  $\eta^2 = .06$ . Findings from a post-hoc pairwise comparison analysis indicated that recruits' psychoticism scores significantly increased between time-point 1 ( $M = 2.61$ ,  $SD = 1.75$ ) and time-point 2 ( $M = 3.26$ ,  $SD = 1.37$ ),  $CI_{.95} = -.997$  (lower)  $-.307$  (upper),  $p < .01$ . Further, a significant decrease in psychoticism scores was noted between time-point 2 ( $M = 3.26$ ,  $SD = 1.37$ ) and time-point 3 ( $M = 2.88$ ,  $SD = 1.78$ ),  $CI_{.95} = .016$  (lower)  $.742$  (upper),  $p < .05$ . Compared to baseline measurement scores collected at time-point 1, recruits' psychoticism scores were higher at the end of basic military training at time-point 3. However, the score difference between baseline measurement and the end of MBT was not statistically significant,  $CI_{.95} = -.669$  (lower)  $.124$  (upper),  $p = .293$ . The findings indicate that psychoticism scores fluctuated during MBT, as it significantly increased during time-points 1 and 2 (i.e., predominantly barracks-based training), but significantly decreased during time-points 2 and 3 (predominantly field-based training).

**Hypothesis 2:** Consistent with the hypothesis predicting that neuroticism will decrease significantly during MBT, results showed that neuroticism scores significantly changed during MBT,  $F(2, 262) = 8.78, p < .01, \eta^2 = .06$ . In a post-hoc pairwise comparison analysis, recruits' neuroticism scores significantly decreased between time point 1 ( $M = 4.37, SD = 2.89$ ) and time point 3 ( $M = 3.44, SD = 2.75$ ),  $CI_{.95} = .335$  (lower) 1.52 (upper),  $p < .01$ . Further, neuroticism scores significantly decreased between time-point 1 ( $M = 4.37, SD = 2.89$ ) and time-point 2 ( $M = 3.83, SD = 3.01$ ),  $CI_{.95} = .085$  (lower) 1.006 (upper),  $p < .05$ , but not between time-points 2 and 3  $CI_{.95} = -.17$  (lower) .94 (upper),  $p = .28$ . The present finding is consistent with those of Vickers et al. (1996), who illustrated that neuroticism decreases during MBT. The present result suggests that recruits become more emotionally stable during training.

**Hypothesis 3:** Contrary to the prediction that extraversion will remain stable during MBT, results revealed that recruits became significantly more extraverted during training,  $F(2, 262) = 9.06, p < .01, \eta^2 = .06$ . In a post-hoc pairwise comparison analysis, recruits' extraversion scores significantly increased between time-point 1 ( $M = 10.15, SD = 2.47$ ) and time-point 3 ( $M = 10.87, SD = 1.77$ ),  $CI_{.95} = -1.199$  (lower)  $-.241$  (upper),  $p < .01$ , indicating that recruits became more extraverted during basic military training. Further review indicated that extraversion significantly increased between time-point 1 ( $M = 10.15, SD = 2.47$ ) and time-point 2 ( $M = 10.49, SD = 2.09$ ),  $CI_{.95} = -.673$  (lower)  $-.009$  (upper),  $p < .05$ . The score increase noted between time-point 2 and time-point 3 was non-significant  $CI_{.95} = -.785$  (lower)  $.027$  (upper),  $p = .76$ .

**Hypothesis 4:** Results in the present study indicate that punishment sensitivity decreased during MBT,  $F(2, 262) = 14.633, p < .01, \eta^2 = .10$ . Bonferroni follow-up test indicated that, when compared to time-point 1 ( $M = 7.99, SD = 7.05$ ), recruits were significantly lower on punishment sensitivity at time-point 3 ( $M = 5.13, SD = 6.47$ ),  $CI_{.95} =$

1.39 (lower) 4.31 (upper),  $p < .01$ . Inspection of the data showed that punishment sensitivity significantly decreased between time-point 1 ( $M = 7.99$ ,  $SD = 7.05$ ) and time-point 2 ( $M = 5.90$ ,  $SD = 7.24$ ),  $CI_{.95} = 1.005$  (lower) 3.161 (upper),  $p < .01$ . However, the decrease in punishment sensitivity scores between time-point 2 and time-point 3 was non-significant,  $CI_{.95} = -.632$  (lower) 2.17 (upper),  $p = .55$ .

**Hypothesis 5:** Contrary to our prediction, results revealed that recruits' reward sensitivity levels significantly increased during MBT. Recruits' sensitivity towards rewards significantly changed during training,  $F(2, 262) = 3.25$ ,  $p < .05$ ,  $\eta^2 = .02$ . However, post-hoc pairwise comparison analysis indicated no significant change between different assessment points. Closer inspection of the data revealed that the largest increase in reward sensitivity occurred between time-point 1 ( $M = 27.29$ ,  $SD = 5.12$ ) and time-point 2 ( $M = 28.08$ ,  $SD = 4.31$ ),  $CI_{.95} = -1.60$  (lower) .029 (upper),  $p = .063$ . Reward sensitivity stayed unchanged between time-point 2 ( $M = 28.08$ ,  $SD = 4.31$ ) and time-point 3 ( $M = 28.07$ ,  $SD = 4.28$ ),  $CI_{.95} = -.773$  (lower) .788 (upper),  $p = 1.00$ . The difference between reward sensitivity levels at time-point 1 and time-point 3 was non-significant,  $CI_{.95} = -1.75$  (lower) .191 (upper),  $p = .161$ .

**Hypothesis 6:** Contrary to expectations, findings in the present study show no support for the hypothesis predicting that recruits will become more MT during training,  $F(2, 262) = .964$ ,  $p = .368$ ,  $\eta^2 = .06$ , suggesting that section commanders did not perceive recruits to become more MT between time-points 1 and 3. Inspection of the data indicated a non-significant decrease in MT levels between time-point 1 ( $M = 4.21$ ,  $SD = .926$ ) and time-point 2 ( $M = 4.11$ ,  $SD = .99$ ),  $CI_{.95} = -.324$  (lower) .304 (upper),  $p < .551$ . In contrast, a non-significant increase in MT back to baseline measurement levels was observed between time-points 2 ( $M = 4.11$ ,  $SD = .99$ ) and 3 ( $M = 4.24$ ,  $SD = 1.27$ ),  $CI_{.95} = -.372$  (lower) .105 (upper),  $p < .528$ .



**Hypothesis 7:** Results reveal no support for the hypothesis predicting that recruits will develop higher self-regulating capacity of effortful control strategies. All three effortful control scales did increase during MBT in the predicted direction; however, these changes were non-significant for activation control,  $F(2, 262) = 2.17, p = .119, \eta^2 = .01$ ; attentional control,  $F(2, 262) = 1.55, p = .215, \eta^2 = .01$ ; and inhibition control,  $F(2, 262) = .211, p = .805, \eta^2 = .00$ . Effortful activation mean-levels demonstrated the highest increase during MBT, whereas inhibition control mean-levels demonstrated the lowest increase during MBT. Findings showed that at the end of MBT, activation control levels ( $M = 5.22, SD = .808$ ) were the highest of the effortful control scales, followed by attention control ( $M = 4.51, SD = 1.09$ ), and inhibition control ( $M = 4.12, SD = .786$ ).

**Hypothesis 8:** Results in the present study revealed only partial support for the hypothesis predicting that introjected regulation will significantly increase, whereas external regulation will decrease during MBT. Introjected regulation did not change significantly from time-point 1 ( $M = 4.86, SD = 1.42$ ) to time-point 3 ( $M = 4.90, SD = 1.44$ ),  $F(2, 262) = 2.01, p = .136, \eta^2 = .01$ . External regulation levels significantly decreased during MBT,  $F(2, 262) = 3.59, p < .05, \eta^2 = .02$ . Post-hoc pairwise comparison analysis however revealed no significant changes between different assessment points for external regulation. Closer inspection of the data revealed that the largest decrease in external regulation occurred between time-point 2 ( $M = 5.45, SD = .086$ ) and time-point 3 ( $M = 5.25, SD = .105$ ),  $CI_{.95} = -.013$  (lower) .419 (upper),  $p = .072$ . Whereas, external regulation stayed stable between time-point 1 ( $M = 5.49, SD = .094$ ) and time-point 2 ( $M = 5.45, SD = .086$ ),  $CI_{.95} = -.184$  (lower) .266(upper),  $p = 1.00$ . The difference between motivation for external regulation levels at time-point 1 and time-point 3 was non-significant,  $CI_{.95} = -.022$  (lower) .510 (upper),  $p = .161$ .

### 3.3.3. Supplementary Analyses

Results from Chapter 2 revealed that MT proved to be a key variable in discriminating between recruits who passed basic military training first time and recruits who failed to pass basic military training first time. The non-significant finding in the present study was unexpected. A series of supplementary analyses were therefore performed in an effort to explain the non-significant finding for MT observed within the present study.

#### *Exploring potential confounding personality differences on Mental Toughness:*

The data were further explored for any potential confounding personality differences that would predict whether recruits would improve or decrease in MT during MBT. To explore for any confounding personality differences, the MT data was split into two groups: the 50 recruits who showed the highest increase on MT scores during MBT and the 50 recruits with the most noteworthy decreasing scores in MT during MBT were selected for data analysis. Thereafter, the dataset was further reduced to the 30 recruits who have shown the highest increase on MT scores during training and the 30 recruits with the most noteworthy decreasing scores in MT during MBT. The dataset was reduced in an effort to remove any unexplained variation within the sample and as a result obtain clearer results. See Appendix D for a complete set of results of analyses performed for both the 50 split and 30 split groups within the present study.

Repeated measures ANOVA results obtained from the 50 split group indicated that recruits within the MT increase group significantly increased in MT during MBT,  $F(2, 98) = 78.95, p < .01$  and that recruits within the MT decrease group significantly decreased in MT during MBT,  $F(2, 48) = 81.85, p < .01$ . Interestingly, findings from an independent samples t-test revealed that recruits within the MT decrease group were perceived to be significantly more mentally tough than recruits within the MT increase group at time-point 1,  $t(98) = -4.02, p < .01, r = .38$ . However, at time-point 2,  $t(98) = 2.10, p < .05, r = .21$  and time-point

3,  $t(98) = 12.96, p < .01, r = .79$ , findings revealed that recruits within the MT increase group were significantly higher on MT than recruits within the MT decrease group. Furthermore, results from a repeated measures MANOVA showed that recruits within the MT increase group became significantly more extraverted,  $F(1.78, 87.41) = 7.05, p < .01$ , but significantly less sensitive to punishment,  $F(2, 98) = 8.44, p < .01, \omega^2 = .14$  during MBT (Time 1 to Time 3). In contrast, no significant changes on any of the personality attributes during MBT (Time 1 to Time 3) were reported for recruits within the MT decrease group.

Results from the 30 split group indicated that recruits within the MT increase group significantly increased in MT,  $F(1.74, 50.54) = 102.40, p < .01$  during MBT and that recruits within MT decrease group significantly decreased,  $F(2, 58) = 112.26, p < .01$  in MT during MBT. Similarly to the results obtained from the 50 split group, findings from an independent samples t-test showed that recruits within the MT decrease group were perceived to be significantly more mentally tough than recruits within MT increase group at time-point 1,  $t(58) = -5.450, p < .01, r = .58$ . No significant difference was noted between the two groups on MT at time-point 2,  $t(58) = 1.19, p = .23, r = .154$ . However, recruits within the MT increase group were perceived to be significantly higher on MT,  $t(58) = 12.03, p < .01, r = .84$ , than recruits within the MT decrease group at time-point 3. Results from a repeated measures MANOVA test show that recruits within the MT increase group became significantly higher in psychoticism,  $F(2, 58) = 7.36, p < .01, \omega^2 = .20$ , but significantly lower on neuroticism,  $F(2, 58) = 4.63, p < .05, \omega^2 = .13$  and punishment sensitivity,  $F(1.66, 48.35) = 11.54, p < .01, \omega^2 = .28$  during MBT (Time 1 to Time 3). In contrast, no significant changes on any of the personality attributes during MBT (Time 1 to Time 3) were reported for the recruits within the MT decrease group.

***Exploring Mental Toughness group differences on different personality variables:***

Multiple analysis of variance (MANOVA) analysis was performed to determine whether

there were any significant differences between the MT increase group and the MT decrease group with regard to personality variables at the different data collection time points during training. See Appendix E for the complete set of results of analyses performed for both the 50 split and 30 split groups within the present study.

Results obtained from the 50 split group indicated no significant differences between the MT increase group and the MT decrease group with regard to personality variables at the different data collection time points during training.

In addition, results obtained from the 30 split group indicated no significant differences between the MT increase group and the MT decrease group with regard to personality variables at the different data collection time points during training.

#### ***Pattern Recognition Analysis:***

Pattern recognition analysis was performed in order to identify important psychological attributes in the data that would enable differentiation between recruits who increased in MT during basic military training and recruits who decreased in MT during basic military training. For detailed analyses and results, please see relevant section in Appendix F.

Waikato Environment for Knowledge Analysis (Weka; Hall, Frank, Holmes, Pfahringer, Reutemann, & Witter, 2009) was used in order to extrapolate these differentiating variables from the data. Weka is a machine learning workbench that uses algorithms and data pre-processing tools for predictive modelling and data analysis (Witten, Frank, & Hall, 2011).

Pattern recognition results from the 50 split group indicated that the reduced  $k$ -nearest neighbour (Lazy: IB6) classification algorithm was able to classify recruits who will increase in MT more accurately than classifying recruits who will decrease in MT. The reduced subset revealed that 7 features, i.e. psychoticism, extraversion, neuroticism, integration of core values, activation control, attention control and inhibition control differentiated between the two groups and had an accuracy success rate of 63%. There appears to be no definitive

criterion in pattern recognition as to which percentage constitutes a good or bad model classification accuracy percentage. Instead, it is suggested that the classification accuracy percentage depends on the application domain. Therefore, within the military environment where one tries to establish which recruits will increase in MT and as a result perform better, a success rate of 63% appears to be low.

Pattern recognition results from the 30 split group indicated that the reduced  $k$ -nearest neighbour (Lazy: IB2) classification algorithm was able to classify recruits who will increase in MT more accurately than classifying recruits who will decrease in MT. The reduced subset revealed that 5 features, i.e., psychoticism, extraversion, neuroticism, punishment sensitivity and externalisation of core values displayed an accuracy prediction rate of 67%. The results revealed that the  $k$ -nearest neighbour (Lazy: IB2) algorithm was able to classify recruits who will increase in MT more accurately, than classifying recruits who will decrease in MT during training. The accuracy percentage of 67% is viewed as satisfactory in accurately differentiating between which recruits will increase the most in MT during MBT and which recruits will become less mentally tough during MBT.

### **3.4. Discussion**

The purpose of the present study was to examine the effect of MBT on psychological attributes of British Infantry recruits within an ecological valid setting. In particular, the study examined the effect MBT has on psychological attributes identified in Chapter 2, that differentiated between recruits who completed MBT first time and recruits who failed to complete MBT first time. The present study produced mixed results. Specifically, only partial support was found for the hypothesis predicting that psychoticism levels will increase during MBT. Findings in the present study indicate that psychoticism levels significantly increased during barracks-based training (i.e., weeks 1-8), but significantly decreased during field-based training (i.e., weeks 9-26). The observed increase in psychoticism from baseline

measurement to the end of MBT was not significant. As predicted, results indicated that neuroticism significantly decreased during MBT, suggesting that recruits become more emotionally stable. Contrary to our prediction that extraversion scores will remain stable throughout training, results revealed that extraversion levels significantly increased during MBT. Further, results in the present study showed that reward sensitivity significantly increased, but the post-hoc test revealed no significant changes between the different data collection points during MBT. Findings showed no support for the hypothesis that recruits will develop higher self-regulating capacity of effortful control strategies during MBT. All three effortful control scales did increase during MBT in the predicted direction; however, these changes were non-significant. Only partial support was obtained for the prediction that introjection regulation levels will significantly increase, whereas external regulation levels will decrease during MBT. Findings indicated that introjected regulation levels did not significantly increase during training; whereas external regulation levels significantly decreased during MBT. The most unexpected finding was the non-significant increase in MT levels during MBT. However, results indicated that some recruits showed an increase in MT during training, therefore a series of supplementary analyses were performed in an effort to explain the non-significant finding for MT within the present study.

The data was further explored for any potential confounding personality variables that would predict whether recruits increased or decreased in MT during basic military training. Results from the MT 50 split group during MBT, indicated that the increase group became significantly more extraverted and significantly less sensitive to punishment during MBT. In addition, results obtained from the MT 30 split group during MBT, indicated that recruits in the increasing group became significantly higher in psychoticism and extraversion and significantly less sensitive to punishment during MBT. Findings have shown that there were no significant differences between MT increase and MT decrease groups with regard to

personality variables at the different data collection time points. Additional pattern recognition analyses were performed in order to identify important psychological attributes in the data that would enable differentiation between recruits who increased in MT during basic military training and recruits who decreased in MT during basic military training. For the MT 50 split group, results revealed 7 features (i.e., psychoticism, extraversion, neuroticism, integration of core values, activation control, attention control and inhibition control) that were able to differentiate between the MT increase and MT decrease groups with an accuracy success rate of 63%. For the MT 30 split group, results indicated that 5 features (i.e., psychoticism, extraversion, neuroticism, punishment sensitivity and externalisation of core values) were able to differentiate between the two groups with an accuracy success rate of 67%. Results indicated that both classification models within the present study were able to classify recruits who will increase in MT more accurately than classifying recruits who will decrease in MT.

With relation to personality results, the present study revealed only partial support for the hypothesis predicting that psychoticism will increase during training. Results revealed that psychoticism levels did increase between time-points 1 and 3. However, the observed increase was non-significant and non-linear, since psychoticism significantly increased between data collection time-points 1 and 2 (i.e., predominantly barracks-based training), but there was also a significant decrease between time-points 2 and 3 (i.e., predominantly field-based training). The non-linear changes of psychoticism during MBT may be attributed to the recruits' response to environmental changes (civilian vs. military; barracks-based training vs. field-based training). Specht et al. (2014) noted that personality traits can fluctuate when confronted with major life experiences; however, these changes may return towards baseline measurements in the long run, or may be altered permanently in instances of far-reaching life experiences. Albeit non-significant, the raised level in psychoticism suggests that recruits did

become more tough minded and aggressive during early training. Higher levels of tough mindedness and aggression may prove to be beneficial for recruits within the military environment. For example, tough-minded individuals are perceived to be self-reliant, responsible, independent and realistic (Cattell, 1957), whereas aggression has been described as the “... hallmark of the warrior hero model of military masculinity” (Woodward, 2000, p. 651). In addition, raised levels of psychoticism are also associated with reduced anxiety and punishment sensitivity (Heym & Lawrence, 2010). Together with physical and moral courage, loyalty and high character, being tough-minded has been identified as an important attribute of a successful soldier (Matthews, 2014).

As expected, the results provided support for our hypothesis predicting that neuroticism would decrease during MBT. These results replicate the findings of Vickers et al. (1996), where neuroticism decreased significantly for naval recruits during MBT. The decrease in neuroticism during MBT suggests that recruits became more emotionally stable, ruminated less about negative events and became less anxious during MBT (Carver, & Connor-Smith, 2010; Perkins & Corr, 2014). This finding suggests that MBT alters the personality profiles of recruits in a positive manner.

Contrary to our prediction, extraversion levels increased during MBT. This result opposes previous findings (i.e., Jackson et al., 2012; Vickers et al., 1996) where extraversion levels remained stable during military training. Rachman (1978) suggested that extroverts are less fearful, since they are relatively insensitive to the threat of punishment and to punishment itself.

There is also the view that high levels of extraversion reflects a tendency to perceive stressful events as challenges rather than threats (Carver & Connor-Smith, 2010). According to the biopsychosocial (BPS) model of challenge and threat (Blascovich & Mendes, 2000), an individual's perception of relevant demands and resources present in a motivated



performance situation will determine whether the individual will perceive the task as a threat or a challenge. Demand consists of elements such as required effort, danger and uncertainty; where resources consist of elements such as certain dispositions (e.g., beliefs, self-esteem), abilities, skill, knowledge and external support (Blascovich & Mendes, 2000). For an individual to perceive a situation as a threat, the demands need to exceed the resources, where a challenge will occur when the available resources meet or exceed the demands (Blascovich & Mendes, 2000). Whether one perceives task demands as a challenge or a threat may determine performance outcome (e.g., Blascovich, Seery, Mugridge, Norris, & Weisbuch 2004).

Results revealed that punishment sensitivity levels significantly decreased during MBT. A possible explanation for our finding is that recruits experienced de-sensitization of fears and punishment stimuli during MBT. Repetitive exposure to fear and punishment stimuli can result in habituation or de-sensitization (Rachman, 1978). The occurrence of these effects can be expected within a training environment, as training instructors use explicit reward and punishment contingencies during MBT to produce desired behaviours within recruits, thereby motivating them to act in accordance to military values and discipline. However, the continuous uses of threats or commands to either terminate or adjust behaviours result in these threats to become less effective (Phillips et al., 1971). Seeing that punishment sensitivity is underpinned by both the BIS and FFFS systems (Gray & McNaughton, 2000; McNaughton & Corr, 2004), the lower levels of punishment sensitivity recorded at the end of MBT in the current study suggests that recruits developed lower levels of fear and anxiousness. Collectively, the significant decrease in punishment sensitivity together with the significant increase in extraversion levels, furthermore suggests a reduction of fear levels of recruits due to MBT.

Contrary to our prediction, results of the present study revealed that reward sensitivity levels of recruits increased during MBT. The initial result revealed a significant increase in reward sensitivity levels; however, Bonferroni post-hoc test did not show any significant changes in reward sensitivity levels between the different assessment points. The biggest change in reward sensitivity levels occurred between time-points 1 and 2, which predominantly involves base related training and covers basic soldiering skills (e.g., military discipline, drill, fitness, weapons training and personal administration). Thereafter, the reward sensitivity mean-levels appeared to stabilise between time-points 2 and 3, which is the period in training that involves more field based exercises and covers more advanced soldiering skills (e.g., fieldcraft and teamwork). Military basic training is a life changing event (e.g., normative life transitions, social roles, major individual life events) and during life changing events, the new environment creates an opportunity for personality development (Specht et al., 2014). Therefore, the current results present an interesting issue, as it appears that the new environment may have initially altered the stability of reward sensitivity levels of recruits by creating an imbalance between normative trait behaviours and expected behaviours of the military. It appears that only after recruits managed to adapt to the new environment, the imbalance between normative and expected behaviours was restored, therefore stabilising reward sensitivity levels.

With relation to cognition results, findings in the current study did not support the hypothesis predicting an increase in self-regulating capacity levels of effortful control scales during training. Even though effortful control levels increased in the predicted direction, the changes were non-significant. The present results echo that of Kochanska et al. (1997), who asserted that effortful control is longitudinally stable through early development. Compared to attentional control and inhibition control levels, effortful control levels were the highest at

the end of training, suggesting that recruits within the present study had the ability to initiate and complete unpleasant tasks that hold long-term value (Rothbart & Bates, 2006).

In terms of internalisation of general core values, results revealed partial support for the hypothesis predicating that recruits will show higher levels for introjected regulation and lower levels for external regulated levels at the end of MBT. The non-significant results for introjected regulation in the present study do not reflect the positive influence of infantry MBT training on the internalisation of values as reported by Arthur et al. (2010). A possible explanation for this result may be that recruits did not feel related to the greater military organisation. As a consequence, recruits did not fully adopt organisational membership. Indeed, Pathak et al. (2016) noted that internalisation of values occur when individuals socialise and adopt organisational membership. In addition, Ryan and Deci (2004) noted that for introjection to occur, individuals need to feel both competent and related, with the emphasis on relatedness. The present results did reveal a significant decrease in external regulation, and for external regulation to occur, individuals need to feel competent (Ryan & Deci, 2004). This is an indication that one part of the equation for introjection to occur has been fulfilled, suggesting that training instructors were more supportive of competence, but less supportive of relatedness. The feeling of relatedness may increase once recruits join their mother units and have proved themselves to other unit members during exercises or combat situations.

One of the most striking results within the present study is that MT did not change during MBT. Chapter 2 revealed that MT is one of the more distinguishing characteristics between recruits who passed MBT first time and recruits who failed to pass MBT first time. Previous findings (Arthur et al., 2015; Gucciardi et al, 2015) revealed that MT plays an important role in successful performance within the military. Results within the present study indicated a non-linear change, as the training instructors perceived recruits to become less

mentally tough between time-points 1 and 2, whereafter recruits were perceived to become more mentally tough between time-points 2 and 3. The changes between the different time-points were non-significant. Possibly, this non-linear change reflects the assessment of MT as a state factor, since MT decreased when recruits entered a new demanding situation, but after successful adaption, returned back to baseline.

It was clear that MT increased for some individuals but decreased for others. Therefore, in an attempt to explain why MT levels did not demonstrate an overall significant increase during MBT, potential confounding personality differences that would predict whether recruits would improve or decrease in MT during MBT were explored. Results from a series of MANOVA analyses revealed no significant differences on personality variables tested the MT increase and MT decrease group during training.

Results from Pattern Recognition analysis for the MT 50 split group revealed that the *k*-nearest neighbour (Lazy: IB6) algorithm was more able to classify recruits who will increase in MT more accurately than classifying recruits who will decrease in MT. Findings indicated that psychoticism, extraversion, neuroticism, integration of core values, activation control, attention control, and inhibition control were able to differentiate between the MT increase and decrease groups. However, the accuracy percentage was only 63%, which may be perceived too low for the result to be of significance within a recruitment environment. Similarly, the Pattern Recognition results for the MT 30 split group revealed that the *k*-nearest neighbour (Lazy: IB2) algorithm was more able to classify recruits who will increase in MT accurately than classifying recruits who will decrease in MT during training. Findings indicated that psychoticism, extraversion, neuroticism, punishment sensitivity, and external regulation were able to differentiate between the MT increase and decrease groups. The accuracy percentage was 67% which was viewed as being satisfactory within the present study.

Aligned with our present findings, Delaney, Goldman, King, and Nelson-Gray (2015) have shown that mentally tough individuals (as measured by the Mental Toughness Questionnaire; MT-18, Clough, Earle, & Sewell, D., 2002) have low levels of neuroticism. High levels of neuroticism have been found to have a negative impact on adjustment to the military environment and reflect characteristics such as high levels of anxiety, unstableness and depression (Eysenck & Eysenck, 1976; Fiedler, Oltmanns, & Turkheimer, 2004). Thus, those recruits who have exhibited an increase in MT behaviour during training became more emotionally stable, less anxious and managed to adjust successfully to the military environment. In addition, current results revealed that recruits who showed an increase in MT scores during MBT also decreased in punishment sensitivity scores during training. This result stands in contrast to the results reported by Hardy, Bell, & Beattie (2014) who investigated the relationship between mentally tough behaviour and reinforcement sensitivities within high level cricketers. Hardy et al. (2014) reported that high-level cricketers with high levels of MT were sensitive to punishment (but insensitive to reward), whereas the present results showed that those who increased in MT were insensitive to punishment stimuli. As punishment sensitivity is underpinned by both the BIS and FFFS systems (Gray & McNaughton, 2000; McNaughton & Corr, 2004), the lower levels of punishment sensitivity observed in the present study suggests that recruits who became more mentally tough during MBT, also became less fearful and anxious during training. The differences between the present findings and those reported by Hardy et al. (2014) may be explained in that both high pressure environments interact differently with appetitive and aversive stimuli. One would almost always find a mixture of appetitive and aversive stimuli within high pressure environments (Hardy et al., 2014). However, the military training environment will have a more punishing environment with fewer opportunities for reward. A sporting environment on the other hand will have high levels of appetitive and aversive

stimuli. Furthermore, cricketers in the Hardy et al. (2014) study were elite young cricketers in their age group, and had been in that environment for a long time, whereas recruits are in a complete new environment. This raises the question whether punishment sensitivity is advantageous (or not) when one encounters new and novel stimuli.

In their study exploring the behaviours and characteristics of decorated courageous bomb-disposal operators, Hallam and Rachman (1980) identified that courageous soldiers were emotionally stable, well adjusted, exhibited lower levels of fear and were less responsive to stressors within extreme hazardous environments. Taken together, results in the present study suggest that there are recruits who did develop MT behaviours as opposed to those who became less mentally tough during MBT. The extreme end of those who developed higher mentally tough behaviour became more emotionally stable and developed lower responsiveness to fear and anxiety stimuli. It is also theorized that these recruits adjusted better to the military environment than those who became less mentally tough during training. Recruits who became less mentally tough during training developed higher levels of neuroticism and became more sensitive to fear and anxiety stimuli. The above findings suggest that MBT prepares some recruits to become potentially courageous soldiers.

In the present study, various avenues were explored to explain the non-significant increase of mentally tough behaviour of recruits during MBT. A possible explanation for the non-significant increase in mentally tough behaviour of recruits is that the observed decreased levels between time points 1 and 2 is an artefact from a combination of when MT data was collected from the informants and situational factors associated with the training environment. That is, MT was collected from section commanders at three time-points (i.e., weeks 4, 8 and 26) during training. The first time-point was chosen as it was felt that section commanders had to observe the recruits under their command for a minimum of 4 weeks before an accurate assessment of recruits' behaviours could be obtained. This decision may

prove to be somewhat controversial, as a 4-week period, especially at the very start of MBT, may not be sufficient for section commanders to make an accurate observation on prevalent behaviours of recruits. Arthur et al. (2015) managed to obtain accurate MT data during the development of their MTMTI measure and had set a minimum inclusion criterion of 5 weeks for the section commanders before an assessment was made on their respective recruits. In addition, the coaches that acted as informants within the Hardy et al. (2014) study had the opportunity to observe the professional cricket players they had to rate for at least a year and at 10 competitive performances, before assessing their behaviours.

Environmental change during MBT may have also affected the MT data. Due to the nature of the training programme, access to both recruits and section commanders were limited to week 8 (i.e., time-point 2) of training. Coincidentally, the given time for data collection corresponded with the transition phase where training changed from predominantly based-related training to field-based training. The change from one environment to the next may have resulted in a subconscious rise in section commander's expectations on how recruits ought to perform and behave within the new environment. Suggesting, that even though the recruits did become more mentally tough, their behaviours and performances did not match the expectations of the section commanders and as a result recruits were perceived to be less MT.

### **3.5. Limitations and Future Directions**

The present study extended the work of both Vickers et al. (1996) and Jackson et al. (2012) by showing that military basic training does incur personality changes that prepare recruits to adapt and perform effectively within hazardous environments. These changes have important implications for military performance in hazardous environments. For example, a combination of high levels of extraversion and low levels of neuroticism can be linked to fearless behaviour that may prove to be very advantageous for soldiers during combat. In a

meta-analysis, Marcus, Fulton, and Edens (2012) showed that the Fearless Dominance factor of the Psychopathic Personality Inventory –Revised (PPI-R; Lilienfeld & Widows, 2005), is positively associated with psychoticism and negatively associated with neuroticism personality factors. The PPI-R Fearless Dominance factor measures an individual's physical and social fear. Individuals that score high on this factor are usually characterised with high levels of Stress Immunity, Social Influence and Fearlessness (Lillienfeld & Widows, 2005). The combination of high levels of extraversion, low levels of neuroticism and the association with Fearless Dominance traits implies that military training is developing recruits to become potential courageous soldiers. Examining the relation between psychopathy and heroism, Smith, Lilienfeld, Coffey, and Dabbs (2013) found that the fearless dominance factor is associated with heroism. Future research may want to establish if any of the training attributes within the current study are expressed in decorated courageous soldiers.

An advantage of the present study is the use of an informant rated measure to collect mentally tough behaviour data. Behavioural observation methods within the military is very rare in personality research, yet behavioural data holds significant value in personality psychology, since personality traits are articulated through behaviour (McDonald, 2008). However, McCrae and Weiss (2007) highlighted potential pitfalls to using informant rated measures. For example, response biases (e.g., extreme ratings, acquiescence) similar to that encountered in self-respondents may occur. In addition, there is also the possibility that enhancement bias or even diminishing bias might occur if the informant is motivated to show the subject in a positive or even negative light. Future research should explore the use of a multiple method approach to measure mentally tough behaviour of military personnel. The use of multiple methods (e.g., self-report and informant-report) to assess MT can provide rich information as well as increase the validity of the assessment measure (Vazire, 2006). The benefit of using a multiple method approach, is that informant-reports complement self-



reports since self-reports contain information that others might not be aware of (Paulhus & Vazire, 2007), whereas informant-reports offer a perspective from the outside (Hogan, 1998). Thus, assessing MT through multiple assessment methods will help enrich the understanding of such behaviours within hazardous environments.

Future research may further want to investigate the trait of mentally tough behaviour. The fluctuation of MT levels observed within the present study suggests that MT may actually be a state-like concept. Such a view would be consistent with the view of Gucciardi et al., (2014), but opposed to that of researchers that view mental tough behaviour as a stable trait (Clough & Strycharczyk, 2012; Hardy et al., 2014; Jones, Hanton, & Connaughton, 2002). Traits are viewed to be relatively stable characteristics over time and does not show change at a rapid rate (Roberts & Jackson, 2008). States on the other hand, reflect how individuals behave, feel or think in a given situation (Allemand, Steiger, & Hill, 2013). States are viewed to change in reaction to internal aspects such as stress, motives and goals and can change over a short period of time (Fleeson, 2001; Hooker & McAdams, 2003). For example, when recruits experienced a change from predominant base-related training to field-based training, they may have found the shift to a new environment stressful, as it presented an unknown factor for the recruits. As a result, recruits were perceived by their section commanders to become less MT between time-points 1 and 2. However, after recruits adapted and started to perform effectively within the new environment, the previously unknown environment became more familiar and less stressful. Thus the recruits' behaviours were perceived to become more mentally tough, hence the increase in MT levels between time-points 2 and 3.

The current study is not without limitations. Firstly, given that the present study included only male infantry recruits, results are limited to male participants and not necessarily relevant to female recruits entering military service. The findings reported in the

present study should be interpreted with caution for two reasons: First, the current study did not follow a true experimental design, as no control group was included. We argued against the use of a control group, since the cohort of recruits within a naturalist environment (i.e., military basic training) that involved repeated observation of the same variables without performing any experimental manipulation were studied. As we observed recruits at multiple times during training, they acted as their own control group. A second reason for caution is that the sample size was small and might raise issues regarding the power of the analysis.

In Summary, the findings in the present study extend our understanding on the effect military basic training exerts on personality and psychological attributes of recruits. Collectively the results suggest that military basic training affected positive changes in personality profiles of recruits. Changes incurred during training have important implications for recruits' performances within hazardous environments. The findings suggest that recruits became less fearful and anxious. These characteristics may form the foundation for recruits to engage in courageous behaviour in future.

## **Chapter 4**

### **The Personality Profile of Courageous Soldiers**

## **Abstract**

The primary purpose of this study was to examine the ultimate expression of military performance; namely, the decorated courageous soldier. The study followed a multi-methodological approach involving qualitative and quantitative methods to explore the personality of 11 decorated courageous soldiers with specific reference, but not limited to: psychopathy, cognitive processes, motivation and behaviours. Findings from both quantitative and qualitative methodologies suggested that decorated courageous soldiers are not psychopathic. However, findings do suggest that courageous soldiers and psychopaths share characteristics such as: fearlessness, low trait anxiety, coldheartedness, boredom susceptibility and sensation-seeking. Other personality, character and behavioural traits exhibited by courageous soldiers include: low neuroticism, extraversion, insensitivity towards punishment stimuli, emotional stability, confidence, calmness, altruism, alexithymia, compartmentalisation, conditional caring, protective / over protective behaviour and mental toughness. Findings further suggest that courageous acts were performed as a result of the right person, with the right genetic-makeup, being in the right situation when it mattered.

## **KEYWORDS**

courageous soldiers, personality, psychopathy, coldheartedness, fearlessness, mental toughness

## 4.1. Introduction

### 4.1.1. Courage

Psychological research has long sought to solve the underlying mechanisms of courageous behaviour under combat conditions (e.g., Anderson, 1986; Dekel, Solomon, Ginzburg, & Neria, 2009; Gal, 1987; Hallam & Rachman, 1980; Rachman, 1978, 1991, 1996). Despite the growing body of research on courage, there still appears to be dissension regarding its conceptualisation (see, Rate, 2010; Rate, Clarke, Lindsay, & Sternberg, 2007). For example, some researchers (e.g., Peterson & Seligman, 2004) define courage as a disposition that includes emotional character strengths such as: persistence, vitality, integrity and bravery; where others (e.g., Gould, 2005) view courage as having three dimensions (i.e., appropriate action, fear and higher purpose). In spite of the dissension, researchers appear to accede that courage is a complex and multidimensional construct (Rate et al., 2007).

Extracting major features from scholarly based conceptualisations of courage, Rate (2010) proposed that courage consists of three dimensions: *motivation towards excellence*, where the act is motivated towards bringing about a morally worthy or a noble good purpose; *volition*, indicating that the actor must have acted out of his / her own will; and *external circumstances*, specifying that there must be a substantial risk or danger to the actor.

According to Rate (2010), all three dimensions should be present, as each dimension on its own is insufficient to define courage. For the purpose of this research, we define an act as courageous when: “... (a) the action was freely chosen; (b) the actor seeks to bring about a noble purpose; and (c) the act is attempted or accomplished at substantial risk to the actor.” (Rate, 2010, p. 61).

### 4.1.2. Characteristics of Courageous Soldiers

One of the characteristics considered synonymous with courage is fearlessness. However, very few researchers (e.g., Mowrer, 1960; Walton, 1986) in fact support this

notion. For example, Walton (1986) argued that some acts that are performed without fear are courageous, though not all fearless acts are viewed as courageous. That is, if someone is fearless and the act involved a dangerous risk to the actor to bring about a worthwhile end, then the actor can be viewed as courageous. However, when a fearless individual rushes into a dangerous situation without bringing about a noble purpose, the act cannot be viewed as being courageous. Even though Rachman (1983; 1991) conceded that there are a few exceptional soldiers who are impervious to fear, he regarded the purest form of courage to be when an individual acted and persevered despite experiencing fear, as such an action required greater effort and endurance. Rachman (1983) further asserted that with adequate training and successful completion of dangerous assignments, soldiers' fears decrease and shift from being courageous to become fearless. This transition from courageousness to fearlessness is attributed to realistic training that reduces one's appraisal of danger and enhances self-confidence (Rachman, 1983).

Self-confidence has been found to be a central element of courageous behaviour in combat conditions (Rachman, 1996). This intrapersonal factor transforms threats into challenges, helps the individual to push through difficult struggles and develops and maintains courage (Finfgeld, 1999). A micro-level approach to self-confidence is the self-efficacy theory, which is a cognitive approach to explain situation specific self-confidence (Bandura, 1977, 1982). For example, in the armed forces, perceived self-efficacy reflect an individual's perceived ability to act efficaciously in the face of combat related threats (Ginzburg, Solomon, Dekel, & Neria, 2003). Decorated courageous war veterans have shown higher ratings of perceived self-efficacy than combat stress reaction casualties and combat veterans (Ginzburg et al., 2003). Explaining their results, Ginzburg et al. (2003) argued that soldiers with high perceived self-efficacy are less susceptible to combat stress reactions than soldiers with low perceived self-efficacy and this may predispose them

towards courageous behaviour. On the other hand, a low sense of self-efficacy may pose a risk factor to coping and long term adjustment to combat-induced stressors, as combat stress reaction casualties may doubt their ability to function efficaciously under similar combat related threats in the future (Solomon, 1993).

