Investigating the relationship between Psychopathy, Fear Conditioning, and Facial Affect Recognition.

by

Allanah R. Casey.

A thesis submitted to Victoria University of Wellington in fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology

September 2013

Declaration

I hereby declare that this thesis has not been submitted, either in the same or different form, to this or any other university for a degree:

Signature:

Acknowledgements

First and foremost, thank you to my research supervisors Devon Polaschek and Gina Grimshaw for all of your ideas, encouragement, enthusiasm, and commitment to helping me produce a thesis of which I am proud. I will always be immensely grateful for your contributions to this thesis, and your role in developing my ability to think and write. Thanks also to my colleagues in the Criminal Justice lab for the time and effort spent reading drafts and giving feedback, offering ideas, support and understanding, and for helping me to stay sane and have fun over the last four years. I am grateful to the numerous other academic staff, administration staff, and students in the School of Psychology who have played a part along the way. Thanks to the Victoria University Scholarships Office for funding this research.

This research would not have been possible without the collaboration of the New Zealand Department of Corrections. Thank you to all of the staff at Rimutaka Prison who helped to make my data collection possible. I am also grateful to all of my research participants, without whom I would not have a thesis. Prisons are an interesting environment in which to collect data; I have learnt a lot, both professionally and personally. I value this experience and am incredibly grateful for the opportunity to conduct my research within Corrections. I hope this research may be of use to you.

Finally, thanks to my family and friends who have supported me throughout this process. In particular, thanks to my parents Madeleine and Kevin. I am grateful for your endless support, your encouragement, your patience, and for your attempts to understand my research!

Abstract

Psychopathic offenders are often considered to be untreatable, especially dangerous, and at very high risk of reoffending. Psychopathy has generated considerable research interest. Despite this interest, our understanding of psychopathy is relatively poor, with ongoing debate regarding how best to define psychopathy, and a lack of clarity regarding how psychopathy develops. Etiological theories of psychopathy posit deficits in recognising and responding to others' emotions, and an attenuated experience of fear as crucial mechanisms in the development of psychopathy. The aims of this thesis are to investigate the pattern of psychopathic traits present within an inmate sample, and to investigate the relationship between these psychopathic traits and performance on two tasks related to etiological theories of psychopathy: facial affect recognition and fear conditioning. Part One of this thesis addresses the first aim, investigating the presentation of psychopathy in the current sample. The relationship between psychopathic traits in the present sample was largely consistent with previous research. A Principal Components Analysis identified two factors of psychopathic traits: a Bold/ Fearlessness factor which measures an absence of fear and anxiety and the presence of self-assurance, and a Mean/ Disinhibited factor which measures the presence of externalising and disinhibited behaviour, alongside aggression and the use of other people for one's own gain. These findings are discussed in relation to common conceptualisations and operationalisations of psychopathy.

Part Two of this thesis uses the measurement of psychopathy from Part One to investigate performance on a facial affect recognition task and a fear conditioning task. The Violence Inhibition Mechanism theory suggests that psychopaths should show impairments on facial affect recognition tasks, particularly in the recognition of fearful

and sad facial expressions. However, in the current research psychopathy was unrelated to affect recognition, across all emotional expressions. When criminal offenders were compared to a student sample, the offenders showed poorer affect recognition than the students. These results suggest that there may be an effect of antisociality on affect recognition, but no effect of psychopathy.

Low fear theories of psychopathy suggest that psychopaths should be impaired at learning conditioned fear associations. However, the present study found no evidence of psychopathy-related deficits in fear conditioning. Rather, higher psychopathy was related to better fear conditioning, with higher scores on the Mean/ Disinhibited factor predicting better discrimination between the conditioned and neutral stimuli.

Taken together, these findings suggest that psychopathy was not related to deficits in either affect recognition or fear conditioning. These findings are inconsistent with etiological theories of psychopathy, and question common assumptions about the deficits which characterise psychopathy.

Contents

List of Tables

List of Figures

Chapter One: General Introduction

Psychopathy is a personality pattern most commonly identified in criminal offenders. Psychopathic offenders are often considered to be untreatable, especially dangerous, and at very high risk of reoffending. For these reasons, psychopathy is frequently used for decision making within criminal justice settings, including for considerations of treatability, indeterminate commitment, and death penalty sentencing (Cunningham & Reidy, 2002; DeMatteo & Edens, 2005; Edens, in press; Edens & Petrila, 2006; Edens, Petrila, & Buffington-Vollum, 2001, Ogloff & Lyon, 1998). Thus, identifying an individual as psychopathic can have a substantial impact on what happens to them within the criminal justice system. Despite the serious implications of identifying an individual as psychopathic, a lot remains unknown regarding psychopathy. One ongoing debate within the psychopathy literature is concerned with the characteristics that define the psychopathic personality (e.g. Skeem & Cooke, 2010a). A diverse set of traits comprise psychopathy, and a heterogeneous group of individuals are defined as psychopathic (Skeem, Polaschek, Patrick & Lilienfeld, 2011), producing a lack of clarity regarding psychopathy and making it difficult to consistently identify associated deficits. This lack of clarity also impedes the development and validation of etiological theories of psychopathy.

Deficits commonly discussed in relation to psychopathy include impaired recognition of others' emotions and reduced responsiveness to fearful and aversive stimuli. Although there is no consensus as yet, deficits in these processes are theorised to be among the factors that contribute to the development of the psychopathic personality. A set of related theories suggest core deficits in cognitive and affective processing. The Violence Inhibition Mechanism (VIM) theory posits that psychopaths

lack the normal automatic physiological response to others' distress (Blair, 1995), creating emotional detachment from — and difficulty in accurately recognising signals of —others' distress, such as fearful and sad facial expressions (Blair, Mitchell & Blair, 2005). Low fear theories of psychopathy suggest that psychopaths have an attenuated experience of fear, rendering them less responsive to fear-inducing stimuli, and creating difficulties in their ability to learn to anticipate fearful or aversive outcomes (Lykken, 1957, 1995). The Integrated Emotion System theory integrates the VIM and low fear theories, postulating that an underlying amygdala deficit characteristic of psychopathy produces the difficulties described in both the VIM and low fear theories (Blair et al., 2005).

Empirically, deficits in recognising others' distress have been investigated using facial affect recognition tasks, while deficits in fear responding and learning to anticipate fear have been investigated using fear conditioning tasks. The results of these studies are often interpreted as providing evidence for the theories outlined above. However, a closer look at this research evidence indicates many inconsistencies between studies, and identifies a number of methodological issues. Moreover, the research literature tends to investigate performance on these tasks in relation to global psychopathy scores. Given the heterogeneity within the psychopathy construct noted above, a closer look at the relationship between distinct psychopathic traits and task performance is warranted.

The current research seeks to test the theories of psychopathy introduced above using a facial affect recognition task and a fear conditioning task with a group of criminal offenders. The present research improves upon some of the methodological issues in previous studies. Moreover, the present research moves beyond the use of

global measures of psychopathy to investigate the relationship between specific psychopathic traits and performance on the two tasks. A more specified understanding of the relationship between core affective deficits and specific behavioural and personality traits will advance our theoretical understanding of psychopathy. Finally, the Integrated Emotion System theory posits that deficits in fear conditioning and affect recognition will co-occur within psychopathy, a hypothesis which has yet to be tested. Therefore, the current research also investigates whether performance on the two tasks is related, and whether deficits on the two tasks co-occur in psychopathy.

Given the confusion and heterogeneity within the conceptualisation of psychopathy, the first step of this thesis was to develop a clearly articulated operationalisation of psychopathy. It was also important to investigate the traits present within the current sample in order to explore the relationship between these traits and performance on the two tasks. Thus, this thesis is presented in two parts. Part One investigates the presence of psychopathic traits within the current sample, the relationship between these traits, and what constellations of traits emerge within this sample.

Part Two investigates participants' performance on the tasks introduced above: facial affect recognition and fear learning. Consistent with the theories noted earlier, it was hypothesised that higher psychopathy scores would be associated with poorer performance on both the affect recognition and fear conditioning tasks. For comparison with previous research, initial analyses investigated the relationship between global psychopathy scores and task performance. Subsequently, task performance was explored in relation to the psychopathic traits and the constellations of traits identified in Part One. Thus, the current research seeks to test the Violence Inhibition Mechanism,

low fear, and Integrated Emotion System theories of psychopathy, and to investigate which specific psychopathic traits are related to the deficits proposed by these theories.

Part One: What is Psychopathy?

Chapter Two: An Introduction to Psychopathy

2.1 What is Psychopathy?

The psychopathic personality is comprised of affective, interpersonal and behavioural traits (Patrick, Fowles & Krueger, 2009), including a deficient experience of emotion, an arrogant and deceitful interpersonal style, and behaviours characterised by impulsivity and irresponsibility (Cooke& Michie, 2001). While most conceptualisations of psychopathy include aspects of all three of these domains, they differ in the specific criteria used to define the construct, and in their emphasis on different components of this personality pattern.