Another characteristic that has been ascribed to contribute towards courageous behaviour and long-term adjustment to combat related traumatic events is sensation seeking. Research has credited courageous actors as possessing personal qualities such as a heightened sense of adventurousness (London, 1970) and engagement in sensation seeking behaviour (Harvey, Erdos, & Turnbull, 2009). Sensation seeking is viewed as a trait, characterised by the willingness to take risks (i.e., physical, financial, legal and social) in search for novel, complex, varied and intense sensations and experiences (Zuckerman, 1994). In their study exploring sensation seeking and its implications for combat performance and long term adjustment, Neria, Solomon, Ginzburg, and Dekel (2000) used a sample of Israeli veterans from the Yom Kippur war who were divided into three groups: decorated courageous soldiers, soldiers who were diagnosed and treated for combat stress reactions and a control group. Results showed that the courageous soldiers were higher sensation seekers than both combat stress reaction casualties and controls. In addition, the high sensation seekers (i.e., courageous soldiers) exhibited less symptoms of Post-Traumatic Stress Disorder (PTSD) than low sensation seekers and they exhibited less combat related intrusion and avoidance tendencies (Neria et al., 2000).

In addition to the above characteristics, Hallam and Rachman (1980) found that decorated bomb disposal operators were well adjusted and emotionally stable (i.e., show low levels of neuroticism). In contrast, Gal (1987) did not find any support for emotional stability in a sample of decorated Israeli soldiers. Individuals who are emotionally stable have a propensity to be secure, steady and confident (Judge & Bono, 2001). Emotionally stable

individuals also tend to show lower cognitive anxiety responses to threat. For example, Rachman (1996) found that decorated bomb-disposal operators experienced significantly lower bodily sensations and low-anxiety compared to non-decorated bomb-disposal operators during a laboratory stress test. Decorated bomb-disposal operators have also proved to be competent, clear thinking and calm under pressure. Possible factors forwarded to explain their performances were personal resilience, unit cohesion and realistic training.

Apart from personal characteristics, there are also certain factors and behaviours that contribute towards courageous actions, namely training and group cohesion (Rachman, 1995), social cohesion (Riemer, 1998), persistence, self-sacrifice and leadership (Gal, 1987), altruism (Kelly & Dunbar, 2001), impulsivity (Harvey et al., 2009), existence of a role model (London, 1970), prior exposure to models of moral behaviour (Jayawickreme & Di Stefano, 2012) and the possession of appropriate skills (Rachman, 1995).

#### **4.1.3. Psychopathy**

Psychopathy is characterised by personality and behavioural traits such as impulsiveness, callousness and proneness to anti-social behaviour (Miller & Lynam, 2015). At present there is a lack of consensus on the conceptualisation of the construct of psychopathy (see Crego & Widiger, 2015). Even though there are large empirical studies available about psychopathy, it is not acknowledged as a stand-alone personality disorder in the Diagnostic and Statistical Manual of Mental Disorder – fifth edition (DSM-5; APA, 2013; Miller & Lynam, 2015). The most widely used measure to assess clinical psychopathy is the Hare Psychopathy Checklist-Revised (PCL-R; Hare 1991, 2003), which was largely developed to measure psychopathy within clinical and forensic settings. The PCL-R (Hare, 2003) differentiates between four psychopathy dimensions nested within two factors. Factor 1 draws on interpersonal and affective deficits of psychopathy and consists of: (a) Interpersonal dimensions such as superficial charm, grandiosity, lying, cunning and glibness; (b) Affective



dimensions such as lack of empathy, shallow affect, unable to accept responsibility for own actions and lack of remorse. Factor 2 draws on anti-social and irresponsible behaviours and consists of: (a) Lifestyle dimensions such as proneness to boredom, impulsive behaviour, irresponsibility, lack of long-term goals and parasitic lifestyle; (b) Antisocial dimensions such as early behavioural problems, juvenile delinquency, poor behavioural control and criminal versatility.

The increase of interest in psychopathy, other than within the clinical and incarcerated population, sparked the development of several self-report measures for the non-clinical population (Lilienfeld, Latzman, Watts, Smith, & Dutton, 2014; See Lilienfeld and Fowler, 2006 for a review on psychopathic self-report assessments). Each psychopathic assessment emphasises and groups the psychopathic traits differently (Glenn & Raine, 2014) In addition, Crego and Widiger (2015) noted that there is no ‘gold standard’ determining which conceptualisation is correct and as a result suggested that the best measure to use in clinical or research settings should be the one that best represents the like-mindedness within that particular field. As a result, we focus on the Psychopathic Personality Inventory-Revised self-report measure (PPI-R; Lilienfeld & Widows, 2005) which is a widely used self-report measure of psychopathy and focuses on the core interpersonal and affective traits of the construct. With reference to the current study, the decision to focus on the PPI-R (Lilienfeld & Widows, 2005) is two-fold. Firstly, the PPI-R measures psychopathy in a manner that is congruent to our conceptualisation of the construct. Secondly, fearlessness and low anxiety are respectively measured by the PPI-R content scales Fearlessness and Stress Immunity, which are indices of the Fearless Dominance factor.

The PPI-R views Psychopathy as a heterogeneous construct that is underpinned by three higher-order factors (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003; Lilienfeld & Andrews, 1996). The first higher-order factor, Fearless Dominance, consists of three

unidimensional subscales: stress immunity, social influence and fearlessness. The Fearless Dominance Factor reflects a tendency towards high levels of interpersonal dominance, low levels of tension, lack of anticipatory physical and social anxiety and low harm avoidance. The second higher order factor, Self-Centred Impulsivity, consists of four unidimensional subscales of machiavellian egocentricity, rebellious nonconformity, blame externalization and carefree nonplanfulness. These subscales reflect a tendency toward blaming others for one's mistakes, self-centredness, taking advantage of others and being impulsive. Both the Fearless Dominance and Self-Centred Impulsivity Factors are orthogonal, as these factors are accessing distinctive dispositional dimensions. An eighth unidimensional subscale, Coldheartedness, was defined as the third higher-order factor, as it did not load on either Fearless Dominance or Self-Centred Impulsivity Factors (Benning et al., 2003).

#### **4.1.4. Courageous Soldiers and Psychopathy**

Although personality research shows that physical courage deteriorates under intense combat conditions (Miller, 2000), there appears to be a personality type that may be immune to courageous decay, namely that of psychopathy. In an attempt to clarify the syndromes of combat neuroses of combat soldiers who took part in the Normandy landings, Swank and Marchand (1946) highlighted that tolerance for combat related stressors vary among individuals. They found that for most combat soldiers, the first symptoms of combat exhaustion appeared after about 25 to 30 days of combat. Additionally, soldiers' tolerance towards combat stressors deteriorated further through stages of emotional exhaustion and apathy the longer they were exposed to combat. During these stages of combat neuroses, soldiers experienced fear reactions, lost personal confidence, became overcautious, lost the ability to control their emotions and became 'followers' rather than leaders. In some cases soldiers became insensitive both emotionally and physically. Swank and Marchand (1946) noted that less than 2% of soldiers were able to withstand combat stressors for any length of

time. Even though no particular personality type was dominant within this group, aggressive psychopathic personalities who were poorly disciplined before combat stood out.

Psychopathic individuals demonstrating aggressive behaviour are more likely to exhibit instrumental aggression (i.e., predatory, unprovoked and planned) to achieve a goal (Glenn & Raine, 2014). Unlike aggressive psychopaths, individuals who do not demonstrate psychopathic traits, but who are associated with aggressive disorders (e.g., posttraumatic stress disorder, antisocial personality disorder, or conduct disorder) do not demonstrate instrumental aggression, as their aggression is more reactive (Glenn & Raine, 2014). Further support that a psychopathic personality could be advantageous in combat situations comes from Lykken (1995), as he hypothesised that proper socialisation combined with a disposition towards fearlessness can predispose psychopathic individuals to courageous behaviour. Lykken (1995) further stated that heroes and psychopaths were inherently related, perhaps even sharing the same “genetic branch”. Courageous soldiers and psychopaths share some characteristics such as; fearlessness (Lykken, 1995; Rachman, 1996), impulsivity (Lykken, 1995; Harvey et al., 2009), low anxiety (Rachman, 1996; Vitale, Brinkley, Hiatt, & Newman, 2007) and sensation seeking (Hare, 2003; Harvey et al., 2009).

#### **4.1.5. Courage and Psychopathy: Empirical Evidence**

Despite the attested link between heroism and psychopathy, research is still in its infancy. Patrick, Edens, Poythress, Lilienfeld, and Benning (2006) examined the nomological network surrounding the Fearless Dominance and Impulsive-Antisociality factors of the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996). Patrick et al. (2006) administered both the PPI and the Activity Frequency Inventory (AFI, Lilienfeld, 1998) to an incarcerated population. The AFI assesses the lifetime frequency of everyday heroism performed by individuals (e.g., pushing a stranger out of the way of an oncoming car or other vehicle). Results indicated that everyday heroism was significantly and positively correlated

with the Fearless Dominance factor and negatively correlated with the Impulsive-Antisociality factor (Patrick et al., 2006). These results indicate a link between courageous actors and fearlessness, which suggests that courageous actors may be linked to primary psychopathy as conceptualised by Lyken (1995).

Primary psychopathy has been found to be related to an inherent lack of fear, underdeveloped empathic feelings (Lyken, 1995, 2007), lack of anxiety (Cleckley, 1955) and emotional stability (Hicks, Markon, Patrick, Krueger, & Newman, 2004). Compared to primary psychopathy, secondary psychopathy is related to anxiety (Lykken, 1995), impulsivity (Levenson, Kiehl, & Fitzpatrick, 1995), high negative emotionality (Hicks et al., 2004) and poorer interpersonal functioning (Skeem, Johansson, Andershed, Kerr & Loudon, 2007).

More recently, Smith, Lilienfeld, Coffey, and Dabbs (2013) examined the relationship between heroism and psychopathy within four samples; two undergraduate populations, a community sample consisting of participants from a North American online community and a sample of 42 U.S. presidents. Smith et al. (2013) examined the relationship between fearless dominance and heroic behaviour, as well as the relationship between heroism, antisocial behaviour, sensation seeking and empathy. Results were mixed across the four samples, but the overarching hypothesis was supported, confirming that a positive association between heroism and fearless dominance existed. Smith et al. (2013) also noted a positive association between war heroism and the fearless dominance construct within the presidential sample. The status as a war hero was derived from historical ratings by Simonton (1981, 1986a, 1986b) where the proviso was that the president needed to be classified as a national war hero prior to taking office. Fearless dominance was also positively associated with altruism towards strangers and was credited to the lack of social and physical anxiety experienced by individuals who score high on the Fearless Dominance Factor. Further, the thrill and

adventure seeking subscale as encapsulated by the Sensation Seeking Scale-Form V (Zuckerman, Eysenck, & Eysenck, 1978) was positively related to heroism in the second undergraduate sample. Blame externalisation was also related to heroism in both the undergraduate and community samples. Possible explanations for these findings were: (a) the moderate effect may be due to the relatively small sample size with the unlikelihood that the results will be replicated; (b) compared to non-impulsive individuals, individuals with poor impulse control may be more likely to act courageously as they are more inclined to engage in novel and interesting activities (Smith et al., 2013). Interestingly, as empathy contributes towards prosocial behavior, no significant association between empathy and everyday heroism was found. These findings provide evidence that certain psychopathic traits and behaviours are related to heroic altruism (Smith et al., 2013).

#### **4.1.6. Research Hypotheses**

Courageous actors share some characteristics with psychopathy. Surprisingly, research examining the relationship between psychopathy and courageous actors is limited despite the amount of research conducted on psychopathy and courage. Understanding factors that may either facilitate or hinder courageous actions forms the foundation for increasing courageous behaviour (Pury, Lopez & Key-Roberts, 2010). In addition, understanding the aspects of positive adjustment (e.g., achievement, well-being) of psychopathic personalities can be advantageous for recruitment and training purposes within high-risk occupations. In the view of limited knowledge and understanding of psychopathic personalities and their relationship with decorated courageous soldiers, this study followed a multi-methodological approach, involving qualitative and quantitative methods. The multi-method approach was employed to enrich understanding of the personality of courageous soldiers with specific reference, but not limited to: psychopathy, cognitive processes, motivation and behaviours of decorated courageous soldiers during courageous acts. Using a mixed method approach not

only allows researchers to collect rich and descriptive data from participants, but also provides a better understanding of aspects of contextual behaviour compared to either approach on its own (Yoshikawa, Wesner, Kalil, & Way, 2013).

The literature suggests that both courageous actors and psychopaths share characteristics such as: fearlessness (Lykken, 1995; Rachman, 1996), impulsiveness (Lykken, 1995; Harvey et al., 2009), low levels of trait anxiety (Rachman, 1996; Vitale et al., 2007) and sensation seeking (Hare, 2003; Harvey et al., 2009). Fearlessness and low anxiety are measured by PPI-R Content scales, Fearlessness and Stress Immunity respectively and are indices of the Fearless Dominance factor. Impulsiveness is measured by the PPI-R Carefree Nonplanfulness sub-scale and is one of the indices of the Self-centred Impulsivity factor. As courageous actors and psychopathic individuals share some common characteristics, it is hypothesised that: (a) Courageous soldiers will score higher on the PPI-R Total than the normal population; (b) Courageous soldiers will rate higher on PPI-R Fearless Dominance Factor than the normal population, as it is expected that courageous soldiers will rate high on Fearlessness and Stress Immunity subscales; (c) Courageous soldiers will rate lower on the Self-Centred Impulsivity factor than the normal population, as we expect the courageous soldiers will rate low on the lower-order scales with the exception of the Carefree Nonplanfulness scale, since we expect the courageous soldiers to score high on impulsivity; (d) Courageous soldiers will be high sensation seekers; and (e) Courageous soldiers will demonstrate emotional stability.

In addition to the main hypotheses, general personality as well as punishment and reward sensitivity of courageous soldiers were explored. In an attempt to further understand the personality and behaviours associated with courageous soldiers, we turned to the revised Reinforcement Sensitivity Theory (rRST; Gray & McNaughton, 2000). The rRST is a neuropsychological theory of motivation, emotion, learning and personality and forms the

base for punishment sensitivity (PS) and reward sensitivity (RS). In the rRST model, RS is affiliated with the behavioural activation system (BAS). The BAS responds to all appetitive stimuli (i.e., conditioned and unconditioned) and functions as a reward system. Further, the BAS also mediates the emotion of anticipated hope or pleasure which can result in approach behaviour. In addition, PS is affiliated with a combination consisting of the behaviour inhibition system (BIS) and the fight-flight-freeze system (FFFS). The FFFS responds to all aversive stimuli (i.e., conditioned and unconditioned) and mediates the emotion of fear, which can lead to active avoidance. Furthermore, the BIS is activated when there is goal conflict; not only between approached (BAS) and avoidance (FFFS) motivations, but also between approach–approach and avoidance-avoidance situations. The BIS mediates the emotion of anxiety, which can result in passive avoidance behaviours (Carver & White, 1994; Corr, 2013; Gray & McNaughton, 2000).

High levels of reward sensitivity have been related to impulsivity, whereas low levels of punishment sensitivity have been related to low anxiety (Corr, 2004; Pickering & Corr, 2008). High sensitivity towards reward cues would result in approach behaviour regardless of potential punishments. Low sensitivity towards punishment cues would show reduced inhibition that may similarly lead to approach behaviours. Less anxious and highly impulsive individuals are thus more prone to disinhibited and risky behaviour in approach-avoidance conflicts (Ross, Moltó, Poy, Segarra, Pastor, & Montañés, 2007). It is expected that courageous soldiers will be: (f) insensitive towards punishment stimuli (i.e., low anxiety), but will be (g) sensitive towards reward cues (i.e., impulsive).

## **4.2. Methods**

### **4.2.1. Participant Selection**

Following University ethical approval, a purposeful sampling approach was used to recruit courageous soldiers who had received awards or decorations for courageous acts

during combat. Purposeful sampling is a recommended method when a limited experienced sample is available to provide information-rich perspectives to help answer the research questions under examination (Patton, 1990). All the participants gave informed consent to take part in the research. At completion of initial interviews a snowball sampling approach was adopted and participants were asked for referrals to other decorated courageous soldiers. Snowballing is most fitting when conducting research on a difficult-to-reach sample (Lee, 1993). The selection criteria of participants warranted that each participant had received an award, commendation or medal for their actions during combat. Participants were also asked to nominate someone who knew them well outside the military environment (e.g., spouse, relative, or friend) to act as an informant for them. Informants provide valuable insight and information which otherwise may have been overlooked by the researchers (Patton, 1990).

#### **4.2.2. Participants**

Eleven combat decorated courageous soldiers participated in the research. The mean age of the participants was 32.54 years ( $SD = 8.66$ ) and participants had an average of 12.18 years ( $SD = 6.99$ ) military service. The average age of participants when they performed the courageous act was 25 years ( $SD = 4.69$ ) and participants had an average of 7.18 years ( $SD = 5.68$ ) military service at the time of the courageous act. The mean age of the individuals who acted as informants for the participants was 33.27 years ( $SD = 9.36$ ) and had known the participants for an average of 11.27 years ( $SD = 10.20$ ).

#### **4.2.3. Measures**

***Psychopathy Personality Inventory (PPI-R; Lilienfeld & Widows, 2005):*** The PPI-R is a 154-item measure that assesses three factors of psychopathy. PPI-R Factor I (Fearless Dominance) consists of three sub-scales, namely, Stress Immunity (e.g., “Sometimes I wake up feeling nervous without knowing why”), Social Influence (e.g., “I am hardly ever the centre of attention”) and Fearlessness (e.g., “High places make me nervous”). In addition,



PPI-R Factor II (Self-Centred Impulsivity), contains four sub-scales; Machiavellian Egocentricity (e.g., “If I really want to, I can persuade most people of almost anything”), Rebellious Nonconformity (e.g., “I have always seen myself as something of a rebel”), Carefree Nonplanfulness (e.g., “I like to act first and think later”) and Blame Externalization (e.g., “If I’d had fewer bad breaks in life, I’d be more successful”). The eighth subscale, Coldheartedness (e.g., “I look out for myself before I look out for anyone else”), does not load highly on to either PPI-R Factors, resulting in the subscale to be treated as a standalone dimension. The PPI-R also contains three validity scales that were designed to uncover problematic response sets (Lilienfeld & Andrews, 1996; Lilienfeld & Widows, 2005). The PPI-R is measured on a 4-point Likert scale anchored by 1 (False) to 4 (True). Lilienfeld and Widows (2005) reported satisfactory Cronbach’s  $\alpha$  reliability coefficient ( $\alpha > .80$ ) for the PPI-R Total and content scales in a community/college sample. Cronbach’s  $\alpha$  for the PPI-R Total and content scales were reported by Lilienfeld and Widows (2005) as follows: PPI-R Total,  $\alpha = .92$ ; Machiavellian Egocentricity,  $\alpha = .84$ ; Rebellious Nonconformity,  $\alpha = .83$ ; Blame Externalization,  $\alpha = .86$ ; Carefree Nonplanfulness,  $\alpha = .80$ ; Social Influence,  $\alpha = .87$ ; Fearlessness,  $\alpha = .87$ ; Stress Immunity,  $\alpha = .86$ ; and Coldheartedness,  $\alpha = .78$ ).

In addition, the PPI-R (Lilienfeld & Widows, 2005) was adapted to be completed by the chosen informants in an attempt to detect both global psychopathy and the component traits of psychopathy within the participants. All 154 items were retained in the informant version of the PPI-R and the items were changed from the first person to the second person (e.g., “He likes to act first and think later”). The informant PPI-R was measured on a 4-point Likert scale anchored by 1 (False) to 4 (True).

***Eysenck Personality Questionnaire-Revised Short version (EPQR-S; Eysenck, Eysenck, & Barrett, 1985):*** The EPQR-S is a 48-item scale that assesses three personality scales: Psychoticism (e.g., “Do you prefer to go your own way rather than act by the rules?”);

Extraversion (e.g., Are you a talkative person?); and Neuroticism (e.g., Are your feelings easily hurt?). A fourth scale, Lie scale assesses social desirability (e.g., Do you always practise what you preach?). Each scale contains 12 items where each item has a dichotomous response that can be answered ‘yes’ or ‘no’. Each scale has a minimum possible score of zero or a possible maximum score of 12. Eysenck et al. (1985) reported acceptable Cronbach’s  $\alpha$  reliability coefficient for each of the scales contained in the EPQ-RS measure for males and females respectively (P:  $\alpha = .62$  and  $0.61$ ; E:  $\alpha = .88$  and  $0.84$ ; N:  $\alpha = .84$  and  $0.80$ ).

***Ten Item Personality Inventory (TIPI: Gosling, Rentfrow, & Swann, 2003):*** The TIPI is a 10-item measure of the Big Five personality domains (i.e., extraversion, conscientiousness, agreeableness, openness to experience and emotional stability (reverse Neuroticism)). The TIPI starts with the statement “I see myself as:” followed by ten pair item trait descriptors (e.g., “extraverted, enthusiastic”), two items for each of the Big Five domains. Each two pair item trait descriptors are scored on a 7-point Likert scale anchored by 1 (*disagree strongly*) and 7 (*agree strongly*). Various studies investigated the psychometric properties of the TIPI (Gosling et al., 2003; Herzberg & Brähler, 2006; Muck, Hell, & Gosling, 2007). Gosling et al. (2003) reported adequate psychometric scores for the inventory. In particular, the Cronbach alphas were .45, .50, .68, .40 and .73 for openness to experience, conscientiousness, extraversion, agreeableness and emotional stability scales respectively.

***Punishment and Reward Sensitivity (Corr, 2001):*** To convert the EPQR-S personality scales into punishment and rewards sensitivity, the formulae proposed by Corr (2001) was used: reward sensitivity =  $(E \times 2) + N + P$  and punishment sensitivity =  $((12 - E) + (N \times 2) - P)$ . Reward sensitivity scores range from 0 to 48, where punishment sensitivity scores range from -12 to 36.

**General Health Questionnaire (GHQ 28: Goldberg, 1978):** The GHQ is a 28-item measure (a scaled version of the original 60 item measure) that assesses four factors of mental well-being: Factor 1 assesses somatic symptoms (e.g. “Been having hot or cold spells”); Factor 2 assesses anxiety and insomnia (e.g., “Lost much sleep over worry”); Factor 3 assesses social dysfunction (e.g., “Felt on the whole you were doing things well”); and Factor 4 assesses severe depression (e.g., “Felt that life isn’t worth living”). Each factor contains 7 items, where each item is affiliated to four possible responses: *Not at all*, *No more than usual*, *Rather more than usual* and *Much more than usual*. A binary method is employed to score the GHQ28 (i.e., *Rather more than usual* and *Much more than usual* scored 1, and *Not at all* and *No more than usual* scored 0). The total score ranges from 0 to 28. Scores above the threshold value of 5/6 would signal the presence of psychological distress and would require further attention (Goldberg et al., 1997). Various studies established the validity of the GHQ 28 within different environments (Goldberg et al., 1997; Makowska, Merecz, Mościcka & Kolasa, 2002). High internal consistency (Cronbach’s  $\alpha$  0.95) for the GHQ 28 has been reported by Failde, Ramos, and Fernandez-Palacin (2000).

#### **4.2.4. Interview Guide**

To explore the research question in depth, we developed a semi-structured interview guide based on three sources of information: (a) psychopathy literature (e.g., Cleckley, 1955; Lykken, 1995; Smith et al., 2013); (b) literature on heroism (e.g., Harvey et al., 2009; Rachman, 1996; Rate, 2010); and (c) guidelines on qualitative research interviewing (e.g., Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001; Kvale & Brinkman, 2009; Patton, 1990). The interview guide was piloted by the first author with two emergency and rescue personnel and two military personnel who had received awards, commendations or decorations for courageous acts. The purpose of the pilot interviews was twofold. First, the pilot interviews were conducted to ensure that the interview guide adequately covered the

relevant areas of interest. Second, it allowed the first author to refine and practice interview skills and techniques. Feedback received from the co-authors and pilot interviewees were used to refine the interview guide. At this stage, it was deemed necessary to add a clinical psychologist to the research team. The clinical psychologist helped with the formulation of additional questions and elaboration probes to obtain further insight into the participants' personalities, behaviour and motivations during heroic acts.

The revised interview guide consisted of five sections. Section 1 reminded the participant about the purpose and the procedure of the interview. As suggested by Kvale and Brinkman (2009), each participant was briefed on issues regarding: confidentiality of personal identifiable information; who would have access to the interview and transcripts; and the participants' right to have access to the interview transcription and analysis of the qualitative data. Section 2 included introductory background questions (e.g., What were your hobbies / sport when growing up?) These questions were aimed at gaining insight into the participant's background, personality and involvement in risk taking activities while growing up. Section 3 investigated the nature of the act (e.g., Describe in as much detail as possible the situation that led to you being decorated for bravery). This section was included to gain knowledge of the participant's behaviour, motivation and emotions during the heroic act. Section 4 explored personality characteristics of the participant (e.g., How has the heroic act changed you as a person?). Section 5 concluded the interview and gave participants an opportunity to add additional information that might be relevant. Efforts were made to keep the order of the presentation of the questions the same for each participant, however the wording and sequence of the questions were changed to adapt to each participant in the context of the interview (Patton, 1990).

#### **4.2.5. Procedure**

All questionnaires were sent to the participants and informants to be completed prior to the interview. The decision to administer the questionnaires prior to the interview was as a result of experimenting with different combinations of collection methods with the pilot sample. This is in line with recommendations by Yoshikawa et al. (2013), stating that different collection methods need to be tested with the pilot samples to be able to make an informed decision as to which method is most suitable. Administering the questionnaires after a lengthy interview proved taxing on the participants. This created a possibility where participants might rush to complete the questionnaires without giving proper thought to each question. To prevent such a scenario, the research team decided to send the questionnaires to the participants and informants before the interview, so that they could be completed in private and at their own leisure. Participants and informants were instructed to place the completed questionnaires in a prepaid envelope and post it to the researchers.

The first author, who has 14 years of military experience, conducted the interviews, which helped in establishing rapport with the participants. This is in line with the recommendations of Lincoln and Guba (1985) who states that a knowledgeable researcher should conduct interviews to ensure the credibility and trustworthiness of the data collection. In preparation for the research, the first author received methodological guidance from several experienced qualitative researchers. Additional knowledge on interviewing techniques was acquired by reading relevant subject matter. Interviews were conducted face-to-face, digitally-recorded and lasted between 180 and 240 min. Each interview was conducted at a location of choice identified by the participant (e.g., home, in a personal office).

#### 4.2.6. Data Analysis

Self-report and informant-rated PPI-R measures were analysed to examine the participants' global and component traits of psychopathy. The TIPI and EPQR-S were analysed to measure the personality dimensions of the participants. In addition, the EPQR-S scores were transformed to measure punishment and reward sensitivity. The GHQ was analysed to screen for psychological and psychiatric co-morbidity. The present study did not contain a control group, therefore one-sample Student's t-tests were performed to determine if the means of the participants' self-report data significantly differed from normative population distribution values on the different measures. Further, paired samples t-tests were performed to determine if there were any significant differences between the self-report and informant rated PPI-R means.

In addition to the above, a multivariate analysis of variance (MANOVA) was performed to determine if the participants' psychopathy profile significantly differed from that of the normative distribution profile. Furthermore, a repeated measures MANOVA was performed to determine if the participants' self-report PPI-R profile significantly differed from the informant rated PPI-R profile. Profile analysis is an extension of the MANOVA to a condition where there are several dependant variables, all measured on the same scale (Tabachnick & Fidell, 2007). The above analyses were conducted using SPSS Statistics software (Version 22; IBM Corp. 2013). The *priori* level of significance was set at .05.

The interviews were transcribed verbatim and yielded 671 pages of text. The transcriptions were analysed using QSR International's NVivo 10 qualitative data analysis software (NVivo qualitative data analysis software, 2012). As knowledge of the personality, motivation and behaviour of decorated courageous soldiers during courageous acts are limited, a thematic interpretational content analysis was deemed appropriate for analysing the interviews (Aronson, 1994; Gibbs, 2007). A combination of inductive and deductive content

analyses was used to analyse the data (see Patton, 2002). Content analysis is a technique used to identify, code and categorise large amounts of data into common themes (Biddle et al., 2001). The inductive content analysis involved the development of themes and categories from the interview data, whereas the deductive content analysis employed a pre-determined set of themes and categories to arrange the interview data (Brown & Locke, 2013).

#### **4.2.7. Verification, Reliability and Trustworthiness**

Three methods of triangulation were used to verify, validate and reduce systematic bias in the data. These methods of triangulation included: method triangulation; triangulation through multiple analysts and theory triangulation (Patton, 1990). Method triangulation involved comparing data obtained from both quantitative and qualitative methods. Triangulation of quantitative and qualitative data creates a platform of comparative analysis and strengthens reliability (Fielding & Fielding, 1986). The qualitative data was used to describe the personality characteristics, behaviour and motivation of decorated military combatants during courageous acts. In turn, the quantitative data was used to analyse and screen the participants' personality, sensitivity towards reward and punishment stimuli and wellbeing. Analyst triangulation involved having two researchers and a clinical psychologist independently analysing the data and comparing their findings. In line with the suggestion from Patton (1990), the transcribed interviews were also sent back to the interviewees to confirm accuracy of the interview. After the thematic content analysis, the results were forwarded to the interviewees to confirm that their views and actions were interpreted accurately. Finally, each participant was sent the final results of the research. Theory triangulation additionally involved examining the data from different theoretical perspectives (Patton, 1990).

The data was examined from both research and clinical perspectives to make more informed and accurate assessments of the personality and behaviours of the participants

involved. The collaborative approach was adopted with the aim to strengthen the quality of the current research, as both approaches draw knowledge from differing epistemological frameworks and populations. For example, the academic researcher has access to a variety of theoretical and methodological resources, whilst the clinical practitioner can facilitates access to interesting settings and materials (Harper, 2013; Potter, 1998).

### **4.3. Results**

#### **4.3.1. Quantitative Data Results**

The quantitative results are based on data obtained from 11 decorated courageous soldiers' self-report measures and informant-rated data from 11 informants.

**4.3.1.1. Self- Report Measures:** Means, standard deviations and correlations for the participants' self-rated measures are displayed in Table 4.1. Means and standard deviations for the PPI-R global and factor scores were calculated as t-scores. T-scores were used to interpret the participants' self-reported levels of psychopathic traits and behaviours. Lilienfeld and Widows (2005) converted raw score distributions to normalised t-scores, establishing that individuals in a normative sample have a mean distribution of 50 with a standard deviation of 10. As recommended by Lilienfeld and Widows (2005), the PPI-R Total and Content scales scores in the present study were interpreted as variations in levels of traits as measured by each scale, where a high score reflected a high level of the trait.

It should be noted that one participant did not complete all the self-report measures. Various attempts were made to get in contact with the participant to complete the measures, but this process proved unsuccessful as the participant was operationally deployed. To determine if the missing data had an effect on the results, two separate analyses were conducted. One analysis was conducted with all the available data, whereas the other analysis was conducted with the participant in question's data removed. Both analyses produced similar results. Since both the participant and his informant completed the PPI-R which was used to determine the



**Table 4.1**

Means, Standard Deviations and Intercorrelations among Participant's Self Rated Variables

		Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	PPI-R Total	53.91 (10.40)																									
2	PPI-R SCI	51.55 (8.19)	.66*																								
3	PPI-R FD	55.45 (11.29)	.69*	-.03																							
4	PPI-R Cold	50.55 (7.93)	.69*	.54	.37																						
5	PPI-R ME	51.00 (9.72)	.55	.84**	-.07	.35																					
6	PPI-R RN	51.55 (4.27)	.43	.22	.38	.20	.09																				
7	PPI-R BE	51.64 (6.23)	.36	.53	-.04	.60*	.06	.05																			
8	PPI-R CN	50.73 (13.62)	.56	.94**	-.08	.40	.83**	-.01	.41																		
9	PPI-R SOI	50.18 (10.66)	.70*	.14	.83**	.32	.06	.40	.12	.07																	
10	PPI-R F	57.36 (11.86)	.66*	.06	.86**	.30	.20	.35	-.31	.09	.62*																
11	PPI-R STI	55.18 (9.69)	.22	-.37	.64*	.24	-.53	.07	.12	-.43	.26	.38															
12	EPQ- RS-P	3.50 (1.90)	.63*	.23	.55	.65*	-.04	.54	.43	.07	.49	.35	.52														
13	EPQ- RS-E	8.30 (3.65)	.72*	.60	.50	.55	.40	.44	.35	.56	.74*	.50	-.16	.23													
14	EPQ- RS-N	4.20 (3.74)	-.41	.03	-.54	-.27	.25	-.08	-.33	.10	-.31	-.24	-.86**	-.64*	.10												
15	RS	24.30 (8.62)	.57	.57	.31	.49	.44	.45	.25	.54	.6	.39	-.39	.13	.94**	.38											
16	PS	8.60 (9.40)	-.73*	-.25	-.74*	-.57	.05	-.34	-.49	-.15	-.64*	-.46	-.72*	-.80**	-.34	.88**	-.09										

**Table 4.1 Continued**

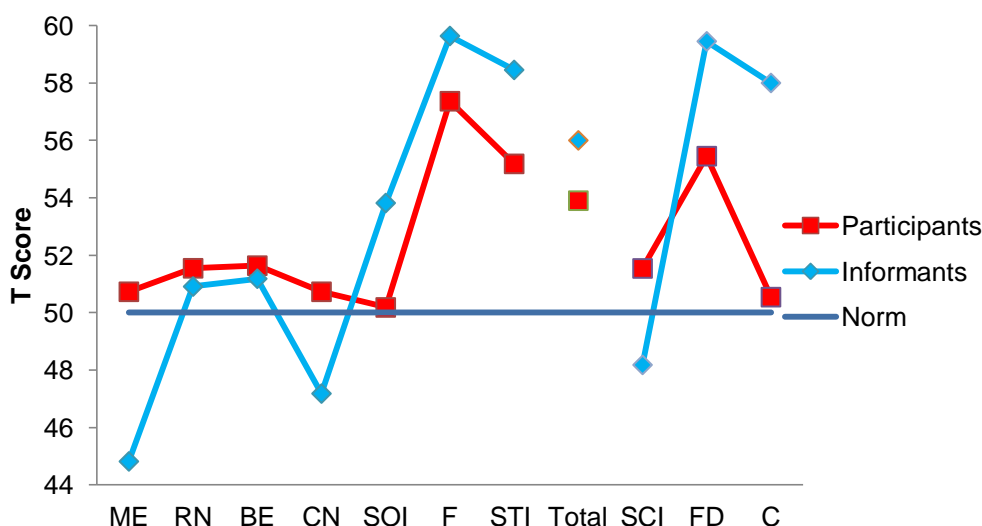
		Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
17	TIPI-E	5.11 (1.40)	.67*	.37	.67*	.37	.15	.23	.29	.43	.74*	.58	.09	.31	.87**	-.17	.79*	-.58									
18	TIPI-A	5.05 (1.10)	-.03	.16	-.20	-.23	-.21	.05	.60	.09	-.08	-.49	.22	.09	-.03	-.60	-.22	-.43	.09								
19	TIPI-C	5.61 (1.02)	-.66	-.80**	-.17	-.57	-.87**	-.02	-.15	-.81**	-.25	-.39	.39	-.10	-.48	-.13	-.5	.14	-.24	.32							
20	TIPI-ES	5.83 (1.06)	.35	.11	.28	.13	-.20	.18	.62	-.03	.33	-.09	.58	.57	.03	-.94**	-.17	-.81**	.22	.70*	.16						
21	TIPI-O	5.11 (1.21)	.48	.02	.61	.54	-.08	-.07	.31	.02	.48	.47	.57	.52	.22	-.50	.14	-.57	.33	-.23	-.33	.37					
22	GHQ- Total	4.60 (6.06)	-.39	.16	-.67*	-.49	.18	.09	-.01	.16	-.41	-.46	-.80**	-.49	.08	.75*	.28	.66*	-.16	.23	.06	-.41	-.86**				
23	GHQ- SS	0.70 (1.25)	-.35	.05	-.55	-.48	.05	-.09	.08	.06	-.26	-.43	-.65*	-.49	.07	.60	.21	.55	.03	.41	.16	.11	-.27	.90**			
24	GHQ- AI	1.50 (1.35)	-.07	.45	-.42	.04	.25	.19	.33	.48	-.14	-.27	-.69*	-.19	.48	.65*	.65*	.37	.34	.04	-.30	-.39	-.25	.73*	.56		
25	GHQ- SD	1.40 (2.01)	-.26	.26	-.59	-.49	.27	.28	-.04	.21	-.38	-.36	-.72*	-.37	.10	.60	.26	.52	-.09	.36	.01	-.15	-.79**	.95**	.80**	.65*	
26	GHQ- SevD	1.00 (2.16)	-.59	-.09	-.75*	-.67*	.07	-.05	-.26	-.07	-.56	-.52	-.76*	-.62	-.21	.77**	.01	.82**	-.56	-.01	.32	-.47	-.80**	.93**	.86**	.49	.87**

*Note.* PPI-R Total = Psychopathic Personality Inventory – Revised (PPI-R) total score; PPI-R FD = PPI-R Fearless Dominance; PPI-R SCI = PPI-R Self-Centred Impulsivity; PPI-R Cold = PPI-R Coldheartedness; PPI-R ME = PPI-R Machiavellian Egocentricity; PPI-R RN = PPI-R Rebellious Nonconformity; PPI-R BE = PPI-R Blame Externalisation; PPI-R CN = PPI-R Carefree Nonplanfulness; PPI-R SOI = PPI-R Social Influence; PPI-R F = PPI-R Fearlessness; PPI-R SI = PPI-R Stress Immunity; EPQ-RS-P = Eysenck Personality Questionnaire Revised Short scale (EPQ-RS) Psychoticism; EPQ-RS-E = EPQ-RS Extraversion; EPQ-RS-N = EPQ-RS Neuroticism; RS = Reward Sensitivity; PS = Punishment Sensitivity; TIPI-E = Ten-Item Personality Inventory (TIPI) Extraversion; TIPI-A = TIPI Agreeableness; TIPI-C = TIPI Conscientiousness; TIPI-ES = TIPI Emotional Stability; TIPI-O = TIPI Openness to Experience; GHQ-Total = GHQ total score ; GHQ-SS = General Health Questionnaire (GHQ) Somatic Symptoms; GHQ-AI = GHQ Anxiety and Insomnia; GHQ-SD = GHQ Social Dysfunction; GHQ-SDep = GHQ Severe Depression. \*\* $p \leq .01$ . \* $p \leq .05$ ,  $n = 11$ .

participants' global psychopathy and lower facets scores, the participant's data was not excluded from the analyses.

***Self-Report Psychopathic Personality Inventory-Revised:*** Profiles depicting both the informants' and participants' mean scores for the PPI-R Total, PPI-R Factors and PPI-R Content scales are displayed in Figure 4.1.

***Psychopathy Personality Inventory Revised: Total:*** Contrary to our prediction, the results in the present study revealed that courageous soldiers did not score highly on the global PPI-R Total score. A one-sample Student's *t*-test showed that the participants' self-rated PPI-R Total mean score ( $M = 53.91$ ,  $SD=10.40$ ) was not significantly different than the normative distribution mean of 50 ( $SD = 10$ ),  $t(10) = 1.24$ ,  $p = .120$ ,  $r = .37$ . The present findings suggest that the participants did not perceive themselves to be high on the global psychopathic construct.



**Figure 4.1.** Profile plots of participant and informant mean scores for the PPI-R Total, PPI-R Factors and PPI-R Content scales. The normative distribution mean is indicated at with a horizontal line at a T score of 50.

*Note.* PPI-R ME = PPI-R Machiavellian Egocentricity; PPI-R RN = PPI-R Rebellious Nonconformity; PPI-R BE = PPI-R Blame Externalisation; PPI-R CN = PPI-R Carefree Nonplanfulness; PPI-R SOI = PPI-R Social Influence; PPI-R F = PPI-R Fearlessness; PPI-R STI = PPI-R Stress Immunity; PPI-R Total = Psychopathic Personality Inventory – Revised (PPI-R) total score; PPI-R SCI = PPI-R Self-Centred Impulsivity; PPI-R FD = PPI-R Fearless Dominance; PPI-R C = PPI-R Coldheartedness.

As psychopathy is a conglomerate of heterogeneous constructs, we also examined the higher order Factors and Content scales of the PPI-R to establish if the participants deviated from the normative distribution value on any of these factors or scales. Closer inspection of the self-rated PPI-R data, showed that the participants' cumulative score for PPI-R Fearless Dominance ( $M = 55.45$ ,  $SD = 11.29$ ) proved to be the highest amongst the three PPI-R factor scores. In contrast to Fearless Dominance, Coldheartedness ( $M = 50.55$ ,  $SD = 7.93$ ) was the lowest amongst the three self-rated PPI-R factors. Where, the Self-Centred Impulsivity factor score ( $M = 51.54$ ,  $SD = 8.18$ ) was slightly above the reported value for Coldheartedness.

*Psychopathy Personality Inventory Revised: Fearless Dominance Factor:* Findings in the present study revealed no support for the hypothesis predicting that the participants would rate high on the Fearless Dominance factor. Results from a one-sample Student's t-test revealed that courageous soldiers ( $M = 55.45$ ,  $SD = 11.29$ ) did not significantly differ from the normative population mean ( $M = 50.00$ ,  $SD = 10.00$ ) on the Fearless Dominance factor,  $t(10) = 1.60$ ,  $p = .70$ ,  $r = .45$ .

Closer examination of the three Fearless Dominance content scales (i.e., Fearlessness, Stress Immunity, Social Influence) showed that courageous soldiers ( $M = 57.36$ ,  $SD = 11.86$ ) were higher on Fearlessness than the normative population distribution value ( $M = 50.00$ ,  $SD = 10.00$ ). A one-sample Student's t-test showed that the difference was significantly higher,  $t(10) = 2.05$ ,  $p < .05$ ,  $r = .45$ . This finding indicates that the participants perceived themselves to be unafraid of physical danger.

Contrary to our expectation, results from the one-sample Student's t-test showed that courageous soldiers ( $M = 55.18$ ,  $SD = 9.69$ ) did not significantly differ from the normative population distribution mean ( $M = 50.00$ ,  $SD = 10.00$ ) on Stress Immunity,  $t(10) = 1.77$ ,  $p = .053$ ,  $r = .48$ . The result did approach significance, suggesting that courageous soldiers may

be more immune to stressors than the normative population. A bigger sample size may have been able to provide a more definitive significant value.

A one-sample Student's t-test showed that courageous soldiers ( $M = 50.18$ ,  $SD = 10.65$ ) were not significantly different from the normative population distribution value ( $M = 50.00$ ,  $SD = 10.00$ ) on Social Influence,  $t(10) = .057$ ,  $p = .95$ ,  $r = .01$ . This result suggests that courageous soldiers did not perceive themselves to be manipulative, engaging, or able to influence others. Collectively the results indicate why courageous soldiers are not significantly different from the normative population distribution mean on the Fearless Dominance factor. Compared to the normative population distribution score, the participants rated significantly higher on the Fearlessness scale, but not on the Stress Immunity or Social Influences scales. These results suggest that courageous soldiers perceive themselves to be unafraid of physical danger and to a certain extent, are able to remain calm under stressful circumstances. However, they did not perceive themselves to be able to engage and influence others.

*Psychopathy Personality Inventory Revised: Self-Centred Impulsivity Factor:* As predicted, results from a one-sample Student's t-test revealed that the Self-Centred Impulsivity factor ( $M = 51.55$ ,  $SD = 8.19$ ) was not significantly dissimilar than the normative population mean ( $M = 50.00$ ,  $SD = 10.00$ ),  $t(10) = .626$ ,  $p = .272$ ,  $r = .19$ . This finding suggests that the participants did not perceive themselves to be affiliated to indices of anti-social behaviour.

Further, contrary to our prediction, results in the present study did not provide support for the hypothesis predicting that courageous soldiers will rate high on Carefree Nonplanfulness. Findings from a one-sample t-test showed that courageous soldiers ( $M = 50.73$ ,  $SD = 13.62$ ) were not significantly different from the population normative

distribution value ( $M = 50.00$ ,  $SD = 10.00$ ) on Carefree Nonplanfulness,  $t(10) = .177$ ,  $p = .432$ ,  $r = .05$ , suggesting that participants did not perceive themselves to be impulsive.

Closer examination of the remaining scales from the Self-Centred Impulsivity factor revealed that the courageous soldiers rated higher, but not significantly different from the normative population distribution value on: Blame Externalisation ( $M = 51.64$ ,  $SD = 6.23$ ),  $t(10) = .177$ ,  $p = .40$ ,  $r = .27$ ; Machiavellian Egocentricity ( $M = 51.00$ ,  $SD = 9.72$ ),  $t(10) = .341$ ,  $p = .740$ ,  $r = .10$ ; and Rebellious Nonconformity ( $M = 51.55$ ,  $SD = 4.27$ ),  $t(10) = 1.19$ ,  $p = .258$ ,  $r = .35$ .

Collectively, the results suggest that courageous soldiers did not perceive themselves to engage or be associated with anti-social behaviours. Thus, the results support our hypothesis predicting that courageous soldiers will rate low on Self-Centred Impulsivity. However, no support was obtained predicting that courageous soldiers will be impulsive.

*Psychopathy Personality Inventory Revised: Coldheartedness Factor:* Results from a one-sample t-test revealed that courageous soldiers ( $M = 50.55$ ,  $SD = 7.93$ ) were not significantly different from the normative population distribution mean ( $M = 50.00$ ,  $SD = 10.00$ ) on Coldheartedness,  $t(10) = .228$ ,  $p = .412$ ,  $r = .02$ . The non-significant difference indicates that the participants did not perceive themselves to exhibit traits and behaviours associated with Coldheartedness

***Profile analysis: Self-report vs. Normative population distribution psychopathy profile:*** To determine if the participants' psychopathy profile significantly differed from that of the normative population distribution profile, a MANOVA was performed. The MANOVA was performed as an omnibus test to control for type I errors that may have occurred from performing multiple one-way Student's t-tests. The MANOVA was performed on the 8 sub-scales of the PPI-R: Machiavellian egocentricity, rebellious nonconformity, blame externalization, carefree nonplanfulness, social influence, fearlessness, stress immunity

and coldheartedness. The grouping variable was divided into self-report and normative population distribution group. Multivariate analysis of variance results showed that the multivariate result was significant, Pillai's trace ( $V = .691$ ,  $F(8,13) = .3.62$ ,  $p < .05$ ), indicating that there was a significant difference between courageous soldiers and the normative population distribution. However, separate univariate ANOVAs on the dependent variables revealed non-significant effects on: Machiavellian egocentricity,  $F(1,20) = .11$ ,  $p = .74$ ; rebellious nonconformity,  $F(1,20) = 1.43$ ,  $p = .25$ ; blame externalization,  $F(1,20) = .76$ ,  $p = .39$ ; carefree nonplanfulness,  $F(1,20) = .03$ ,  $p = .86$ ; social influence,  $F(1,20) = .00$ ,  $p = .967$ ; fearlessness,  $F(1,20) = 4.24$ ,  $p = .053$ ; stress immunity,  $F(1,20) = 3.14$ ,  $p = .09$ ; and coldheartedness,  $F(1,20) = .05$ ,  $p = .82$ . As can be seen in Figure 4.2, the individual profiles suggest that there were large individual differences in the pattern of responding on the different PPI-R Content scales, implying that there was not a clear profile amongst participants.

***Eysenck Personality Questionnaire – Revised Short version:*** One sample Student's t-tests were performed to determine if courageous soldiers differed from a normative population distribution on EPQ-RS derived personalities. As the current study had no control group, the courageous soldiers were compared to a sample from the EPQ-RS measure. To be comparable with the mean age of the courageous soldiers ( $M = 32.54$ ,  $SD = 8.66$ ), the EPQ-RS personality scale values were obtained from the sample containing 53 males in the 31-40 years age group (See, Eysenk et al., 1985). Results from the one- sample Student's t-test revealed that the courageous military participants scored higher on psychoticism ( $M = 3.50$ ,  $SD = 1.90$ ) than the normative sample ( $M = 3.23$ ,  $SD = 1.82$ ). This difference was not significant,  $t(9) = .449$ ,  $p = .664$  and yielded a small-sized effect  $r = .14$ , however, the observed difference between the two samples was non-significant,  $t(9) = 1.64$ ,  $p = .134$ ,  $r =$

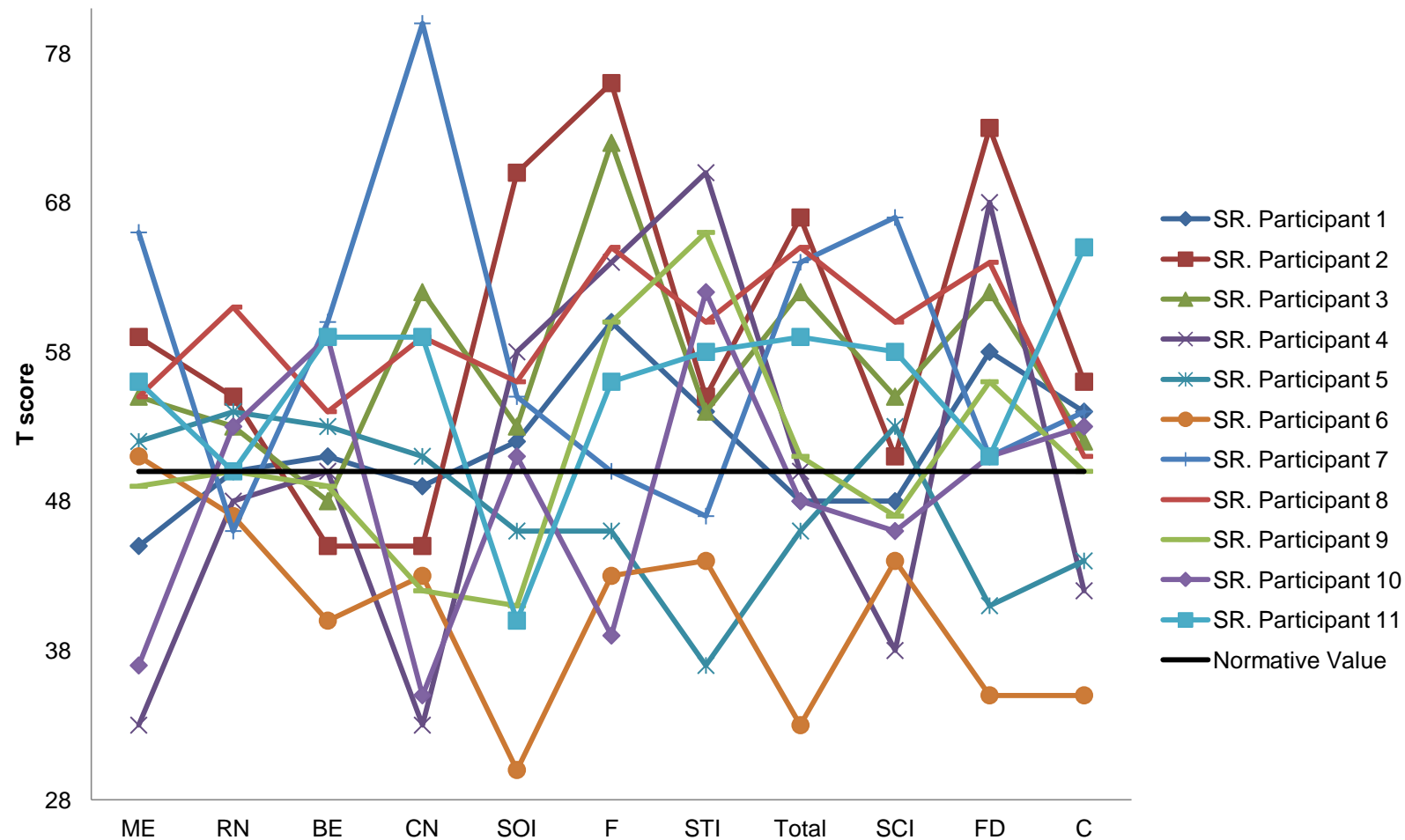


Figure 4.2. PPI-R Profile plots of participants, where the normative distribution is represented with a horizontal line at a t-score of 50.

Note. PPI-R ME = PPI-R Machiavellian Egocentricity; PPI-R RN = PPI-R Rebellious Nonconformity; PPI-R BE = PPI-R Blame Externalisation; PPI-R CN = PPI-R Carefree Nonplanfulness; PPI-R SOI = PPI-R Social Influence; PPI-R F = PPI-R Fearlessness; PPI-R STI = PPI-R Stress Immunity; PPI-R Total = Psychopathic Personality Inventory – Revised (PPI-R) Total score; PPI-R SCI = PPI-R Self-Centred Impulsivity; PPI-R FD = PPI-R Fearless Dominance; PPI-R C = PPI-R Coldheartedness.



48. In addition, courageous soldiers reported lower neuroticism ( $M = 4.20$ ,  $SD = 3.74$ ) levels than the normative sample ( $M = 5.75$ ,  $SD = 3.46$ ), suggesting that the former were more emotionally stable; however, this difference between the two samples was non-significant  $t(9) = -1.31$ ,  $p = .22$ ,  $r = .40$ .

Collectively the results indicate that courageous soldiers did not significantly differ from a normative population sample on EPQ-RS derived personalities. Compared to the normative population, courageous soldiers rated higher on psychoticism and extraversion personality dimensions, but lower on the neuroticism dimension. This result suggests that courageous soldiers may be more emotionally stable, energetic and tough-minded than the normative population sample.

***Ten Item Personality Inventory:*** One sample Student's t-tests were performed to determine if the courageous soldiers' TIPI derived personalities significantly differed from that of a normative sample. The normative population sample consisted of the male sample ( $n = 633$ ) who was tested during the development of the TIPI measure (See, Gosling et al., 2003). Results in the present study revealed that courageous soldiers ( $M = 5.11$ ,  $SD = 1.40$ ) were more extraverted than the normative sample ( $M = 4.25$ ,  $SD = 1.41$ ). The difference between the two samples was non-significant,  $t(8) = 1.83$ ,  $p = .104$ ,  $r = .54$ .

Further, results in the present study revealed that courageous soldiers ( $M = 5.05$ ,  $SD = 1.10$ ) did not significantly differ from the normative sample ( $M = 5.06$ ,  $SD = 1.10$ ) on agreeableness,  $t(8) = -.012$ ,  $p = .99$ ,  $r = .00$ . Compared to the normative sample ( $M = 5.19$ ,  $SD = 1.15$ ), courageous soldiers ( $M = 5.61$ ,  $SD = 1.02$ ) were more conscientious. However, the difference between the two samples was non-significant,  $t(8) = 1.23$ ,  $p = .252$ ,  $r = .40$ . Results further revealed that there were no significant differences between courageous soldiers ( $M = 5.83$ ,  $SD = 1.06$ ) and the normative sample ( $M = 5.13$ ,  $SD = 1.31$ ) on emotional stability,  $t(8) = 1.98$ ,  $p = .08$ ,  $r = .57$ . Lastly, courageous soldiers ( $M = 5.11$ ,  $SD = 1.21$ )

scored lower on the openness personality scale than the normative sample ( $M = 5.34$ ,  $SD = 1.09$ ). However, this difference was non-significant  $t(8) = -.56$ ,  $p = .294$ ,  $r = .20$ .

Collectively the results indicated that courageous soldiers did not significantly differ from the normative sample on any of the TIPI derived personality dimensions. The findings suggested that courageous soldiers are higher on extraversion, conscientiousness and emotional stability dimensions than the normative sample. In contrast, courageous soldiers rated lower than the normative sample on the openness dimension. Lastly, the findings indicated that both the courageous and normative sample displayed similar means for the agreeableness personality dimension.

***Punishment and Reward Sensitivity:*** Limited research is available where punishment and reward sensitivities are derived from EPQ-RS scales. One notable study (Hardy, Bell, & Beattie, 2014) deriving punishment and reward sensitivities from EPQ-RS scales, examined the relationship between mentally tough behaviour and reinforcement sensitivities in high-level cricketers. The high-level cricketers within the Hardy et al. (2014) study had experience of maintaining high level performance under high stress circumstances. Therefore, the EPQ-RS derived punishment and reward sensitivity values collected from the high level cricketers were used for comparative purposes within the present study.

Results from a one-sample Student's t-test showed no support for the hypothesis predicting that courageous soldiers will rate lower than the normative sample on punishment sensitivity. Findings in the present study showed that courageous soldiers ( $M = 8.60$ ,  $SD = 9.40$ ) were indeed lower than the high-level cricketers ( $M = 9.24$ ,  $SD = 7.43$ ) on punishment sensitivity. However, the difference was not significant,  $t(9) = -.21$ ,  $p = .417$ ,  $r = .07$ . Further, results within the present the study did not support the prediction that courageous soldiers will rate higher than the normative sample on reward sensitivity. Results from a one-sample Student's t-test showed that courageous soldiers ( $M = 24.30$ ,  $SD = 8.62$ ) were not

significantly different than the high level cricketers ( $M = 24.36$ ,  $SD = 5.59$ ) on reward sensitivity,  $t(9) = -.22$ ,  $p = .491$ ,  $r = .06$ .

**General Health Questionnaire – Total:** To determine if the courageous soldiers suffer from any psychological distress, the suggested threshold score of 5 (Goldberg et al., 1997; Makowska et al., 2002) was used during analysis. A score above the threshold value will indicate the presence of psychological distress, whereas a score below the threshold value will indicate a more ‘normative’ distress state. On average, courageous soldiers’ GHQ 28 Total score ( $M = 4.5$ ,  $SD = 6.13$ ) was below the threshold value. The result from a one-sample Student’s t-test was non-significant,  $t(9) = -.26$ ,  $p = .802$ ,  $r = .08$ ; indicating that courageous soldiers were not experiencing psychological distress.

#### **4.3.1.2. Informant-Rated Measures:**

**Informant-Rated Psychopathy Personality Inventory:** Means, standard deviations and correlations for the informant-rated PPI-R scores with the participants’ self-rated PPI-R scores are displayed in Table 4.2. The means and standard deviations for the informant rated PPI-R global and factor scores were calculated as t-scores.

**Informant Rated Psychopathic Personality Inventory Revised: Total:** The profile plot of the informant rated PPI-R data in Figure 4.1 shows that the informants viewed participants slightly different from how participants viewed themselves. Results from a paired samples t-test, revealed that informants ( $M = 56.00$ ,  $SD = 11.22$ ) perceived participants to be higher on the global psychopathy dimension than participants ( $M = 53.90$ ,  $SD = 10.39$ ) perceived themselves to be. The difference was non-significant,  $t(10) = -.79$ ,  $p = .44$ ,  $r = .24$ .

**Informant Rated Psychopathic Personality Inventory Revised: Fearless Dominance Factor:** Results in the present study showed that informants ( $M = 59.45$ ,  $SD = 11.66$ ) rated participants ( $M = 55.45$ ,  $SD = 11.29$ ) higher on the content scales that made up the Fearless Dominance factor, than how courageous participants rated themselves. A paired samples t-

**Table 4.2**

Means, Standard Deviations and Intercorrelations among Participant's Self Rated PPI-R and Informant Rated PPI-R Scales

	Mean (SD)	PPI-R SR Total	PPI-R SR SCI	PPI-R SR FD	PPI-R SR Cold	PPI-R SR ME	PPI-R SR RN	PPI-R SR BE	PPI-R SR CN	PPI-R SR SOI	PPI-R SR F	PPI-R SR STI
1. PPI-R Total	56.00 (11.22)	.67*	.28	.65*	.72*	.03	.39	.47	.16	.75**	.40	.31
2. PPI-R Inf SCI	48.18 (10.02)	.45	.40	.27	.73**	.09	.26	.59	.28	.32	.07	.18
3. PPI-R Inf FD	59.45 (11.66)	.62*	.08	.72*	.33	-.01	.44	.15	-.02	.93**	.49	.20
4. PPI-R Inf Cold	58.00 (8.04)	-.02	-.21	.20	.09	-.05	-.43	-.24	-.05	-.19	.39	.35
5. PPI-R Inf ME	44.82 (8.93)	.37	.17	.30	.81**	.03	.16	.35	.06	.23	.20	.25
6. PPI-R Inf RN	50.91 (9.85)	.23	.17	.15	.29	-.05	.63*	.36	-.06	.38	-.09	-.00
7. PPI-R Inf BE	51.18 (9.31)	-.03	.13	-.06	.38	-.24	.07	.55	.09	-.01	-.30	.13
8. PPI-R Inf CN	47.18 (11.50)	.71*	.71*	.35	.68*	.51	-.04	.51	.75**	.29	.34	.17
9. PPI-R Inf SOI	53.82 (15.08)	.41	.02	.53	.25	-.10	.29	.23	-.05	.86**	.27	.02
10. PPI-R Inf F	59.64 (9.49)	.64*	.44	.45	.31	.45	.54	-.06	.38	.57	.50	-.11
11. PPI-R Inf STI	58.45 (10.71)	.31	-.31	.60	.17	-.38	.14	.09	-.40	.43	.40	.68*

*Note.* PPI-R SR Total = Psychopathic Personality Inventory – Revised (PPI-R) Participant self-rated (SR) total score; PPI-R SR FD = PPI-R SR Fearless Dominance; PPI-R SR SCI = PPI-R SR Self-Centred Impulsivity; PPI-R SR Cold = PPI-R SR Coldheartedness; PPI-R SR ME = PPI-R SR Machiavellian Egocentricity; PPI-R SR RN = PPI-R SR Rebellious Nonconformity; PPI-R SR BE = PPI-R SR Blame Externalisation; PPI-R SR CN = PPI-R SR Carefree Nonplanfulness; PPI-R SR SOI = PPI-R SR Social Influence; PPI-R SR F = PPI-R SR Fearlessness; PPI-R SR SI = PPI-R SR Stress Immunity; PPI-R Total = Psychopathic Personality Inventory – Revised (PPI-R) Informant rated (Inf) total score; PPI-R Inf FD = PPI-R Inf Fearless Dominance; PPI-R Inf SCI = PPI-R Inf Self-Centred Impulsivity; PPI-R Inf Cold = PPI-R Inf Coldheartedness; PPI-R Inf ME = PPI-R Inf Machiavellian Egocentricity; PPI-R Inf RN = PPI-R Inf Rebellious Nonconformity; PPI-R Inf BE = PPI-R Inf Blame Externalisation; PPI-R Inf CN = PPI-R Inf Carefree Nonplanfulness; PPI-R Inf SOI = PPI-R Social Inf Influence; PPI-R Inf F = PPI-R Inf Fearlessness; PPI-R Inf SI = PPI-R Inf Stress Immunity.

$n = 11$ , \*\*  $p \leq .01$ . \*  $p \leq .05$ .

test revealed that the difference between the informants and courageous soldiers were not significantly different from one another,  $t(10) = -1.55, p = .152, r = .44$ . Interestingly, a one sample Student's t-test revealed that there was a significant difference between the informant-rated and normative population distribution value ( $M = 50.00, SD = 10.00$ ) on Fearless Dominance  $t(10) = 2.69, p < .05, r = .67$ ; indicating that the informants viewed courageous participants to have a tendency toward lack of physical harm and to have low levels of worry and anxiety.

Examination of the Content scales that made up the Fearless Dominance factor, showed that informants ( $M = 59.64, SD = 9.49$ ) perceived courageous participants ( $M = 57.36, SD = 11.85$ ) to be more fearless than courageous participants rated themselves to be. Results from a paired samples t-test indicated that the difference between informants and courageous soldiers on Fearless was not significant,  $t(10) = -.69, p = .50, r = .21$ . However, a one sample Student's t-test revealed that there was a significant difference between the normative population distribution value ( $M = 50.00, SD = 10.00$ ) and the informant rating on Fearlessness,  $t(10) = 3.36, p < .05, r = .72$ ; indicating that informants perceived courageous soldiers to exhibit a willingness to take physical risks and to have low anxiety levels.

Similar to Fearlessness, the informants ( $M = 58.45, SD = 10.71$ ) viewed the courageous participants ( $M = 55.18, SD = 9.69$ ) to be higher on Stress Immunity than how courageous participants perceived themselves to be. Results from the paired samples t-test showed that the difference was not significant,  $t(10) = -1.32, p = .214, r = .38$ . A one sample Student's t-test indicated that the informant rating on Stress Immunity did significantly differ from the normative population distribution value ( $M = 50.00, SD = 10.00$ ),  $t(10) = 2.61, p < .05, r = .63$ . These findings imply that informants perceived the courageous soldiers to have low trait anxiety, enabling them to remain calm during stressful circumstances.

Compared to the self-rated values of courageous soldiers ( $M = 50.18$ ,  $SD = 10.65$ ), informants ( $M = 53.81$ ,  $SD = 15.07$ ) rated courageous soldiers higher on the Social Influence factor. Results from a paired samples t-test indicated that the difference between the two groups was not significant,  $t(10) = -1.51$ ,  $p = .16$ ,  $r = .44$ . Results from a one sample Student's t-test revealed that there was no significant difference between the informant-rated and normative population distribution value ( $M = 50.00$ ,  $SD = 10.00$ ),  $t(10) = .840$ ,  $p = .421$ ,  $r = .25$ . The result for Social Influence suggests that informants perceived courageous soldiers to have a modest ability to make an impact and influence others.

Collectively, the findings indicated that there were no significant differences between the informants and courageous soldiers on the three content scales forming the Fearless Dominance factor. However, there were significant differences between informant rated values and the normative population distribution values on Fearlessness and Stress Immunity. Thus, compared to a normative sample, the informants perceived courageous soldiers to have low levels of anticipatory physical anxiety, low levels of worry, as well as low levels of tension.

*Informant Rated Psychopathic Personality Inventory Revised: Self-Centred*

*Impulsivity Factor:* Results in the present study indicated that informants ( $M = 48.18$ ,  $SD = 10.02$ ) rated courageous soldiers ( $M = 51.54$ ,  $SD = 8.18$ ) lower on Self-Centred Impulsivity factor than how courageous soldiers rated themselves. A paired samples t-test revealed that the difference between the two groups was not significant,  $t(10) = 1.10$ ,  $p = .29$ ,  $r = .33$ . This finding suggests that informants had a more contracted perception of the participants' traits and behaviours associated with the Self-Centred Impulsivity factor and related content scales. In addition, findings indicated that the informant rated Self-Centred Impulsivity score was lower than that of the normative population distribution value ( $M = 50.00$ ,  $SD = .00$ ). Results

from a one sample t-test revealed that the observed difference between the two means was not significant  $t(10) = -.60, p = .56, r = .18$ .

Examination of the four Content scales that form the Self-Centred Impulsivity factor revealed that the informant rated mean scores on all four content scales, were lower than that of the participants'. Results from a one sample Student's t-test revealed that there was no significant difference between the informant ( $M = 47.18, SD = 11.50$ ) and courageous soldiers' ( $M = 50.72, SD = 13.61$ ) self-rated score on Carefree Nonplanfulness,  $t(10) = 1.300, p = .22, r = .38$ . Suggesting, the informants did not perceive courageous participants to be impulsive. Further, results from a one sample t-test indicated that informants did not perceive courageous soldiers to be significantly different from the normative population distribution value ( $M = 50.00, SD = .00$ ),  $t(10) = -.813, p = .43, r = .24$ . Interestingly, the informant rated value was below the normative population distribution value, which suggest that informants perceived courageous soldiers to be very adept at planning ahead and learning from their mistakes.

The courageous soldiers ( $M = 51.63, SD = 6.23$ ) were rated lower by informants ( $M = 51.18, SD = 9.31$ ) on Blame Externalisation. The observed difference between the two groups was not significant,  $t(10) = .193, p = .85, r = .06$ . Thus, the informants did not perceive courageous soldiers to blame others when they are at fault. The informants did not perceive the courageous participants to be significantly different from the normative population distribution value ( $M = 50.00, SD = .00$ ),  $t(10) = .421, p = .68, r = .13$ .

Compared to the courageous participants ( $M = 51.00, SD = 8.93$ ), informants ( $M = 44.82, SD = 8.93$ ) rated the courageous soldiers to be lower on Machiavellian Egocentricity. This difference was not significant,  $t(10) = 1.63, p = .134, r = .45$ . In addition, the informants perceived courageous soldiers to be lower than the normative population distribution value ( $M = 50.00, SD = .00$ ) on Machiavellian Egocentricity. The difference between the two

groups was not significant,  $t(10) = -1.92, p = .08, r = .51$ ; however, the difference did approach significance. These findings suggest that informants perceived the courageous participants to be more altruistic and to operate within the rules.

The results within the present study showed that informants ( $M = 50.91, SD = 9.85$ ) perceived the participants ( $M = 51.54, SD = 4.27$ ) to be lower on the PPI-R Rebellious Nonconformity content scale than what participants perceive themselves to be. Results from a paired samples t-test revealed that the difference was not significant,  $t(10) = .27, p = .79, r = .08$ . Results further indicated that informants did not perceive courageous participants to be different from the normative population distribution value ( $M = 50.00, SD = .00$ ). A one sample Student's t-test indicated that the difference was not significant,  $t(10) = .306, p = .76, r = .09$ . These findings indicate that informants perceived the courageous participants not to exhibit anti-authoritative attitude or to be susceptible to boredom.

Collectively, these results indicated that informants did not perceive courageous participants to be impulsive, self-centred or to blame others for their own mistakes. Indeed, the findings indicated that informants held a more protracted view of the courageous soldiers. The findings further suggest that informants perceived the courageous soldiers to be altruistic.

*Informant Rated Psychopathic Personality Inventory Revised: Coldheartedness Factor:* Results showed that informants ( $M = 58.00, SD = 8.04$ ) viewed participants ( $M = 50.54, SD = 7.92$ ) to be more Coldhearted than the participants viewed themselves, as the informant-rated Coldheartedness factor was higher than that of the participants' self-rated score. Results from paired samples t-tests revealed that there was a significant difference between the informants and courageous soldiers on Coldheartedness,  $t(10) = -2.30, p < .05, r = .589$ . In addition, results from a one sample Student's t-test indicated that there was a significant difference between the informant-rated score and the normative population

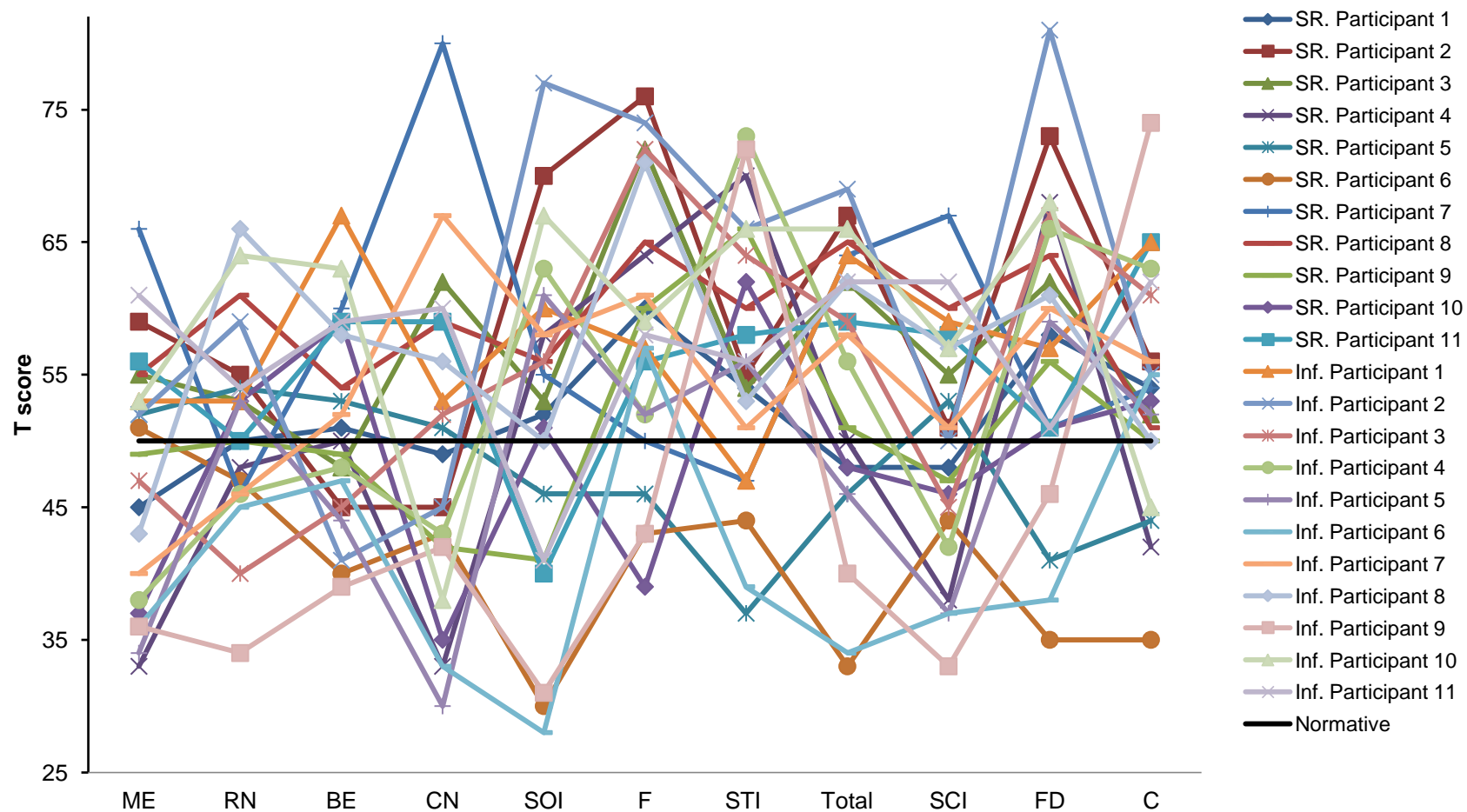


distribution value  $t(10) = 3.30, p < .05, r = .72$ . Taken together, the results indicate that informants perceived courageous soldiers to lack empathy and to be both guiltless and callous.

**Profile analysis:** A profile analysis was performed to determine if the informant-rated data profile significantly differed from that of the self-rated data profile of the courageous participants. The profile analysis was performed by conducting a Repeated Measures MANOVA on the 8 subscales of the PPI-R: i.e., Fearlessness, Stress Immunity, Social Influence, Carefree Nonplanfulness, Blame Externalization, Machiavellian Egocentricity, Rebellious Non-Conformity and Coldheartedness. The grouping variable was divided into courageous soldiers and informants. The Repeated Measures MANOVA was performed as an omnibus test to control for type I errors that may have occurred from performing multiple paired-samples t-tests.

Results indicated that the Wilks Lambda multivariate test of parallelism was not significant,  $F(1, 10) = 1.27, p = .466$ , partial  $\eta^2 = .77$ . This finding indicates that there was no significant difference between the profiles of courageous soldiers and that of the informant data. As can be seen in Figure 4.3, there were large individual differences in the patterns of responding on the different PPI-R Content scales, implying that there was not a clear profile amongst the participants and informants.

**4.3.1.3. Zero Order Correlations between PPI-R self-report data and PPI-R informant-rated data:** Correlations between PPI-R informant-rated and PPI-R self-rated psychopathy scores are presented in Table 4.2. It should be noted that the current study is based on a very small sample. Thus the magnitude of correlations is unstable and should be interpreted with caution. All significant correlations reported here are positively associated. Correlations indicated that there was a significant relationship between self-rated PPI-R Total and informant-rated PPI-R Total,  $r = .67, p < .05$ . In addition, self-report PPI-R factors



*Figure 4.3.* PPI-R Profile plots of participant and informant data, where the normative distribution is represented with a horizontal line at a t-score of 50.

*Note.* PPI-R ME = PPI-R Machiavellian Egocentricity; PPI-R RN = PPI-R Rebellious Nonconformity; PPI-R BE = PPI-R Blame Externalisation; PPI-R CN = PPI-R Carefree Nonplanfulness; PPI-R SOI = PPI-R Social Influence; PPI-R F = PPI-R Fearlessness; PPI-R SI = PPI-R Stress Immunity; PPI-R Total = Psychopathic Personality Inventory – Revised (PPI-R) total score; PPI-R SCI = PPI-R Self-Centred Impulsivity; PPI-R FD = PPI-R Fearless Dominance; PPI-R C = PPI-R Coldheartedness.

Fearless Dominance,  $r = 65$ ,  $p < .05$  and Coldheartedness,  $r = 72$ ,  $p < .05$  proved to be significantly related to informant-rated PPI-R Total; in addition, self-report PPI-R Social Influence was also correlated with informant-rated PPI-R Total,  $r = 75$ ,  $p < .01$ . Further, self-report PPI-R Total was significantly correlated to informant-rated: Fearless Dominance,  $r = 62$ , Carefree Nonplanfulness,  $r = 71$  and Fearlessness,  $r = 64$  (all  $ps < .05$ ). In addition, self-report PPI-R Self-Centred Impulsivity factor was significantly related to informant-rated PPI-R Carefree Nonplanfulness,  $r = 71$ ,  $p < .05$ .

There was a significant relationship between self-report PPI-R Fearless Dominance factor and the informant-rated PPI-R Fearless Dominance factor,  $r = 72$ ,  $p < .05$ . The self-report PPI-R Coldheartedness factor was significantly correlated with informant-rated PPI-R: Self-Centred Impulsivity,  $r = 73$ ,  $p < .01$ , Machiavellian Egocentricity,  $r = 81$ ,  $p < .01$  and Carefree Nonplanfulness,  $r = 68$ ,  $p < .05$ . Self-report PPI-R Rebellious Nonconformity was significantly related to informant-rated PPI-R Rebellious Nonconformity,  $r = 63$ ,  $p < .05$ ; and a significant relationship was observed between self-report PPI-R Carefree Nonplanfulness and informant-rated PPI-R Carefree Nonplanfulness,  $r = 75$ ,  $p < .01$ . Self-report PPI-R Stress Immunity was positively correlated with informant-rated PPI-R Stress Immunity,  $r = 68$ ,  $p < .05$ .