Across conceptualisations of psychopathy, traits used to describe and define the construct are numerous, and include callous use of others, self-centredness, weak conscience, lack of empathy and remorse, deficient emotional experience, failure to form close attachments to others, shallow affect, failure to accept responsibility, failure to learn from punishment, manipulativeness, untruthfulness, grandiosity, narcissism, superficial charm, good social skills, good intelligence, absence of acute mental illness, freedom from anxiety, fearlessness, proneness to boredom, sensation seeking, impulsivity, low frustration tolerance, unreliability, irresponsibility, parasitic lifestyle, promiscuous sexual behaviour, and lack of realistic long term goals and plans (Cleckley, 1964; Hare, 1980, 1991, 2003; Lilienfeld & Andrews, 1996; Lilienfeld & Widows, 2005). More controversially, some conceptualisations include criminal and antisocial behaviour in their definition of psychopathy. Relevant descriptors include poor

behavioural controls, criminal versatility, juvenile delinquency, revocation of conditional release (Hare, 1991), and hostility and aggression (McCord & McCord, 1964). Other authors maintain that criminal and antisocial behaviours are common, but not inevitable, outcomes of the core personality pattern of psychopathy, and should not be used to define the construct (Cooke & Michie, 2001; Skeem & Cooke, 2010a, 2010b).

Thus, debate remains regarding which traits are central to the construct of psychopathy (Skeem & Cooke, 2010a; Skeem, et al., 2011). Despite this debate, the majority of research investigating the relationship between psychopathy and other variables uses global psychopathy scores, whereas research investigating the relationship between specific psychopathic traits and other variables is conducted less frequently. The use of global versus trait-based measurements of psychopathy is also influenced by the view of psychopathy as either a unitary construct (e.g., Hare, 1980) or as a set of constructs which co-occur in psychopathy (e.g., Lilienfeld & Widows, 2005). Recent research tends to support the latter, indicating the presence of a higher order psychopathy factor, comprised of distinct, uncorrelated subfactors (e.g., Patrick, Hicks, & Krueger, 2007). Different conceptualisations of psychopathy emphasise these distinct subfactors to differing degrees (Patrick et al., 2009).Thus, a divergent picture of psychopathy exists across conceptualisations. This divergent picture of psychopathy has led to researchers and practitioners comparing dissimilar groups, all termed psychopathic. A recent model for synthesising the diverse conceptualisations of psychopathy — the Triarchic Model of Psychopathy — will be presented later in this chapter.

2.1.1 Is psychopathy a category or a dimension?

Another debate within the psychopathy literature concerns the definition of psychopathy as a categorical disorder, or as a continuum of personality traits. The categorical distinction between 'psychopathic' and 'non-psychopathic' is intuitively appealing where psychopathy is used for making important policy decisions, such as criminal sentencing. However, recent research on psychopathy indicates that a dimensional rather than a categorical model tends to produce a better fit to observed psychopathy scores, across different measures of psychopathy (Edens, Marcus, Lilienfeld, & Poythress, 2006; Guay, Ruscio, Knight, & Hare, 2007;Marcus, John & Edens, 2004, however see also Harris, Rice, & Quinsey, 1994 and Skilling, Harris, Rice, & Quinsey, 2002). Consistent with the dimensional approach, most measures of psychopathy produce continuous scores. The most commonly used measure of psychopathy – the Psychopathy Checklist-Revised (PCL-R; Hare, 1991) – produces a continuous scale score between 0 and 40, and a score of 30 or above is recommended for diagnosing psychopathy (Hare, 2003). Thus, the PCL-R accommodates both the dimensional and categorical approaches. However, the categorical approach, and the use specifically of 30 as a cut-off score, is largely unsupported in the research literature (e.g., Edens et al., 2006).

The conceptualisation of psychopathy as both a categorical and dimensional construct results in confusion when the term 'psychopath' or 'psychopathic' is used. By 'psychopathic' do authors mean individuals scoring above some pre-determined threshold, such as a score of 30 or above on the PCL-R? Or do they simply mean those with a strong presence of a given trait or series of traits? Indeed using the terminology of 'psychopath' or 'psychopathic' is intuitively more pleasing to both reader and author

than ‘those scoring highly on measures of psychopathy’. Throughout this thesis, for ease, the terms ‘psychopath’ and ‘psychopathic’ will be used. By these terms I refer to ‘those scoring highly on measures of psychopathy’, with a view that psychopathy is a dimensional personality construct, with no clear boundary between ‘psychopathic’ and ‘non-psychopathic’.

2.2 History of psychopathy

In order to understand current conceptualisations of psychopathy, and the origins of the debate regarding what psychopathy is, a brief background on the construct is important. The term psychopathy has been around since at least the 19th century, but it is the writings of Cleckley beginning in the 1940’s that are regarded as the seminal works on the modern construct of psychopathy. Cleckley was the first to produce a systematic description of a series of traits present in psychopathy, producing a prototype against which others believed to be psychopathic could be compared. Cleckley’s description of the psychopath was as someone who outwardly presents as normal and well adjusted, and may fool others into seeing them this way. However, Cleckley saw psychopaths’ internal experience of the world as anything but ordinary, as they remained largely detached from the world around them, with very little experience of emotion (Cleckley, 1941, 1964).

Broadly, Cleckley’s 16 criteria can be considered to fall into three categories (Patrick, 2006). The first series of descriptors relates to positive adjustment, and includes good intelligence, superficial charm, good social skills, and an absence of delusions and irrational thinking. Within Cleckley’s description, committing or genuinely attempting suicide was seen as highly unusual among psychopaths. Cleckley also describes an absence of nervousness, whereby psychopaths appear immune to

anxiety and worry (Cleckley, 1964). This absence of anxiety has been emphasised as a key differentiating factor between psychopathy and other personality types (e.g., Lykken, 1957, 1995).

The second set of characteristics present in Cleckley's description relate to indicators of chronic behavioural deviance, and include unreliability, sexual promiscuity, poor judgement and decision making, failure to learn from the experience of negative consequences, and failure to follow any life plan or give sustained effort toward any long term goal(Cleckley, 1964). Cleckley also observed that psychopaths often show antisocial behaviour which is not driven by any clear goals, and for which the costs seem to significantly outweigh the benefits. Thus, while Cleckley notes the presence of antisocial behaviour, it is the inadequate motivation for this behaviour which is emphasised, rather than solely the presence of antisocial behaviour. Moreover, Cleckley directly references antisocial behaviour, but not necessarily criminal behaviour. Criminal behaviour is considered here to include behaviour which is sanctioned by the legal system, and is a more extreme manifestation of antisocial behaviour, while antisocial behaviour refers more broadly to behaviour which acts against the interests of social order (Skeem & Cooke, 2010a).

The third set of Cleckley's characteristics describe deficits in emotional and interpersonal functioning, including lack of remorse or shame, a markedly attenuated experience of emotion, incapacity for love, untruthfulness and insincerity (Cleckley, 1964). Cleckley describes this third set of characteristics – a profound inability to experience emotion – as the heart of the psychopath's problem. An important absence from Cleckley's description is any traits relating to violence or aggression. Rather, Cleckley's description of psychopathy emphasises an affective disturbance alongside

indicators of positive adjustment, with aggressive and criminal behaviours considered an outcome present only in some cases (Cleckley, 1964).

In contrast to this description, contemporaries of Cleckley, McCord and McCord, described a 'meaner' type of psychopath:"an asocial, aggressive, highly impulsive person, who feels little or no guilt and is unable to form lasting bonds of affection with other human beings" (1964, p. 3). The McCords saw the psychopath's inherent antisociality as being frequently expressed in the form of brutal aggression. The emphasis on antisocial behaviour, particularly aggression, in the McCord and McCord account of psychopathy sets it apart from Cleckley's conceptualisation. However, both authors agree that the psychopath is largely free of anxiety, and that deficient guilt and incapacity for love are crucial to defining psychopathy and differentiating the psychopathic personality from other personality types (McCord & McCord, 1964).

2.2.1 Primary and Secondary subtypes of Psychopathy

Another contemporary of Cleckley and the McCords, Benjamin Karpman (1941) provided a broader view of psychopathy, contributing a description of psychopathy that included subtypes. According to Karpman, the criteria put forward by Cleckley described a group of 'primary' or 'idiopathic' psychopaths, who were characterised by a "constitutional" affective deficit, which rendered these psychopaths unable to experience emotions such as empathy (Karpman, 1941).