**4.3.1.4. Discussion:** By viewing the results obtained from both self-report and informant-rated data, it was possible to create a better understanding of the courageous soldiers' psychopathic personality profile. In the participants' collective profile, none of the self-rated mean scores were above 1 SD from the normative distribution value, suggesting that participants did not score highly on any of the psychopathic traits as measured by the PPI-R, thus there was no support for our overarching hypothesis that courageous soldiers will score high on psychopathy. Results supported our hypothesis that courageous soldiers will score low on the Self-Centred Impulsivity Factor, however there was no support for our

prediction that courageous soldiers will be impulsive. The Carefree Nonplanfulness scale which measures one's tendency to act before thinking was not significantly above the norm. In addition, there was only partial support for the hypothesis predicting that courageous soldiers would rate highly on the PPI-R Fearless Dominance Factor, as the difference between Fearless Dominance Factor scores of the participants and that of the normative distribution value did approach significance. In support, informants perceived participants to be significantly higher from the normative distribution score on the Fearless Dominance Factor due to a combination of elevated PPI-R Fearlessness and PPI-R Stress Immunity Content scale scores. This result is in line with the findings of Smith et al. (2013), who established a positive association between Fearless Dominance and war heroism in a U.S. President sample, as well as a positive association between Fearless Dominance and heroism and altruism (as measured by the Activity Frequency Inventory; Lilienfeld, 1998) towards strangers in an undergraduate sample.

The informant-rated score on the PPI-R Machiavellian Egocentricity Content scale was significantly lower than the normative distribution value, suggesting that informants perceived the courageous participants in the present study to be linked with altruistic behaviours, as opposed to being associated with behaviours such as taking advantage of others and being manipulative. According to Harvey et al. (2009), courageous behaviour is viewed as a moral behaviour that can be explained as a form of altruism.

One striking finding was the difference between participants and informants ratings for coldheartedness. The participants' self-rated score for the PPI-R Coldheartedness Factor was very similar to that of the normative distribution value. In contrast, the informant-rated PPI-R Coldheartedness Factor score was significantly higher than those of the participants and that of the normative distribution value, suggesting that informants perceived participants to be more coldhearted and exhibited traits and behaviours such as; lack of empathy, inability

to establish a deep-rooted relationship with others and an inability to sympathise with other's hardship. This opposing perspective of participants and informants is also mirrored in the very low and non-significant correlation between the informant-rated and participants' self-report PPI-R Coldheartedness Factors. The coldhearted traits and behaviours of the participants will be re-visited after the qualitative data have been examined.

It appears that the personality structure of the military courageous participants in the present study also contains elements of Extraversion (as measured by both the EPQR-S and TIPI) and Emotion Stability (as measured by the TIPI). The facets of Extraversion and Emotion Stability may help explain the courageous soldiers' higher scores on the PPI-R Fearlessness and PPI-R Stress Immunity Content scales, as Extraversion is associated with low levels of arousal and an approach temperament, where Emotion Stability (or in its reversed form, Neuroticism) is associated with; calm, collective and stable behaviours (See, Carver & Connor-Smith, 2010).

The participants in the present study did not show a significant difference to elite young cricketers (Hardy et al., 2014) on punishment and reward sensitivities. However, the insensitivity towards punishment stimuli may help explain the ability of participants to stay calm under stressful conditions. Insensitivity towards punishment involves a weak Behavioural Inhibition System (BIS), which in turn implies low anxiety levels (See, Bijttebier, Beck, Claes & Vandereycken, 2009). The low anxiety levels may have contributed to the performance efficiency of the courageous soldiers during their act, as the low anxiety may have resulted in the actors not having to fixate their attention on immediate threats to personal physical harm, but rather enabling them to focus on goal directed behaviours and the environment to save somebody else's life and complete their tasks. Insensitivity towards punishment may also account for the informants' perception that participants are Coldhearted, as a weak BIS is associated with emotional detachment (Johnson, Sellbom, &

Phillips, 2014). Interestingly, our finding is different to some recent findings in sport. For example, Hardy et al. (2014) found that high-level cricketers, who were perceived to be mentally tough by their coaches, were sensitive to punishment stimuli but insensitive to reward stimuli. Hardy et al. (2014) offered an explanation that the punishment sensitive high-level cricketers were able to detect threats early on, enabling them to maintain performance under pressure. Comparing soldiers and high-level cricketers' punishment sensitivity profiles is not straight forward, even though both soldiers and high-level cricketers can perceive their respective environments to be stressful, the soldiers, unlike high-level cricketers have to deal with more serious aspects of physical harm or even mortality.

Another finding within the present study was that courageous soldiers were below the threshold value of the GHQ Total. This finding implies low mental health problems and low psychological distress amongst participants, suggesting that participants are emotionally stable. Our findings are in line with Dekel et al. (2009), who have found that decorated courageous soldiers had better general psychological health than combat stress reaction casualties.

In summary, courageous soldiers did not significantly differ from the normative distribution value on any of the PPI-R psychopathy scales. However, findings did reveal that informants perceived courageous soldiers to be significantly higher than the normative distribution on PPI-R Fearlessness, PPI-R Stress Immunity and PPI-R Coldheartedness scales. Results further indicated that courageous soldiers did not view themselves to be sensation seekers, as there was no significant difference between the courageous participants and the normative distribution on the PPI-R Carefree Nonplanfulness scale. Exploratory analyses revealed that courageous soldiers were not significantly different than the normative sample on any of the EPQ-RS, TIPI, punishment or reward sensitivity derived personality dimensions. Results indicated that courageous soldiers were below the threshold value for the

GHQ total, implying low mental health problems and low psychological distress amongst courageous participants.

#### **4.3.2. Qualitative Results**

The Qualitative results are based on interviews conducted on the same 11 decorated military soldiers who were described in the quantitative analysis.

**4.3.2.1. Fear and Fearlessness:** This theme reflects the role that fear plays during courageous behaviour. Literature suggests that individuals, who perform courageous acts, may be fearless (Mowrer, 1960). However, Rachman (1978) questioned this view, as he regarded those individuals who continue to engage in fearful situations without experiencing fear as being fearless and not necessarily as being courageous. According to Rachman (2010) the purest form of courageous behaviour occurs when an individual approaches a dangerous situation despite experiencing fear.

**Acting courageously without fear:** Three participants reported to engage in courageous behaviour without experiencing any fear. The following quotations illustrate their fearlessness:

P8: “Personally, I don’t think that I have experienced fear, because it all just kicked in. You know what you need to do and you know what you’ve got to do.”

P11: “I remember the first three words that I said, ‘fuck, fuck, fuck’. But the feelings, ... I don’t remember having a particularly strong feeling. There was no outright fear, not even during the moment when I thought, ‘I am going to fucking die’ ... when standing up to help a fallen comrade. There wasn’t any real feeling behind it, it was more an acceptance of what might happen, ... more like a statement of possible fact than a nervousness or an excitement of the possibly dying, which was like why did I do this?”

P5: “I did not experience any fear ... ”

***Acting courageously while experiencing fear:*** In contrast to the three participants who did not experience any fear, six participants reported experiencing fear before and/or during their courageous act:

P9: "I experienced quite a lot of fear, especially walking over to the vehicle. That was probably the most fear I've ever gone through."

P6: "I did experience fear, but I was calm at the same time. Afterwards I thought, that was stupid, that was crazy, but at the time I felt quite content with myself."

P4: "I was scared. I had fear. I had that fear for myself, I had fear for other people, and I was petrified that my friend would not make it."

P1: "In this situation, there was an element of fear because I knew what the possible outcome could be."

P2: "I definitely felt like fuck, if I get up there I am probably going to get shot. That was a longer, almost duller fear. It was like, this is really dangerous, but you get that feeling of I don't know if it is acceptance or just oh well whatever happens, happens."

Even though one participant did report experiencing fear before the courageous act, the fear subsided once he engaged on the task at hand:

P3: "Like I said, the fear was before, not during or afterwards. It was during the chopper ride in, when I thought, ... right this is it now, we are going to get off the chopper and we are going to be fighting."

***Choking, thriving and low anxiety:*** This sub-section tries to account why fear did not have a debilitating effect on the participants' performance during their courageous act. Participants identified factors such as; desensitisation/habituation, confidence, control, training, calmness under pressure, thriving under pressure and the use of fear as a positive source of energy.



*Desensitisation / Habitual Effect:* Six of the courageous participants perceived that constant or regular exposure to stressful situations had resulted in them becoming desensitised to such a level that combat situations became less threatening to them. Experiencing the situations as less threatening or stressful may have improved their confidence, resulting in these courageous participants performing well under pressure:

P10: “The habitual experience is like anything in life, the first time you play rugby you’re not as good as the 50<sup>th</sup> time you play rugby. The first time you go on a zodiac with an engine, is maybe not as good as at time 10 when you know what you are doing. Success at one situation will contribute towards experience, which you know, will prepare you on how react the next time you encounter the same situation.”

P9: “Military experience gained on tours and training, helps you to deal with shitty circumstances a little bit more calmly, because if you are experienced in seeing things happen then it’s effect is less on you. For example, if someone claps against your ear for the first time, you shat yourself. If someone claps twice then you’re like, “Will you stop doing that now?” I think it’s a bit like that.”

P11: “I do think you get used to fire fights. I think your reaction towards it may be diminished”.

P7: “There had been sporadic shooting anyway and small fire fights within the place itself. Nothing major, a couple of RPGs<sup>3</sup>, the occasional mortar and one of the portable toilets got fucking obliterated. It was normal occurrences for our location at that point.”

P1: “It has happened so many times. It is just another job where they wanted some bigger guns present.”

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<sup>3</sup> Rocket Propelled Grenade (RPG)

The frequency and time intervals between contacts may have also influenced the desensitisation/ habitual effect; one participant stated:

P5: "... you do sort of get used to fire fights and you know what to expect. So if you haven't had a contact for a while, then you sort of don't get used to it, but because there were three or four contacts in quite a short period of time, you sort of get used to it".

*Confidence:* Confidence appears to have influenced performance in courageous behaviour as eight of the participants indicated that they were confident at the time of their courageous act:

P5: "I would say that confidence helped me to make the decision to act, because you get the confidence of knowing that when the section is providing heavy rapid fire, then the chances that the enemy will deliver accurate fire are minimal. So it does give you a lot of confidence in what you are doing."

P2: "My confidence was high before the incident. I have always been a confident person."

P1: "I think that I have always been confident but not overly confident."

P3: "I knew I could do the job, I knew I was as good as anyone. As a corporal, I remember thinking that some platoon sergeants were useless and that I could do a better job than that. So I never had that to look up to any of them."

P4: "But that's the thing, the reason I do them is because I know I can do them. It's not a challenge if you know you can do something."

Amongst those who said that they were confident, three participants identified various reasons as to why they felt confident at the time of their courageous act:

P10: "If one is facing a tank, or tanks, one knows how tanks operate in that environment, in what situations and environments they're dangerous and not so

dangerous, how to get rid of them and how to destroy them. So the more one knows, the more one is able to navigate this little channel confidently.”

P8: “I had to deal with it, as I’ve been trained to deal with mass casualties. Which again I think it just boils down to having that confidence in what you’ve done during the training and then trusting what you’ve been taught. Again, it worked in that dreadful situation, I’d like to think.”

P6: “I knew I wouldn’t drown because I was quite a good swimmer. You know, I have swum all my life as most kids do anyways.

*Perceived control:* Perceived control over one’s actions and over the situation may have helped participants to act courageously. Six of the participants mentioned that they were in control of their own actions as well as having control of the situation:

P5: “I would like to think that I was in complete control. I knew what I was going to do and I had my section ready to give suppressive fire towards the enemy. I just felt that I was in control and I knew what I was going to do.”

P2: “You are in control of your own actions ... you are empowered, aren’t you?”

P10: “Given that many of my actions were in reaction to those of the enemy and were therefore reactive and by definition therefore not under my own control. I nevertheless had full control over any actions, over which I had decision-making control at the time.”

P8: “The platoon commander was a bit worse for wear, but it was just a matter of taking control of the situation. As bad as it is, you’ve got to do it anyway. You’re not feeling great about it, but you’ve just got to rise above that feeling and just get things done.”

P7: “I’ve got control. There is nothing that I cannot do in a fire fight. There is nothing I cannot achieve because I can use my weapon and I can move my body.

There is no doubt, there is nothing else really. It is just what you have to do and it is a nice simple process. I know I have done it a 100 times before. There is no confusion, there is no doubt, it's just a fire fight, it's just the process of movements."

P6: "I have a lot of control."

*The role of training:* All of the participants perceived military training to have had an influence on them acting courageously. Four participants felt that training at specific military training centres provided them with the necessary skills and confidence. The exposure to realistic training scenarios practiced during these courses helped them to apply the learnt skills with confidence within a stressful combat situation, resulting in them being able to act calmly and with confidence under stressful circumstances.

P3: "Training at Brecon worked and stood me in good stead. All the processes followed exactly as you fucking trained for it, all those rehearsals, everything was fucking done. It was almost easier than doing an appointment on 'Seniors', because you haven't got some fucker shouting in your ear hole."

P5: "I think, doing the section commander's battle course down in Brecon, gives you a lot of confidence that you are doing the right thing. Once you start doing it, you think; 'oh well that is what I have learned' and then you start to evaluate what you are doing, well that is what I learned to do that in Brecon. You know it works and you can draw back on stuff from there to help with other stuff."

P7: "Training at the Depot was good. It just filled you with the information that you needed on a basic level. .... But just on a base level of doing things repeatedly, repeatedly and repeatedly, you don't even think about doing these things, they just happen which is an amazing skill that the body has to just conduct things that it knows how to do without even thinking about it. "

P6: "I suppose it is just the training that I received and I knew that the support I needed to do it was there. Just the basic training you know, for example, calling out target indications. You concentrate more on your basics at the time, rather than other things that are going on around you. Basically, it is our basic training that kicks in and you follow it like you do in Depot, the Battalion and on exercises."

Once the participants found themselves in combat situations, the drills that had been practiced over and over during training took over and became second nature. Seven of the participants perceived that training provided them with familiarity.

P11: The only thing about it is that your training does take over. I don't think you go onto auto pilot, because you still need to make decisions. I think maybe some things like; contact drills, your initial reaction to a contact, or your physical reaction to a contact, that is where your training takes over but everything else you have to try and make a decision."

P8: "Because of the training you went through, you have been put in that situation before, not for real but in training and I think it provides one with faith in the drills and the skills that they've got. There's the odd thing which you cannot account for. If that happens, you deal with that as and when it happens. I think you've just got to, as long as you are trained correctly and everything is done before you are put in that situation. "

P1: "I think it was just all my training that was kicking in, I was just thinking about how to do the shot. I didn't once think of how I was going to get out of this, it was more of how am I going to finish this? "

P10: "One is taught many things during training. This forms the basis upon which one can implement one's strategies/tactics in a contact and/or battle. It is always a combination of possession of the background knowledge of the basics and the

integration of these into one's own implementation of unique action based upon these basic frameworks.”

P9: “Military training definitely helped me during those incidents. Military training and me liking medical skills, helped. You can do courses and stuff, but if you are not interested in something, then you don’t really take it on and you don’t really remember what you’ve got at home anyway. If you like something and you like doing something, then you tend to put a little bit more into it and learn a bit more about it.”

P4: “Training played some part. As I have said earlier, I have trained to the point where I would push myself until I’d pass out. “

P2: “It even came down to the serials that we did during training ... Everyone is always shouting at you, there is a lot of pressure on you which it is designed to have. Whenever the sergeant came in and saw what we were doing, he would always look at me and go: ‘Stop! What’s happening?’ He was always very calm and I took that from him. So whenever anything happened and it got a bit much, I would have that in my head ... ‘Stop, what’s going on?’ He always said to me, ‘always treat everything like a training serial, even if it is real. So if it is a casualty go in and go: Right stop, what’s happening and what do I need to do and then you do it’. He was very good at it.”

*Calmness:* The ability to stay calm enabled four of the participants to perform well under stressful conditions:

P9: “Everybody else would be like: ‘I can’t believe he’s that calm when he does that’. Even referring to those incidents, they were all saying: “How can you be so calm? You did not panic. You did not start flapping. You just did it and you weren’t even worried about it.”

P6: “Well, basically I just wanted to engage the enemy. Everyone was calm about it and no one was running around frantically, which was quite good.”

Duty towards comrades, self-preservation and commitment towards the task, can be described as reasons for the ability to stay calm during stressful situations:

P10: “By focussing on the task at hand and due purely to normal human requirements of; (a) Attempting to stay alive in a difficult situation.

(b) Attempting to repulse and overcome the enemy in an attempt to do so.

(c) Assisting my colleagues to do so, as was my duty.”

In addition, one participant perceived the ability to stay calm during stressful situations made him accept the possible negative outcomes of his actions.

P3: “It is almost like you say. It is this calm feeling of right, if it happens it happens, sort of thing. It is almost like waiting for a round to hit you but not worrying too much about it.”

*Thriving Under Pressure:* Four of the participants perceived that their ability to thrive under pressure helped them to maintain their performance. Once they perceived themselves to be under pressure or being observed, they tend to perform well under difficult conditions:

P1: “A lot of my reports, if you were to read my references, say that I thrive exceptionally well under pressure. That’s when I am in my comfort zone. If there is no pressure it is a dull situation and it is boring..... “

P7: “I had a goal for the first time, for an extremely long time. I had a timeline which was even better and I had an amount of self-induced pressure which I seemed to thrive under. I like stressful situations and I like to be challenged.”

P2: “I actually work worse when there is no pressure. Sometimes I just don’t work. But I get, I hate to use the term as it sounds sexual, but I get turned on by it, as it flicks on a switch when its high pressure and it is important then you fire on all

cylinders. You are like; ‘this is important, this needs to get done, we’ve got a deadline or things are at risk’, so I get focused and motivated.”

P5: “Even now when I go and play rugby, if I am not the captain, I know I will perform, but if your people are looking to you, you just lead better, you just perform better..... “

It further appears that one participant’s ability to perform well under pressure may partially be influenced by training and tolerance towards stress:

P11: “I was doing quite well, because I got to do two company attacks as company commander at Sandhurst and they were rather stressful, but they allowed me to see what I was capable of achieving under great stress. My tolerance for stress is a lot higher than other people, partly because that is down to me as a person I think and a part of that will be to do with the way in which I trained and another part to the fact that being in the Parachute Regiment. I can’t let things get to me.”

*Use fear to their advantage:* Instead of allowing fear to have a detrimental effect on their behaviour, five participants managed to master their fear and enhance their performance during stressful situations:

P10: “This is a much wider subject. It is not whether one experiences fear or not, it is whether or not one allows fear to become one's Master, in which case one will often die under such circumstances, or whether one becomes the Master of one's own life and fear ..... In other words, mastery over the mental aspects of fear is required, whereas the physical results of the body instinctively reacting to situations of stress / fear is welcomed and required in order to lend assistance to the body to assist it in such a time and situation.”



P4: "Fear is energy. If you have fear, you have energy. Right, so I fear for my friend's life. The only thing that is going to combat that fear, is by trying to save my friend's life. I thought, I'd better try my hardest."

P7: "Like I said when I was in the fire fights and stuff, I was elevated, because I feel my heart going, I can feel my muscles getting full of blood, I know that it is the fear and I know that is the scariness, but all that it is, is my body prepping. It is just prepping itself and I know that it wants to run, I know that it wants to piss, I know that it wants to shit, but all I know is that if I just stick with it, it is just fuel and I can then do what I need to do. "

P1: "Of course there is a slight element of fear there, there always is. Whatever happens out there, whatever fire fight you are in, everybody shit themselves. I don't care what they say but you need that, that is what gives you your adrenaline, that's what makes you go. "

P5: "... I am not fearless, but I will sort of use that adrenaline from getting scared or adrenaline from the fear to accomplish it. "

***Fear of failure:*** An interesting fact that came to light is that five of the participants' greatest fear was that of failure, or not being able to perform during dangerous situations:

P3: "I remember thinking my greatest fear is; 'I don't know how I am going to react?' I would like to think I will react in a positive way once those rounds are going. We have never experienced that. My greatest fear is crumbling under the pressure and just fucking not being able to cope and either cry and just taking cover and not getting up again."

P11: "Failure is still an experience you can learn from as long as no one has been hurt or killed, but I don't like failure in myself at all. I hate not being good at something but I hate when something I have tried goes wrong. "

P2: “Other fears? maybe a fear of failing you know. I don’t want to ever fuck up, it’s not a terror but I definitely don’t want to fuck up or fail.”

P9: “I hate mess-ups. It is hard work and, like I say, it’s even harder when you don’t want to get anything wrong.”

P6: “Well everyone has got a fear of failure.”

One participant’s fear for failure appeared to prevent him from engaging in situations where the possibility of failure is high:

P5: “I am not fond of heights, I think part of me wants to try jumping out of an aeroplane, but I think the fear of failure is a lot greater. I don’t want to go up in an aeroplane and then bottle it at the door. I would rather not put myself in that situation.”

**Discussion:** An analysis of the interviews lends only partial support to the prediction that courageous soldiers will be fearless. Three of the participants’ lack of fear while performing their courageous act suggests that fear is not a necessity for courageous behaviour, thus supporting Mowrer’s (1960) link between fearlessness and courage. In contrast, five of the participants reported to have experienced fear at some point during their courageous act, thereby supporting the research of Rachman (1978) and Woodard (2004) who stated that fear should be a precondition for courageous behaviour. The valuation that those individuals who do not experience fear when approaching dangerous situations are fearless rather than courageous is challenged within the present results. Rachman (1991) as well as McGurk and Castro (2010) argued the premise that those fearless individuals may pose a danger to themselves or to others as they may be irresponsible during the process when acting. Within the present study, those who have reported not to have experienced any fear during their acts were sound of mind and emotionally stable. Acting with the knowledge that one may make the ultimate sacrifice to save somebody else’s life and in the process leave

loved ones behind can only be regarded as a selfless act of psychological and physical courageous behaviour rather than being classified as simply fearless.

Our results revealed that most of the participants acted courageously regardless of experiencing fear, where varying factors such as; desensitisation, confidence, perceived control, calmness, training, thriving under pressure and the use of fears, may have aided participants to deal with their fear effectively before it became debilitating to their performance. Training as well as previous exposure to combat situations prepared most of the participants mentally for what to expect during combat situations. The constant or regular exposure to stressful situations experienced by the participants during their deployments and training helped the participants to deal with / use their fear effectively. Further, having confidence in their own ability, skill and comrades contributed in the courageous soldiers' ability to act confidently within stressful situations, considering that confidence is an important factor in reducing fear (Gould, 2005).

Evidence from the above mentioned results suggest that the perception of being in control may have helped the participants to act courageously. The perception of being in control helped the courageous soldiers to stay calm, which created a feeling of empowerment and control of their own fate. Being calm under stressful situations may be a result of exposure to realistic military training, as the participants reported that exposure to realistic training scenarios helped them to apply the learnt skills with confidence within a stressful combat situation, resulting in them acting calmly under stressful situations.

The primary purpose of exposing trainees to realistic combat situations during training is to ensure that the soldiers maintain effective performance during real combat situations (Driskell, Salas, Johnston, & Wollert, 2008). From the interviews in the current study, it transpired that some courageous soldiers thrived under pressure as such circumstances provide them with a challenge. Individuals who feel challenged instead of

threatened will perform more effectively under pressure as they are less emotionally overwhelmed and more confident than those who do not feel challenged (Lazarus & Folkman, 1984). It can be hypothesised that being confident in one's abilities can lead to a person being more energised and as a result invest more effort in performing well under stressful conditions. Eysenck's (1982) early research on Processing Efficiency Theory states that where individuals have at least moderate confidence in their ability to succeed and when they are anxious about performance, they will invest extra effort.

It also came to light during the interviews that many courageous soldiers' greatest fear was that of failure. Unlike the high fear of failure sample reported in Birney, Burdick and Teevan (1969), the courageous soldiers within the present study performed well during threatening tasks. The fear of failure may have acted as a motivational factor for the courageous soldiers to perform well in difficult conditions, as they wanted to avoid embarrassment, humiliation and being viewed as incompetent by peers.

In summary, fear is not a prerequisite for being courageous. Most of the participants experienced fear during their courageous act with very few not experiencing any fear. It is argued that those who did not experience fear should also be classified as courageous and not as fearless. Varying factors such as; desensitisation, confidence, perceived control, calmness, training, thriving under pressure and the use of fears, may have helped participants to deal with fear and stress effectively thus enabling them to act courageously. It is interesting to note that many participants' greatest fear was that of failure, because they wanted to avoid being perceived as being incompetent by their peers.

**4.3.2.2. *Caring, Coldheartedness and Compartmentalisation:*** Research on decorated military bomb-disposal operators revealed that most courageous participants had: satisfactory and lasting relationships; were psychologically stable; and did not reveal a propensity towards anti-social behaviour (Rachman, 2010). In addition, research investigating the

differences and similarities between social courage and helpful behaviour indicated that the decision to engage in helping behaviour was influenced by perceived responsibility and empathy (Greitemeyer, Fischer, Kastenmüller, & Frey, 2006). Correspondingly, Jayawickreme and Di Stefano (2012) stated that a deep sense of empathy was one of the main characteristics of rescuers within the genocide studies literature. Five constructs emerged from the present analysis, namely: caring, altruism, protectiveness, conditional caring and compartmentalisation.

***Caring:*** This construct encapsulated most of the participants' perception of being caring. Four participants exhibited caring leadership qualities towards peers and subordinates within dangerous situations:

P3: "I was there and these four fucking young lads were looking up at me with eyes like fucking dinner plates, like ... 'make it good, make it better, make it alright... lead us! ... [all] they needed was reassurance..... I said... just tuck in behind me and wait for further instructions type thing and you can see they were alright then, because they were round the fucking mother hen if you like, round the dad."

P4: "I went around ... I just wanted to tell them how well they'd done, you know? Me telling them how well they'd done, that they were the best soldiers in the world and they're going to be able to push through that contact zone, even though they didn't want to. ... They were shouting at me, 'Fucking hell man, get the fuck down! Get the fuck down!' I was like, 'Fuck off! I want to speak to [my] people and I want to see how everybody is.' I wasn't having them stopping me from doing that, so that's what I did."

P7: "I now realise that not all people react the same. ... [X] got shot and was out of the battle, ... I got shot and I wasn't out of the battle. I saw what happened and how it affected people ... so I would take an interest in either making them feel better about

what was happening so they would do their job better, or take an interest in what they were doing so that they can then improve and not react that way in the future. “

P8: “I think being compassionate ... as in understanding where they were at, but also being firm and letting them know that we still have a long way to go and [that] we’ve got a job to do and [that] we’ve got to do it and do it well. I think it was just gauging where the company sat in terms of how different individuals and different platoons were dealing with it.”

Three participants perceived themselves to have a caring relationship with their immediate family:

P5: “... so whenever I have been away and missed my family ... I get a little bit upset, like when I went away for like three months last year, I got a little bit upset. Like I missed my kids and my wife as well ...”

P6: “It was a brilliant relationship. I have always had a close family relationship with my brothers and with my parents.”

P9: “My mother is my best friend, absolutely. We know everything about each other. My mum tells me everything and I tell her everything and it’s been like that since an early age.”

One participant expressed that being in a relationship is to have a purpose, one where you care and look after one another:

P2: “... at least for me meeting a girl like her and having my first real relationship ... You are looking after someone who also looks after you [and] cares for you as much as you care about them ....”

Another participant resigned from the military to have a closer relationship with his family. The participant served in the military for 11 years and resigned 6 months after the courageous act:

P1: "... I got out of the army to have more personal time with my family."

**Altruism:** The quotations in this section indicate that ten of the participants are altruistic and have helped others, especially those whom they perceived to be weaker than themselves:

P7: "I physically go out of my way to try and help in any way I can and just try to be a better person which is quite cheesy. I give blood, I donate money, I try and help my neighbours. I try and do anything I can to help people, ..."

P1: "There are photos and all sorts of me helping kids with little cuts on their faces or little cuts on their arms and I would always try and put plasters on and have a chat with them. I have had mates that have been down with money, so I've thrown them some money and not expected it back. I will do anything if I can, to help someone."

P11: "I think I have always been quite good at helping people. You know when women are struggling with shopping I will as long as she is willing to let me, I will help her carry her stuff from the shop or I'll help someone open their car. You know if someone is struggling at the side of the road, I will stop to help them because I would always like someone to do that for me."

P6: "... I would usually help someone, especially the elderly, I like helping the elderly."

P3: "I don't mind helping people. I'll go out of my way sometimes to help people. Do you know what I mean? I don't like to see people struggling if there is something I can do about it."

P2: "I like being able to help other people, as in if they have problems and you are in a position of power to find solutions for them that they would otherwise not have been able to achieve ... it's like being a banker and you've got money and people who are

poor need money to pay hospital bills or send their kids to school, you can provide to help make their lives better.”

P9: “I like to help people that I don’t even know. If I saw someone struggling with their shopping then I’d help them pick their shopping up (an old person), if I saw them struggling with anything, I’d help them.”

P5: “... [W]here I can, ... I try to help people. If I am confident and I know what I am doing, I will try and help people, whether it is training ... or if they need help and they are struggling ...”

P8: “I don’t have a problem with helping anyone, as long as they appreciate it and they’re not taking the piss.”

P4: “Me and my mate were walking down the road and it must have been 20:30.

There was a guy passed out drunk, I mean absolutely passed out drunk. He has thrown up all over himself and he had obviously pissed himself. He was a big guy.

The guy must have weighed about 18-stone, so I’ve got one on the other side trying to help and the other one on the other side I had actually trained and I was strong. I think I could have just walked past and left him there, but they had rang a taxi to come and collect this guy, so I picked him up and I stuck him in a taxi. Stuff like that I will always help with.”

***Protective vs. over-protective:*** Quotations contained within the current section suggest the protective nature of the participants. A common point mentioned among the participants was that of protectiveness. Certain participants perceived themselves to be very protective towards immediate family and friends, especially concerned for the physical wellbeing of those whom they perceived to be vulnerable and physically incapable of protecting themselves. However, sometimes the author was left wondering if the participants were over protective rather than protective:



P1: "I am a very protective person ... whether it is friends or family, especially my sister ... if anything is threatening them, then I am always the first to jump in."

P2: "... she was my little sister, I had to protect her from all my friends and I think that carries through to today. She has had a very different life, a very difficult life. "

P4: "... I was just more concerned about what was going on with my brother. We might not get a long, but if something happened to him, I still cared, you know. "

P9: "If it means protecting [my] family ... I would hurt someone if it means protecting them. I don't think [that] I've ever hurt someone without any good reason. The only time I've ever hurt someone, was either [when] they've attacked someone very close to me or myself, or something like that."

P7: "I was very protective of my sister and my mum, massively protective of them, especially my sister and I still am .... "

Along with this, some of the participants expressed a protective nature towards subordinates under their command:

P8: "The lad, who was clearing up, tried to jump in the vehicle, even though it was on fire and there were rounds cooking off (ammunition exploding). I kind of dragged him back and said: 'Get back there' and I just had a peep inside. I was going to say that there was nothing really in there. ... You could see bits and pieces and stuff we don't need to talk about."

P3: "... there were all sorts of initiation ceremonies and getting beaten up when you first came up to battalion. I never experienced that, because it didn't really happen in our company. I remember when I was in a position of authority ... I made it policy that nobody would touch the new blokes. They would not beat them up just because they were fucking new. You never had it happen to you, therefore you won't fucking do it to anybody else. "

In addition, two of the participants indicated that they did not share their experiences or the true nature of their work with those to whom they were close to, as they wanted to protect those people from the realities of combat or unnecessary worry:

P11: "... that upsets my girlfriend as well because my girlfriend thinks I am very closed ... it causes a bit of friction at times, because she thinks I am lying about stuff, but I'm not lying. I am just omitting bits of information because I am so used to doing it when dealing with people outside of work. Some of it is omission because I can't tell people about it ... because if I was to tell them it would upset them, so it was easier for people just to coast through life on certain bits of information."

P10: "My parents had become quite agitated because everyone [back home] thought that I was a game ranger because I told them [so]."

***Conditional caring vs. coldheartedness:*** In the previous discussion of caring, participants expressed caring behaviour towards other people. However, the current discussion reflects that the caring behaviour of participants may have been conditional upon qualities that those in need of assistance may have had. When somebody attaches strong conditions to whether they provide care or not, that could be perceived as coldheartedness by others. Some participants provided limitations to the care provided and sometimes those conditions may have been so strong that one might question whether this was conditional caring or coldheartedness. Care provided included encouragement to help someone who was in need of assistance, whereas the conditions attached to the care provided highlighted the terms under which the participants would either provide or withdraw their assistance. Conditional terms under which participants indicated that they would assist somebody, included that a person must really want to be helped and show that they are willing to put in an effort:

P10: “If they were making a genuine effort, a genuine effort and they were really trying, but they couldn’t crack it, I’d assist them. If they were weak and they didn’t want to grow up, so they were trying to slack, or they felt sorry for themselves, I do not respond well to people like this.”

P5: “When I see somebody struggle, I try and help them ... try and offer advice, show them how I would do it ... but then, if they ... if they don’t want to learn from that ... I will help you if you want to be helped, but if you don’t want me to help you, then you are on your own.”

P2: “... where people are weak, who are not getting it but are trying really hard, so either the fact is they are not quite fit enough but they are pushing themselves as hard as they can or they are not picking up concepts but they are trying really hard and they want to be good, ... those people I always feel you have got to give them any assistance you can ... because they are putting in as much effort as they possibly can, which is all you can ask of a man. “

P6: “If the guys are really struggling, then yeah, I would do my best to help them out. But if they just can’t be bothered and they would just rather take a ‘thrashing’ or ‘wake up exercise’ the next day instead of carrying on and doing their best, then I never bothered ...”

P7: “I tried to help as many as I could and I think that is why I got the award. I would always try and guide people or help people but I would never do it for them. I would always try and get them on the right path.”

Another condition set by some of the participants for assisting those in need of help, was based on their perception of liking the person. Three participants indicated that they are willing to assist those whom they perceive to be a likeable and good person:

P3: "... I am a great believer in helping your fellow man, helping your mates out.

Don't get me wrong I wouldn't cross the fucking street to help someone I didn't like, do you know what I mean."

P11: "... when I went through training ... I initially tried to help, so I did everything I could, especially if I like them."

P8: If you excel at one thing, spread it and if you are good at something else, then you help out on that side ... as long as they're willing to screw the nut and everybody chips in a fair share in their team. If they're a nice guy and just a good bloke then you don't mind to just go and help him out."

One participant expressed that he would only assist individuals if he knew they would engage in reciprocal behaviour:

P9: "I've started drawing a line where those people that are willing to help me and those I know for a fact won't do anything for me ... well, them lot can go and swivel and do it themselves. The other people I will happily do anything [for], if I can do it."

In contrast to the conditional caring tone of the above statements, one of the participants indicated that he would assist individuals that were truly in need of assistance without conditional statements:

P4: "I do like to help people. I saw a woman in one of those mobility wheelchairs. She was trying to get to a pay-box or pay phone to ring a taxi. I said, 'Pass your money here and I'll ring the taxi for you'. It is stuff like that, I don't mind helping with ... I will try and make a bit of extra effort on my own behalf, if somebody looks like they need some help, as long as I can help."

**Compartmentalisation:** Time spent away from home due to military training or deployment has an effect on soldiers. Combat deployments place many physical as well as psychological demands on soldiers to ensure optimal performance. To isolate attributes that

may influence their performance in these environments, participants compartmentalised certain aspects of their lives in order to function effectively. Compartmentalisation may be a mechanism for the courageous participants to stay alive and keep others safe.

Compartmentalisation between work and family was not the only example. There was also compartmentalisation of emotions and where they place their focus:

*Compartmentalisation of work and family:* Participants made a distinction between the work and home environments. They highlighted the fact that they like to keep the two environments separate and act differently within these two diverse environments as some of the behaviours that are acceptable in one environment are not necessarily acceptable in the other environment:

P3: “It depends like I say on the context, at home you have to react differently. I might shout ... I might just remove myself from the fucking situation. Whereas at work ... it is more robust at work, isn't it? Then again it depends what is causing the stress, if some fucker is whinging at you or having a go at you that is causing you stress, then at work it is easier to say something isn't it? If it is peers then, ‘shut the fuck up or I'll batter you’... obviously you can't say that to your missus can you? So I find the best thing is to try and avoid her, I remove myself from her fucking presence and her company.”

P8: “In work, I think family on the back-step straight away and I just put my time into it and make sure that I've done everything I physically can, to make that work ... I think the way you do business at work, you try and have a laugh, when you can have a laugh, sort of thing, the humour. But at home, it is completely different. You're seen as the dad and not the guy. You're the father of two kids. You've got a wife and you've got all of them different complexities. ... [S]ometimes it's hard to switch from

one to the other and you've got to do it to a degree. You've got to be a different man at work than you are at home, or it would not work. ”

P5: “ ... you are deployed and you are there, you sort of ... forget everything that is going on back home and just concentrate on what is there, ... because I am deployed. It has been possibly the best times in the army ... I just enjoy what we do, the job that we have, ... But when you come home for your leave, then I come home ... I would say, I was really home more for them, more for the people at home, more than for myself. Because I am sort of ... if I am concentrating, I just want to be doing that and not concentrate on stuff that is going on at home.”

P4: “I tend to keep my army life and my personal life separate.”

One participant indicated that he does not necessarily want to make decisions at home. As a leader, he engages in regular decision making processes at work and therefore does not necessarily want to make the decisions at home as well:

P11: “ ... [W]hen you are in a leadership position, sometimes you just don't want to make decisions [when you are home], but [my girlfriend] is always like ‘what do you want to do?’ and I say ‘I don't care’, just [as long as] someone else makes the decisions, as I am sick of making decisions all the time.”

*Compartmentalisation of emotion:* Nine of the participants indicated that they have difficulty in connecting with and describing their emotions. Six of the participants indicated a particular difficulty in expressing positive feelings about other people in their relationships:

P1: “I don't know. I am not the emotional person really. I can't think of a situation of real emotion.”

P5: “I would say like ... I don't really get emotional ... I don't really get like sad or ...”

P9: "I've got nothing. I've hardly got any emotions any more. I can't cry. I can't do anything. My wife or everybody could be crying around me but I've got nothing ... I'm like a stone ... I really have not got much emotion about me. ... [I] was saying to myself, 'you should be crying. 'Why aren't you crying?' I just couldn't and I didn't know how to. I just felt like there was nothing there to make me cry. I should have been crying because that's what you do, when someone dies. It's an emotional thing but I just didn't have it."

P8: "Connecting with my own emotions ... I don't know. I think I deal with it myself ... you've just got to get on with it and just bite the bullet at times."

P7: "... I don't seem to have a very varied range of emotions when it comes to things like... I don't cry. I don't understand the crying process. If you have something in your eyes I can understand you crying, maybe the sun or it is a windy day. My missus cries at adverts, she cries at everything which is nice. She is like a separate part that I can borrow that emotional part of life by having her around, because she has all of these emotions but I just don't understand it."

P4: "...I was in a very new formed relationship, when I [was deployed], so in all fairness, I didn't miss her. She wasn't my wife and I didn't miss her. I think I got in a relationship with her, I think it was like five months before I was deployed ... I didn't miss her. I told her every day that I missed her. "

Another participant highlighted that he perceived the showing of emotions around colleagues and family to be a sign of weakness.

P2: I am not really an emotional person to be honest. I think it is because I don't get sad and she has never seen me cry. For some reason it seems that all her friends and boyfriends have cried in front of her. I don't know why ... It's shameful."