Karpman identified a second group of psychopaths who had not previously been well described. This 'secondary' or 'symptomatic' psychopathy group were similar in presentation to primary psychopaths; both groups would lie and cheat with an apparent disregard for others (Karpman, 1948). However, secondary psychopaths differed from

primary psychopaths in aetiology and emotional experience. Karpman's description of secondary psychopathy emphasised that this group showed a vulnerability to anxiety, depression, anger, impulsivity and aggression, with their behavioural and personality manifestations of psychopathy present only as a secondary outcome of this underlying emotional disturbance, which was absent from the primary subtype. Thus, secondary psychopathy was believed to reflect a learnt affective disturbance resulting from aversive early life experiences, such as abuse (Poythress & Skeem, 2006). As such, secondary psychopaths were, at times, able to experience emotions such as empathy, and suffered from considerable anxiety, depression or neurosis (Karpman, 1941). These 'secondary' psychopaths were excluded from the definitions of psychopathy offered by Cleckley and the McCords, who saw psychopathy as exclusively reflecting a low-anxious personality pattern.

Karpman's distinction between primary and secondary psychopathy continues to be influential today. Significant research evidence suggests the existence of two groups of individuals scoring highly on current measures of psychopathy, such as the PCL-R (to be discussed in the following section). Consistent with Karpman's view of primary and secondary psychopathy, these two groups correlate in opposing directions on external measures of anxiety and negative emotionality (Hicks, Markon, Patrick, Krueger & Newman, 2004; Skeem, Johansson, Andershed, Kerr & Louden, 2007).

Given the important differences in emotional experience and hypothesised aetiology between primary and secondary psychopaths, debate remains as to whether secondary psychopaths are best conceptualised as psychopathic rather than as a separate personality pattern, distinct from psychopathy (see Skeem et al., 2011). The presence of these two subgroups within psychopathy, both of which score highly on

measures such as the PCL-R, contributes to the heterogeneity evident within the psychopathy construct (Skeem et al., 2011). The presence of subgroups may also contribute to inconsistent findings across studies investigating the relationship between psychopathy and other variables.

The influential works of Cleckley, the McCords, and Karpman, present a varied view of psychopathy. Differences are particularly evident between conceptualisations developed by those working with criminal offenders (e.g., McCord & McCord) and those working with psychiatric inpatients (e.g., Cleckley and Karpman; Patrick et al., 2009), with the former emphasising a more aggressive and antisocial presentation. These differing client groups no doubt influenced the typical psychopathic presentation with which each author was working. Since the time of Cleckley and his contemporaries, psychopathy has most commonly been measured and investigated in criminal groups, influencing the dominant view of psychopathy over this time.

2.3 Psychopathy and the Psychopathy Checklist

In his work with criminal offenders, Robert Hare created a tool for the measurement of psychopathy. This tool – the Psychopathy Checklist (PCL; Hare, 1980), and subsequently the Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003) – has become the most influential operationalisation of psychopathy. The PCL and PCL-R provided a reliable measurement of psychopathy which had not previously existed, and this reliability led to a wealth of research on psychopathy using the PCL and PCL-R. The PCL-measurement of psychopathy also showed an ability to predict both violent and non-violent recidivism (e.g., Salekin, Rogers & Sewell, 1996), with this clinical utility further adding to the PCL's popularity. Given the dominance of the PCL measurement of

psychopathy, understanding what PCL-psychopathy is, and how this measurement tool developed, are crucial to understanding the current research literature on psychopathy.

2.3.1 How is psychopathy measured in the PCL-R?

The PCL was originally conceptualised by Hare as measuring a unitary psychopathy construct (Hare, 1980; Hare & Neumann, 2008). However, subsequent factor analyses have identified two, three, and four factor solutions (Cooke & Michie, 2001; Hare, 2003; Harpur, Hare & Hakstian, 1989). Table 2.1 presents the factors and the items which comprise them. Initial factor analysis identified two factors: an interpersonal/ affective and a lifestyle/ antisocial factor (Hare et al., 1990). These factors are moderately correlated, and this two-factor solution is the most commonly used. These two factors are indicated in the top row of Table 2.1.

Subsequent factor analyses further divided these two factors, splitting the interpersonal and affective components, and the lifestyle and antisocial components. The first factor analysis splitting the two-factor structure dropped the antisocial component, based on the belief that antisocial behaviour is an outcome present in some psychopaths, but not a defining feature of the personality pattern, thus producing the three-factor solution (Cooke & Michie, 2001). The remaining three factors are indicated in the second row of Table 2.1, but were labelled 'arrogant and deceitful interpersonal style', 'deficient affective experience', and 'impulsive and irresponsible behaviour style' respectively (Cooke & Michie, 2001).The four-factor solution reinstated the antisocial items, and described the four factors indicated in the second row of Table 2.1 as 'facets' embedded within the two original factors (Hare, 2003).

Table 2.1: PCL-R items and factor structure (Hare, 2003; Harpur et al., 1989).

Factor 1: Interpersonal/ affective		Factor 2: Lifestyle/ antisocial	
Facet 1: Interpersonal	Facet 2: Affective	Facet 3: Lifestyle	Facet 4: Antisocial
Glibness/ superficial charm. Grandiose sense of self worth. Pathological lying. Conning/ Manipulative.	Lack of remorse or guilt. Shallow affect. Callousness/ Lack of empathy. Failure to accept responsibility.	Proneness to boredom. Parasitic lifestyle. Lack of realistic long-term goals. Impulsivity. Irresponsibility.	Poor behavioural controls. Early behavioural problems. Juvenile delinquency. Revocation of conditional release. Criminal versatility.

A recent conceptualisation of the PCL-R factor structure, the bifactor model, empirically showed a global factor comprising all 20 PCL-R items, as well as three uncorrelated subfactors (Patrick et al., 2007). The first of these subfactors was dominated by items from the interpersonal component of the PCL-R, including glibness/ superficial charm and grandiosity. The second subfactor was dominated by the items 'lack of remorse' and 'failure to accept responsibility', both from the PCL-R affective component. The third subfactor was dominated by the impulsivity item of the PCL-R lifestyle component. The subfactors identified within the bifactor model resemble interpersonal, affective and lifestyle components identified in previous factor analysis of the PCL-R (e.g., Cooke & Michie, 2001). The relationship between PCL-R items and other measures of personality indicated an emphasis on hostile and aggressive interpersonal

style within the general PCL-R factor (Patrick et al., 2007). Thus, the PCL-R as a whole appears saturated with disinhibited aggression, and resembles DSM-IV-TR Antisocial Personality Disorder (ASPD; Patrick et al., 2007).The global PCL-R factor then appears indicative of antisociality more generally, rather than the core personality components essential to the psychopathy construct. Thus, considering the traits within the PCL-R appears crucial to differentiating psychopathy from other antisocial personalities.

2.3.2 Development of the PCL/ PCL-R

Initially Hare's attempt to assess psychopathy involved rating clients on how closely they resembled the prototypic psychopath described by Cleckley. This rating was done using a 1 to 7 rating scale where a rating of 1 suggested that the individual did not match Cleckley's description at all, and a rating of 7 suggested that there was clear evidence that the individual strongly resembled Cleckley's prototype (Patrick et al., 2009). Thus, Hare's early conceptualisation of psychopathy was based entirely on Cleckley's description. Advancing this initial rating scale, Hare developed the 22-item Psychopathy Checklist (PCL; Hare, 1980), and subsequently the 20-item Psychopathy Checklist-Revised (PCL-R; Hare, 1991; 2003). Items included in the initial PCL item pool were based on Cleckleyan psychopathy. In refining the PCL item pool, Hare also retained those items that best discriminated between those who were good and poor matches to the Cleckley prototype.

However, while initially based on Cleckleyan descriptions of psychopathy, the bottom-up evolution of the PCL measurement tool led to a markedly different conceptualisation of psychopathy. Items were selected based on high internal consistency, following Hare's view of psychopathy as a unitary construct (Patrick, 2006). Thus, those items with higher internal consistency were favoured over those

without, regardless of the emphasis on any given trait in previous conceptualisations. Patrick (2006) notes that this attention to internal consistency likely resulted in the removal of items relating to positive adjustment present in the initial item pool, as these items measured a distinct subcomponent of psychopathy, and were fewer in number than deviance items, thus producing lower internal consistency scores. These positive adjustment indicators were an important characteristic of Cleckley's criteria; in particular, an absence of anxiety was emphasised (Cleckley, 1964). Karpman emphasised the difference between primary and secondary psychopaths as the differing experience of neurotic emotions, including anxiety (Karpman, 1941, 1948). Moreover, other theories of psychopathy emphasise the role of low anxiety and low fearfulness as crucial to defining psychopathy (e.g., Lykken, 1957). Despite the important role of anxiety and other indicators of positive adjustment in pre-PCL conceptualisations, these criteria are largely absent from the PCL conceptualisation of psychopathy. Thus, the PCL includes items measuring the chronic behavioural deviance and emotional-interpersonal deficit components of Cleckley's conceptualisation, but the positive adjustment indicators are largely absent. For this reason, PCL-psychopathy appears to capture both the primary and secondary subtypes of psychopathy described by Karpman without distinguishing between the two types (Skeem et al., 2007).

The PCL operationalisation of psychopathy also emphasises antisocial and criminal behaviour to a much greater extent than was present in Cleckley's description. The PCL includes items explicitly measuring criminal behaviour, such as juvenile delinquency, criminal versatility, and revocation of conditional release, as well as including criminal behaviour in the rating of other items (Skeem& Cooke, 2010a). Cleckley's original work included a component of behavioural deviance with descriptors

such as unreliability, lack of long-term goals, and poor judgement. Cleckley did also reference antisocial behaviour in his conceptualisation, with the descriptor 'inadequately motivated antisocial behaviour'. However, even in this descriptor Cleckley did not explicitly reference criminal behaviour. Moreover, Cleckley placed a greater emphasis on the inadequate motivation, with limited gain to be achieved, than on the presence of the antisocial behaviour per se.

Most of the behavioural deviance component of Cleckley's description is covered in the lifestyle facet of the PCL-R, while the antisocial facet seems to include uniquely criminal items quite distinct from Cleckley's conceptualisation. In addition to using Cleckley's criteria as a starting point for the development of the PCL item pool, Hare also drew on other sources, such as his own experience working in correctional settings (Hare & Neumann, 2008). The absence of descriptors relating to criminal behaviour in Cleckley's description of psychopathy indicates that the PCL criminality items were developed from these other sources. The emphasis on criminal behaviour in the PCL-R is more consistent with the McCords' view of psychopathy, which placed a heavy emphasis on aggression and antisociality. Unlike Cleckleyan psychopathy, both the McCords' description of psychopathy and the PCL were developed from work with incarcerated criminal offenders, and thus may reflect a more criminal form of psychopathy more typical in prison settings.

The PCL-R's absence of positive adjustment indicators, and inclusion of a high number of items referencing criminal and antisocial behaviour, has resulted in a conceptualisation of psychopathy which is strongly influenced by criminality. In this way, PCL-psychopathy is over-inclusive of those with a history of involvement in the criminal justice system, and may identify as psychopathic individuals with extensive

criminal histories, but without the core personality characteristics of psychopathy (Lilienfeld, 1994; Skeem & Cooke, 2010a, 2010b). As noted earlier, those regarded as psychopathic on the PCL-R (usually a score of 30 or above) are a heterogeneous group, including both the primary and secondary subtypes described by Karpman (Skeem et al., 2007).

The ability of the PCL-R to reliably measure psychopathy, as well as the scale's ability to predict criminal recidivism, led to the dominance of the PCL-R in the measurement of psychopathy. The majority of measurement, diagnosis, and research on psychopathy are aligned with PCL-defined psychopathy. Therefore, in understanding the current picture of, and research on psychopathy, it is important to understand PCL-psychopathy. However, it is also important for psychopathy to be investigated using other measures. The assessment of psychopathy in the present research has avoided the use of the PCL-R in order to increase knowledge on psychopathy using other measures, as well as to avoid the possible over-identification of psychopathy within the current offender sample which may result from the PCL-R's emphasis on antisocial behaviour. Moreover, alternative measures of psychopathy enable a more thorough investigation of specific traits within psychopathy, crucial to the goals of the present research. The assessment of psychopathy in the current study utilises modern self-report measures, discussed in the following section.

2.4 Self-report measurement of psychopathy

The self-report assessment of psychopathic traits is not new, with scales such as the Psychopathic Deviate scale of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1940), the Socialization scale of the California Personality Inventory (CPI: Gough, 1987), and the Antisocial scale of the Millon Clinical

Multiaxial Inventory (MCMI; Millon, Davis & Grossman, 2006) used to assess psychopathic traits for many years. However, while purportedly measuring psychopathic traits, these scales can be regarded as "nonspecific measures of behavioural deviance" (Lilienfeld & Fowler, 2006, p.114). That is, these scales measure a general tendency toward criminal and antisocial behaviour (Harpur et al., 1989), and do not adequately measure the affective and interpersonal *personality* characteristics essential to the construct of psychopathy.

Adequate coverage of these interpersonal and affective traits has been a focus in the development of modern measures of psychopathy. A desire to measure psychopathy outside of correctional settings in the absence of file information has also spurred the development of self-report measures of psychopathy. Recent self-report measures of psychopathy with some empirical validation include the Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl & Fitzpatrick, 1995), the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) and the PPI-Revised (PPI-R; Lilienfeld & Widows, 2005), and the Hare Self-Report Psychopathy Scale (SRP; Hare, 1985). The PPI-R appears to be the most commonly used self-report psychopathy questionnaire, and has been the subject of substantial validation research. Therefore, the PPI-R was chosen for use in the current study. The development and validity of the PPI and PPI-R are discussed in detail below.

2.4.1 Development of the Psychopathic Personality Inventory (PPI/ PPI-R)

The PPI was developed to assess psychopathy in non-institutional populations. Specifically, undergraduate students were the development sample used in refining this measure. The PPI was then administered to incarcerated offenders, and norms developed for both offender and student samples (Lilienfeld & Widows, 2005). The PPI

was subsequently revised to produce the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005), which was also normed on both student and offender samples. In developing the PPI and PPI-R, the authors' goals were to develop a personality based measure of psychopathy which could be easily and efficiently administered both in clinical and non-clinical settings. Further, they sought to clarify the construct of psychopathy in the process of test construction and refinement (Lilienfeld & Andrews, 1996). In pursuit of this aim, the authors included a wide range of descriptors of psychopathy in their initial item pool, including those commonly described and those only occasionally included in descriptions of psychopathy. Notably absent from this item pool were any items measuring criminal or antisocial behaviours. Items relating to criminal behaviour were excluded, consistent with the authors' view that antisocial and criminal behaviour items measure nonspecific behavioural deviance while not helping to assess the core personality traits of psychopathy (Lilienfeld & Widows, 2005).

In addition to producing a global psychopathy score, Lilienfeld and Andrews sought to develop a measure that assessed more specific traits within psychopathy. To this end, the PPI-R is comprised of eight scales measuring different components of psychopathy. These scales are described in Table 2.2. The eight scales load onto two higher order factors. Factor 1 is described as 'Fearless Dominance': including the scales Social Influence, Stress Immunity and Fearlessness. Factor 2 is described as 'Self-centred Impulsivity' (previously Impulsive Antisociality in the PPI): including the scales Machiavellian Egocentricity, Rebellious Nonconformity, Blame Externalisation, and Carefree Nonplanfulness. The final of the eight scales, Coldheartedness, does not load onto either factor, but is retained in the PPI-R factor structure as a third factor alongside

the Fearless Dominance and Self-centred Impulsivity factors (Lilienfeld & Widows, 2005).

Table 2.2: The eight scales of the Psychopathic Personality Inventory- Revised (Lilienfeld & Widows, 2005).

Scale Label	Scale Content
Social Influence	Interpersonal impact and skill at influencing others. E.g. "Even when others are upset with me, I can usually win them over with my charm."
Fearlessness	A willingness to take physical risks and an absence of anticipatory anxiety. E.g. "Making a parachute jump would really frighten me" reverse scored.
Stress Immunity	Sangfroid and absence of tension in anxiety-provoking situations. E.g. "I can remain calm in situations that would make many other people panic."
Machiavellian Egocentricity	A ruthless willingness to manipulate and take advantage of others. E.g. "I sometimes try to get others to bend the rules for me if I can't change them any other way."
Rebellious Nonconformity	A flagrant disregard for tradition. E.g. "I sometimes question authority figures 'just for the hell of it'."
Blame Externalisation	Tendency to attribute responsibility for one's mistakes to others. E.g. "When I'm in a group of people who do something wrong, somehow it seems like I'm usually the one who ends up getting blamed."
Carefree	An insouciant attitude toward the future. E.g. "I weigh the pros and

Nonplanfulness	cons of major decisions carefully before making them" reverse scored.
Coldheartedness	Callousness, guiltlessness, and absence of empathy. E.g. "I have had 'crushes' on people that were so intense that they were painful" reverse scored.

2.4.2 Validity of the Psychopathic Personality Inventory (PPI/ PPI-R)

A major concern with self-report measures of psychopathy is the reliability and validity of participants' responses. Possible problems with self-report ratings include psychopaths' propensity to lie and lack of insight (Lilienfeld & Fowler, 2006). If—as Cleckley suggests—psychopaths are by definition pathological liars who lack any insight into their own condition, can we rely on their self-report as an accurate and honest reflection of their personality? Moreover, if psychopaths have never experienced emotions such as empathy or guilt, and are thus unaware what the experience of these emotions feels like, will they be able to rate their own absence of these emotions(Lilienfeld & Fowler, 2006)?