Emotions are perceived as a threat by one of the participants. To him, emotions require extra thought and may become a source of distraction. He perceived that this distraction could have a negative effect on his life, especially during combat situations.

P10: Emotions are an enemy, they are the enemy of logic and reason and without logic and reason you will die. So there's a physiological shock which is involuntary and which is welcome, because that is where you get your adrenaline from and the adrenaline is what helps you to think quickly, ignore pain and carry on even when you are tired – that's alright. But emotion ... because emotion pulls your ability to think and if you lose your ability to think you will die. You have to think."

Having difficulty experiencing emotions when it was expected made one participant question his emotional stability:

P11: "The other thing that I worry about is the lack of reaction, because you are trained to expect to have a reaction to these kinds of things. You watch things like Band of Brothers, Pacific and all these things and people have all these reactions to it, and then you go through it and you don't have any of them ... it can be a little bit unnerving at times and you are thinking that maybe there is something not quite right."

*Compartmentalisation of focus:* Five participants indicated that they were very focused and capable of directing their focus towards their task, where anything outside their immediate focus became unimportant to them:

P6: "I was just doing my best to ID any enemy targets which I could engage and that took up most of my focus to be honest."

P1: "I was just thinking about how to do the shot ... I didn't once think of how I was going to get out of this ... it was more ... how am I going to finish this?"



P9: “I was quite clear in my conscience and I just had to concentrate on the deployment ... concentrate and not have to worry about finances at home ... or my mother being ill, or something like that.”

P3: “I had a fucking urge to stop and ask; ‘are you alright ... what’s going on?’ But it was almost like ... again in the back of my mind, right, they are being treated and I need to focus on the fucking job.”

P11: “You know you’ve got that, you’ve got the camaraderie where you are all living on top of each other, but everyone is focused on one single direction, nothing [is] pulling anyone in any other way.”

**Discussion:** The emerging themes in this section revealed that participants are caring, altruistic, protective, and make use of compartmentalisation. Evidence suggests that participants compartmentalise certain aspects of their lives (i.e., their work and family lives, where they focus) to enable them to function effectively within the military and private environments respectively. Interestingly, the results imply that some of the courageous soldiers may be alexithymic. Also of interest are that two opposing sides of the caring and protective themes emerged. In particular, participants reported to be caring towards other people whilst, on the other side, the participants reported that their caring behaviours could be withheld if certain conditions were not met, suggesting an unspoken conditional caring clause. In addition, participants revealed that they are protective. However, inspection of the data suggests that participants may be over protective, especially towards those whom they perceive not to be strong enough to fend for themselves.

As brave exemplars exhibit a caring nature towards others by risking their own lives to save others (Walker & Frimer, 2007), it is no surprise that the data revealed that courageous soldiers in this study have a caring nature. A few of the participants demonstrated their caring attitude through leadership during dangerous situations. Previous research (i.e.,

Gal, 1987; Gal & Gabriel, 1982) has shown that courageous soldiers were characterised by having leadership qualities. In particular, Wansink, Payne and Van Ittersum (2008) have found that courageous soldiers are more strongly associated with Transformational leadership behaviour. One Transformational leadership dimension which relates to the caring nature of the courageous soldiers in this study is the Individual Consideration dimension, which highlights the leader's concern for the followers' feelings and needs (Hardy et al., 2010). An interesting aspect of the courageous soldiers who participated in this study, is that in some instances the caring nature of the courageous soldiers may come across as being over-protective, in particular towards those individuals whom they perceive to be weak and unable to fend for themselves (e.g., children, women and the elderly). Being over-protective may be one of the driving forces for courageous soldiers, especially towards wounded comrades or children.

In addition to being caring, the courageous soldiers proved to be altruistic in nature and showed a willingness to assist those in need. However, an opposing side to the altruistic nature of these courageous soldiers exists: the courageous soldiers are willing to help a person who requires assistance, but will withdraw their help when they perceive the person in need is not investing any effort of his own. This suggests that courageous soldiers are willing to assist those in need; however, those in need of assistance are required to fulfil certain criteria before assistance is rendered by participants. These criteria can involve one or some of the following: an expectation that the person needing assistance is either physically incapable of performing the task or defending him or herself; have showed effort in an attempt to complete the task before asking for assistance; showed a willingness to learn.

In an effort to avoid conflict of behaviours between military lives and their private lives, courageous soldiers make use of compartmentalisation to minimise conflict. Three aspects that are being compartmentalised are: their military vs. private lives; emotions; where

they focus. Courageous soldiers in this study deemed it necessary to separate the military and home environments from each other, as behaviours and attitudes in the one environment are not necessarily interchangeable with the other. By compartmentalising work and home environments individuals are able to focus on their work-tasks, temporally freeing them from any stressors from home. Home to work conflict has been shown to lead to a decrease in compliance with safety measures (Cullen & Hammer, 2007). Any deviation from safety measures due to unnecessary cognitive distractions, especially in the military, can have an array of severe consequences for individuals, including death or injury, decreased operational readiness, misconduct, carelessness and errors of judgement (Krueger, 2008). In reverse, failure to successfully compartmentalise work and home also has the potential to result in a series of problems for the actors such as: increased conflict, social adjustment problems and being perceived as being coldhearted by others.

Combat units are typically viewed as a 'man's environment' where expressions of personal emotions are limited due to a fear of being perceived as weak by colleagues. This generalised view is strengthened by the data from the interviews, as it was indicated that showing emotions was viewed as a sign of weakness and being a threat. Such attitudes and views can lead to soldiers compartmentalising their emotions in an effort to prevent an emotional spill-over between the work and home environments. The perception from one participant is that emotions are a threat and can become a source of distraction and lead to a deterioration in performance.

The data further brought to light that some courageous soldiers have difficulty describing their emotions and expressing positive feelings toward others in their relationships. This suggests the possibility that most of the participants may be alexithymic. One could argue that there may be a parallel between the courageous military participants and those with prolonged engagement in high-risk sports such as mountain climbers and trans-

atlantic rowers. Woodman, Hardy, Barlow, and Le Scanff (2010) have found that mountaineers and trans-atlantic rowers high on alexithymia engaged in high-risk activities to experience emotion regulation and to experience agency. Hence, courageous soldiers may be driven by the same sort of variables (e.g., agency and emotion regulation). They may have a need to feel more agentic than they are and this may drive them to engage in high-risk behaviour during combat situations. Courageous soldiers may also be driven towards high-risk behaviour in an effort to experience emotional regulation. It is unclear from the interviews if the participants experience difficulty with their emotions as a result of adapting to the military norm, or if they had difficulty describing their emotions prior to enlisting in the military. Research suggests that the former statement holds truer where the participants become emotionless as a result of adapting to the military environment. For instance, Filstad (2010) has found that emotional management is learned on the job through participation and social practices.

The third aspect that courageous participants in this study compartmentalise is their focus. The participants indicated that they are capable of directing their focus to their task and effectively blocking out anything that may cause a distraction. Becoming task-focused when away from home may be the courageous participants' way of dealing with emotions. Similar to our results, Myers (2005) found that fire fighters tend to focus on the task as a way to manage their emotions when treating casualties. It can thus be hypothesised that courageous soldiers became task-focused as part of a strategy to regulate their emotions when away from home. One emotional regulatory process, attentional deployment, involves directing attention within a situation in order to alter one's emotions (Gross, 2014). Courageous participants choose to divert their focus away from family, friends and loved ones when away from home (i.e., operational deployment, course, or at base) and only focus on the task at hand, as any distraction may have serious negative consequences within in the military environment.

Being task-focused can lead to the participant ignoring other aspects outside of their immediate focus and neglect family, friends and loved ones in the process, which in turn can result in courageous soldiers being viewed as coldhearted.

In summary, the results of this section revealed the emergence of the important themes of caring, protecting, coldheartedness and compartmentalisation. The results further revealed two opposing sides of the caring and protecting themes. On the one side, participants reported to be caring towards other people; whilst, on the other side, they reported that their caring behaviours could be withheld if certain conditions were not met. It was also shown that participants are protective, however the question arose if the courageous participants may actually be over-protective. The courageous participants also compartmentalise aspects of their lives such as; work vs. home, emotions and where they focus. The themes of conditional caring, over-protectiveness and compartmentalisation may appear to be normal for the courageous participants, but these themes may lead others to perceive the courageous participants as being coldhearted.

**4.3.2.3. *Sensation Seeking and Impulsivity:*** Depending on the nature and circumstances of courageous acts, courageous actors have been associated with characteristics such as boredom (Rachman, 2010) and sensation seeking (Neria et al., 2000). Sensation seeking describes a personality trait that refers to an individual's optimal level of arousal and desire for intense stimuli, meaning that individuals high on sensation seeking need higher levels of stimulation to uphold optimal levels of arousal (Zuckerman, 1979; 1994). Sensation seeking is divided into four factors: thrill and adventure seeking; boredom susceptibility; experience seeking; and disinhibition (Zuckerman, 1971). Research on profiling anti-social risk takers within combat units, indicated that risk-taking misconduct was weakly correlated with boredom susceptibility, suggesting that those who engaged in weapon related risk-taking behaviours did so to escape from boredom (Glicksohn, Ben-

Shalom & Lazar, 2004). Rachman (2010) suggested that one should not underestimate the power of boredom, as it can tempt individuals to prefer exposure to dangerous conditions rather than that of mundane conditions.

***Sensation seeking:*** In line with Zuckerman (1971), all four categories of Sensation seeking (i.e., Thrill and Adventure Seeking, Boredom Susceptibility, Disinhibition and Experience Seeking) emerged in the present analysis.

***Thrill and Adventure Seeking vs. Risk-Avoidance:*** Seven of the participants indicated that they have an orientation towards thrill and adventure seeking behaviour, especially towards activities that involved elements of physical danger or speed:

P11: "... you have to, because otherwise being in the military would be really boring, because you do all this training and stuff but you don't get anywhere. But that's why I volunteered for the tour, because I get to go back to that excitement. ... [A] lot of the time ... the military is 90% boredom and 10% excitement ... if even that much. So you have to seek out these things, otherwise you are going to have a very stale career."

P3: "I've done all this shit you know. I've free-falled and fucking rafting and some of the other dangerous stuff. I will go out of my way ... well I won't go out of my way all of the time, but I like doing stuff that stimulates, excites and that is probably why I was drawn to the army ..."

P7: "I like the whole ... I get a small buzz off things that are slightly dangerous or out of the norm like; front right hand man, entry man, fighting, skydiving. ... I like things that go fast ... I get a slight thrill out of it. I need to stop speeding my car otherwise they are not going to insure me, that kind of thing. I like things that go fast; I like things that go bang. I love hunting, shooting, clay pigeon; anything that is ... it's something that gives me a small buzz about it."

P2: "I am a skydiver. I've done about 200 jumps. I definitely do that. I enjoy offshore sailing as well, especially when you are out in the ocean, no land, big waves and wind."

P4: "It's like, say with the bungee jumping, you jump and you're going down, you get that weird feeling. I love it. I love that feeling. It's as simple as you are driving down the road and you're coming up to the home bridge. I'll speed up before I hit that home bridge, just so I can have that feeling."

P5: "I like to do stuff that gets me a bit excited ..."

P1: "... [I]f they said they had two patrols they wanted teams for ... I would find out what they were for. If one would be to go and have a look at a river crossing and the other one is going looking for the [enemy] – I would be on the team looking for the [enemy] ..."

Not all participants indicated that they would engage in sensation seeking behaviours.

Three of the participants reported risk-avoidance behaviour over sensation seeking. When asked if they would engage in sensation seeking, the participants responded:

P10: "I wasn't a sensation seeker at all. I don't like sensation seekers, because they are ... they have character flaws, serious character flaws. And in a military situation such people are dangerous to all those around them."

P6: "No, not really. Parachuting and sniping are just jobs I enjoy ... I went through a stage where I didn't like parachuting, but I enjoy it now because it is quite a rarity, it is the most dangerous thing I do is parachuting."

P8: "I don't think I would, no. I don't go out thinking skydiving. I don't want to jump from 10,000 feet."

*Boredom Susceptibility:* This sub-section reflects the participants' perceived susceptibility towards boredom. The seven participants who revealed that they are prone to

boredom when they are not challenged or engaged in exciting tasks were also the ones that engaged in thrill and adventure seeking. The participants recalled feeling unfulfilled and disengaged when they were bored:

P3: "... [I]f I am bored, I feel depressed, although not depressed in the term of clinical depression, just unfulfilled, whereas ... yeah, I want to experience that ... I am avoiding the term adrenaline junkie ... and maybe that is what it is, but I don't need that..... I enjoy that, I enjoy free falling, I enjoy the rush of adrenaline but I don't necessarily need that, but I want to be stimulated."

P5: "... I got in a bit of trouble within the army because ... the job I was in sort of got a bit stagnant and ... I sort of got bored ... and if I get bored, then I just get like a bit complacent and ... I don't do as well, ... I need to have my brain constantly working."

P7: "If I am not challenged, then I get bored very easily and I had a goal and I had a way to go about it."

P2: "I think I get bored easily. I think you have to use your own initiative to find things to do, whether it is practising for those high pressure environments, or training for them, or finding something that keeps you interested and engaged, whether it is a hobby or learning a new skill."

P11: "I think that is just boredom from not being [deployed], or from not being involved in stuff. So when you are out there and you are involved in stuff and things are going well ... you are in fire-fights, you are on patrols and you are busy ... you know you have got that twinkle in your eye and you are on the edge. Stuff is happening, life is exciting and then you come back ... and it's like ... paperwork and I suppose it is a bit of numbness ... Anything just to get out of the boredom itself is a reason to do stuff."



P4: “After I’d done all of the stuff that I’d done, I got bored. I got bored of doing it.”

P1: “I was just like ... this is boring, so I just left ... [E]ven though some of the jobs were pretty boring and dull,...”

*Disinhibition:* Six participants, of whom five participants indicated that they have an orientation towards thrill and adventure seeking behaviour, expressed social disinhibition behaviour such as drinking, drug taking, partying, or some form of sexual disinhibition which resulted in them getting into trouble:

P5: “... every time I have been in trouble is through drinking alcohol. Like I got arrested when I was nineteen or twenty, I got arrested for drunk driving.”

P3: “... I probably ended up partying a bit more, drinking a bit more but it wasn’t like I was any more than anyone else, every fucker was at it and it was almost like ... and I don’t know but again subconsciously, it was like life is too short ... do you know what I mean, fucking hell let’s have a party. So yeah, my behaviour off duty wasn’t as appropriate as it should have been, so I ended up getting busted ... But eventually I just went off the rails.”

P4: “I did a lot of drinking. My main problem was just drinking. I drank too much ... The next day I felt hung-over. That was the main problem when you wake up in a police cell, you feel hung-over, you don’t even know where you are.”

P7: “Back then my hobby then was drugs ... drugs of any kind really ... So I got into a lot of that, I got into a lot of trouble, I got into a lot of things I shouldn’t have got into at the time, but it was the nature of the situation, so you just fall into those routines. And yeah, I would admit that I had a lot of problems with drugs at that point.”

P9: “Well, I had three girlfriends for about a year, at the same time. But it was complicated. I had to keep them out of each other’s way all the time and I’d been to the families and everything. I knew their family and all that. I basically turned into a

massive liar and I was really bad for lying, because I had to lie. I became secretive, which were exciting and fun in a way, but then it started ‘this is too much this’ ... some things were wrong what I’ve done, like I said with the relationships, making them believe that they were the only one and I hadn’t been with other people, which is wrong.”

P11: “So there were a few times where I have flirted with other girls and I maybe shouldn’t have, but there is no like bad intention behind it, I’m not trying to replace my girlfriend or cheat on her. I wouldn’t do that, but it was just because I was bored, or it’s different, or I needed something that just wasn’t there.”

*Experience Seeking:* Six participants, of which four participants indicated that they have an orientation towards thrill and adventure seeking behaviour, showed a tendency towards wanderlust, as they indicated that they liked to travel and experience new things:

P11: “I try to do a lot of new things. I get very restless very quickly ... So there are times when I basically can’t sit still and I have to be moving forward and doing something different, so be that trying new sports, like I am trying to get into kite surfing now but I am also trying to get into free diving and trying always to go somewhere different on holiday.”

P7: “I was very kinetic at that age so I would always want to be away and doing things and be out and not causing trouble ... My mum had got a job at the caravan site and she wanted me to stay there, because I didn’t have anywhere else to live, but I had been dying for the opportunity to go and see the world, do my thing and grow up and start living. So I just got a sleeping bag, a day sack, a roll mat and I was just off.”

P10: “... [W]e went for a 10 days break. I flew down to South Africa and then I flew to Europe and I went to London and Switzerland and Italy and France with my girlfriend.”

P2: "I have always been keen to travel, so I just travelled. I've had Christmases in Egypt and Tunisia and sometimes with friends and sometimes on my own."

P6: "... I have got two weeks after when we finish the tour, so I am just going to stay out for those two weeks. I am going to hire a car and just drive around."

P3: "We were deployed ... but that Christmas leave I went to Africa on holiday, so I went off just trekking on my own and stayed with some friends for a while and then went trekking off, so I went to ... all the old stomping grounds and just had an adventure on my own, drinking and making friends. Then I came back and then went back on deployment."

***Impulsive vs. non-impulsive behaviour:*** In this section, the quotations reflect whether the participants perceived themselves to exhibit impulsive or non-impulsive behaviour.

***Impulsive behaviour:*** From the evidence available five participants perceived themselves to be impulsive:

P2: "... I am very much one of those people who, when my girlfriend comes to visit and I feel like going away, I will book a holiday and go away that day. ... I am an impulsive shopper, so I will see something and buy it immediately ..."

P3: "..... but I am quite impulsive as well ... and usually it's the fucking wrong decision, but I can be quite impulsive. "

P8: "... the obvious thing is to just do it. "

P1: "...a decision has got to be made there and then. So you have got to be impulsive, and you've got to be extreme ... [I ] do some impulsive buying ..."

P4: "... it was impulse. As soon as I started doing it, I knew what I was doing. It's the way you think. I knew what I had to do, so I did it. ... I knew what I wanted to do and I knew what I was going to do."

*Non Impulsive behaviour:* Six of the participants did not perceive themselves to be impulsive, but preferred to plan ahead and prepare future actions:

P9: "Planning it and preparing it, is far better than just jumping in and doing it."

P10: "... everything needs to be thought-through and planned if one is to do them properly ...."

P11: "Sometimes I work off lists ... so I need to write out lists for stuff, just to make sure for myself that I am not leaving any gaps."

P7: "I have ... a diary and I write down things that need to be accomplished by certain dates and obviously I do them as they occur, so every week I open my book and there are things that need to be done. At home I have got a giant fucking blackboard ... and it has my 'to do' list on it. Things I need to get done, when I have to get them done by and I like to work through the list ..."

P5: "... I need to plan sort of in advance. I have agreed to do stuff on impulse but then ... but not like something that is going to happen immediately. "

P6: "I am a bit of a procrastinator to be honest, but I do things in my own time.

Whether that takes a month or a day, it just depends on what actually needs doing and what priority it is. If it needs to be done as soon as possible, then I will do it as soon as possible, if it is not really needed to be done, then yeah ... I will wait until I can be bothered to do it."

**Discussion:** The results revealed the emergence of two themes; sensation seeking and impulsivity. Data revealed that courageous soldiers were linked with sensation seeking behaviour, thus supporting our hypothesis predicting that courageous soldiers will be sensation seekers. The results further revealed that not all participants are impulsive, as some participants prefer to plan their actions in advance.

Of the ten participants that indicated that they engaged in sensation seeking behaviours, seven of the participants engaged in two or more of the sensation seeking behaviours as included in the Sensation Seeking Scale Form IV (SSS-IV; Zuckerman, 1971), whereas three participants engaged in only one sensation seeking behaviour. As the Total Sensation Seeking Scale is an overall measure of sensation seeking (Zuckerman, 2008), we viewed the participants in the present study to be sensation seekers, regardless of how many sensation seeking behaviours they engaged in. A positive correlation was noted between Boredom Susceptibility and Thrill and Adventure Seeking behaviours; the seven participants who indicated that they were predisposed towards boredom were also those whom engaged in thrill and adventure seeking behaviour. In contrast, the three participants who indicated that they were risk avoidant did not engage in any Sensation seeking behaviour. Thrill and adventure seeking activities as indicated by the courageous participants in this study had a propensity towards physical danger and included sky-diving and speeding. The results suggest that participants may have felt unfulfilled and disengaged when experiencing boredom and as a result engaged in thrill and adventure seeking behaviour to feel more agentic and fulfilled.

Even though our results indicate that courageous soldiers engage in sensation seeking behaviours, we do not view the sensation seeking behaviours of the participants as the force behind the courageous acts. The author's interpretation is that sensation seeking may be more the reason why people join the military than it is to do with courageous acts. Our view is mirrored by evidence presented by Hobfoll, Rom, and Segal (1989) showing that Israeli youth high on sensation seeking were more likely to volunteer for combat units during their required military service period. This suggests that the participants may have been sensation seekers when they enlisted in the military. However, the participants within the present study were not aware of the boredom associated with prolonged deployments. Another interesting

finding is that impulsivity does not form an integral part of the personality profile of courageous soldiers, as some participants reported to have an impulsive nature, whereas other participants reported to engage in reflective processing before acting.

In summary, the results revealed that those participants who indicated that they were predisposed towards boredom were also those whom engaged in thrill and adventure seeking behaviour. The thrill and adventure seeking activities as indicated by the participants involved, or tended to involve physical danger and included sky-diving and speeding. In contrast, those individuals who indicated that they preferred to engage in risk-avoidance behaviour were also the individuals who did not report susceptibility towards boredom. From the results, it appears that a correlation exists between boredom susceptibility and thrill and adventure seeking behaviour. Some of the participants also indicated that they are prone to wanderlust and like to travel. Ten of the participants engaged in one or more of the sensation seeking factors, suggesting that sensation seeking may well be a trait of courageous soldiers, although it might simply be a characteristic of all soldiers. The results also indicated that some participants appear to be impulsive and some not. Impulsivity does not appear to be part of the reason why courageous soldiers perform courageous acts.

**4.3.2.4. Other Correlates of Courageous Behaviour:** Analysis of the current data identified additional correlates that may have contributed to courageous behaviour. Two themes that emerged from the data were: mental toughness and challenge appraisals.

**Mental toughness:** Soldiers face a wide range of stressors on a daily basis, either being deployed for prolonged periods away from home, or struggling to adjust to base and home routines after returning from deployment. To be able to deal with these stressors and adjustments, soldiers need to exhibit mentally tough attitudes to enable them to maintain a high level of performance. We view mental toughness as a behaviour which can be defined as "... the ability to achieve personal goals in the face of pressure from a wide range of different

stressors” (Hardy et al., 2014, p.70). Within the present research, seven participants perceived themselves to exhibit mentally tough behaviours and used words such as robust, mentally strong and mental bravado to describe their behaviour:

P11: A lot of it is down to personality, but you can certainly build up - through training - your ability to cope with stress and applied pressure, as well as external pressure. But, I think that the attributes that you have to do to pass an arduous selection process - be it parachute selection, commander course or special forces selection - is to prove that you can take that extra step further, you can take extra external stress ... be it physical, mental and your own added internal stresses, mental stresses.”

P3: “I think my whole life shaped the way I became as a person. I don’t think one instance in your life shapes you as a person completely, but without a doubt it had an influence and I would imagine that it toughened me up mentally ... do you know what I mean? It enabled me to deal with shitty situations, situations that I did not want to be in.”

P4: “I’d like to think of myself as mentally tough. I definitely would like to think that. Most people [who] refers to me say that I am like ... I don’t even know if I’m going to say this correctly but ... I would say like ... I’m almost like a mental bravado. My wife says I’m the manliest man she knows. I don’t even know what that means.”

P2: “There is also other connotations of being an officer here, it is not just; ‘are you fit, are you mentally strong, are you a leader’?, ....”

P9: “I say that I am very robust. I can keep going until I physically just can’t do it anymore ...”

P7: “Even when I got put on my arse I was happy. Nothing seemed to get me down. You are going to crawl through seven metres of fucking sheep shit and I was like,

‘yeah, okay not a problem’, I’ll crawl through seven metres of sheep shit ... it doesn’t bother me. I would never feel like ... fucking pricks making us do this, it was always like I wanted to do more and more and more.”

P1: “Me and the wife have been through things that would have divorced a couple, that has caused so much stress, but you just don’t let it break you, you try and work out how we can work on this bit, how can we use this to our own benefit.”

**Challenge appraisals:** Challenge forms part of the core dimension of hardiness which is aligned with the concept of mental toughness (See Levy, Polman, Clough, Marchant & Earle, 2006). Challenge appraisals can be described as when an individual views life changes as a challenge and an opportunity rather than as a threat (Kobasa, Maddi, & Kahn, 1982). Analysis of the interviews indicated that nine participants appraised challenges in a positive light. Instead of viewing their courageous acts as a threat, four of the participants perceived their courageous act to have been a challenge:

P7: “The act was a challenge really. Obviously things can happen and I could get hurt, but I knew for a fact that as soon as I hear the crack and thump, then all my worries will be gone.”

P11: I still feel pangs of guilt because in a way I wanted that to happen, because I wanted that experience, I wanted that challenge. I wanted to be able to come through it at the other end and look back on it and say, ‘you know, I had that big contact ... the one that people still talk about because of X, Y and Z’.”

P5: “... [U]ncertainty is just like a challenge ... it challenges you to do things, but ... and obviously you can’t plan for everything, but like ... whenever I was doing a patrol, I would always plan as best as possible and I would be prepared ... I love to be prepared, I think I was prepared for pretty much every situation as I could have been.”



P6: "... [I]f I hadn't done that, he would have drowned and floated down, so it was a challenge for me to get him out of the water ..."

Two participants viewed challenges as an opportunity to test themselves and to do something novel:

P2: "Because they were the best, I just wanted to serve with the best. To challenge myself in order to get into that unit ... and also; when you go into operations, you want to be surrounded by blokes who are as motivated and as professional as you, I think that was it."

P3: "I went for selection ... I think of course it was something different, something fresh, it's something new. I have been doing the same sort of job and stimulating it was. But you know, it's like if you are free falling every fucking single day of your life, eventually you will get fucking bored with it, or maybe not. So, it was something different, the unknown ... do you know what I mean, trying out something and testing myself, putting myself in a position where you don't quite know what will happen ... so yeah there was an element to that."

One participant indicated that he perceived challenging situations to be fun and an opportunity to do something that is not within everybody's reach:

P1: "The challenge has got to be there. There is maybe a reason for doing it, but if there is no challenge it is no fun. It is just the fact of doing something that not everyone can do."

For one participant, a challenge is engaging in something where he is not sure if he would be able to complete it, but if he manages to complete the task, it creates a pleasurable feeling:

P4: "There are challenging things where I don't know if I'm actually going to be able to do that and then when you do it, you get that pleasure of completing the challenge."

But when you do something like 180-mile bike ride, you only get the pleasure afterwards. You just have sore knees but you know you can do it.”

Another participant saw an accomplished challenge as a useful tool in a toolbox to use in the future when faced with a similar challenge:

P8: “I think you just take the challenge and take it for what it is and reverse the role when you achieve it. It’s not a situation, it’s not a problem, it’s just another toolbox that gives you more, not knowledge, but it gives you more tools to play with in the future for later on.”

**Discussion:** Results revealed other correlates such as mental toughness and challenge appraisals that may have had an influence on the courageous behaviours of the participants. As seven of the courageous soldiers in this study were either serving in elite military units (i.e., Special Forces, Parachute Regiment) or occupying specialised roles within their units (e.g., Sniper) we argue that these participants already exhibited mental tough behaviour prior to their courageous acts, as these elite units and specialised roles require individuals to pass an arduous selection process that necessitates both mental and physical toughness. Our argument is supported by research from Bartone, Roland, Picano, and Williams (2008), confirming that Special Forces graduates are higher in mental toughness (hardiness), compared to non-graduates. Additional results from our data supporting the argument that courageous soldiers in the present study are mentally tough, comes from the theme of Challenge Appraisals, which indicated that participants perceived difficult situations as a challenge rather than a threat. Challenge Appraisals is one of three interrelated factors that form the concept of Hardiness (Kobasa et al., 1982); in addition, the Challenge factor is one of the four factors of mental toughness as conceptualised by Clough, Earle, and Sewell (2002).

Both mentally tough behaviour and challenge appraisals exhibited by the participants may have contributed to them acting courageously, as the participants indicated that they view difficult situations as a challenge and they continued to act despite the possibility of losing their lives whilst acting to save the lives of others. As argued above, courageous soldiers may have been mentally tough prior to their courageous acts, but it is also believed that courageous behaviour can enhance mental toughness in soldiers (McGurk & Castro, 2010). Thus we hypothesise that mental toughness is a cyclical phenomenon with courageous soldiers, as it may have both causal and consequential effects on the individual. The causal effect acts as the driving force, enabling the courageous actor to act; whereas the actor may become more mentally tough as a consequence of the act.

To summarise: The courageous military participants in the present study may possess mental toughness as a cyclical phenomenon with causal and consequential effects. Most of the participants served in elite military units which required the participants to pass arduous selection courses that required both mental and physical tough behaviours, thus suggesting that they were mentally tough prior to their courageous acts. Mental toughness may have been a contributory effect, enabling the participants to act; whereas, performing courageous acts can have a consequential effect, as it enhances mentally tough behaviour, thus completing the cyclical phenomenon. The participants also indicated that they viewed life's difficult situations as a challenge rather than a threat. Challenge appraisals forms part of Hardiness which is aligned with Mental Tough Behaviour. Both Mental Tough behaviour and Challenge Appraisals may have contributed to courageous participants acting courageously.

**4.3.2.5. *Situational circumstances of the courageous acts:*** The current section explores the situational circumstances under which the participants of the present study acted courageously. The situational circumstances under which the courageous acts occurred were: trying to save wounded comrades; doing their duty; moral obligation towards children; and

persistence despite being wounded. The situational circumstances for courageous acts are not always singular. In such cases the participants were entered under the sub-theme that described their situational circumstances the best.

***Altruistic act trying to save injured comrades:*** Four of the participants reported that they acted in order to save wounded comrades under combat conditions:

P6: “I looked over and I saw one of our Afghans floating head down in the water, so I swam over to him ... there were rounds zipping in and around the water at the time. I grabbed him by his collar and I didn’t have time to swing him over so his face was upside [down] and I just swam with him with his head in the water. At the time I got to the bank, I turned him over ... I started CPR and after about the 6<sup>th</sup> or 7<sup>th</sup> breath I saw his eyes started to flicker.”

P4: “He had been shot through the neck and it came out of the jaw ... I jumped in the water and I dragged him across the fucking river. It was just ... when I got into that river, I looked around and there was only me and my friend. We are the two that is going to be able to do this and save the moment. I just thought we were the best two for the job, so let’s do it.”

P2: “Even if he said ‘no don’t get the gun’, I know I still would have got up there, because I was the only one who could get up there and someone had to put down fire. I don’t know if it is a sense of protection, or the fact that because you are firing, you are now engaged in a fight rather than someone trying to kill you. I don’t know what the thought process for that is, or whether it is just training, but it was just automatic down to my core, that the only way to stop them from coming and killing us was to fire back.”

P9: "I am not an actual medic. I did the medic course because I like; (1) helping people and, (2) it interests me being able to fix people up ... it was just that self-achievement of 'you could have died but I stopped it from happening'."

**Duty:** Three of the participants saw their courageous act as part of their duty and claimed that they were merely fulfilling their obligations:

P8: "Well, maybe that's just down to who you are, but when I say 'doing your job', it is what I'm paid to do. It's the fact that any casualties within a Company, the Company Sergeant Major deals with it. However he does that is down to that guy, but it is my job. In a situation like that, the senior bloke in the Company, soldiering wise is the man who is paid to get things right, if that makes sense."

P3: "It was more like, 'right I have fucking got to do this now ... Because again keep re-relating, reiterating about being part of your job, it is part of your job you know. What your job as a platoon sergeant is, is to step up if your platoon commander gets injured. If there is a casualty, deal with it. Deal with prisoners, deal with fucking rations ... you know, so we need rations, then okay we deal with that.'"

P11: "My 2IC and my MFC [Mortar Fire Controller] were gone ... So I stood there and my next senior bloke was a private ..... So I was doing my job ..."

**Moral responsibility towards children:** Two of the participants reported that their decision to act was motivated by the fact that children were involved. One participant indicated that he acted, as he would have felt responsible if something should have happened to the children:

P5: "To make sure that they didn't get ... to make sure that they didn't get injured or hurt, because ... if they died, then we were partly responsible ... because they are firing ... these insurgents are firing at us and if we weren't there, they wouldn't be firing at us and the kids wouldn't have been in danger there."

Another participant acted because he has children of his own. He admits that he may have acted differently if he had no kids of his own:

P1: “You know, I was never really child orientated, but I found ever since having kids myself, I was always helping kids out. If they had a little cut, I would get my med kit out and help them. Things do change and the situation may have been different if you go back a few years before kids were involved and maybe I would have taken the shot.”

***Persistence despite being injured:*** One participant kept on fighting and re-supplying his comrades under fire while he was wounded himself during combat.

P7: “My citation reads ‘despite being wounded ...’, my mate actually told the platoon commander about the vehicles I dealt with. I think it was six vehicles I dealt with, six crews I despatched with a gun, I was on fucking fire. Six vehicles had been taken out by me ... and their crews ... and then obviously being wounded and continuing with the fire fight and doing with the resupply was what my write up was about.”

One participant acted because he perceived that despite being wounded himself, it was unfair to continue to save himself and leave others behind:

P10: “... I could not leave them and continue to save myself.”

***Discussion:*** The results revealed four situational circumstances under which the courageous acts occurred namely: altruistic acts trying to save wounded comrades, doing their duty, moral obligation towards children and persistence despite being wounded. The situational circumstances under which courageous acts manifest are not always singular, but can consist of a combination of situational circumstances. For, a courageous soldier can be wounded during combat and still risk his own life to save those of his comrades or being wounded during combat and continue to perform his or her duty. The courageous acts performed by the participants did not occur in isolation, but were performed in the presence

of other unit members, thus warranting the question, why did *these* participants act in these specific situations while none of the other unit members acted? As the courageous acts were performed in the presence of other unit members, but it was only the participants who acted, we support the interactionist viewpoint that courageous soldiers is equipped with certain virtues and characteristics and responds to situations inducing courageous behaviour. In other words, he or she was the right person in the right place.

#### **4.4. General Discussion**

A multi-methodological approach was used to further the understanding of personality with specific reference, but not limited to: psychopathy, cognition processes, motivation and behaviours of decorated courageous soldiers. In addition, punishment and reward sensitivity of these courageous soldiers were explored. Results from both qualitative and quantitative methodological approaches presented mixed findings. Self-rated data from courageous soldiers provided no support for the hypotheses predicting that courageous soldiers will score high on both the global psychopathy personality construct and the Fearless Dominance Factor. In contrast, the informant-rated global psychopathy score approached significance, indicating that informants perceived participants to be higher on the global psychopathy scale than the norm, therefore providing partial support for the high global psychopathy hypothesis. Informants also perceived courageous soldiers to be significantly higher than the norm on the Fearless Dominance Factor. As a result, only partial support was obtained for the fearless dominance hypotheses. Collectively, findings from both quantitative and qualitative approaches did support the predictions that courageous soldiers will be fearless and have low trait anxiety. Results further supported the hypotheses that: courageous soldiers will score low on the Self-Centred Impulsivity Factor; will be sensation seekers; and will be emotionally stable. However, low informant and self-report scores for the Carefree-

Nonplanfulness scales, together with qualitative results did not support the prediction that courageous soldiers will be impulsive.

The finding that the self-rated global psychopathy score was low, could be a result of the participants' low Self-Centred Impulsivity and Coldheartedness higher-order factor scores. In contrast, the Fearless Dominance Factor score approached significance. Findings from both informant-rated and qualitative data supported the fearless disposition of the courageous participants. These findings reinforce the views of Mowrer (1960) and Walton (1986), suggesting that fear is not a pre-requisite for courageous behaviour. That is, those who are fearless and act courageously can still be viewed as being courageous, as they willingly engaged in a selfless act risking their own physical wellbeing for the benefit of others. In contrast to those who were fearless, some of the participants acted despite experiencing fear. Factors such as: desensitisation, confidence, self-efficacy, perceived control, calmness, realistic training, thriving under pressure and the effective use of fear, prevented fear having a debilitating effect on the performance of participants. Therefore, these factors helped them to overcome fear and to act courageously in dangerous situations. An interesting finding was that courageous soldiers described their biggest fear to be a fear of failure. Fear of failure may have even acted as a driving force for the participants to act courageously. The military is a high performance environment, where failure can be met with ridicule or be perceived as incompetence by fellow soldiers. Research has described shame as forming the core of fear of failure (McGregor & Elliot, 2005). Thus in an effort to prevent failure and ultimately shame, individuals will adopt performance-approach goals as a self-regulatory strategy (Elliot & Church, 1997). The prospect of experiencing shame may have acted as a motivational factor towards approach behaviour for courageous soldiers and would help explain why individuals would adopt an approach temperament when facing danger during combat.



Self-report and informant-rated data seems to present a contradiction around the coldheartedness construct. One would expect courageous soldiers to be inherently helpful, protective, caring and to show empathy towards others. However, informant-rated results indicated that participants were being perceived as coldhearted. Three possible explanations to support the informants' perception of this concept are forthcoming from the qualitative findings. First, results revealed that not only are the participants altruistic and helpful towards those in need of help, but they also attach conditional terms to these helpful behaviours. These conditional terms included, but are not limited to the following: the person in need must have shown a willingness to help himself before asking for assistance; or showed a willingness to learn; or must be either physically incapable of performing the task, or defending him or herself. On that account, conditional caring appears to function as a 'safety measure' implemented by the participants to establish confidence and trust between comrades. Trust is defined as "... a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another" (Rousseau, Sitkin, Burt, & Camerer, 1998; p. 395). Military personnel work in a dynamic and dangerous environment where they are dependent on each other's abilities and support to stay safe. Therefore they have to rely on and trust each other to perform effectively (Lee, Bond, Russel, Tost, Gonzalez, & Scarbrough, 2010). Providing assistance to individuals who are not willing to help themselves before requesting help, may not only create feelings of doubt and distrust in that person's ability to perform effectively during combat, but also feelings of vulnerability. Through the process of conditional caring, the participants are actually sanctioning those individuals in an effort to minimise involvement between each other. It can also be hypothesised that the aim of such motives is to expose individuals who are unwilling to help themselves as incompetent and unreliable, with the aim that they can be closely monitored, re-trained or replaced by someone that is more able. The above may present the

participants as coldhearted, nonetheless the participants have demonstrated a caring thread, in particular towards the “under-dogs” who are trying hard.

The second possibility as to why informants may perceive participants as coldhearted, may be that participants come across as being over-protective. The results revealed that participants are protective and they tend to become over-protective especially towards those whom they perceive as being too weak or incapable to defend themselves (e.g., women, children, the elderly and wounded comrades). However, over-protectiveness of participants may be viewed by others as an attempt by participants to control, show dominance and exert power over them; hence the perception that the over-protectiveness of participants are coldheartedness.

The third explanation offered to account for the informants’ perception that participants are coldhearted, is the participants’ utilisation of compartmentalisation strategies. The participants in this study used compartmentalisation strategies to avoid conflict crossover between their military and private lives in an effort to function effectively within a high performance environment. Three aspects were identified as being compartmentalised: where they focus; their emotions; and their work and private lives. It can be argued that the military is a high-risk environment that necessitates soldiers to adopt compartmentalisation strategies to enable them to stay focused at work. However, individuals outside the military environment may view compartmentalisation strategies as coldheartedness. For soldiers, any cognitive distraction when at work can lead to a series of detrimental behaviours such as: carelessness, making judgement errors, or a decrease in readiness state (Krueger, 2008). Efficient cognitive utilisation is influenced by factors such as motivation, effort and emotion (Gaillard, 2008). Thus compartmentalisation of such factors becomes a necessity in order to keep focused, thereby ensuring effective performance in extreme environments. In addition to the compartmentalisation strategies employed by the participants, findings also indicated that

courageous soldiers may be task focused and alexithymic, which in turn may appear as being un-empathetic and coldhearted to others. This observation is in line with Baron-Cohen (2011) who noted that individuals have the potential to be un-empathetic when they are focused whilst in pursuit of goals, as such individuals may find themselves in a world of their own whilst pursuing those goals. Being task-focused may have lead participants to minimise contact with significant others and family in an effort to restrict possible distractions whilst being away from home. On the other hand, family members may feel neglected and may construe such behaviour from participants as being coldhearted.

The finding that courageous soldiers within this study indicated that they experience difficulty recognising, as well as describing their emotions, suggests that they may be alexithymic. Alexithymia can be described as a stable trait where individuals have difficulty in identifying and expressing their emotions (Mikolajczak & Luminet, 2006; Sifneos, 1973). Findings from FeldmanHall, Dalgleish, and Mobbs (2013) are contradictory to findings in this study that courageous soldiers are both alexithymic and altruistic. FeldmanHall et al. (2013) used magnetic resonance imaging (MRI) to investigate the brain behaviour relationship between prosocial action and alexithymia. Their findings indicated that alexithymia decreases altruism, as these individuals report less distress at seeing others in pain. A possible explanation for the contradictory finding is that participants have a 'switch' to shift between prosocial and coldhearted behaviours when necessary. According to Antonacopoulou and Gabriel (2001), emotions are a learned aspect of behaviour, suggesting that the military played a role in shaping the emotional attitude and behaviour of participants. Military personnel share experiences and interact with fellow soldiers on a daily basis, leading to their emotions being shaped accordingly to fit in with their working environment. For example, Myers (2005) has shown that probationary firefighters learn how to manage their emotions through socialisation with other firefighters. As military personnel spent a

large portion of their careers either deployed, training and in close proximity of other soldiers, it may become difficult to adapt their emotions to assimilate with the expected emotions associated with social life outside the military. This may result in a blunting of emotions, with soldiers being perceived as unemotional and coldhearted by family members when they are home.

Results also indicated that participants engage in sensation seeking behaviours. This finding supports the results of Neria et al. (2000) who established Israeli decorated war veterans to be higher sensation seekers than both combat veterans and combat stress reaction casualties of the Yom Kippur War. It was interesting to note that participants in the present study, who indicated that they engage in sensation seeking behaviours, were the same participants who were predisposed towards boredom. As indicated earlier, there may be a parallel between courageous military participants and individuals high on alexithymia who participate in high-risk sporting activities.

The parallel is demonstrated in the notion that participants are driven to engage in high-risk activities to experience emotion regulation and agency (see Woodman et al., 2010). Even though participants in this study engage in sensation seeking behaviour, it is our contention that sensation seeking behaviour was not the motivational force that enabled them to act courageously. This view is in disagreement with Harvey et al. (2009) who suggested that heroism is related to sensation seeking behaviour through the desire to impress others and appear courageous. The military is a high risk profession, especially to those who serve in Special Operations and other frontline units. Individuals with certain personality traits tend to select professions that offer them behavioural expressions related to their personality (Ickes, Snyder, & Garcia, 1997). Therefore, high sensation seekers will seek out a profession that will provide them with opportunities to engage in sensation and risk-taking activities (e.g., military). It can also be argued that those individuals high in both sensation seeking and

alexithymia will enlist in the military in an effort to experience emotion regulation and agency. In addition, compared to low sensation seekers, high sensation seekers experience less symptoms associated with post-traumatic stress disorders, as high sensation seekers tend to employ active problem-focused coping strategies and view stressful events as challenging (Neria et al., 2000; Solomon, Ginzburg, Neria, & Ohry, 1995).

Viewing difficult situations as a challenge has been associated with traits such as mental toughness (Clough et al., 2002) and self-confidence (Finfgeld, 1999). Mental toughness has proven to act as a protection for soldiers deployed in high as well as multiple stress conditions, against the ill effects of stress (Bartone, 1999). Our findings showed that participants are mentally tough and in addition viewed life's difficult situations as challenging. The participants in this study also demonstrated that they are emotionally stable and in good psychological health. This finding may be explained by the mentally tough attitude and challenge appraisals of the participants. Both mental tough behaviour and challenge appraisals account for the participants' ability to stay calm and perform well during extremely dangerous situations. The participants may have experienced mental toughness as a cyclical phenomenon, with both causal and consequential effects. It can be argued that participants in this study must have been mentally tough prior to their act, as most of them had to pass arduous physical and psychological selections to be able to serve in elite military units (e.g., Special Forces; Parachute Regiment) or occupy specialised roles (e.g., sniper). Mental toughness could have had a causal effect, by enabling the participants to act. In return, performing the courageous act could have had a consequential effect, as courageous behaviour can enhance mental toughness in soldiers (McGurk & Castro, 2010). The participants also proved to be confident. Similar to mental toughness, confidence can also be described as a cyclic phenomenon: First, one needs to be mentally tough and self-confident to

act courageously during combat. However, by acting courageously one's self-confidence and mental toughness is enhanced (McGurk & Castro, 2010).

Further, results revealed that the most dominant "big five" traits present in the personality structure of courageous soldiers are extraversion and emotion stability (or in its reversed form, neuroticism). Extraversion has been positively correlated with behaviours and traits such as: sensation seeking (Eysenck & Zuckerman, 1978), low levels of arousal and approach temperament (Carver & Connor-Smith, 2010); and dominance (Depue & Collins, 1999). On the other hand, emotion stability reflects calm, collective and stable behaviours (Carver & Connor-Smith, 2010). Extraversion is one of the personality traits that can help account for the lack of physical anxiety and low levels of emotional anxiety, since fearless dominance can be predicted by personality traits such as high extraversion and openness, and low agreeableness and neuroticism (Ross, Benning, Patrick, Thompson, & Thurston, 2009). Therefore, the traits and behaviours associated with both extraversion and emotion stability personality types provide support for our findings that participants in this study are: fearless; have low trait anxiety; engage in sensation seeking behaviours; act calmly under pressure; and are over-protective (i.e., dominance). Interestingly, our results did not support the findings of Harvey et al. (2009) that showed courageous behaviour to be an impulsive response to a particular situation. Our findings also revealed that some participants were impulsive in nature, whereas others engaged in reflective processing before executing tasks. These results do not support our hypothesis that courageous soldiers will be impulsive. The results actually suggest that it is the situational demand, rather than the personality characteristic, that dictates whether an act is impulsive or not.

In addition, the present study explored the situational circumstances under which the participants performed courageous acts. These situational circumstances included: part of their duty; trying to save wounded comrades; showing persistence despite being wounded;

and moral obligation towards children. The situational circumstances were not always singular in nature, but consisted of a combination of two or more of the situational circumstances mentioned above. For example, despite being wounded during combat, one participant refused to be evacuated to receive medical attention, as he felt it was his duty to remain with the rest of his platoon. The participant continued to engage the enemy and later continued to resupply other members with much needed ammunition whilst coming under heavy enemy fire.

Explaining why the participants acted courageously under certain situational circumstances is not straightforward, as the aetiology of courage is not without discourse. For instance, situationists contend that external forces are responsible for the emergence of courage and that dispositional factors of the individuals are not relevant (e.g., Rate et al., 2007). Inversely, some researchers (e.g., Peterson & Seligman, 2004) propagate the view of disposition, arguing that courageous soldiers have a set of character strengths that inclines them to act courageously. For example, Peterson and Seligman (2004) present the character strengths of courage as; Bravery, Persistence, Integrity and Vitality. However, we argue that neither the situationist, nor the dispositional views alone can account for military courageous acts. Courageous acts performed by the participants involved in the present study did not occur in isolation, but were performed in the presence of other unit members. Not everybody present at the time of each act responded to the circumstances or the environment in the same way. For instance, during a fire-fight with the enemy, both the leader and second in command of a patrolling section were severely wounded. Only one individual among the remaining men stepped up and took control of the situation whilst still under heavy enemy fire. This leads us to question the situationist's view and ask the question; why did only one person take control while the rest were reluctant to do so? Supporters of the dispositional view will most probably argue that courageous soldiers possesses certain character strengths others don't,

and that is why he acted. However, such an approach should come attached with a warning. One should not presuppose that when an individual performed a courageous act in a particular situation, the same individual will act courageously in a different situation (Walton, 1986).

To account for the reason why participants acted courageously, we adopt an interactionist stance. Interactionists argue that the courageous act is an interaction between the person and the situation, where a person is predisposed by certain qualities and then responds to situational triggers, thus evoking courage (e.g., Walker, Frimer, & Dunlop, 2010; Zimbardo, 2009). Zimbardo (2009) defines person and situation as follows: “The Person is an actor on the stage of life whose behavioural freedom is informed by his or her makeup - genetic, biological, physical and psychological. The Situation is the behavioural context that has the power, through its reward and normative functions, to give meaning and identity of the actor’s roles and status.” (pp. 445-446). Thus our contention is that the courageous acts involved the interaction between the right person, with the right genetic-makeup (i.e., psychological, physiological and biological), within the right situation. If it was not the right person at the right place, such a person may not have succeeded. From this studies’ results, we suggest that the ‘right genetic-makeup’ for courageous soldiers include, but is not limited to: low physical fear, low trait anxiety, ability to stay calm, protectiveness, confidence, altruism, emotional stability, insensitivity towards punishment, thriving under pressure and mental toughness. Approach temperament associated with extraversion, fear of failure, and insensitivity towards punishment may also have formed part of the genetic-makeup enabling participants to act courageously.

#### **4.5. Practical Implications and Future Directions**

Findings presented in this study have important implications, not only to how we view, but also how we assess both courageous soldiers and the situational circumstances



surrounding those acts. Firstly, results found that courageous soldiers are not psychopaths; but they do, however, share characteristics such as fearlessness, low anxiety, coldheartedness, boredom susceptibility and sensation seeking. This suggests that courageous soldiers and psychopaths have more in common than one would like to believe. Future research should use a larger military sample to explore the similarities between these two groups. Another important finding is that fear is not a pre-requisite for courageous behaviour, since some participants did not experience any fear prior or during their courageous act. This finding may have an implication as to how future researchers conceptualise courage, as some definitions (e.g., Evans & White, 1981; Gould, 2005; Rachman, 1978) include fear as a pre-requisite for courageous behaviour. This result in fearless individuals that acted courageously to be classified as being fearless instead of courageous, even though they made a conscious decision to risk their own lives for the benefit of others. In addition, in this study, sensation seeking is viewed as the reason why participants enlisted in the military and not as the driving force behind courageous acts. As the participants indicated that they have some difficulty in describing their emotions, we hypothesise that the participants enlisted in the military, since the environment provide them with opportunities to experience emotion regulation and to be agentic. However, future research should investigate the role of both alexithymia and sensation seeking in enlisted men. Our findings on the characteristics and behaviours of courageous soldiers can also have implications for the recruitment of military personnel, as both courage and fear is contagious (see, Miller, 2000). Therefore, choosing individuals with personality traits that promote courage may prove to be advantageous for soldiers destined for combat environments.

Extensive research has been devoted to establish the characteristics of courageous actors. However, very little research has investigated the personality traits and reinforcement sensitivity of physical courageous actors. Trying to account for the personality and

reinforcement sensitivity of courageous soldiers is not as straightforward as one would like to think. For example, do all individuals who enlist into military combat units out of own volition, share the same dominant personality and reinforcement sensitivity traits? Or does military training provide the recruit with the necessary skills to act courageously?

Regarding personality, research (Hobfoll et al., 1989) has shown that Israeli youth high in sensation seeking tend to volunteer for combat units. In addition, investigation into the role of personality of German males during military service revealed that individuals low on neuroticism, openness and agreeableness were more likely to enter military service (Jackson, Thoemmes, Jonkmann, Lüdtkke, & Trautwein, 2012). However, Jackson et al. (2012) also found that military training changed personality, as recruits were found to be low on agreeableness after training. However, both Israel and Germany have conscription, thus these results are not necessarily a true reflection of personality traits of enlistees in countries without conscription. In addition, research on the change of individual reinforcement sensitivities as a result of training, especially in the military is very limited. Future research into these areas would not only help to understand physical courage in combat environments, but also help understand the personality and reinforcement adjustments of courageous individuals during training.

This study differs from other studies in two ways. Foremost, quantitative as well as qualitative research methodologies were employed in the approach to investigate the personality of courageous soldiers as well as the situational circumstances surrounding courageous behaviour. Subsequently, informant rated data were used to obtain further perspective on the personality traits of the participants. The findings illustrate the benefit of utilising informant rated as well as mixed methodological approaches. Using both methodologies allowed a triangulation of data from the different sources, thus strengthening the study design and results (Patton, 1990). By using informant rated psychopathy personality

data, one would circumvent disadvantages associated with self-report measures involved in the assessment of psychopathy. The disadvantages involved are: dishonesty of psychopaths; psychopaths' lack of understanding the scope of their problem; saturation of negative emotions; and it may become problematic to expect somebody who has never experienced emotion to report on something that he or she has never experienced (see, Lilienfeld & Fowler, 2006). Future research into the psychopathic personality traits of courageous soldiers should consider using informant-rated data in addition to self-rated data. Apart from countering the disadvantages involved in self-report measures, the advantage of using informants also include the possibility that they can identify aspects that psychopaths are either evading or incapable to report on (Lilienfeld & Fowler, 2006).

#### **4.6. Limitations**

Our study is not without limitations. Our sample was limited to decorated military combatants, thus the applicability of the results to courageous actors outside the military environment is unknown. Results in the present study were based on individuals performing physical courageous acts; consequently, future research should also focus on social and civil courageous acts. In addition, only a small sample size was achieved, thus affecting the power and effect size of statistical tests (Stevens, 2009). Quantitative results of the present study should therefore be interpreted with caution. A further limitation of the present study design is the absence of a comparison group, even though the use of a comparison group within a qualitative design study is rare (Johnson, 1997). The inclusion of a comparison group would have required access to individuals that were present during the time when the current participants performed the courageous acts. It can be agreed that forming a normative group for the present study would have proved to be very challenging and time consuming.

## 4.7. Conclusion

This study makes an important contribution towards the understanding of personality and the motivation of courageous soldiers. Findings from both quantitative and qualitative methodologies provided mixed results, but overall indicated that decorated courageous soldiers are not psychopathic. However, findings do suggest that courageous soldiers and psychopaths share characteristics such as: fearlessness, low trait anxiety, coldheartedness, boredom susceptibility and sensation seeking. Other personality, character and behavioural traits exhibited by courageous soldiers in the present study include: mental toughness; confidence; alexithymia; protective / over protective behaviour; altruism; conditional caring; compartmentalisation; calmness; emotional stability; extraversion; low neuroticism; and low insensitivity towards punishment stimuli. No support was found for impulsive behaviour. The findings also suggested that courageous acts were performed as a result of the right person, with the right genetic-makeup, being in the right situation when it mattered. The approach temperament associated with extraversion, fear of failure and insensitivity to punishment stimuli may have contributed to the driving force behind courageous acts. Without such an interaction, the courageous acts might not have taken place.

## **Chapter 5**

### **General Discussion**

In this last chapter, the reader will be reminded of the research questions presented, and the main themes and findings from the three preceding empirical chapters will be drawn together. The findings are discussed in terms of the theoretical and applied issues that emerged from the research, followed by the limitations and strengths of the thesis. The chapter concludes with considerations for future research directions.

## **5.1. Summary of Results**

Chapter 1 predominantly concentrated on personalities and their relationship with performance in the military environment. Certain gaps were identified in the current literature. Areas of interest included military recruitment and training, psychoticism (Eysenck & Eysenck, 1976) and psychopathy (Lilienfeld & Widows, 2005) personality types, and courageous behaviour. The chapter concluded by proposing that the military creates an environment where individuals with some measure of psychoticism and psychopathy may flourish, provided that they are given appropriate training.

Chapter 2 explored how the psychological attributes and behaviours that British main-line Infantry recruits bring to the start of basic military training (MBT) influence retention and performance outcomes. The study was also interested in exploring individual differences of recruits at the start of MBT on psychological attributes such as: personality, mental toughness (MT), effortful control and the internalisation of military core values. Results showed that at the start of MBT, recruits who successfully completed MBT first time were significantly higher on the psychological attributes of psychoticism, MT, effortful activation control and effortful attention control than recruits who failed to complete MBT first time. Additionally, recruits who passed MBT first time were significantly lower on neuroticism and punishment sensitivity than recruits who failed to pass MBT first time. A novel aspect of the study was the use of pattern recognition analyses to identify the pattern of attributes that most accurately differentiated between successful and unsuccessful recruits, as well as

between the top performing recruits and those recruits that left the military prior to completing MBT. Results from pattern recognition analyses indicated that psychoticism, punishment sensitivity, MT, effortful attention control, effortful activation control, and integrated regulation were able to differentiate between recruits who successfully completed MBT first time and recruits who were unable to complete MBT first time. Findings obtained from the top performing recruits and early leaver recruits also indicated that psychoticism, neuroticism, punishment sensitivity, MT, integrated regulation, effortful attention control, and effortful activation control were successful group differentiators.

Chapter 3 was longitudinal in nature, and examined the effect MBT has on psychological attributes of military recruits. The same psychological attributes that were explored within Chapter 2, were investigated within Chapter 3 (i.e., psychoticism, extraversion, neuroticism, punishment sensitivity, reward sensitivity, mental toughness, effortful control, and general core values). With relevance to personality, consideration of the results suggested that recruits became significantly more extraverted and reward sensitive during MBT. However, follow-up tests for reward sensitivity failed to reveal any significant changes between individual data collection time-points. Further, findings showed that recruits significantly decreased in neuroticism and punishment sensitivity during MBT. With relation to cognitive results, findings indicated that none of the effortful control scales significantly increased during MBT. However, recruits did report significantly lower external regulation of core values at the end of MBT. The most unexpected finding within Chapter 3 was the non-significant increase in MT levels during MBT. A series of supplementary analyses were performed in an effort to explain the non-significant finding for MT. Results indicated that some recruits did increase in MT, where other recruits decreased in MT during training. Pattern recognition analyses of data obtained at the end of MBT revealed that psychoticism, extraversion, neuroticism, integrated regulation, activation control, attention control and

inhibition control were able to differentiate between the 50 recruits who demonstrated the highest increase in MT and the 50 recruits with the largest decrease in MT scores.

Psychoticism, extraversion, neuroticism, punishment sensitivity, and externalisation of core values were also able to differentiate between the 30 recruits that demonstrated the highest increase in MT and the 30 recruits with the most note-worthy decreasing MT scores.

Chapter 4 looked at the ultimate expression of military performance; namely, decorated courageous soldiers. The chapter followed a multi-methodological approach involving both qualitative and quantitative methods to explore the personality of decorated courageous soldiers with specific reference, but not limited to: psychopathy, cognitive processes, motivation and behaviours. Findings from both quantitative and qualitative methodologies suggested that courageous soldiers are not psychopathic. However, courageous soldiers and psychopaths do share some characteristics such as: fearlessness, low trait anxiety, coldheartedness, boredom susceptibility and sensation-seeking. Other personality, character, and behaviour traits exhibited by courageous soldiers include: low neuroticism, extraversion, insensitivity towards punishment stimuli, emotional stability, confidence, calmness, altruism, alexithymia, compartmentalisation, conditional caring, protective / over protective behaviour, and mental toughness. The approach temperament associated with insensitivity to punishment stimuli, fear of failure, and extraversion may have contributed to the driving force behind courageous acts. The findings within Chapter 4 suggest that courageous acts were performed as a result of the right person, with the right genetic-makeup, being in the right situation when it mattered.

## **5.2. Theoretical Points of Interest**

The key theoretical issues that emerged from the research in this thesis are addressed in the discussions from Chapters 2, 3 and 4, and as a result will only be summarised here.



### 5.2.1. Personality

In this thesis, attention was especially directed towards the personalities of military personnel and the effect it has on their performance within extreme environments. The thesis explored the personality profile of the successful recruit at the start of MBT, the effect MBT may exert on the personality of the (successful) recruit during MBT, and the personality profile of the ultimate expression of a soldier, i.e., the decorated courageous soldier. With relation to Eysenck's Big Three personality super-factors, evidence from the three chapters within the current thesis tells a coherent story: military training develops recruits to become potential courageous soldiers. Evidence from Chapter 2 showed that recruits who successfully completed MBT first time were significantly higher on psychoticism and significantly lower on neuroticism than recruits who failed to complete MBT first time. Data from Chapter 3 indicated that recruits became significantly more extraverted and significantly less neurotic (i.e., more emotionally stable) during MBT. Compared to the normative population, the personality profile of courageous soldiers in Chapter 4 are higher on psychoticism and extraversion, but lower on neuroticism. This indicates that military training does change the personality of recruits, and is equipping them to become potential courageous soldiers.

***Psychoticism:*** Eysenck (Eysenck & Eysenck, 1976) argued that high psychoticism is related to tough mindedness, but no evidence was found to support this argument. Instead, higher levels of psychoticism in recruits that successfully completed MBT first time could be attributed to sensation-seeking (Eysenck, 1991; Zuckerman, 1994). Evidence from Chapter 4 suggests that courageous soldiers displayed higher levels of sensation seeking than the normative sample. However, it was argued that sensation-seeking was not the driving force behind courageous acts, but rather the reason why they joined the military. The results obtained from the empirical chapters within the current thesis imply that high level of

psychoticism in a military sample may be more related to sensation-seeking than tough mindedness. Future research may want to explore this further, by examining whether individuals that join the military of their own volition score high on sensation-seeking.

***Extraversion:*** The results reported on extraversion in Chapter 3 underlie most of the theoretical implications reported here. On the one hand, the increase in extraversion levels during MBT was unexpected because previous research indicated that extraversion levels remained stable during MBT (Jackson, Thoemmes, Jonkmann, Lüdtke, & Trautwien, 2012; Vickers, Hervig, Paxton, Kanfer, & Ackerman, 1996). However, individuals with high levels of extraversion tend to be fearless (Rachman, 1978), and have low levels of arousal and an approach temperament (Carver & Connor-Smith, 2010). Consequently, the increase in extraversion levels observed in Chapter 3 suggests that extraversion is not as stable as previously reported, and that MBT develop recruits to have low levels of arousal and an approach temperament that may lead them to perform fearlessly within hazardous environments. This view is reflected within Chapter 4, as the courageous soldiers were higher than the normative sample on extraversion, and on PPI-R Fearlessness scale. Future research should investigate the development of extraversion during MBT and its relation to lower arousal levels and fearlessness.

***Neuroticism:*** One of the most consistent theoretical implications from the present thesis is support for the positive behavioural manifestation of low neuroticism (i.e., emotional stability) within the military environment. Various research studies (e.g., Glicksohn & Bozna, 2000; Vickers et al., 1996) have indicated that low neuroticism is an important characteristic for successful performance within the military. Therefore it comes as no surprise that low neuroticism was one of the personality factors to successfully discriminate between successful and unsuccessful recruits in Chapter 2. Evidence from Chapter 3 found that MBT had a positive effect on recruits' emotional stability; as recruits reported being significantly

lower on neuroticism at the end of MBT compared to the start of MBT. In addition to the courageous soldiers described in Chapter 4 being lower than the normative sample on neuroticism, courageous soldiers also reported that they did not experience psychological distress, as their GHQ Total scores were below the distress state threshold value. From the evidence obtained in the present thesis, one might infer that low neuroticism is a crucial personality characteristic for successful performance within the military.

***Relationship between psychopathy and courageous soldiers:*** The theoretical implication that stood out the most from the thesis concerns the relationship between psychopathy and courageous soldiers. Previous research has established a link between psychopathy and courageous behaviour, suggesting that courageous soldiers are fearless, impulsive, have low anxiety, and are high on sensation-seeking (Lykken, 1995; Rachman, 1996; Smith, Lilienfeld, Coffey, & Dabbs, 2013). Evidence obtained from the multi-methodological approach in Chapter 4 was consistent with this research and indicated that courageous soldiers are not psychopathic, but that they do possess certain characteristics from the psychopathy profile, such as fearlessness, low trait anxiety, boredom susceptibility, coldheartedness, and sensation-seeking.

An interesting theoretical implication that stood out in the present thesis is that the courageous soldiers were perceived to be coldhearted by their informants, because of factors such as conditional caring and compartmentalisation of certain aspects, such as work and family lives, emotions, and task focus. The informants' coldheartedness finding presents a contradiction with the popular belief that courageous soldiers are inherently helpful, protective, caring, and show empathy towards others. Baron-Cohen (2011) did note that individuals may be perceived as un-empathetic when they are very focused in pursuit of goals. Being task-focused, with an apparent lack of emotion (alexithymia), and coldheartedness, suggests that the courageous soldiers may have some overlapping

characteristics with autism (Asperger, 1944; Baron-Cohen, 2011; Kanner, 1943). Autism can be placed along a continuum extending from general population to clinical disorders (Sierro, Rossier, & Mohr, 2016). Within the population of individuals with autism, there appears to be considerable variability, as some individuals perform at normal levels, whereas others are clearly impaired (Bird & Cook, 2013). Consequently, it appears that the military could be an environment where being on the autistic spectrum could be advantageous; however, in a different environment this can be a disadvantage. Future research could explore the possible connection between military courageous soldiers and autism further.

One more important theoretical implication concerns the argument of whether a courageous act can be classified as courageous if the actor did not experience fear during the act. Evidence from Chapter 4 indicates that fear is not a pre-requisite for courageous behaviour, as recognised by the military authorities, since some courageous participants did experience fear whilst others did not experience any fear prior or during their courageous act. This may affect how future researchers conceptualise courage, as some definitions (e.g., Evans & White, 1981; Gould, 2005; Rachman, 1978) include fear as a pre-requisite for courageous behaviour, whereas other researchers (e.g., Walton, 1986) consider fearlessness to be synonymous with courage. However, at another level, perhaps this conceptualisation issue is a philosophical rather than an empirical question.

### **5.2.2. Punishment and Reward Sensitivity**

This thesis has shown that low levels of punishment sensitivity can be beneficial for performance within the military environment. Results from Chapter 2 revealed that successful recruits were significantly lower on punishment sensitivity than unsuccessful recruits. These results support the findings of Perkins, Kemp, and Corr (2007) who found that high punishment sensitivity is negatively related with performance during combat simulations. Insensitivity towards punishment cues may have enabled the successful recruits to be less

anxious and less fearful during MBT (Bijttebier, Beck, Claes, & Vandereycken, 2009; Gray, 1991), thereby facilitating approach towards stressful circumstances and maintaining high levels of performance. The significant decrease in punishment sensitivity reported in Chapter 3 may be attributed to the recruits being de-sensitised towards fear and punishment stimuli. Rachman (1978) noted that repetitive exposure to fear and punishment can result in de-sensitisation or habituation. The low punishment sensitivity noted in courageous soldiers may thus explain the ability of courageous soldiers to stay calm under stressful conditions. Collectively, the findings in the present thesis indicate that low levels of punishment sensitivity are advantageous within a military environment.

Previous research has shown reward sensitivity to be positively associated with high levels of performance in military combat training, and to be relatively stable over an individual's life span (Gray, 1991; Perkins et al., 2007). No significant difference was observed between successful and unsuccessful recruits on reward sensitivity. It was therefore suggested that the behaviour of both successful and unsuccessful groups of recruits were equally reinforced by positive stimuli at the start of MBT. However, the stability of reward sensitivity was brought into question in Chapter 3, as data indicated a significant increase in recruits' reward sensitivity during MBT. The biggest increase in reward sensitivity occurred during the first phase of MBT, whereafter reward sensitivity stabilised. Being in a new environment creates an opportunity for personality development (Specht et al., 2014). As a result, recruits may have experienced an imbalance between normative trait behaviours and expected behaviours of the military at the start of MBT, and as a consequence the stability of reward sensitivity levels was altered. It appears that after recruits managed to adapt to the new environment, the imbalance between normative and expected behaviours was reduced, thereby stabilising reward sensitivity levels.

### 5.2.3. Mental Toughness

The view that MT is an important factor for military performance (e.g., Arthur, Fitzwater, Hardy, Beattie, & Bell, 2015; Gucciardi, Hanton, Gordon, Mallett, & Temby, 2014) was supported by Chapters 2 and 4 within the present thesis. Chapter 2 indicated that at the start of MBT, successful recruits were significantly higher on MT. This confirms that MT is an important predictor of successful adjustment and recruit retention during MBT (Godlewski & Kline, 2012). In addition, Chapter 4 showed that courageous soldiers were mentally tough and viewed difficult situations as a challenge. Both MT behaviour and challenge appraisal account for the courageous soldiers' ability to remain calm and perform well during dangerous situations. Being MT acted as a defence against the ill effects of stress in highly demanding situations (Bartone, Roland, Picano, & Williams, 2008). This is supported by evidence indicating that the courageous soldiers were emotionally stable, and not experiencing psychological distress.

Very little is known about the effect of MBT on the development of MT behaviours. Contrary to expectations, and Bell, Hardy, and Beattie's (2013) research on young elite cricketers, MT did not increase during MBT in Chapter 3. Bell et al. (2013) showed MT to increase in young elite cricketers as a consequence of the transformational delivery of a punishment based intervention. The intervention consisted of repeated exposure to punishment stimuli for failure to meet performance or disciplinary standards. Bell et al. (2013) suggested that the success of the MT development programme can largely be attributed to the transformational manner of delivery of the intervention, and the psychological support participants received to develop coping strategies to effectively manage the negative consequences associated with punishment. The non-significant increase in MT that was noticed in Chapter 3 may be a consequence of the recruits lacking the necessary psychological skills to effectively deal with stressors in the training environment.

In Chapter 3, follow up analyses revealed that some recruits increased in MT whereas others decreased in MT during MBT. Recruits at the very top end of MT showed significant decrease in both neuroticism and punishment sensitivity during MBT. This suggests that the very top MT recruits became more emotionally stable, less anxious, less fearful, and more able to adjust successfully into the military (Eysenck & Eysenck, 1976; Fiedler, Oltmanns, & Turkheimer, 2004; McNaughton & Corr, 2004). In contrast, those who became less MT during MBT developed higher levels of neuroticism and became more sensitive to fear and anxiety stimuli. High levels of neuroticism have been found to have a negative impact on adjustment to the military environment, and reflect characteristics such as high levels of anxiety, depression and unstableness (Eysenck & Eysenck, 1976; Fiedler et al., 2004).

#### **5.2.4. Effortful Control and General Core Values**

With regards to cognition, evidence from Chapter 2 indicated that successful recruits were significantly higher than unsuccessful recruits on activation control and attention control at the start of MBT. The higher levels of activation control and attention control of the successful recruits may have enabled them to remain focused and be more flexible when approaching stressful situations (Eisenberg, Smith, & Spinrad, 2010; Rothbart, Sheese, & Posner, 2014). Chapter 3 affirmed Kochanska, Murray, and Coy's (1997) assertion that effortful control is a stable temperament, as none of the effortful control scales increased during MBT.

The last theoretical implication has reference to internalisation of military values. The prediction that successful recruits will have significantly more integrated motivation with regard to the UK Army's core values than unsuccessful recruits at the start of MBT was not supported in Chapter 2. This is consistent with Arthur, Hardy, and Wagstaff (2010) who found that internalisation of core values only increased from week 3 during MBT. According to Ryan and Deci (2004), for internalisation of values to occur, an individual needs to feel

that their needs for autonomy, relatedness and competence are met. Recruits may have felt that their psychological needs were not supported; since they found themselves in a new environment which is driven by essentially alien rules, especially for new recruits. Further, Chapter 3 revealed a significant decrease in external regulation during MBT, suggesting that recruits related better to Army values and felt more autonomous and competent in their actions by the end of training, as compared to at the start (Ryan & Deci, 2004). Future research should explore the relationship between self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) and the internalisation of military core values in more depth.

### **5.3. Applied Issues**

Findings from Chapters 2 and 3 suggest that in order to help recruits pass MBT first time, training protocols could focus on the development of psychological attributes such as psychoticism, MT, integrated regulation, attention control, effortful activation control, emotional stability (reverse neuroticism), and the reduction of punishment sensitivity. One psychological attribute that stands out throughout this thesis is MT. For example, in Chapter 2, MT was one of the psychological attributes that successfully differentiated between recruits that successfully completed MBT first time and recruits that failed to complete MBT first time. In Chapter 3, results indicated that some recruits significantly increased in MT, while other recruits significantly decreased in MT. In Chapter 4, MT proved to be an integral part of courageous behaviour and therefore the development of MT proves to be a beneficial attribute for the combat soldier.

#### **5.3.1. Developing Mindset**

Before implementing a MT development programme, it will be necessary to consider the mindset of the recruits involved. The rationale for this step is that, even when recruits are taught the skills to be mentally tough, they may not implement those skills effectively unless their mindset fosters the idea that they can become more mentally tough. Changing



individuals' mindsets can promote resilience and motivation (See Yeager & Dweck, 2012). Dweck's (2006) research in sport, business, relationships, and education suggests that there are two different mindsets on how individuals perceive their abilities. Individuals with a fixed mindset believe that their traits and abilities are innate and fixed and they feel the need to prove themselves over and over again. Conversely, individuals with a growth mindset believe that their abilities can be developed through good teaching, persistence and effort. An important aspect of the growth mindset is that it allows individuals to persist and thrive during challenges and setbacks (Dweck, 2006). Consequently, it might be advantageous to teach and equip section commanders with the ability to foster a growth mindset amongst their recruits. According to Dweck (2006; 2015), fostering a growth mindset is not just about the amount of effort an individual invests, but it can also be promoted by having the individual focus on the process that leads to learning (e.g., trying new strategies, hard work). Gucciardi and Gordon (2011) proposed some growth mindset questioning to foster a MT mindset; For example, "When recently did you struggle with failure or pressure, yet persisted despite the setback and adversity"? Once an individual's mindset has been changed to that of a growth mindset, it becomes important to maintain the mindset otherwise an individual may revert back to a fixed mindset (Dweck, 2006). Training instructors should promote a growth mindset and continue helping recruits to learn and develop throughout training.

### **5.3.2. Developing Mental Toughness**

Bell et al. (2013) showed that a mental toughness development programme involving young elite cricketers resulted in coaches perceiving their athletes to be more mentally tough after the intervention. The premise of the Bell et al. (2013) MT developmental programme focused around the repeated exposure to punishment-conditioned stimuli in the training environment for failure to meet disciplinary or performance standards. The success of the MT development programme can largely be attributed to two factors: firstly, the

intervention was delivered in a transformational nature by staff members and secondly the participants received psychological support to develop coping strategies to effectively manage the negative consequences associated with punishment (e.g., increased anxiety).

During MBT, recruits are already exposed to constructive punishment for infractions of conduct (e.g., punctuality, failure to maintain personal hygiene or equipment) and performance. The appropriate use of punishment (i.e., punishment that is coupled to a specific transgression) during military training has already showed a positive effect upon the improvement of recruits' self-esteem and satisfaction (Arthur et al., 2010); however, the leadership style of training instructors and the psychological support to recruits could be examined to ascertain if some changes would be beneficial to ensure maximum benefit is obtained from constructive punishment. Bell et al. (2013) suggested that when a punishment is delivered in a transformational manner (i.e., inspirational motivation, appropriate role modelling), it can result in an increase in performance under pressure. Inspirational motivation is a dimension of transformational leadership and articulates a positive vision of the future (Bass & Avolio, 1995), where appropriate role modelling behaviour by the leader sets an example for the followers (Podsakoff, Mackenzie, Moorman, & Fetter, 1990). Assisting training instructors to develop transformational leadership behaviours to successfully deliver the MBT programme may not only prove to be beneficial for developing recruit MT, but it may also have a positive effect upon training outcome. For example, examining the effect of a differentiated model of transformational leadership on training outcome of UK Royal Marine recruits, Hardy et al. (2010) showed that in addition to inspirational motivation and appropriate role modelling, transformational leadership behaviours (fostering of group goals, contingent reward and individual consideration) successfully discriminated between pass and failure in recruits. In addition, Arthur et al., (2010) showed that both inspirational motivation and appropriate role modelling

transformational behaviours were important in predicting the internalisation of core values of Infantry recruits during training. Developing transformational leadership skills of training instructors will also assist in developing courageous behaviour amongst recruits (Lester, Vogelgesang, Hannah, & Kimmey, Jr., 2010).

Equipping recruits with the necessary skills to deal with the negative consequences of punishment and to maintain prolonged performance during stressful situations can be advantageous for both MT and performance. Recently, Fitzwater, Arthur, and Hardy (under second review) explored whether a psychological skills training intervention (i.e., imagery, relaxation, self-talk, and goal setting strategies) would develop mental toughness and enhance performance of elite Infantry recruits during a 3-week intervention programme. Findings indicated a significant increase in the use of psychological skills and observer-rated MT in the treatment group during training, and no significant changes in observer-rated MT were reported for the control group. Further, individual recruit performance was significantly higher in the treatment group during a week-long pre-selection course for the Parachute Regiment when controlling for leadership climate and fitness. Results further indicated that during the pre-selection course, the treatment group only differed from the control group on imagery and relaxation, but not on self-talk and goal setting strategies. In explaining their results, Fitzwater et al. (under second review) suggested that self-talk and goal setting may be more naturally occurring psychological skills than imagery and relaxation.

### **5.3.3. Developing Courageous Behaviour**

Chapter 4 explored the ultimate expression of soldier values in courageous acts. Developing moral, social and physical courage within military personnel should be beneficial for the military, not only with regard to the achievement of the military's aims and objectives, but also with regard to the internalisation of core values, seeing that courage is one of the six core values of the British Army.

Lester et al. (2010) suggested that the most effective method for organisational leaders to develop and encourage courageous behaviour amongst followers was to espouse transformational leadership behaviours. The differentiated model of transformational leadership (Hardy et al., 2010) contains six dimensions of transformational leadership behaviours: appropriate role modelling, inspirational motivation, fostering acceptance of group goals, high performance expectations, intellectual stimulation, and individual consideration. The differentiated model also includes a transactional dimension, i.e., contingent reward. For the development of courage, we will focus on inspirational motivation, appropriate role modelling, and individual consideration.