Despite these concerns, promising evidence is accumulating that the self-report assessment of psychopathy can produce reliable and valid results (see Lilienfeld & Fowler, 2006 for a review). The PPI and the PPI-R have been the subject of validation research, with the bulk of the research having used the older PPI. Therefore, evidence relating to the reliability and validity of the PPI and the PPI-R is reviewed here. Moreover, the revised PPI-R did not radically alter the nature of the PPI, and thus PPI validity research is relevant to determining the validity of the PPI-R. Scores on the PPI have been shown to be stable over time, with good test-retest reliability (r=.95,

Lilienfeld & Andrews, 1996; subscale *r*'s = .82 to .94, Chapman, Gremore & Farmer, 2003). These test-retest reliability scores indicate that individuals are responding with a high level of consistency over time.

Moreover, the PPI has shown good convergent validity, correlating with other theoretically related measures such as the CPI Socialisation scale (Chapman et al., 2003; Lilienfeld & Andrews, 1996),and measures of peer-rated Cleckleyan psychopathy, interview-rated Cleckleyan psychopathy, and Structured Clinical Interview for DSM-III-R rated antisocial and narcissistic personality disorders (see Lilienfeld & Fowler, 2006 for a review). Among criminal offenders, the PPI has also been shown to correlate with measures of empathy and aggression (Sandoval, Hancock, Poythress, Edens & Lilienfeld, 2000), and with the number of disciplinary infractions an offender had accrued (Edens, Poythress & Watkins, 2001). Moreover, the PPI has been demonstrated to correlate well with total PCL-R scores (r=.54), as well as with both PCL-R affective/ interpersonal factor (r=.54) and lifestyle/ antisocial factor scores (r=.40; Poythress, Edens & Lilienfeld, 1998). These convergent validity findings indicate that not only does the PPI correlate with other theoretically relevant measures, but that the PPI correlates with clinician rated measures of psychopathy that rely on interview and file review methods, lending support to the validity of these self-report scores.

As noted above, the PPI correlates moderately with the PCL-R, indicating a reasonable degree of cross-over between the two scales. However, the PPI represents an importantly distinct conceptualisation to that put forward in the PCL-R. The PPI explicitly avoids items directly assessing criminal behaviour, while these items have a strong weighting in the PCL-R. The PPI-R Fearless Dominance factor also emphasises some of Cleckley's positive adjustment indicators which are absent from the PCL-R,

such as an absence of anxiety and fearfulness. Thus, while there is a significant relationship between scores on the two measures, the conceptualisation of psychopathy offered by each measure differs in important ways. The Triarchic Model of psychopathy, described below, provides an additional framework for understanding the differences between, and integrating, the various conceptualisations of psychopathy.

2.5 Triarchic Model of Psychopathy

The review of the psychopathy construct presented above indicates how diversely psychopathy has been defined. These diverse conceptualisations have led to confusion about which traits are essential to the definition of psychopathy. The triarchic Model of psychopathy seeks to draw together the previous accounts by identifying the core components of psychopathy and describing how these components have been emphasised to differing degrees across previous conceptualisations. The Triarchic Model of Psychopathy sees the various conceptualisations of psychopathy as made up of three components: boldness, meanness, and disinhibition (Patrick et al., 2009). According to the Triarchic Model, an individual need not possess all three components to present with psychopathy. Rather, psychopathy presents as disinhibition in combination with either boldness *or* meanness, or both (Patrick et al., 2009). Patrick and colleagues state that it is the differing emphasis on boldness and meanness which has led to the diverse conceptualisations of psychopathy, with more aggressive and criminal descriptions such as McCord and McCord (1964) and Hare (1991) emphasising meanness, while Cleckley (1941, 1964) and the Psychopathic Personality Inventory (Lilienfeld& Andrews, 1996;Lilienfeld& Widows, 2005) emphasise boldness (Patrick et al., 2009).

2.5.1 Triarchic components: Disinhibition, Boldness, and Meanness

Disinhibition is described as "a general phenotypic propensity toward impulse control problems" (Patrick et al., 2009, p. 925). This component of psychopathy includes impulsivity and externalising psychopathology, a lack of planfulness, lack of restraint and regulation of behaviour and affect, and the desire for immediate gratification. Disinhibition is evident in behaviours such as irresponsible, untrustworthy and aggressive actions; impatience, alienation and distrust; antisocial and criminal behaviours; as well as proneness to alcohol and drug problems (Patrick et al., 2009). Disinhibition is present in most, if not all, conceptualisations of psychopathy, featuring predominantly in the lifestyle and antisocial components of the PCL-R, and in several of Cleckley's descriptors including unreliability, poor judgement and failure to learn from experience, inadequately motivated antisocial behaviour, trivial and impersonal sex life, and failure to follow any life plan. Disinhibition also features strongly in the PPI-R Self-centred Impulsivity factor (Patrick et al., 2009).

Boldness is described as "a capacity to remain calm and focused in situations involving pressure or threat, an ability to recover quickly from stressful events, high self-assurance and social efficacy" (Patrick et al., 2009, p.926). Behaviourally, boldness is evident in actions such as thrill and adventure seeking, assertiveness, imperturbability in stressful situations, persuasiveness and bravery (Patrick et al., 2009).This component includes the positive adjustment and lack of anxiety present in Cleckley's conceptualisation, which is largely absent from PCL-psychopathy. Boldness is included in the PPI-R, with the Fearless Dominance factor providing good content coverage of boldness (Patrick et al., 2009).

Meanness is described as "including deficient empathy, disdain for and lack of close attachments with others, rebelliousness, excitement seeking, exploitativeness, and empowerment through cruelty" (Patrick et al., 2009, p. 927). Terms such as coldheartedness, antagonism, and insensitivity refer to the series of traits subsumed by the term meanness. Meanness is associated with high dominance, high emotional stability, low affiliation, and the pursuit of pleasure and satisfaction without regard for others (Patrick et al., 2009). Meanness presents in the behaviours of arrogance, derisiveness, cruelty towards others, and deliberate and strategic use of other people, including predatory aggression. Meanness is less evident than boldness in Cleckley's description of psychopathy, but is indicated by traits such as incapacity for love, unresponsiveness in general interpersonal relations, and lack of remorse or shame. Meanness is well measured in the PCL-R, most thoroughly in the affective facet, but also to a lesser extent in the interpersonal facet. Thus, the PCL-R is believed to emphasise meanness more so than boldness (Patrick et al., 2009). Within the PPI-R, meanness is measured with the Coldheartedness scale. Thus, meanness is included within the PPI-R, but receives less content coverage than boldness or disinhibition (Patrick et al., 2009).

As noted above, all three components are not required to demonstrate psychopathy. It is the presence of *either* boldness or meanness alongside disinhibition that produces psychopathy. Both boldness and meanness are hypothesised to result from the same underlying temperamental fearlessness. However, they present as phenotypically distinct(Patrick et al, 2009). This distinct phenotypic presentation is the result of interactions between the underlying fearless temperament and subsequent life experiences (Patrick et al., 2009). Boldness is the more benign phenotype, which Patrick and colleagues describe as the more dominant and common expression of underlying

fearlessness. Meanness is a more malignant response, resulting from a more chaotic and aversive environment, including experiences such as abuse (Patrick et al., 2009). It seems that those working with criminal offenders typically describe a meaner presentation of psychopathy, which may be the more common presentation of psychopathy in criminal samples (e.g., Hare, 1991; McCord & McCord, 1964). It may be that those psychopaths high on meanness and disinhibition are more likely to end up in criminal samples than those high on boldness and disinhibition.

Disinhibition alone may lead to antisocial and criminal behaviours. However, disinhibition alone does not constitute psychopathy (Patrick et al., 2009). Disinhibition appears similar to 'nonspecific behavioural deviance' used to describe some early measures of psychopathy (Lilienfeld & Fowler, 2006). The predominantly disinhibited presentation of psychopathy may be what is included in descriptions of secondary psychopathy, whereby individuals behave in much the same way as primary psychopaths, but without the underlying emotional detachment or fearlessness. Indeed, scales measuring disinhibition, such as the PPI-R Self-centred Impulsivity factor are positively correlated with anxiety, a disposition on which only secondary psychopaths tend to score highly (Lilienfeld & Widows, 2005). In contrast, boldness and meanness would be expected to relate negatively with anxiety given the fearless temperament which is hypothesised to underlie both boldness and meanness. If secondary psychopaths were highly disinhibited, but did not show meanness or boldness, then these individuals would not be considered psychopathic according to the Triarchic Model of Psychopathy. Given the emphasis on criminal behaviour within the PCL-R, it is possible that those individuals scoring highly on disinhibition in the absence of high scores on boldness or meanness may still receive high scores on the PCL-R.

The utility of the Triarchic Model is that it enables a synthesis between previously conflicting models of psychopathy. Describing psychopathy as the presence of disinhibition alongside *either* boldness or meanness enables us to exclude individuals who display disinhibition in the absence of boldness or meanness, decreasing some of the heterogeneity within the psychopathy construct, and potentially eliminating secondary psychopaths from our definition of psychopathy. The separation between 'bold' and 'mean' types of psychopathy may also help us to understand divergent research findings. Some external correlates, such as performance on empirical tasks, may be related specifically to boldness or meanness, and thus present only in some psychopaths. Other correlates may be related to both boldness and meanness, and thus should be seen in all those classified as psychopathic.

In addition to providing a conceptual framework with which to understand and synthesise the various descriptions of psychopathy, Patrick and colleagues' Triarchic Model of Psychopathy has spawned a new measurement tool, a self-report psychopathy questionnaire called the Triarchic Psychopathy Measure (TriPM; Patrick, 2010).This measure provides a ready way to test some of the hypotheses presented in the Triarchic Model of Psychopathy.

2.5.2 Triarchic Psychopathy Measure (TriPM)

The Triarchic Psychopathy Measure (TriPM; Patrick, 2010) was designed to assess equally the domains of boldness, meanness and disinhibition. Items comprising the Boldness scale were selected from a larger set of items seeking to extend and define the PPI-R Fearless Dominance factor (Patrick, 2010). Thus TriPM Boldness and PPI-R Fearless Dominance should be highly related. The Boldness scale includes items designed to measure interpersonal behaviour (persuasiveness, social assurance,

dominance), emotional experience (resiliency, self-assurance, and optimism), and venturesomeness (courage, intrepidness, and tolerance for uncertainty; Patrick, 2010). Items comprising both the Meanness and Disinhibition scales were selected from a larger pool of items comprising an Externalising Spectrum Index (ESI; Krueger, Markon, Patrick, Benning & Kramer, 2007). This original ESI showed an overarching externalising factor, and two subfactors representing callous aggression and addictions (Krueger et al., 2007; Patrick, 2010). Those items selected from the ESI for the TriPM Disinhibition scale were those with the highest and purist loadings on the overarching externalising factor. Disinhibition includes items assessing irresponsibility, problematic impulsivity, theft, alienation, boredom proneness, impatient urgency, and fraud, as well as negative loadings from items measuring dependability and planful control (Patrick, 2010).

Meanness scale items were selected from those loading primarily on the callous aggression subfactor of the ESI, with only secondary loadings on the overarching externalising factor. Meanness includes items measuring relational aggression, destructive aggression, physical aggression, and excitement seeking, as well as negative loadings of empathy and honesty items. Initial evidence showed a moderate correlation of approximately 0.4 between the TriPM Meanness and Disinhibition scales, consistent with the relationship between callous aggression as a distinct subfactor within an overarching externalising or disinhibition factor (Patrick, 2010; Stanley, Wygant, & Sellbom, in press). Boldness showed negligible correlations with both Meanness and Disinhibition (at or below 0.2; Patrick, 2010; Stanley et al., in press).

Initial psychometric evidence suggests good reliability and validity of the TriPM scales (Marion, Sellbom, Salekin, Toomey, Kucharski & Duncan, in press; Patrick, 2010;

Sellbom & Phillips, in press; Stanley et al., in press). Two recent papers have investigated the convergent validity of the TriPM and found promising results, showing that the TriPM relates strongly to, and is predictive of, scores on other measures of psychopathy including the PCL-R, the PPI and the PPI-R (Sellbom & Phillips, in press; Stanley et al., in press). Exploratory factor analysis showed that the TriPM scales, the PPI-R scales, and other measures of psychopathy loaded onto a three factor solution, theoretically similar to the three components of the Triarchic Model (Sellbom & Phillips, in press). As anticipated, Boldness loaded on a factor shared with the scales comprising the PPI-R Fearless Dominance factor, while Disinhibition loaded on a factor shared with three of the four scales comprising the PPI-R Self-centred Impulsivity factor. Meanness loaded on a factor shared with the PPI-R Coldheartedness subscale. Thus, the structure of the TriPM appears consistent with the factor structure of the PPI-R, but the TriPM provides a stronger emphasis on the meanness component than that offered in the PPI-R.

2.6 The Present Study

In the present research, both the TriPM and the short form of the PPI-R were administered to participants. The PPI-R contains limited content coverage of meanness. The inclusion of the TriPM enabled adequate content coverage of all three of the triarchic components. Adequate coverage of the meanness component was important as many previous studies investigating performance on the tasks to be presented in Part Two of this thesis use measures of psychopathy which emphasise meanness, such as the PCL-R. Thus, in order to avoid further confusion resulting from measurements capturing different components of the psychopathy construct, an assessment tool that covered all three of the triarchic components was desirable. As the TriPM is a new

measure which is still developing a psychometric validation base, the PPI-R was also included as a more established and validated measure of psychopathy. The inclusion of both the TriPM and the PPI-R also enabled the comparison of scores on these two measures. These two measures of psychopathy also emphasise the traits within the construct of psychopathy, rather than a global psychopathy score. Therefore, these two measures are useful tools for investigating psychopathy in a trait-based way. In Part Two of this thesis, this trait-based view of psychopathy will be used to investigate the relationship between psychopathic traits and performance on experimental tasks.

The emphasis placed on an absence of anxiety in some conceptualisations of psychopathy was also highlighted in the above review. Measures of anxiety have frequently been used to separate primary and secondary psychopathy subtypes. Components of anxiety are measured within the PPI-R, specifically within the Stress Immunity and Fearlessness scales. In order to ensure that anxiety was adequately assessed in the current study, a specific scale designed to measure trait anxiety was also included: the Trait Anxiety scale of the State Trait Anxiety Inventory (STAI; Spielberger, 1968).

The results presented in Part One of this thesis describe psychopathy in the present sample. Where possible, the scores of the present sample were compared to available norms. Correlations were calculated between scales in order to investigate whether the scales relate to one another in ways consistent with previous research. Finally an exploratory factor analysis (a Principal Components Analysis) was conducted in order to reduce the volume of the questionnaire data into a smaller set of components.

Consistent with the Triarchic Model of Psychopathy, it is hypothesised that the PPI-R Fearless Dominance factor and its component scales will be positively correlated with TriPM Boldness, and that both Fearless Dominance and Boldness will show an inverse relationship with Trait Anxiety. It is hypothesised that the PPI-R Coldheartedness scale will be positively correlated with TriPM Meanness. The PPI-R Self-centred Impulsivity factor and its component scales are expected to correlate positively with TriPM Disinhibition, and consistent with previous research, these scales are expected to show positive correlations with STAI Trait Anxiety.

Consistent with the Triarchic Model of psychopathy, and with previous research using a similar set of scales (Sellbom & Phillips, in press), it is anticipated that the Principal Components Analysis will uncover three components resembling those described within the Triarchic Model: Boldness, Meanness, and Disinhibition. In line with the hypothesised correlations above, the three hypothesised factors are expected to show loadings respectively of (1) the PPI-R Fearless Dominance scales, TriPM Boldness and STAI Trait Anxiety (inversely); (2) PPI-R Coldheartedness and TriPM Meanness; and (3) the PPI-R Self-centred Impulsivity scales and TriPM Disinhibition. Part One presents these results, while Part Two presents the relationship between these psychopathy scores and performance on two experimental tasks: a facial affect recognition task, and a fear conditioning task. Both parts of this thesis utilise the same sample.

Chapter Three: Method

3.1 Participants

Participants in this study were 83 male criminal offenders incarcerated in Rimutaka Prison, New Zealand. One participant was excluded for invalid responding on the questionnaires, and another participant was excluded for invalid performance on the facial affect recognition task to be presented in Part Two, leaving a total sample of 81. Two participants were unable to complete all tasks due to time constraints, however these participants have been retained in analyses where possible, and all completed the questionnaire measures.

The average age of participants in the sample was 37.7 years (SD=11.3, range=18 to 69). One third of the sample (33%, 27 men) were of New Zealand European ethnicity, 42% (34 men) were New Zealand Maori, 12% (10 men) were Pacific Islanders, and 12% (10 men) were from other ethnic groups or their ethnicity was not recorded. The most serious offence for which participants were currently incarcerated was recorded. For 65% of the sample (52 men) this conviction was for a violent offence (16 for aggravated robbery, 10 for murder, 3 for manslaughter, and 23 for other serious assaults). For 19% of the sample (15 men) their most serious current offence was a sexual offence (7 for rape, 7 for unlawful sexual connection, and 1 for indecent assault). Nine offenders (11%) had a drug offence as their most serious current offence. The remaining 4 men (5%) had property or burglary offences as their most serious current offence.

Criminal risk was measured using the RoC*RoI, the New Zealand Department of Corrections actuarial static risk assessment measure for estimating the risk of reconviction leading to re-imprisonment within 5 years after release (Bakker, Riley

&O'Malley, 1999). The mean RoC*RoI for study participants was 0.53 (SD=0.25, range=0.04 to 0.86), representing a 53% likelihood of re-imprisonment within 5 years after release, corresponding to medium risk according to departmental classification criteria. The majority of participants were right-handed (86%, 70 men).