Inspirational motivation behaviours of transformational leaders develop a positive vision amongst followers, which in turn inspires followers to achieve the organization's vision and goals (Bass & Avolio, 1995). Inspirational motivation usually concentrates on positive attributes like unity, competence and generosity (Bass & Steidlmeier, 1999). Through inspirational motivation, the transformational leader offers the follower empowerment, enabling the follower to develop (Kanungo & Mendonca, 1996) and to invest more effort to attain their goals and tasks (Bass, 1985). As far as can be established, there is no known empirical evidence indicating that inspirational motivation develops courage in followers. However, there are examples within military literature where leaders inspired and motivated followers to act courageously when the odds were against them. One such example would be First Lieutenant James Stone, platoon commander of the U.S. Army, 8<sup>th</sup> Cavalry Regiment, during an intense fire fight against the Chinese near Sokkogae, North Korea on November 21, 1951. First Lieutenant Stone's platoon was manning a desolate hilltop outpost when they came under attack by overwhelming Chinese enemy forces. During the enemy onslaught, 1<sup>st</sup> Lt. Stone repeatedly exposed himself to enemy fire to direct defensive-fire against overwhelming advancing enemy forces. Throughout the attack, 1<sup>st</sup> Lt. Stone

continued to encourage and motivate his platoon in the defence of the outpost even though he was wounded. When the enemy managed to breach the perimeter, 1<sup>st</sup> Lt. Stone was wounded in the neck. During this incident, one of his men rushed to his aid and saved his life by attending to the wound whilst under enemy fire. During Stone's account of the events (Medal of Honor: Portraits of valor beyond the call of duty, 2011), he told the remaining able bodied men to break-out while he covered their retreat. Stone recalled that the men refused and said that they would rather stay beside him and keep fighting. The post was eventually overrun by overwhelming enemy forces and the remaining men were captured, only to be released after the war. Part of 1<sup>st</sup> Lt. Stone's citation for the Congressional Medal of Honour reads " ... because of this officer's driving spirit and heroic action was the platoon emboldened to make its brave but hopeless last ditch stand". With regard to 1<sup>st</sup> Lt. Stone, his actions identified his goal (i.e., repel the enemy and defend the outpost at all cost), whilst his behaviour of motivating and encouraging his men during combat inspired his followers to aspire to his goal of defending the outpost by exhibiting courageous behaviour rather than retreating.

The effects of transformational leadership on followers' motivation are more complex than simply suggesting leaders need to inspire followers to transcend beyond their limits to act courageously. Leaders also need to act as a role model for their followers by modelling courageous behaviour (i.e., physical, social and moral) on a daily basis (Finfgeld, 1999; Lester et al., 2010; Peterson & Seligman, 2004), and by setting an example and acting consistently with values that the leader supports (Podsakoff et al., 1990). The appropriate role modelling behaviours of leaders play an integral part in the development of courage within an organisation, seeing that individuals learn to a certain extent by observing others successfully completing a task, i.e., vicarious learning (Bandura, 1977; Lester et al., 2010). Success of vicarious observation is influenced by the observer's perception on how competent, trustworthy and credible the role model is (Bandura, 1977). Courageous actors emulate

exemplary behaviour that they have observed from family members, individuals who have similar problems as themselves, and famous individuals (Finfgeld, 1999). Therefore, it is important that section commanders must understand the importance of being a role model for their followers. They will be observed by their followers on a daily basis and will have the opportunity to model courageous behaviours (e.g., physical, social, moral) that may lead to followers emulating them when presented with a similar situation. Behaviours that are deemed courageous and worth modelling by the section commanders include: contributing to the society/organisation, going beyond the norm to help others, and maintaining a positive attitude whilst facing adversity (Finfgeld, 1999).

A transformational leader may also develop courageous behaviour among his followers by knowing and understanding each of his followers, and providing individualised consideration (Lester et al., 2010). Individual consideration entails the leader showing concern for the feelings and needs of followers, as well as recognising individual differences (Bass & Avolio, 1995). Followers, who perceive their leaders to show individual consideration, are said to be more altruistic, more productive, and exhibit more civic virtue than followers who perceive their leader to withhold individual support (Podsakoff, MackKenzie, & Bommer, 1996). Leaders exhibiting individual consideration behaviour will therefore be in a position to learn each follower's fear that may hinder ultimate performance during combat situations (e.g., fear of vulnerability or fear of failure during combat). Such knowledge will enable the leader to develop and implement training methods where each follower can develop the skill to confront and master those fears in a controlled environment.

Findings within Chapter 4 indicated that fear is not a pre-requisite for courageous behaviour, as some courageous soldiers experienced fear, whereas others did not. For a soldier to experience fear during combat may not only adversely affect the soldier's motivation to engage in combat, but it may also prove to be detrimental to the wellbeing of

the rest of the fighting unit as fear is contagious, and can therefore be transferred from soldier to soldier (Rachman, 1978). Being exposed to realistic and adequate training, the soldier can become less responsive to stress, less fearful and experience an increase in self-confidence, and as a result develop or maintain courageous behaviour (Rachman, 1978; 2010).

Continuous rehearsal of fearful combat scenarios during training (e.g., encirclement, wounded comrades) can result in the reduction of fear by desensitisation, and finally to a stage of fearlessness. For example, trainee parachutists who jump from an aircraft for the first time shows courage despite the subjective fear; where veteran parachutists, who have been exposed to the fear of jumping on many occasions has been habituated to the situation, and as a consequence no longer experience fear when parachuting, suggesting that the parachutists transitioned from being courageous to being fearless (McMillan & Rachman, 1988; Rachman, 1983; 2010).

In summary, the development of mental toughness (and therefore courageous behaviour) in recruits during MBT may prove to be beneficial to organisational, as well as personal development and performance. The development of courageous behaviour will aid in the internalisation of core values, as courage is one of the values of the British Army. In addition, courageous behaviour is contagious (Miller, 2000), suggesting that the observation of another soldier acting courageously might inspire others to exhibit courageous behaviour as well. It is proposed that the military considers implementing training protocols in order to help recruits to develop MT and courage by developing the right mindset, through appropriate punishment, transformational leadership behaviours, and psychological skills training. Transformational leadership behaviours that were identified for the development for MT and courageous behaviour were inspirational motivation, appropriate role modelling, and individual consideration (Bell et al., 2013). Psychological skills that were identified for the

development of both MT and performance enhancement were imagery and relaxation strategies (Fitzwater et al., under second review).

## **5.4. Limitations and Strengths of the Thesis**

Specific limitations and strengths have been highlighted and discussed within the relevant empirical chapters; therefore this section will highlight general limitations and strengths of the thesis.

### **5.4.1. Limitations**

First, it may be argued that none of the chapters within the present thesis followed a true experimental design, as no control group was included in any of the studies. However, various factors argued against the use of control groups. It would have been very cumbersome and time consuming to match the control group by gender, age, and matching life changing circumstances. It would also have been difficult to ensure that both experimental and control groups were time matched (in order to control for other external factors), unless the control group consisted of recruits from another military training Company. However, this option was not viable due to the probability of cross contamination in such a close knit community. Although, case-matching does not necessarily control for confounding, it may in fact introduce confounding even when it does not exist within the test participants (Rothman, Greenland, & Lash, 2008). Since the recruits were observed at multiple times during MBT (i.e., three times), it was argued that a control group would not be necessary, as the recruits could act as their own control group. Future research could explore the viability of a matching sample consisting of new trainees from other Arms of Services (e.g., Navy, Air Force) or even trainees within civilian emergency services (e.g., Police and Fire service).

A second limitation of the current thesis concerns the generalisability of the results. Given that the present thesis included only military male subjects, the results are limited in



generalisability; even if one can assume that the results are representative of the rest of the British male armed service members, generalisability to male armed service members from other countries cannot be assumed as they may differ from the sample in age, education, ethnicity, and culture. Future research should explore the generalisability of the results to different Arms of Services (i.e., Navy, Air Force), gender, and different military service (i.e., voluntary military service, national service).

#### **5.4.2. Strengths**

An important strength of this thesis is the use of multiple research methodologies (i.e., self-report vs. informant-report, qualitative vs. quantitative) to assess personality and behaviour of courageous soldiers. A multi-methodological approach can provide rich information about personality as well as increase the validity of the personality assessment (Vazire, 2006). The benefit of using of multiple method approach is that informant-reports complement self-reports, since self-reports contain information that others might not be aware of (Paulhus & Vazire, 2007); whereas informant-reports offer a perspective of the personality from the outside (Hogan, 1998). Using both quantitative and qualitative methodologies allowed for the triangulation of data from different sources (Patton, 1990). Thus, assessing courageous soldiers through multiple assessments helped to enrich the understanding of associated behaviours within hazardous environments. The information rich results obtained from the mixed methodological approach within this thesis attest to the benefit of using these methodologies.

A further strength of the present thesis is the use of sophisticated machine learning techniques to conduct pattern recognition analyses for classification purposes. Machine learning refers to the development of algorithms to detect meaningful patterns in the data (Witten, Frank, & Hall, 2011). An advantage of machine learning techniques is that unlike statistics, it works under a distribution-free setting; therefore it does not require any prior

assumptions about the underlying relationships between the variables (Shalev-Shwartz & Ben-David, 2014). According to Shalev-Shwartz and Ben-David (2014) a distribution free setting permits the learning algorithm to establish which models best estimate the data-generating process. In machine learning, the model can be descriptive (i.e., to gain knowledge from the data), predictive (i.e., to make predictions in the future) or both (Alpaydin, 2010).

From a theoretical perspective, the collection of empirical chapters within the present thesis contributes and extends the current literature with regards to: the personality profile of the successful recruit at the start of MBT; how the successful recruit develops with relation to personality, cognition, and MT behaviour; and finally with regard to the ultimate expression of soldiering (i.e., courageous acts). A particular strength is that the research contained within this thesis was conducted in an ecologically valid setting. The applied value of this thesis within the military context is that it offers pointers to improve recruitment and retention during MBT, develop recruits into becoming better combat soldiers, decrease the incidence of combat stress related disorder, and make soldiers more courageous.

## **5.5. Future Directions**

Taken together, evidence from the collection of empirical chapters contained within the present thesis suggests further understanding of personalities and their relationship with performance in the military environment through a psychological lens may prove to be beneficial for future performances on the battlefield. The purpose of this section is to target particular gaps in the present thesis and to suggest future research avenues to pursue. The theoretical rationales for the research questions below were addressed within the thesis. As a consequence, the priority questions are presented in a condensed manner.

### **Priority Questions**

1. What is the relationship between psychoticism and tough-mindedness (MT)?
2. Are volunteer recruits higher in sensation seeking than the general population?

3. Are recruits that successfully complete MBT first time higher on the sensation seeking scale than recruits that failed to complete MBT first time at the start of MBT?
4. Does MBT develop the potentially beneficial psychopathic characteristics (e.g., Fearlessness, Stress Immunity, Coldheartedness) in recruits? Do civilian courageous actors share the same psychological profile as their military counterparts?
5. Can transformational leadership behaviour (e.g., individual consideration) moderate the relationship between the three psychological needs (competence, autonomy, relatedness) and integrate regulation of military core values?
6. Are military courageous soldiers closer related to autism than psychopathy?

## **5.6. Conclusion**

In this thesis the personality, cognition and behaviours of combat soldiers were explored to better understand their performance within training and combat environments. Evidence was found indicating that there are psychological attributes that successfully differentiate between recruits who complete MBT first time and recruits who fail to complete MBT first time. In addition, evidence was forwarded showing the effect of MBT on psychological attributes of military recruits. Finally, the thesis explored the personality and behaviour of courageous soldiers and the relationship with psychopathy. Findings suggested that some of the psychopathy traits of the courageous soldiers are also traits associated with autistic spectrum disorders. Individuals displaying such characteristics may well be advantaged in a military environment. Future directions are offered to develop a better understanding of the military soldier and his/her function within extreme environments.

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## APPENDIX A

### Chapter 2 - Pattern Recognition Analysis

Pattern recognition analysis was performed in order to identify important attributes in the data that would enable differentiation between recruits who successfully passed military basic training first time and recruits who were unable to complete the training. In order to extrapolate these differentiating variables from the data, Waikato Environment for Knowledge Analysis (Weka; Hall, Frank, Holmes, Pfahringer, Reutemann, & Witten, 2009) was used. Weka is a machine learning workbench that uses algorithms and data pre-processing tools for predictive modelling and data analysis (Witten, Frank, & Hall, 2011). Three classification algorithms (i.e., nearest neighbour classifier: Lazy, IB1; decision tree: J48; and Support Vector Machine: SMO) was used to evaluate the accuracy of the predictive model, as well as the weight of each attribute. To predict the error rate of each classification algorithm, we applied stratified tenfold cross-validation on the data. Training outcome, whether a recruit was successful or unsuccessful in completing basic training first time, was used as the classifier.

#### Results

*Pattern Recognition results for recruits who successfully completed CIC training first time (n = 85) vs. recruits who were unsuccessful in completing CIC training first time (n = 51):* Results of the predictive performance of the three classification algorithms are presented in Table A1. The predictive performance of the Support Vector Machine (SVM; SMO) algorithm was more accurate when compared to the predictive performances of the decision tree (J48) and nearest neighbour (Lazy: IB1) algorithms. The SVM (SMO) algorithm classified 63.9% of the instances correctly and 36.02% instances incorrectly. The SVM (SMO) algorithm had the highest positively weighted Kappa value (.140) of the three algorithms tested. The Kappa statistic (Cohen, 1988) measures the agreement between the

**Table A1**

Estimates of the Predictive Performance of the Three Classifier Algorithms

	Algorithm		
	Nearest Neighbour (Lazy: IB1)	Decision (Tree J48)	SVM (SMO)
Total Number of Instances	136	136	136
Total Number of Attributes	14	14	14
Correctly Classified Instances % Accuracy	44.11	55.88	63.97
Incorrectly Classified Instances % Accuracy	55.88	44.11	36.02
Kappa Statistic	-.18	-.07	.14
Mean Absolute Error	.55	.48	.36
Root Mean Squared Error	.75	.57	.60
Relative Absolute Error	119.05	102.85	76.76
Root Relative Squared Error	154.37	117.74	123.95
Total Computational Time (seconds)	.03	.17	.18

observed and predicted categories of a data set, while adjusting for the amount of agreement that may occur by chance (Witten et al., 2011). A Kappa value of 0 would indicate that there is less than chance agreement between the observed and predicted categories, whereas a Kappa of 1 would indicate perfect agreement (Landis & Koch, 1977). The SVM (SMO) Kappa value of .140 suggested that there was only a slight chance of agreement between the observed and predicted categories. The low Kappa statistic can be ascribed to the high number of false positives present in the confusion matrix (See Table A2). The negative Kappa values observed in both the decision tree (J48) and nearest neighbour (Lazy: IB1) algorithms, were interpreted as a potential systematic disagreement between the categories (Viera, & Garrett, 2005), thus there was no effective agreement between the two classifiers. This disagreement is reflected in the confusion matrices in Table A2.

The confusion matrix from the nearest neighbour (Lazy: IB1) algorithm classified 46 instances correctly to the successful group; whereas only 14 instances were correctly classified in the unsuccessful group. However, the algorithm incorrectly classified 39 instances of the successful class to the unsuccessful class and 37 of the unsuccessful class to the successful class. The confusion matrix from the decision tree (J48) algorithm classified 70

**Table A2**

2 x 2 Confusion Matrices of the Three Algorithms: Successful vs. Unsuccessful

		Successful	Unsuccessful
Nearest Neighbour (Lazy:IB1)	Successful	46	39
	Unsuccessful	37	14
Decision Tree (J48)	Successful	70	15
	Unsuccessful	45	6
SVM (SMO)	Successful	74	11
	Unsuccessful	18	13

Number of Instances = 136.

instances correctly to the successful group, but only managed to classify 6 instances correctly to the unsuccessful group. Conversely, the algorithm incorrectly classified 15 instances of the successful class to the unsuccessful class and 45 of the unsuccessful class to the successful class. SVM (SMO) algorithm showed a slight agreement between the classifying categories, as it classified 74 instances correctly to the successful group, where only 13 instances were correctly classified in the unsuccessful group. Furthermore, SVM (SMO) incorrectly classified 11 instances of the successful class to the unsuccessful class and 18 of the unsuccessful class to the successful class. Results indicated the SVM (SMO) algorithm to be a better predictor, as more instances were correctly classified to the correct class and fewer instances were misclassified.

Performance characteristic of the three classifying algorithms are shown in Table A3.

The weighted average performance characteristics for the three classifying algorithms are shown in bold. The classification algorithm with the best performance when predicting successful and unsuccessful outcome was SVM (SMO), with 61.6% precision, 64% recall and 75% accuracy. Considering each classifier on its own within the SVM (SMO) algorithm, the successful classifier had the best predictive power (75.1%, f-measure) as opposed to the low predictive power (34.7%, f-measure) of the unsuccessful classifier. The results above indicated that out of the three classifying algorithms explored, SVM (SMO) classifying

**Table A3**  
Performance Characteristics of the Three Algorithms

Classification Algorithm	Classifier	TPR	FPR	Precision	Recall	F-Measure	ROC Area	Accuracy in %
Nearest Neighbour (Lazy:IB1)	Successful	.54	.73	.55	.54	.55	.41	44%
	Unsuccessful	.28	.46	.26	.28	.27	.41	
	Weighted Average	<b>.44</b>	<b>.63</b>	<b>.45</b>	<b>.44</b>	<b>.44</b>	<b>.41</b>	
Decision Tree (J48)	Successful	.82	.88	.61	.82	.70	.44	56%
	Unsuccessful	.12	.18	.29	.12	.17	.44	
	Weighted Average	<b>.56</b>	<b>.62</b>	<b>.49</b>	<b>.56</b>	<b>.50</b>	<b>.44</b>	
SVM (SMO)	Successful	.87	.75	.66	.87	.75	.56	75%
	Unsuccessful	.26	.13	.54	.26	.35	.56	
	Weighted Average	<b>.64</b>	<b>.51</b>	<b>.62</b>	<b>.64</b>	<b>.60</b>	<b>.56</b>	

Number of Instances 136. TPR = True Positive Rate; FPR = False Positive Rate; ROC = Receiver Operating Characteristic.

algorithm produced the best results and were more able to accurately classify those who will successful than classifying those who will not complete training.

We further investigated whether extracting individual features from the model could improve the accuracy of the classifiers. We followed a heuristic process by visually inspecting individual features in the data. Six of the features were eliminated as a result of low individual weightings, where after the SVM (SMO) classifying algorithm was re-run with the reduced subset of features. Table A4 shows a comparison of estimates between the complete subset with 14 attributes against the reduced subset with 8 attributes. Results revealed that the accuracy of the new model improved from 63.9% to 66.9%. The percentage of the incorrect classified instances decreased from 36.02% to 33.08%. In addition, the value of the Kappa statistic improved from .140 to .196, indicating a slight agreement between the observed and predicted classifiers. The low Kappa statistic can be attributed to the high

**Table A4**

Comparison of the Estimates of the Predictive Performance of the SVM (SMO) Algorithms after Individual Features with Low Weightings were Extracted

	Algorithm SVM (SMO)	
	Full Subset	Reduced subset
Total Number of Instances	136	136
Total Number of Attributes	14	8
Correctly Classified Instances % Accuracy	63.97	66.91
Incorrectly Classified Instances % Accuracy	36.02	33.08
Kappa Statistic	.140	.196
Mean Absolute Error	.360	.330
Root Mean Squared Error	.600	.575
Relative Absolute Error	76.76	70.49
Root Relative Squared Error	123.95	118.78
Total Computational Time (seconds)	.18	.10

number of false positives present in the confusion matrix. Within the confusion matrix there were 78 true positive, 13 true negative, 7 false negative and 38 false positive compounds. As a result of the high number of false positives, the recall value for the fail compound (i.e., .255) is low.

Table A5 depicts the performance characteristics for the reduced subset. The weighted average for the subset is indicated in bold. Compared to the full subset, all the performance characteristics of the adjusted subset improved. The model indicated that the successful classifier had the best predictive power (77.6 % f-measure) to accurately classify new recruits who will be successful. The new improved subset further revealed that, of the seven remaining features, Psychoticism, Mental Toughness and Integration of Core Values had the highest individual weighting, followed in order of weight decent by Neuroticism, Punishment

**Table A5**

Performance Characteristics for the Reduced Model with 8 Attributes

Classification Algorithm	Classifier	TPR	FPR	Precision	Recall	F-Measure	ROC Area	Accuracy in %
SVM(SMO)	Successful	.92	.75	.67	.92	.78	.59	66.9%
	Unsuccessful	.26	.08	.65	.26	.37	.59	
	Weighted Average	<b>.67</b>	<b>.50</b>	<b>.66</b>	<b>.67</b>	<b>.62</b>	<b>.59</b>	

Instance = 136

Sensitivity, Effortful Control Attention and Effortful Control Activation. Individual feature weightings before and after features with low weightings were extracted and the SVM (SMO) algorithm was re-run and can be observed in Table A6.

The only attribute in the current subset that failed to show statistical significant difference between the successful and unsuccessful classifiers was the General Core Value Integration feature. Thus, the results showed that the psychological attributes contained in the adjusted subset is able to predict with 66.9% accuracy whether a recruit will be able to pass basic military training.

***Pattern Recognition results for top ranking recruits who were successful in completing CIC training first time (n = 29) vs. recruits who left the military before completing CIC training first time (n = 37):*** We further investigated whether psychological attributes were able to accurately differentiate between the top performing recruits (n = 29) and/or recruits who left the military before complete training (n = 37). The top performers group consisted of recruits who had obtained high outcome classification scores at the end of

**Table A6**

Individual Feature Weightings Before and After Features with Low Weightings were Removed and the Protocol was Re-Run

Feature	Weighting Before Extraction	Weightings After Extraction
Mental Toughness	-1.09	-1.15
Reward Sensitivity*	.11	-
Punishment Sensitivity	.85	.79
Psychoticism	-1.69	-1.71
Extraversion*	.35	-
Neuroticism	.83	.98
Lie-Scale*	.17	-
GCV Externalisation*	-.017	-
GCV Introjection*	.19	-
GCV Integrated	-1.07	-.98
Eff. Cntl. Activation	-.91	-.58
Eff. Cntl. Attention	-.80	-.66
Eff. Cntl. Inhibition*	.43	-

Number of Instances = 136

GCV = General Core Values; Eff. Cntl. = Effortful Control

\* Features removed due to low weightings.

basic training. The early leaver group consisted of recruits who were either discharged or dismissed from military service ( $n = 18$ ), as well as recruits who left military training of their own volition ( $n = 19$ ). Training outcome (i.e., top performer; early leaver) was used as the classifier. To be able to evaluate the accuracy of the predictive model as well as the attribute weights of the variables, three classification algorithms were explored: decision tree (J48), nearest neighbour classifier (Lazy: IB1) and SVM (SMO). To predict the error rate of each classification algorithm, the stratified tenfold cross-validation was used on the data.

Results of the predictive performances of the three classification algorithms are presented in Table A7. The predictive performance of the SVM (SMO) algorithm was more accurate when compared to the predictive performances of the decision tree (J48) and nearest neighbour (Lazy: IB1) algorithms. SVM (SMO) algorithm classified 65.15% of the instances correctly and 34.84% instances incorrectly. The SVM (SMO) algorithm had the highest Kappa value (.284) of the three algorithms tested, indicating a fair agreement between observed and predicted classifiers. The negative Kappa values observed in both the decision tree (J48) and nearest neighbour (Lazy: IB1) algorithms were interpreted as a potential systematic disagreement between the categories (Viera, & Garrett, 2005), suggesting there

**Table A7**

Estimates of the Predictive Performance of the Three Classifier Algorithms: Top Performers vs. Early Leavers

	Algorithm		
	Nearest Neighbour (Lazy: IB1)	Decision (Tree J48)	SVM (SMO)
Total Number of Instances	66	66	66
Total Number of Attributes	14	14	14
Correctly Classified Instances % Accuracy	48.48	48.5	65.15
Incorrectly Classified Instances % Accuracy	51.51	51.5	34.84
Kappa Statistic	-.04	-.07	.28
Mean Absolute Error	.52	.50	.35
Root Mean Squared Error	.72	.62	.59
Relative Absolute Error	104.42	101.21	70.64
Root Relative Squared Error	144.48	125.55	118.83
Total Computational Time (seconds)	.01	.01	.06



was no effective agreement between the two classifiers. This disagreement is reflected in the confusion matrices in Table A8.

The confusion matrix from the nearest neighbour (Lazy: IB1) algorithm classified 13 instances correctly into the top performer group, whereas 19 instances were correctly classified in the early leaver group. However, the algorithm incorrectly classified 16 instances of the top performer class to the early leaver class and 18 of the early leaver class to the top performer class. The confusion matrix from the decision tree (J48) algorithm indicated that 9 instances were correctly classified to the top performer group and 23 instances were correctly classified to the early leaver group. Conversely, the algorithm incorrectly classified 20 instances of the top performer class to the early leaver class and 14 of the early leaver class to the top performer class. The SVM (SMO) algorithm showed a fair agreement between the classifying categories, as it classified 16 instances correctly into the top performer group and 27 instances were accurately classified in the early leaver group. Further, SVM (SMO) incorrectly classified 13 instances of the top performer class to the early leaver class and 10 of the early leaver class to the top performer class. Results from the SVM (SMO) algorithm proved to be a better predictor as more instances were allocated to the correct class and fewer instances to the incorrect class. SVM (SMO) confusion matrix is more accurate to identify new recruits who will leave the military before completion of training, as opposed to identifying recruits who will be a top performer first time.

**Table A8**

2 x 2 Confusion Matrices of the Three Algorithms: Top Performers vs. Early Leavers

	Top Performers	Early Leavers
Nearest Neighbour (Lazy:IB1)	13	16
	18	19
Decision Tree (J48)	9	20
	14	23
SVM (SMO)	16	13
	10	27

Number of Instances = 66.

The weighted average performance characteristics for the three classifying algorithms are shown in Table A9. The classification algorithm with the best performance when predicting top performer and early leaver outcome was SVM (SMO), with 64.9% precision, 65.2% recall and 65.1% accuracy. Considering each classifier on its own within the SVM (SMO) algorithm, the early leaver classifier had the best predictive power (70.1%, f-measure) as opposed to the low predictive power (58.2%, f-measure) of the top performer classifier. The results above indicated that out of the three classifying algorithms explored, SVM (SMO) classifying algorithm produced the best results and were more proficient to accurately classify those who will leave the military before completing military training than classifying those who will complete training successfully first time.

We further investigated whether extracting individual features from the model could improve the accuracy of the classifiers. We followed a heuristic process by visually

**Table A9**

Performance Characteristics of the Three Algorithms: Top Performers vs. Early Leavers

Classification Algorithm	Classifier	TPR	FPR	Precision	Recall	F-Measure	ROC Area	Accuracy in %
Nearest Neighbour (Lazy:IB1)	Top Performers	.45	.49	.42	.45	.43	.48	48.48%
	Early Leavers	.51	.55	.54	.51	.53	.48	
	Weighted Average	<b>.49</b>	<b>.52</b>	<b>.49</b>	<b>.49</b>	<b>.49</b>	<b>.48</b>	
Decision Tree (J48)	Top Performers	.31	.38	.39	.31	.35	.50	48.48%
	Early Leavers	.62	.69	.55	.62	.58	.50	
	Weighted Average	<b>.49</b>	<b>.55</b>	<b>.47</b>	<b>.49</b>	<b>.47</b>	<b>.50</b>	
SVM (SMO)	Top Performers	.55	.27	.62	.55	.58	.64	65.15%
	Early Leavers	.73	.45	.68	.73	.70	.64	
	Weighted Average	<b>.65</b>	<b>.37</b>	<b>.65</b>	<b>.65</b>	<b>.65</b>	<b>.64</b>	

Number of Instances 66. TPR = True Positive Rate; FPR = False Positive Rate; ROC = Receiver Operating Characteristic.

**Table A10**

Comparison of the Estimates of the Predictive Performance of the SVM (SMO) Algorithms after Individual Features with Low Weightings were Extracted: Top Performers vs. Early Leavers

	Algorithm SVM (SMO)	
	Full Subset	Reduced subset
Total Number of Instances	66	66
Total Number of Attributes	14	7
Correctly Classified Instances % Accuracy	65.15	68.18
Incorrectly Classified Instances % Accuracy	34.84	31.81
Kappa Statistic	.28	.35
Mean Absolute Error	.35	.32
Root Mean Squared Error	.59	.56
Relative Absolute Error	70.64	64.49
Root Relative Squared Error	118.83	113.53
Total Computational Time (seconds)	.06	.10

inspecting individual features in the data. Seven of the features were eliminated as a result of low individual weightings, where after the SVM (SMO) classifying algorithm was re-run with the reduced subset of features. Table A10 shows a comparison of estimates between the complete subset with 14 attributes against the reduced subset with seven attributes. Results revealed that the accuracy of the new model improved from 65.15% to 68.18%. The percentage of the incorrect classified instances decreased from 34.84% to 31.81%. In addition, the value of the Kappa statistic improved from .284 to .351, indicating a fair agreement between the observed and predicted categories. Within the confusion matrix there were 18 true positive, 27 true negative, 11 false negative and 10 false positive compounds.

Table A11 depicts the performance characteristics for the reduced subset. The weighted average for the subset is indicated in bold. Compared to the full subset, all the performance characteristics of the adjusted subset improved. The model indicated that the early leaver classifier had the best predictive power (72 % f-measure) to accurately classify new recruits who will leave the military before completing training.

The new improved subset further revealed that, of the six remaining features, Psychoticism, Mental Toughness and Integration of Core Values had the highest individual weightings, followed in order of weight decent by Effortful Control Activation,

**Table A11**

Performance Characteristics for the Reduced Model with 8 Attributes: Top Performers vs. Early Leavers

Classification Algorithm	Classifier	TPR	FPR	Precision	Recall	F-Measure	ROC Area	Accuracy in %
SVM(SMO)	Top Performers	.62	.27	.64	.62	.63	.68	68.18%
	Early Leavers	.73	.38	.71	.73	.72	.68	
	Weighted Average	<b>.68</b>	<b>.33</b>	<b>.68</b>	<b>.68</b>	<b>.68</b>	<b>.68</b>	

Instance = 66

Punishment Sensitivity and Neuroticism. Table A12 contains individual feature weightings before and after features with low weightings were extracted and the SVM (SMO) algorithm was re-run.

Two of the attributes in the current subset that failed to show statistical significant difference between the top performers and early leaver classifiers, were the General Core Value Integration and Effortful Control Activation features. These results suggest that the

**Table A12**

Individual Feature Weightings before and after Features with Low Weightings were Removed: Top Performers vs. Early Leavers

Feature	Weighting Before Extraction	Weightings After Extraction
Mental Toughness	-1.32	-1.28
Reward Sensitivity*	.01	-
Punishment Sensitivity	.78	.83
Psychotocism	-2.12	-1.98
Extraversion*	.34	-
Neuroticism	.64	.78
Lie-Scale*	.33	-
GCV Externalisation*	-.52	-
GCV Introjection*	.27	-
GCV Integration	-1.57	-1.23
Eff. Cntl. Activation	-1.03	-1.03
Eff. Cntl. Attention*	-.28	-
Eff. Cntl. Inhibition*	.32	-

Number of Instances = 66

GCV = General Core Values; Eff. Cntl. = Effortful Control

\* Features removed due to low weightings.

psychological attributes contained in the adjusted subset are able to predict with 68.18% accuracy whether a recruit will leave the military before completing military training.

Results from both the full and narrowly selected group sets indicated that of the three classifying algorithms used, SVM (SMO) algorithm produced the best results. After extracting individual attributes with low weightings, results of both sets of data indicated that both groups shared the same differentiating factors, except for one exception. Effortful Control Activation was not identified as one of the differentiating factors in the narrowly selected group. The accuracy of the differentiation is very similar. The accuracy percentage for the full sample set was 66.91 % and for the narrowly selected sample set 68.18%. The main difference between the full sample set and the narrowly selected sample set is the classifications. The confusion matrix from the full data set showed that more of the top performer group were classified correctly. However, the opposite holds true for the narrowly selected data set, as it classified more of early leaver group correctly. It should be noted that we did perform feature selection tests on the data, focusing on Fast Correlation-Based Filter (FCBF), Relief-F, & SVM tests. The FCBF test failed to produce any results, whereas the SVM test produced the clearest results. The SVM tests performed suggested the same set of parameters as those that were identified during our heuristic approach. As we did not have a very large scale data set, we decided to follow a heuristic approach by clustering attributes according to their weights, rather than relying on feature selection tests.

## APPENDIX B

### Chapter 3 - Means, Standard Deviations and Intercorrelations of Psychological Parameters at Time-Point 2

**Table B1**

Means, Standard Deviations and Intercorrelations of Psychological Parameters at Time-Point 2

		<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1	Mental Toughness	4.10	.99	-										
2	Psychoticism	3.26	1.37	-.02	-									
3	Extraversion	10.49	2.09	.02	-.01	-								
4	Neuroticism	3.83	3.01	-.04	.01	-.40**	-							
5	Reward Sensitivity	28.08	4.31	-.01	.32**	.69**	.32**	-						
6	Punishment Sensitivity	5.90	7.24	-.03	-.18*	-.62**	.95**	.00	-					
7	GCV External Regulation	5.45	.98	-.21	-.16	.08	-.01	.02	-.01	-				
8	GCV Introjection	5.08	1.33	-.01	-.29**	.08	.06	.02	.08	.62**	-			
9	GCV Integration	6.28	.75	.04	-.30	.14	-.03	.02	-.01	.37**	.60**	-		
10	Eff Cntl Activation	5.26	.82	.03	-.15	.18*	-.30**	-.08	-.27**	.20*	.25**	.24**	-	
11	Eff Cntl Attention	4.57	.74	.05	-.16	.14	-.39**	-.19*	-.33**	.04	.12	.17	.57**	-
12	Eff Cntl Inhibition	4.13	.78	-.02	-.12	-.12	-.31**	-.38**	-.20*	-.06	.14	.08	.40**	.41**

Note. \*\* $p < .01$ , \* $p < .05$ ; GCV = General Core Value, Eff. Cntl. = Effortful Control.

$N = 132$

## APPENDIX C

### Chapter 3 - Means, Standard Deviations and Intercorrelations of Psychological Parameters at Time-Point 3

**Table C1**

Means, Standard Deviations and Intercorrelations of Psychological Parameters at Time-Point 3

		<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1	Mental Toughness	4.24	1.27	-										
2	Psychoticism	2.88	1.78	.00	-									
3	Extraversion	10.87	1.77	-.04	.07	-								
4	Neuroticism	3.44	2.75	-.01	.11	-.35**	-							
5	Reward Sensitivity	28.07	4.28	-.03	.54**	.62**	.40**	-						
6	Punishment Sensitivity	5.13	6.47	.00	-.20*	-.59**	.92**	.02	-					
7	GCV External Regulation	5.25	1.20	-.09	-.15	.20*	-.03	.08	-.04	-				
8	GCV Introjection	4.90	1.44	-.02	-.25**	.07	-.15	-.14	-.08	.64**	-			
9	GCV Integration	6.14	.84	-.05	-.28**	.13	-.17	-.12	-.10	.35**	.66**	-		
10	Eff Cntl Activation	5.22	.81	.00	-.21*	.21*	-.34**	-.13	-.29**	.08	.11	.14	-	
11	Eff Cntl Attention	4.67	1.04	.00	-.25**	.16	-.36**	-.21*	-.28**	-.04	.00	.11	.58**	-
12	Eff Cntl Inhibition	4.12	.78	.15	-.22*	-.13	-.39**	-.45**	-.24**	.03	.21*	.13	.45**	.48**

Note. \*\* $p < .01$ , \* $p < .05$ ; GCV = General Core Value, Eff. Cntl. = Effortful Control.

$N = 132$

## APPENDIX D

### Chapter 3 - Supplementary Analysis: Exploring Potential Confounding

#### Personality Differences on Mental Toughness

The data was further explored for any potential confounding personality differences that would predict whether recruits would improve or decrease in mental toughness (MT) during MBT. To explore for any confounding personality differences, the MT data was split into two groups, namely: recruits who increased in MT during training and recruits who decreased in MT during training.

#### **Recruits with highest increasing scores in Mental Toughness (N = 50) vs. recruits with the most noteworthy decreasing scores in Mental Toughness (N = 50)**

In an effort to obtain clearer results, data of the 50 recruits who had the highest increase in MT scores during training and the 50 recruits whose MT scores decreased the most during training were selected for data analysis. A total of 32 recruits were removed from the sample.

#### **Repeated Measures ANOVA**

Before exploring the data further, repeated-measures ANOVA was performed to determine whether recruits with the highest increasing scores in MT did significantly increase in MT during MBT and whether recruits with the most noteworthy decreasing scores in MT did significantly decrease in MT during MBT.

Results for the 50 recruits with the highest increasing scores in MT revealed that the assumption of sphericity had been met,  $\chi^2(2) = 3.59, p = .16$ . Findings indicated that MT of the 50 recruits with the highest increasing MT scores changed significantly during MBT,  $F(2, 98) = 78.95, p < .01$ . Pairwise comparisons with Bonferoni corrections were applied as a follow-up test to determine if the mean changes were significant. Results from the follow-up



test showed that recruits with the highest increasing scores in MT did significantly increase in MT between time-point 1 ( $M = 3.81$ ,  $SD = .11$ ) and time-point 3 ( $M = 5.24$ ,  $SD = .12$ ),  $CI_{.95} = -1.68$  (lower) -1.18 (upper),  $p < .01$ .

Findings for the 50 recruits with the most noteworthy decreasing scores in MT showed that the assumption of sphericity had been met,  $\chi^2(2) = .10$ ,  $p = .94$ . Results indicated that MT of the 50 recruits with the most noteworthy decreasing MT scores changed significantly during MBT,  $V = .77$ ,  $F(2, 48) = 81.85$ ,  $p < .01$ ,  $\omega^2 = .77$ . Pairwise comparisons with Bonferoni corrections were applied as a follow-up test to determine if the mean changes were significant. Findings from the follow-up test showed that the 50 recruits with the most noteworthy decreasing scores in MT decreased significantly in MT between time-point 1 ( $M = 4.49$ ,  $SD = .92$ ) and time-point 3 ( $M = 3.85$ ,  $SD = .88$ ),  $CI_{.95} = 1.15$  (lower) 1.70 (upper),  $p < .01$ .

### **Independent-Samples t-tests**

To test whether the 50 recruits with the highest increase in MT scores significantly differed from the 50 recruits with the most noteworthy decreasing scores in MT at the three data collection time-points on MT, an independent-samples t-test was performed. At time-point 1 (i.e., week 4) the decrease group ( $M = 4.51$ ,  $SD = .90$ ) was significantly higher on MT scores than the increase group ( $M = 3.81$ ,  $SD = .83$ ,  $t(98) = -4.02$ ,  $p < .01$ ,  $r = .38$ ). Based on Cohen's (1988; 1990) recommendations, the estimated effect size indicates that the difference between the two groups represents a medium effect. At time-point 2 (i.e., week 8), the increase group ( $M = 4.27$ ,  $SD = 1.02$ ) was perceived to be significantly higher on MT than the decrease group ( $M = 3.88$ ,  $SD = .87$ ),  $t(98) = 2.10$ ,  $p < .05$ ,  $r = .21$ . At the end of training (i.e., time-point 3) the increase group ( $M = 5.24$ ,  $SD = .913$ ) was perceived to be significantly higher on MT than the decrease group ( $M = 3.08$ ,  $SD = .744$ ),  $t(98) = 12.96$ ,  $p < .01$ ,  $r = .79$ .

In summary, the above results indicate that both the increase and decrease groups significantly differed from one another at each of the data collection time points.