Ethical approval to conduct this research was gained through the Victoria University School of Psychology Human Ethics Committee. Research approval was also gained from the New Zealand Department of Corrections.

3.1.1 Method of recruitment

In order to access potential participants, different units within Rimutaka Prison were approached that had agreed to data collection. Data collection was conducted at a unit if the unit had a suitable room where data collection could take place. Within a unit, custodial staff asked for offenders to volunteer to take part in the research. Each offender who volunteered was then seen individually by the author. The research was explained to each man and he was given the opportunity to ask any questions and to consent or decline to being involved in the project. No additional eligibility criteria were set. Four offenders who were approached individually after originally agreeing to see the researcher subsequently declined; no information is available on these men. In some units, potential participants were 'screened' by prison staff, and men they deemed unsuitable to see were not put forward to the researcher. This screening was based on prison staff's concern for the safety of the researcher. To the author's knowledge, this only occurred for two potential participants.

The method of recruitment in this study was likely not random. It is probable that differences exist between those who volunteered and consented to take part and

those who did not volunteer or declined when approached. Selection bias may have been introduced because staff excluded some potential participants. The selection of specific units based on accessibility and ability to house the research may have biased participant selection. The units where data collection took place tended to be lower security units, typically with a low-medium security classification. The collection of data in lower security units may have restricted participation to those who had adapted better to the prison setting and were able to reduce their security classification.

3.2 Measures

Participants completed three questionnaires, the Psychopathic Personality Inventory – Revised: Short Form, the Triarchic Psychopathy Measure, and the State Trait Anxiety Inventory – Trait Anxiety scale.

3.2.1 Psychopathic Personality Inventory-Revised: Short Form (PPI-R:SF; Lilienfeld & Widows, 2005):

The PPI-R:SF is a 56 item self-report scale for assessing psychopathic traits. It is the abbreviated form of the full Psychopathic Personality Inventory – Revised (PPI-R). Participants are asked to rate how well they think each item describes them on a 4-point Likert scale of 1-True, 2-Mostly True, 3-Mostly False, and 4-False. Of the 56 items, 23 items are reverse scored. Items and scales are scored so that higher scores represent a greater presence of the trait measured by that item or scale.

The PPI-R:SF is comprised of 8 subscales: Machiavellian Egocentricity, Social Influence, Fearlessness, Coldheartedness, Rebellious Nonconformity, Blame Externalisation, Carefree Nonplanfulness, and Stress Immunity (a brief description and example item from each of these scales was provided in Table 2.2). In the short form of the PPI-R, each of these scales contains seven items. Scale scores for each of the 8 scales

are calculated by summing a participant's score on each of the 7 items, producing a scale score between 7 and 28.

Factor analysis on the PPI-R has identified two factors: *PPI-I Fearless Dominance* comprised of the scales Social Influence, Fearlessness, and Stress Immunity; and *PPI-II Self-Centred Impulsivity* comprised of the scales Machiavellian Egocentricity, Rebellious Nonconformity, Blame Externalisation, and Carefree Nonplanfulness (Lilienfeld & Widows, 2005). The Coldheartedness scale does not load on either factor, but is retained as a separate scale and adds to the total PPI-R score (Lilienfeld & Widows, 2005). These factors can be created in the short form of the PPI-R by summing the scores of the scales which comprise the factor, giving a total range of possible scores for PPI-I Fearless Dominance of 21-84, and for PPI-II Self-centred Impulsivity of 28-112. A PPI-R:SF total score can be created by summing all 56 items, giving a total PPI-R:SF score between 56 and 224.

No psychometric data was available on the PPI-R:SF. Psychometric data are available on the PPI-R. These data indicate acceptable internal consistency, with Cronbach's alpha's above 0.7 for all scales and factor scores (Lilienfeld & Widows, 2005). The PPI-R also shows good test-retest reliability, with all scales showing test-retest reliability at or above r=0.82 (Lilienfeld & Widows, 2005). The PPI-R also demonstrates good construct validity, correlating with other conceptually relevant measures of psychopathy and personality (Lilienfeld & Widows, 2005). Time constraints within the prison setting prohibited use of the full PPI-R in the current study.

There are well established norms for the PPI-R among samples of university students and criminal offenders (Lilienfeld & Widows, 2005). These norms enable T-

scores to be assigned to participants based on their scale, factor, and total scores relative to the scores of the normative sample. These T-scores are available for PPI-R, but not PPI-R:SF scores. In order to compare the scores of the current sample to established norms, PPI-R:SF scores were converted to PPI-R scores by multiplying the average item score for each scale by the number of items comprising that PPI-R scale. T-scores from the offender normative sample were then assigned based on these converted PPI-R scores. This conversion was done only for the purpose of comparison between the current sample and available norms. For all subsequent analyses participants' unconverted PPI-R:SF scale scores were used. The authors of the PPI-R recommend using PPI-R scale and factor scores continuously rather than assigning cut-off scores, in line with their dimensional view of psychopathic traits (Lilienfeld & Widows, 2005).

3.2.2 Triarchic Psychopathy Measure (TriPM; Patrick, 2010): The TriPM is a 58 item questionnaire assessing psychopathic traits. Each item is rated on a 4-point Likert scale from 1-True, 2-Somewhat True, 3-Somewhat False, to 4-False. 42 of the 58 items are reverse scored, and higher scores reflect the stronger presence of the trait. The TriPM was created as a measure of the three components theorised to underlie psychopathy in the Triarchic Model of Psychopathy (Patrick et al., 2009). The TriPM includes three subscales: Boldness, Meanness and Disinhibition. Boldness and Meanness are both comprised of 19 items, with total scores ranging from a possible 19 to 76. Disinhibition is comprised of 20 items with a possible score range from 20 to 80. The TriPM manual does not suggest computing a total TriPM score. However, for the purposes of comparison with the total PPI-R:SF score, a total TriPM score was

computed in the current sample, by summing each participant's scores on all 58 items, giving a total score between 58 and 232.

Initial psychometric data on the TriPM indicate acceptable internal consistency for all three scales, with Cronbach's alphas above 0.7 (Stanley et al., in press). The TriPM shows good construct validity, correlating with other conceptually relevant measures of psychopathy and personality (Marion et al., in press; Patrick, 2010;Sellbom & Phillips, in press; Stanley et al., in press).

3.2.3 State Trait Anxiety Inventory (STAI) -Trait Anxiety scale (Spielberger, 1968): The Trait Anxiety scale of the STAI is a 20 item self report questionnaire assessing levels of trait anxiety. Participants are asked to rate each item for how they generally feel, rating each on a 4-point Likert scale from 1-almost never to 4-almost always. Nine of the 20 items are reverse scored. All 20 items are then summed to produce a total STAI-Trait Anxiety score with higher scores indicating higher levels of trait anxiety. The Trait Anxiety scale of the STAI has demonstrated good reliability and validity (Spielberger, 1983). Extensive norms are also available, separated by gender and age group. These norms are for general community samples, not specifically for offender populations.

3.2.4 Missing Data: Where participants omitted questionnaire items, their scale scores were prorated using the average value of their responses to other items on that scale. At most, participants had missing values for three items from any one questionnaire.

3.3 Procedure

Participants were informed about the study and given the opportunity to consent or decline to participate. Those who declined were thanked for their time, and then left.

Those who consented were asked to sign a consent form. Information and consent forms for participants are attached in Appendix 1. After completing the consent process, participants completed the two tasks: a facial affect recognition task and a fear conditioning task. These tasks will be described in Part Two of this thesis. After completing these tasks, participants were asked to complete the three questionnaires described above. The questionnaires measuring psychopathy — the PPI-R:SF and the TriPM — were usually completed first, followed by the STAI, but participants were allowed to complete the questionnaires in any order they wished. The researcher went over the instructions for each questionnaire with the participant, and offered whatever help was necessary for the participant to complete the questionnaire. For some participants this assistance was minimal. However, questionnaires were read out to participants for approximately one third of the sample. In order to avoid influencing participants' responses, questionnaire items were read to the participant, and further information to assist the participant to interpret the questionnaire item was offered where needed, but participants were not guided toward a response.

After completing the questionnaires, participants were orally thanked for their time and given a small amount of confectionary as additional thanks for taking part. Any questions participants had about the research were answered. File information was extracted from Department of Corrections' records for participants following the data collection session. This information included their age, ethnicity, index offence, and RoC*RoI score (a measure of the participant's risk of serious reoffending leading to re-imprisonment over 5 years).

Chapter Four: Results and Discussion

In this section, participants' scores on the questionnaire measures are presented and, where possible, compared to normative data on these measures. A median split of PPI-R total psychopathy scores was conducted for the purposes of assigning individuals to a high and low psychopathy group for the analyses to be presented in Part Two of this thesis. While a dimensional approach to the measurement of psychopathy is preferred, assigning individuals to a low and high psychopathy group enabled closer comparison of the current results to previous research findings. In the current section, the high and low psychopathy groups' scores will be compared across all questionnaire scales. Finally, results from a Principal Components Analysis of the questionnaire scales will be presented.