### **Repeated Measures MANOVA**

Repeated measures MANOVA test was performed to explore the data for any potential confounding personality differences that would predict whether recruits would improve or decrease in MT during MBT. The personality variables of interest were: psychoticism, extraversion, neuroticism, reward sensitivity and punishment sensitivity.

Results from the repeated measures MANOVA test showed that there was a significant effect of MBT on the personality attributes of the 50 recruits with the highest increase in MT scores and the 50 recruits with the most noteworthy decrease in MT scores, Pillai's trace  $V = .283$ ,  $F(6, 93) = 6.12$ ,  $p < .01$ ,  $\eta^2 = .28$ .

### **Follow-up tests**

Separate repeated measures ANOVAs for the 50 recruits with the highest increase in MT scores and the 50 recruits with the most noteworthy decrease in MT scores were conducted in order to follow up the significant repeated measures MANOVA.

**Psychoticism:** Results from the 50 recruits who increased the most in MT during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 3.20$ ,  $p = .201$ . Results revealed that psychoticism significantly changed during training,  $F(2, 98) = 6.05$ ,  $p < .01$ ,  $\omega^2 = .11$ . Pairwise follow-up test with Bonferroni corrections revealed that psychoticism significantly increased between time-point 1 ( $M = 2.46$ ,  $SD = 1.45$ ) and time-point 2 ( $M = 3.26$ ,  $SD = 1.32$ ),  $CI_{.95} = -1.311$  (lower)  $-.289$  (upper),  $p < .01$ . No other significant changes in psychoticism were observed within the MT increase group, as a non-significant decrease in psychoticism was observed between time-point 2 ( $M = 3.26$ ,  $SD = 1.32$ ) and time-point 3 ( $M = 3.04$ ,  $SD = 1.78$ ),  $CI_{.95} = -.39$  (lower)  $.83$  (upper),  $p = 1.00$ . Further inspection of the results showed that psychoticism did increase between time-points 1 ( $M = 2.46$ ,  $SD = 1.45$ ) and 3 ( $M$

= 3.04,  $SD = 1.78$ ); however, the increase was not significant,  $CI_{.95} = -1.21$  (lower) .05 (upper),  $p = .08$ . Results suggest that psychoticism fluctuated between barracks-based training and field-based training.

Results from the 50 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 3.22$ ,  $p = .19$ . Findings indicated that psychoticism did not significantly change during training,  $F(2, 98) = 2.40$ ,  $p = .10$ ,  $\omega^2 = .04$ .

**Extraversion:** Results from the 50 recruits who had the highest increase in MT during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 8.26$ ,  $p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .892$ ). Findings revealed that extraversion significantly changed during training,  $F(1.78, 87.41) = 7.05$ ,  $p < .01$ ,  $\omega^2 = .12$ . Pairwise follow-up test with Bonferroni corrections revealed that extraversion significantly increased from time-point 1 ( $M = 10.14$ ,  $SD = 2.39$ ) to time-point 3 ( $M = 10.84$ ,  $SD = 1.54$ ),  $CI_{.95} = -1.29$  (lower) -.10 (upper),  $p < .01$ ; indicating that the MT increase group became more extraverted during MBT. Results further revealed that extraversion did not significantly increase between time-point 1 ( $M = 10.14$ ,  $SD = 2.39$ ) and time-point 2 ( $M = 10.22$ ,  $SD = 2.14$ ),  $CI_{.95} = -.50$  (lower) .34 (upper),  $p = 1.00$ . However, extraversion did significantly increase between time-point 2 ( $M = 10.22$ ,  $SD = 2.14$ ) and time-point 3 ( $M = 10.84$ ,  $SD = 1.54$ ),  $CI_{.95} = -1.10$  (lower) -.13 (upper),  $p < .05$ .

Results for the 50 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 14.17$ ,  $p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .81$ ). Findings showed that extraversion did not significantly change during MBT,  $F(1.63, 80.24) = 2.81$ ,  $p = .08$ ,  $\omega^2 = .05$ .

**Neuroticism:** Results from the 50 recruits who increased the most in MT during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = .88, p = .64$ . Findings indicated a significant change in neuroticism during MBT,  $F(2, 98) = 3.40, p < .05, \omega^2 = .06$ . Pairwise follow-up test with Bonferroni corrections revealed that there were no significant changes between any of the time-points during training.

Results for the 50 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 8.45, p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .89$ ). Findings showed that neuroticism did not significantly change during MBT,  $F(1.77, 87.15) = 2.06, p = .14, \omega^2 = .04$ .

**Reward Sensitivity:** Results from the 50 recruits who increased the most in MT during MBT showed that the assumption of sphericity had been met,  $\chi^2(2) = 5.56, p = .06$ . There was no significant change in reward sensitivity scores during MBT,  $F(2, 98) = 1.51, p = .22, \omega^2 = .03$ .

Results for the 50 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 5.37, p = .07$ . Findings showed that reward sensitivity did not significantly change during MBT,  $F(2, 98) = 2.49, p = .09, \omega^2 = .05$ .

**Punishment Sensitivity:** Results from the 50 recruits who increased the most in MT during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 2.15, p = .34$ . Findings indicated a significant change in punishment sensitivity scores during training,  $F(2, 98) = 8.44, p < .01, \omega^2 = .14$ . Pairwise follow-up test with Bonferroni corrections revealed that the MT increase group significantly decreased in punishment sensitivity between time-point1 ( $M = 8.68, SD = 6.55$ ) and time-point 3 ( $M = 5.48, SD = 5.53$ ),  $CI_{.95} = 1.07$  (lower) 5.32 (upper),  $p < .01$ . Results further revealed that punishment sensitivity significantly

decreased between time-point 1 ( $M = 8.68$ ,  $SD = 6.55$ ) and time-point 2 ( $M = 6.68$ ,  $SD = 6.77$ ),  $CI_{.95} = .23$  (lower) 3.76 (upper),  $p < .05$ . However, punishment sensitivity did not significantly decrease between time-point 2 ( $M = 6.68$ ,  $SD = 6.77$ ) and time-point 3 ( $M = 5.48$ ,  $SD = 5.53$ ),  $CI_{.95} = -.74$  (lower) 3.14 (upper),  $p = .40$ .

Results for the 50 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 10.36$ ,  $p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .86$ ). Findings showed that punishment sensitivity significantly changed during MBT,  $F(1.72, 84.63) = 3.79$ ,  $p < .05$ ,  $\omega^2 = .07$ . Pairwise follow-up test with Bonferroni corrections revealed that the MT decrease group significantly decreased in punishment sensitivity scores between time-point 1 ( $M = 7.48$ ,  $SD = 7.36$ ) and time-point 2 ( $M = 5.36$ ,  $SD = 7.25$ ),  $CI_{.95} = .68$  (lower) 4.31 (upper),  $p < .05$ . No significant changes in punishment sensitivity scores were observed between time-point 2 and time-point 3.

### **Recruits with highest increasing scores in Mental Toughness ( $N = 30$ ) vs. recruits with the most noteworthy decreasing scores in Mental Toughness ( $N = 30$ )**

The data set was even further reduced in an effort to obtain clearer results. Data from the 30 recruits who have shown the highest increase in mental toughness during training and the 30 recruits whose mental toughness decreased the most during training were selected for data analysis.

#### **Repeated Measures ANOVA**

Before exploring the data further, repeated-measures ANOVA was performed to determine whether recruits with the highest increasing scores in MT did significantly increase in MT during MBT and whether recruits with the most noteworthy decreasing scores in MT did significantly decrease in MT during MBT.

Results for the 30 recruits with the highest increasing scores in MT revealed that the assumption of sphericity had been violated,  $\chi^2(2) = 6.53, p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .87$ ). Findings indicated that the MT increase group significantly changed during MBT,  $F(1.74, 50.54) = 102.40, p < .01$ . Pair-wise comparisons with Bonferoni corrections were applied as a follow-up test to determine if the mean changes were significant. Results from the follow-up test showed that recruits with the highest increasing scores in MT did significantly increase in MT between time-point 1 ( $M = 3.69, SD = .82$ ) and time-point 3 ( $M = 5.53, SD = .90$ ),  $CI_{.95} = -2.14$  (lower)  $-1.63$  (upper),  $p < .01$ .

Results for the 30 recruits with the most noteworthy decreasing scores in MT showed that the assumption of sphericity had been met,  $\chi^2(2) = 4.13, p = .12$ . Results indicated that the MT decrease group significantly changed during MBT,  $F(2, 58) = 112.26, p < .01$ . Pair-wise comparisons with Bonferoni corrections were applied as a follow-up test to determine if the mean changes were significant. Findings from the follow-up test showed that the 30 recruits with the most noteworthy decreasing scores in MT did significantly decrease in MT between time-point 1 ( $M = 4.86, SD = .92$ ) and time-point 3 ( $M = 2.92, SD = .75$ ),  $CI_{.95} = 1.67$  (lower)  $2.1$  (upper),  $p < .01$ .

### **Independent-Samples t-tests**

To test whether the 30 split groups significantly differed from each other during MBT on MT at the three data collection time-points during training, an independent sample t-test was performed. Results revealed that the decrease group ( $M = 4.86, SD = .921$ ) was significantly higher on MT scores than the increase group ( $M = 3.63, SD = .822$ ) at time-point 1,  $t(58) = -5.450, p < .01, r = .581$ . Based on Cohen's (1988; 1990) recommendations, the estimated effect size indicates that the differences between the two groups represents a large effect. At time-point 2, the increase group ( $M = 4.32, SD = 1.00$ ) had higher MT scores

compared to the MT 30 decrease group ( $M = 4.02$ ,  $SD = .97$ ), however the difference between the two groups was statistically non-significant,  $t(58) = 1.194$ ,  $p = .237$ ,  $r = .154$ . Compared to the decrease group ( $M = 2.92$ ,  $SD = .75$ ) the increase group ( $M = 5.52$ ,  $SD = .90$ ) had significantly higher MT scores at time-point 3,  $t(58) = 12.03$ ,  $p < .01$ ,  $r = .844$ .

### **Repeated Measures MANOVA**

Repeated measures MANOVA test was performed to explore the data for any potential confounding personality differences that would predict whether recruits would improve or decrease in MT during MBT. The personality variables of interest were: psychoticism, extraversion, neuroticism, rewards sensitivity and punishment sensitivity.

Results from the repeated measures MANOVA test showed that there was a significant effect of MBT on the personality attributes of the 30 recruits with the highest increase in MT scores and the 30 recruits with the most noteworthy decrease in MT scores, Pillai's trace  $V = .41$ ,  $F(6, 53) = 6.19$ ,  $p < .01$ ,  $\eta^2 = .41$ .

### **Follow-up tests**

Separate repeated measures ANOVAs for the 30 recruits with the highest increase in MT scores and the 30 recruits with the most noteworthy decrease in MT scores were conducted in order to follow up the significant repeated measures MANOVA.

**Psychoticism:** Results from the 30 recruits who increased the most in MT during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 3.07$ ,  $p = .21$ . Results revealed that psychoticism significantly changed during training,  $F(2, 58) = 7.36$ ,  $p < .01$ ,  $\omega^2 = .20$ . Pairwise follow-up test with Bonferroni corrections revealed that psychoticism significantly increased between time-point 1 ( $M = 2.30$ ,  $SD = 1.34$ ) and time-point 2 ( $M = 3.20$ ,  $SD = 1.29$ ),  $CI_{.95} = -1.57$  (lower)  $-.22$  (upper),  $p < .01$ . Further, a non-significant decrease in psychoticism was observed between time-point 2 ( $M = 3.20$ ,  $SD = 1.29$ ) and time-point 3 ( $M = 3.46$ ,  $SD = 1.92$ ),  $CI_{.95} = -1.11$  (lower)  $.57$  (upper),  $p = 1.00$ . Further, inspection

of the results showed that psychoticism did increase significantly between time-points 1 ( $M = 2.30$ ,  $SD = 1.34$ ) and 3 ( $M = 3.46$ ,  $SD = 1.92$ ),  $CI_{.95} = -2.03$  (lower)  $-.27$  (upper),  $p < .05$ .

Results from the 30 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 521$ ,  $p = .77$ . Findings indicated that psychoticism significantly changed during training,  $F(2, 58) = 4.23$ ,  $p < .05$ ,  $\omega^2 = .12$ . Pairwise follow-up test with Bonferroni corrections revealed that psychoticism significantly increased between time-point 1 ( $M = 2.46$ ,  $SD = 1.43$ ) and time-point 2 ( $M = 3.30$ ,  $SD = 1.44$ ),  $CI_{.95} = -1.57$  (lower)  $-.09$  (upper),  $p < .01$ . No further significant changes on psychoticism scores during MBT were observed.

**Extraversion:** Results from the 30 recruits that increased the most in MT during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 3.99$ ,  $p = .13$ . Results revealed that extraversion significantly changed during training,  $F(2, 58) = 4.79$ ,  $p < .01$ ,  $\omega^2 = .14$ . Pairwise follow-up test with Bonferroni corrections revealed that extraversion only significantly increased between time-point 2 ( $M = 10.06$ ,  $SD = 2.46$ ) and time-point 3 ( $M = 10.83$ ,  $SD = 1.51$ ),  $CI_{.95} = -1.45$  (lower)  $-.08$  (upper),  $p < .01$ .

Results for the 30 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 4.91$ ,  $p = .08$ . Findings showed that extraversion did not significantly change during MBT,  $F(2, 58) = 1.79$ ,  $p = .18$ ,  $\omega^2 = .05$ .

**Neuroticism:** Results from the 30 recruits who increased the most in MT during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 3.93$ ,  $p = .14$ . Findings indicated a significant change in neuroticism during training,  $F(2, 58) = 4.63$ ,  $p < .05$ ,  $\omega^2 = .13$ . Pairwise follow-up test with Bonferroni corrections revealed that neuroticism significant decreased between time-point 1 ( $M = 4.73$ ,  $SD = 2.75$ ) and time-point 2 ( $M = 3.90$ ,  $SD = 2.57$ ),  $CI_{.95} = .02$  (lower)  $1.64$  (upper),  $p < .01$ . Neuroticism did not significantly change



between time-point 2 ( $M = 3.90$ ,  $SD = 2.57$ ) and time-point 3 ( $M = 3.56$ ,  $SD = 2.23$ ),  $CI_{.95} = -.717$  (lower)  $1.38$  (upper),  $p = 1.00$ . However, the result showed that the 30 recruits with the highest increase in MT during MBT significantly decreased in neuroticism between time-point 1 ( $M = 4.73$ ,  $SD = 2.75$ ) and time-point 3 ( $M = 3.56$ ,  $SD = 2.23$ ),  $CI_{.95} = .04$  (lower)  $2.29$  (upper),  $p < .05$ .

Results for the 30 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 6.22$ ,  $p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .87$ ). Findings showed that neuroticism did not significantly change during MBT,  $F(1.75, 50.95) = 1.35$ ,  $p = .26$ ,  $\omega^2 = .04$ .

**Reward Sensitivity:** Results from the 30 recruits who increased the most in MT during MBT showed that the assumption of sphericity had been violated,  $\chi^2(2) = 7.95$ ,  $p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .84$ ). Results indicated that there were no significant changes in reward sensitivity scores for the MT increase group during MBT,  $F(1.68, 48) = 3.21$ ,  $p = .06$ ,  $\omega^2 = .10$ .

Results for the 30 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been met,  $\chi^2(2) = 2.41$ ,  $p = .30$ . Findings showed that reward sensitivity significantly changed during MBT,  $F(2, 58) = 3.37$ ,  $p < .05$ ,  $\omega^2 = .10$ . Pairwise follow-up test with Bonferroni corrections revealed that reward sensitivity did not significant change between any of the time-points for the MT decrease group during MBT.

**Punishment Sensitivity:** Results from the 30 recruits who increased the most in MT during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 8.34$ ,  $p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .83$ ). Findings indicated a significant change in punishment sensitivity scores during training,

$F(1.66, 48.35) = 11.54, p < .01, \omega^2 = .28$ . Pairwise follow-up test with Bonferroni corrections revealed that the 50 recruits who increased the most in MT, significantly decreased on punishment sensitivity between time-point 1 ( $M = 9.16, SD = 6.81$ ) and time-point 2 ( $M = 6.53, SD = 6.40$ ),  $CI_{.95} = .98$  (lower) 4.28 (upper),  $p < .05$ . However, punishment sensitivity did not significantly decrease between time-point 2 ( $M = 6.53, SD = 6.40$ ) and time-point 3 ( $M = 4.83, SD = 4.88$ ),  $CI_{.95} = -.75$  (lower) 4.15 (upper),  $p = .26$ . Findings indicated that punishment sensitivity significantly decreased between time-point 1 ( $M = 9.16, SD = 6.81$ ) and time-point 3 ( $M = 4.83, SD = 4.88$ ),  $CI_{.95} = 1.63$  (lower) 7.02 (upper),  $p < .01$ .

Results for the 30 recruits with the most noteworthy decreasing MT scores during MBT showed the assumption of sphericity had been violated,  $\chi^2(2) = 7.31, p < .05$ , therefore degrees of freedom were adjusted using Huynh-Feldt estimates of sphericity ( $\epsilon = .85$ ). Findings showed that punishment sensitivity did not significantly changed during MBT,  $F(1.70, 49.57) = 2.85, p = .08, \omega^2 = .09$ .

## APPENDIX E

### Chapter 3 - Supplementary Analysis: Exploring Mental Toughness Group

#### Differences on Different Personality Variables

We performed a series of multiple analyses of variance (MANOVA) tests to determine whether there were any significant differences between the mental toughness (MT) increase group and the MT decrease group with regard to personality variables at the different data collection time points during training.

#### **Recruits with highest increasing scores in Mental Toughness ( $N = 50$ ) vs. recruits with the most noteworthy decreasing scores in Mental Toughness ( $N = 50$ )**

Mental toughness data was split into two groups, namely the 50 recruits with the highest increasing scores in MT during MBT and the 50 recruits with the most noteworthy decreasing scores in MT during training. In order to obtain clear results, only the 50 recruits that have shown the highest increase in MT scores during training and the 50 recruits with the most noteworthy decreasing scores in MT during MBT were selected for data analysis.

Multivariate analysis of variance results for personality data collected at time-point 1 indicated that the multivariate result was non-significant, Pillai's trace ( $V = .029$ ,  $F(3,96) = .951$ ,  $p = .419$ ), indicating that there were no significant differences between the two MT split groups at the start of training. The effect size was estimated at .029, which indicates that 2.9% of the variance in the multivariate combination of dependent variables was accounted for by MT level. The MANOVA indicated that there was no significant effect of level of MT on the personality variables.

Multivariate analysis of variance results for personality data collected at time-point 2 (i.e., week 8) indicated that the multivariate result was non-significant, Pillai's trace ( $V = .019$ ,  $F(3,96) = .634$ ,  $p = .595$ ), indicating that there were no significant difference between the two

MT split groups at time-point 2. The effect size was estimated at .019, which indicates that 1.9% of the variance in the multivariate combination of dependent variables was accounted for by MT level. The MANOVA indicated that there was no significant effect of level of MT on the personality variables.

Multivariate analysis of variance results for personality data collected at time-point 3, indicated that the multivariate result was non-significant, Pillai's trace ( $V = .004$ ,  $F(3,96) = .139$ ,  $p = .937$ ), indicating that there were no significant difference between the two MT split groups at the end of basic military training. The effect size was estimated at .004, which indicates that .4% of the variance in the multivariate combination of dependent variables was accounted for by MT level. The MANOVA indicated that there was no significant effect of level of MT on the personality variables.

**Recruits with highest increasing scores in Mental Toughness ( $N = 30$ ) vs. recruits with highest decreasing scores in Mental Toughness ( $N = 30$ )**

Multivariate analysis of variance (MANOVA) analyses were performed on smaller sample size groups in an effort to attenuate any differences. Data of only 30 recruits who have increased the most in MT scores during training and the 30 recruits whose MT scores decreased the most during training were selected for data analysis.

Multivariate analysis of variance results for personality data collected at baseline measurement at week 1 indicated that the multivariate result was non-significant, Pillai's trace ( $V = .071$ ,  $F(3,56) = 1.42$ ,  $p = .247$ ), indicating that there were no significant differences between the two MT split groups at the start of training. The effect size was estimated at .071, which indicates that 7.1% of the variance in the multivariate combination of dependent variables was accounted for by MT level. The MANOVA indicated that there was no significant effect of level of MT on the personality variables.

Multivariate analysis of variance results for personality data collected at data collection time-point 2 (i.e., week 8), indicated that the multivariate result was non-significant, Pillai's trace ( $V = .067$ ,  $F(3,56) = 1.33$ ,  $p = .273$ ), indicating that there were no significant differences between the two MT split groups at data collection time-point 2. The effect size was estimated at .067, which indicates that 6.7% of the variance in the multivariate combination of dependent variables was accounted for by MT level. The MANOVA indicated that there was no significant effect of level of MT on the personality variables.

Multivariate analysis of variance results for personality data collected at the end of basic military training, indicated that the multivariate result was non-significant, Pillai's trace ( $V = .013$ ,  $F(3,56) = .244$ ,  $p = .865$ ), indicating that there were no significant differences between the two MT split groups at the end of basic military training. The effect size was estimated at .013, which indicates that 1.3% of the variance in the multivariate combination of dependent variables was accounted for by MT level. The MANOVA indicated that there was no significant effect of level of MT on the personality variables.

## **APPENDIX F**

### **Chapter 3 - Supplementary Analysis: Pattern Recognition Analysis**

Pattern recognition analysis was performed in order to identify important psychological attributes in the data that would enable differentiation between recruits who increased in mental toughness (MT) across basic military training and recruits who decreased in MT across basic military training. In order to extrapolate these differentiating variables from the data, we used Waikato Environment for Knowledge Analysis (Weka; Hall, Frank, Holmes, Pfahringer, Reutemann, & Witter, 2009). Weka is a machine learning workbench that uses algorithms and data pre-processing tools for predictive modelling and data analysis (Witten, Frank, & Hall, 2011).

To evaluate both the accuracy of the predictive model and the weight of each attribute, we used four learning classification algorithms (i.e., decision tree: J48; Support Vector Machine: SMO; Lazy, IB1, and Lazy, IB6) for the pattern recognition analyses. The decision tree (J48) algorithm is based on Quinlan's (1993) C4.5 algorithm that utilises a divide and conquer approach which can be used for classification problems. Classification of a case occurs through a reiterative process; the feature is placed at the root of the tree and then split into subsets of decision nodes based on possible outcomes. Each possible outcome represents a new branch. The process is repeated until the case is assigned to a class distribution at leaf level. The Sequential Minimal Optimization algorithm (SMO: Platt, 1998) is a solution to resolving the time consuming and cumbersome numerical quadratic programming (QP) optimisation problem during SVM training. The SMO algorithm is able to handle large data training sets faster, as it breaks the larger QP problem into smaller QP problems, which are solved analytically. The nearest neighbour (Lazy: 1B1) algorithm makes use of instance-based learning where the training set is stored; an unseen data instance is then compared to the training set to establish the closest instance in the training data set to the

unseen data instance (Witten et al., 2011). Within the  $k$ -nearest neighbour algorithm (Lazy: 1Bk) the number of nearest neighbours can be specified (default  $k = 1$ ). The data instance is then allocated to the class most common among its  $k$ -nearest neighbours.

The error rate of each classification algorithm was predicted by using a stratified tenfold cross-validation model. Our data contained two classes (i.e., increase and decrease), representing those recruits who increased in MT across basic military training and recruits who decreased in MT across basic military training. During the stratified tenfold cross-validation the data is divided into approximately equal folds or partitions. Nine of these folds are used for the training scheme; where after the error rate is calculated using the 10<sup>th</sup> fold (Witten et al., 2011).

**Pattern recognition results for recruits who increased in mental toughness during basic military training (n = 50) and recruits who decreased in mental toughness during basic military training (n = 50).**

Accuracy differences between the four learning algorithms used in the analyses are displayed in Table F1. Results indicated that the nearest neighbour (IB6) algorithm had the highest accuracy amongst the four learning algorithms, correctly classifying 55% of instances and incorrectly classifying 45% of the instances. As the nearest neighbour (IB6) algorithm displayed the highest accuracy predictions amongst the four learning algorithms, the remaining three classifying algorithms were omitted from further analyses.

**Table F1**  
Accuracy Predictions of The Four Learning Classification Algorithms

	Decision Tree (J48)	Algorithm		
		SVM(SMO)	Nearest Neighbour (Lazy: IB1)	$k$ -Nearest Neighbour (Lazy: IB6)
Total Number of Instances	100	100	100	100
Total Number of Attributes	12	12	12	12
Correctly Classified Instances % accuracy	43	45	52	55
Incorrectly Classified Instances % accuracy	57	55	48	45

Table F2 contains the 2 x 2 confusion matrices for each of the four classifying algorithms. The confusion matrix (Kohavi & Provost, 1998) displays the actual and predicted classifications of the classifier. Our data contained two classes (i.e., increase and decrease), therefore a 2 x 2 confusion matrix is produced for each classifying algorithm. Each row in the confusion matrix represents instances in the actual class, whereas each column represents instances in the predictive class. The number of correctly classified instances in the confusion matrix is calculated by the sum of diagonals; whereas the number of misclassified instances is calculated by the sum of the off-diagonals. Results revealed that the confusion matrix from the *k*-nearest neighbour (Lazy: IB6) algorithm classified 41 instances correctly and 14 instances incorrectly.

**Table F2**  
2 x 2 Confusion Matrices of the Four Classifying Algorithms

			Predictive Class	
			Increase	Decrease
Decision Tree (J48)	Actual Class	Increase	22	28
		Decrease	29	21
SVM (SMO)	Actual Class	Increase	21	29
		Decrease	26	24
Nearest Neighbour (Lazy: IB1)	Actual Class	Increase	31	19
		Decrease	29	21
<i>k</i> -Nearest Neighbour (Lazy: IB6)	Actual Class	Increase	41	9
		Decrease	36	14

Number of Instances = 100

Predictive Performance accuracy of the *k*-nearest neighbour (Lazy: IB6) classifier is displayed in Table F3. True Positive Rate (TPR) and True Negative Rate (TNR) reflect the percentage of recruits who were classified to a specific class and who truly belonged to that class. The results showed that the predicted performance accuracy percentage for TPR class was 82% and 28% for the TNR class. This indicates that 82% of recruits who were classified to be in the increase class and 28% of recruits who were classified to be in the decrease class, were in actual fact recruits who belonged to those specific classifications classes. The predicted performance accuracy percentages for both TPR and TNR were



**Table F3**Prediction Performance Accuracy for *k*-Nearest Neighbour (Lazy: IB6) Classification Algorithm

	TPR	TNR	FPR	FNR	Accuracy in %
<i>k</i> -Nearest Neighbour (Lazy: IB6)	82%	28%	18%	72%	55%

Number of Instances = 100

TPR = True Positive Rate; TNR – True Negative Rate; FPR = False Positive Rate; FNR = False Negative Rate

calculated by dividing the correctly classified class value in the confusion matrix by the total of the row in which the correctly classified class value appeared; i.e.,  $TPR = 41/(41+9) = 82\%$ , and  $TNR = 14/(14+36) = 28\%$ .

False Positive Rate (FPR) and False Negative Rate (FNR) reflect the predicted accuracy percentage of recruits who were classified to a certain class, but who actually belonged to a different class. Results showed that the predicted performance accuracy percentage for FPR was 18% and 72% for FNR. This indicates that 18% of recruits were classified into the increase class, but actually belonged to the decrease class. Whereas, 72% of recruits were classified in the decrease class, but actually belonged in the increase class. The predictive performance accuracy percentages, both the FPR and FNR were calculated by dividing the incorrectly classified class value in the confusion matrix by the total of the relevant row in which the incorrectly classified class value appeared; i.e.,  $FPR = 9/(41+9) = 18\%$  and  $FNR = 36/(36+14) = 72\%$ . The overall accuracy percentage for the *k*-nearest neighbour (Lazy: IB6) algorithm was 55%. The success rate was calculated by dividing the sum of the correctly classified instances by the Total of classified instances in the confusion matrix; i.e.,  $(41+14) / (41+14+36+9) = 55\%$ .

We further investigated whether extracting individual features from the model could improve the accuracy of the classifiers. Each item was removed from the model, whereafter the classifying algorithm was re-run with the reduced subset of features. If the removal of the item did not improve the accuracy of the classifiers, the item was replaced within the model, the next item was removed and the classifying algorithm was re-run. Removal of four of the

features (i.e., reward sensitivity, punishment sensitivity, external regulation of core values and introjected regulation) resulted in an improvement of the accuracy of the correctly classified instances. Table F4 shows a comparison of estimates between the complete subset with 12 attributes against the reduced subset with 8 attributes. Results showed that the accuracy of the correctly classified instances improved from 55% to 63%. Thus by eliminating individual features, the predictive accuracy of the classifiers was improved. Within the confusion matrix (See Table F5), there were 43 true positive, 20 true negative, 7 false negative and 30 false positive compounds.

**Table F4**

Comparison of the Estimates of the Predictive Performance of the *k*-Nearest Neighbour (Lazy: IB6) Algorithms after Individual Features were Extracted

	Algorithm <i>k</i> -Nearest neighbour (Lazy:IB6)	
	Full Subset	Reduced Subset
Total Number of Instances	100	100
Total Number of Attributes	12	8
Correctly Classified Instances % Accuracy	55	63
Incorrectly Classified Instances % Accuracy	45	37

**Table F5**

Confusion Matrix of Reduced Subset

			Predicted Class	
			Increase	Decrease
<i>k</i> -Nearest Neighbour (Lazy: IB6)	Actual Class	Increase	43	7
		Decrease	30	20

Number of Instances = 100

Table F6 depicts the predictive performance accuracy percentages for the reduced subset. Compared to the full subset, the predictive performance accuracy percentage of the TPR in the reduced subset improved from 82% to 86%, whereas the FPR decreased from 18% to 14%. The TNR increased from 28% to 40%, whereas the FNR decreased from 72% to 60%. These results indicated that 86% of recruits who were classified to be in the increase class and 40% of recruits who were classified to be in the decrease class, were in actual fact

**Table F6**

Prediction Performance Accuracy for *k*-Nearest Neighbour (Lazy: IB6) Classification Algorithm for Reduced Subset

	TPR	TNR	FPR	FNR	Accuracy in %
<i>k</i> -Nearest Neighbour (Lazy: IB6)	86%	40%	14%	60%	63%

Number of Instances = 100

TPR = True Positive Rate; TNR – True Negative Rate; FPR = False Positive Rate; FNR = False Negative Rate

recruits who belonged to those specific classification classes. Results further revealed that 14% of recruits were classified into the increase group, but in actual fact belonged to the decrease class; whereas 60% of recruits were classified into the decrease class, but in actual fact belonged in the increase class. The overall success rate improved from 55% to 63% for the reduced subset. The results above indicate that the reduced *k*-nearest neighbour (Lazy: IB6) classification algorithm was able to classify recruits who will increase in MT more accurately than classifying recruits who will decrease in MT. The reduced subset revealed that, of the 7 remaining features, psychoticism, extraversion, neuroticism, integration of core values, activation control, attention control and inhibition control had a very low success rate of 63%.

The results showed that the *k*-nearest neighbour (Lazy: IB6) algorithm was able to classify recruits who will increase in MT more accurately, than classifying recruits who will decrease in MT during training. However, the accuracy percentage of 63% is very low.

**Pattern recognition results for recruits who increased in mental toughness during basic military training (n = 30) and recruits who decreased in mental toughness during basic military training (n = 30)**

Accuracy differences between the four learning algorithms used in the analyses are displayed in Table F7. Results indicated that both SVM(SMO) and nearest neighbour (IB2) algorithms had the highest accuracies amongst the four learning algorithms, correctly classifying 55% of instances and incorrectly classifying 45% of the instances. Since the nearest neighbour (IB6)

**Table F7**

Accuracy Predictions of The Four Learning Classification Algorithms

	Algorithm			
	Decision Tree (J48)	SVM (SMO)	Nearest Neighbour (Lazy: IB1)	<i>k</i> -Nearest Neighbour (Lazy: IB2)
Total Number of Instances	60	60	60	60
Total Number of Attributes	12	12	12	12
Correctly Classified Instances % Accuracy	36.66	55	48.33	55
Incorrectly Classified Instances % Accuracy	63.33	45	51.66	45

algorithm displayed the highest accuracy predictions amongst the four learning algorithms, the remaining three classifying algorithms were omitted from further analyses.

Table F8 contains the 2 x 2 confusion matrices for each of the four classifying algorithms. Our data contained two classes (i.e., increase and decrease); therefore a 2 x 2 confusion matrix is produced for each classifying algorithm. Each row in the confusion matrix represents instances in the actual class, whereas each column represents instances in the predictive class. The number of correctly classified instances in the confusion matrix is calculated by the sum of diagonals, whereas the number of misclassified instances is calculated by the sum of the off-diagonals. Results revealed that the confusion matrix from the SMO (SVM) algorithm classified 14 instances correctly and 19 instances incorrectly; whereas the *k*-nearest neighbour (Lazy: IB2) algorithm classified 25 instances correctly and 8

**Table F8**

2 x 2 Confusion Matrices of the Four Classifying Algorithms: Increase vs. Decrease - Reduced Subset

			Predictive Class	
			Increase	Decrease
Decision Tree (J48)	Actual Class	Increase	9	21
		Decrease	17	13
SVM (SMO)	Actual Class	Increase	14	16
		Decrease	11	19
Nearest Neighbour (Lazy: IB1)	Actual Class	Increase	17	13
		Decrease	18	12
<i>k</i> -Nearest Neighbour (Lazy: IB2)	Actual Class	Increase	25	5
		Decrease	22	8
Number of Instances = 60				

instances incorrectly. As the  $k$ -nearest neighbour (IB2) algorithm classified more instances correctly than the SMO (SVM) algorithm, it was decided to omit the remaining three classifying algorithms from further analyses.

Predictive Performance accuracy of the  $k$ -nearest neighbour (Lazy: IB2) classifier is displayed in Table F9. The results showed that the predicted performance accuracy percentage for TPR class was 83.33% and 26.7% for the TNR class. This indicates that 83% of recruits who were classified to be in the increase class and 27% of recruits who were classified to be in the decrease class, were in actual fact recruits who belonged to those specific classifications classes. The predicted performance accuracy percentages for both TPR and TNR were calculated by dividing the correctly classified class value in the confusion matrix by the total of the row in which the correctly classified class value appeared; i.e.,  $TPR = 25/(25+5) = 83.33\%$  and  $TNR = 9/(8+22) = 26.7\%$ .

False Positive Rate (FPR) and False Negative Rate (FNR) reflect the predicted accuracy percentage of recruits who were classified to a certain class, but actually belonged to a different class. Results showed that the predicted performance accuracy percentage for FPR was 16.7% and 73.3% for FNR. This indicates that 17% of recruits were classified into the increase class, but actually belonged to the decrease class. Whereas, 73% of recruits were classified into the decrease class, but actually belonged in the increase class. The predictive performance accuracy percentages, both the FPR and FNR were calculated by dividing the incorrectly classified class value in the confusion matrix by the total of the relevant row in which the incorrectly classified class value appeared; i.e.,  $FPR = 5/(25+5) = 16.66\%$  and

**Table F9**

Prediction Performance Accuracy for  $k$ -Nearest Neighbour (Lazy: IB2) Classification Algorithm

	TPR	TNR	FPR	FNR	Accuracy in %
$k$ -Nearest Neighbour (Lazy: IB2)	83.33%	26.66%	16.66%	73.33%	55%

Number of Instances = 60

TPR = True Positive Rate; TNR – True Negative Rate; FPR = False Positive Rate; FNR = False Negative Rate

$FNR = 22/(22+8) = 73.33\%$ . The overall accuracy percentage for the  $k$ -nearest neighbour (Lazy: IB2) algorithm was 55%. The success rate was calculated by dividing the sum of the correctly classified instances by the Total of classified instances in the confusion matrix; i.e.,  $(25+8) / (25+5+22+8) = 55\%$ .

We further investigated whether extracting individual features from the model could improve the accuracy of the classifiers. Each item was removed from the model, whereafter the classifying algorithm was re-run with the reduced subset of features. If the removal of the item did not improve the accuracy of the classifiers, the item was replaced within the model, the next item was removed and the classifying algorithm was re-run. By removing six of the features (i.e., reward sensitivity, introjected regulation of core values, integrated regulation of core values, attentional control, activation control and inhibition control) resulted in an improvement of the accuracy of the correctly classified instances. Table F10 shows a comparison of estimates between the complete subset with 12 attributes against the reduced subset with 6 attributes. Results showed that the accuracy of the correctly classified instances improved from 55% to 67%. Thus by eliminating individual features, the predictive

**Table F10**

Comparison of the Estimates of the Predictive Performance of the  $k$ -Nearest Neighbour (Lazy: IB2) Algorithms After Individual Features were Extracted

	Algorithm $k$ -Nearest Neighbour (Lazy:IB2)	
	Full Subset	Reduced Subset
Total Number of Instances	60	60
Total Number of Attributes	12	6
Correctly Classified Instances % Accuracy	55	67
Incorrectly Classified Instances % Accuracy	45	33

accuracy of the classifiers was improved. Within the confusion matrix (See Table F11), there were 26 true positive, 14 true negative, 4 false negative and 16 false positive compounds. Table F12 depicts the predictive performance accuracy percentages for the reduced subset. Compared to the full subset, the predictive performance accuracy percentage of the TPR in the reduced subset improved from 83.33% to 86.7%, whereas the FPR decreased from 16.7%

to 13.3%. The TNR increased from 26.7% to 46.7%, whereas the FNR reduced from 73.3% to 53.3%. These results indicated that 86.7% of recruits who were classified to be in the increase class and 46.7% of recruits who were classified to be in the decrease class, were in actual fact recruits who belonged to those specific classification classes. Results further revealed that 13.3% of recruits were classified into the increase group, but in actual fact belonged to the decrease class, whereas 53.3% of recruits were classified into the decrease class, but in actual fact belonged in the increase class. The overall success rate improved from 55% to 67% for the reduced subset. The results above indicate that the reduced  $k$ -nearest neighbour (Lazy: IB2) classification algorithm was able to classify recruits who will increase in MT more accurately than classifying recruits who will decrease in MT. The reduced subset revealed that, of the 5 remaining features, psychoticism, extraversion, neuroticism, punishment sensitivity and externalisation of core values had a very low accuracy prediction rate of 67%. The results revealed that the  $k$ -nearest neighbour (Lazy: IB2) algorithm was able to classify recruits who will increase in MT more accurately, than classifying recruits who will decrease in MT during training. However, the accuracy percentage of 67% is very low.

**Table F11**

Confusion Matrix of Reduced Subset: Increase vs. Decrease Groups

			Predicted Class	
			Increase	Decrease
$k$ -Nearest Neighbour (Lazy: IB2)	Actual Class	Increase	26	4
		Decrease	16	14

Number of Instances = 60

**Table F12**Prediction Performance Accuracy for  $k$ -Nearest Neighbour (Lazy: IB2) Classification Algorithm for Reduced Subset

	TPR	TNR	FPR	FNR	Accuracy in %
$k$ -Nearest Neighbour (Lazy: IB6)	86.7%	46.7%	13.3%	53.3%	66.66%

Number of Instances = 60

TPR = True Positive Rate; TNR – True Negative Rate; FPR = False Positive Rate; FNR = False Negative Rate