4.1 Questionnaire Scales

First, means, standard deviations and internal consistency for the full sample on each of the questionnaire scales were calculated. As seen in Table 4.1, internal consistency was acceptable for most questionnaire scales. However, PPI-R Social Influence showed poor internal consistency, while the PPI-R scales Rebellious Nonconformity and Coldheartedness showed questionable internal consistency. These findings suggest that caution is warranted in interpreting relationships using these three scales, as participants do not appear to be responding similarly to items within these scales. The two PPI-R factors and the three TriPM scales showed acceptable internal consistency.

Table 4.1: Raw score means, standard deviations, and internal consistency of the participants' questionnaire scores.

Scale (possible range)	Mean	*SD*	*α*
Psychopathic Personality Inventory – Revised: Short Form			
Machiavellian Egocentricity (7-28)	14.96	4.86	.79
Rebellious Nonconformity (7-28)	14.93	4.45	.65
Blame Externalisation (7-28)	19.05	5.41	.84
Carefree Nonplanfulness (7-28)	13.31	4.16	.71
Social Influence (7-28)	17.63	3.19	.39
Fearlessness (7-28)	18.97	5.79	.78
Stress Immunity (7-28)	19.89	4.40	.72
Coldheartedness (7-28)	13.54	3.85	.67
PPI-I: Fearless Dominance (21-84)	56.51	8.67	.71
PPI-II: Self-centred Impulsivity (21-112)	62.27	12.71	.85
PPI Total Score (56-224)	132.33	16.23	.80
Triarchic Psychopathy Measure			
Boldness (19-76)	51.42	8.15	.75
Meanness (19-76)	36.58	10.63	.89
Disinhibition (20-80)	54.30	11.98	.85
TriPM Total Score (58-232)	142.31	22.01	.88
State Trait Anxiety Inventory			
Trait Scale (20-80)	39.76	9.48	.89

4.1.1 Psychopathic Personality Inventory – Revised: Short Form (PPI-R:SF)

Extensive norms are available on the PPI-R but not the PPI-R:SF. In order to compare the current sample's PPI-R:SF scores with available norms, scores from the PPI-R:SF were converted to full scale PPI-R scores. This conversion was done by taking the average item score (between 1 and 4) for items on each of the 8 scales. This average

item value was then multiplied by the number of items comprising that scale on the full PPI-R. Once full PPI-R scale scores had been generated, these values could be used to convert scale scores to standardised T-scores from the PPI-R manual. Norms for male offenders were used, developed from a standardisation sample of 154 offenders, aged 18 to 57 (Lilienfeld & Widows, 2005). The conversion of PPI-R:SF scores to PPI-R scores was used only for the purposes of comparing the current sample with the normative sample. PPI-R:SF scores are used for all subsequent analyses.

The average PPI-R T-scores for the current sample are presented in Table 4.2. These scores are comparative to the normative sample with a mean score of 50 and a standard deviation of 10. A series of one-sample t-tests were conducted to compare the current sample with the normative sample, and showed that the current sample scored significantly higher than the normative sample on PPI-R total score, $t(80)=4.91$, $p<.001$, and on the PPI-II Self-centred Impulsivity factor, $t(80)=5.94$, $p<.001$. The one-sample t-test for scores on the PPI-I Fearless Dominance factor showed no significant difference between the current sample and the normative sample, $t(80)=1.24$, $p=.22$. The difference between the current sample and the normative sample approached significance on the PPI-R Coldheartedness scale, with the current sample scoring slightly lower, $t(80)=2.08$, $p=.05$.

4.1.2 Triarchic Psychopathy Measure (TriPM)

No official norms exist with which TriPM scores could be compared. However, the mean TriPM scale scores in this sample were similar to values found in previous samples of male offenders (Patrick, personal communication, 10th May 2012; Stanley et al., in press). The mean scores for participants in this sample tended to be higher than the mean scores for previous samples of students (Patrick, personal communication,

10th May 2012). Means, standard deviations, and internal consistency values for the TriPM scales are presented in Table 4.1.

Table 4.2: T-score means and standard deviations for the current sample's converted PPI-R scores.

	T-Score Mean	T-Score *SD*
PPI-I Fearless Dominance	51.77	12.83
PPI-II Self-centred Impulsivity	58.25	12.49
Coldheartedness	47.56	10.56
Total Score	57.31	13.40

4.1.3 State Trait Anxiety Inventory (STAI) – Trait Anxiety scale

Raw scores on the STAI Trait Anxiety scale were converted to T-scores using the STAI-Trait standard score tables. The current sample has an average T-score of 55.02 with a standard deviation of 9.95. Compared to the STAI normative community sample, trait anxiety was significantly higher in the current sample, as indicated by a one-sample t-test, $t(80)=4.57$, $p<.001$. The raw score mean and standard deviation, as well as internal consistency of the scale are reported in Table 4.1. The elevation on trait anxiety within the current sample is interesting given the role of anxiety in differentiating between primary and secondary psychopaths (e.g., Skeem et al., 2007). However, this elevation is relative to a normative community sample and not to a sample of offenders; therefore it is unclear whether the level of trait anxiety in the current sample differs from other offender samples in which psychopathy has been measured. The presentation of psychopathic traits in the current sample was similar to

previous samples of male offenders, and the current findings can therefore be interpreted in line with previous findings.

4.2 Correlations between Scales

Correlations between scale and factor scores were generated to investigate whether scales related to one another in the ways hypothesised by the Triarchic Model and whether these relationships were consistent with previous research. Given the large number of comparisons included here, a control for multiple comparisons is desirable. A Bonferroni correction for multiple comparisons was deemed to be too conservative for the purposes of this data analysis. Therefore, a criterion of $p<.01$ was set for statistical significance. Effect size guidelines of$r\geq.30$ were set for considering a correlation noteworthy. Using recommendations from Cohen (1988), correlations between 0.10 and 0.30 were considered indicative of a weak relationship, correlations from 0.30 to 0.50 were considered indicative of a moderate strength relationship, and correlations above 0.50 were considered indicative of a strong relationship. Correlations indicating a weak relationship were not further considered.

Correlations between the PPI-R:SF scales and factors are presented in Table 4.3. Previous research has indicated that the two factors of the PPI-R, Fearless Dominance and Self-centred Impulsivity, are uncorrelated with one another (Lilienfeld & Widows, 2005). Consistent with previous research, the Fearless Dominance and Self-centred Impulsivity factors of the PPI-R:SF were uncorrelated in the current sample ($r=.08$; $p=.47$). The Coldheartedness scale was also uncorrelated with both PPI-R:SF factors, and all other PPI-R:SF scales. For a full matrix of the intercorrelations between all questionnaire scales, see Appendix 2.

Consistent with previous research, it was hypothesised that within the TriPM Meanness and Disinhibition would be moderately correlated, while neither scale would correlate significantly with Boldness (Patrick, 2010). Consistent with this hypothesis, TriPM Boldness was uncorrelated with both TriPM Meanness (r=.12, p=.29) and TriPM Disinhibition (r=-.06, p=.62) in the current sample. Meanness and Disinhibition correlated strongly and positively with each other (r=.60, p<.001), showing a stronger correlation than was hypothesised.

Table 4.3: Intercorrelations between Psychopathic Personality Inventory-Revised: Short Form factor and scale scores.

	PPI-R:SF			
	PPI-I:F D	PPI-II:SCI	Cold	Total
PPI-I: F D	-	.08	.02	.60**
Social Influence	.50**	.13	.00	.37**
Fearlessness	.78**	.23	-.10	.58**
Stress Immunity	.58**	-.23	.15	.16
PPI-II: SCI	.08	-	-.07	.81**
Machiavellian Egocentricity	.01	.81**	-.03	.63**
Carefree Nonplanfulness	.05	.41**	.21	.40**
Blame Externalisation	-.20	.66**	.24	.35**
Rebellious Nonconformity	.42**	.78**	-.09	.82**
Coldheartedness	.02	-.07	-	.19

PPI-I:FD=Fearless Dominance Factor; PPI-II: SCI= Self-centred Impulsivity Factor; Cold = Coldheartedness Scale.
**p<.001, *p<.01

The correlations between the TriPM scales and the PPI-R:SF scale and factor scores are presented in Table 4.4. As the PPI-R and TriPM both purportedly measure the same construct, it was anticipated that the two scales' total scores would be positively correlated. As anticipated, PPI-R:SF total and TriPM total scores were strongly positively correlated (r=.76, p<.001). The Triarchic Model of Psychopathy, on which the TriPM is based, aligns boldness with the PPI-I Fearless Dominance factor, disinhibition with the PPI-II Self-centred Impulsivity factor, and meanness with the PPI-R Coldheartedness scale (Patrick et al., 2009). These associations have been supported by initial research on the TriPM (Phillips & Sellbom, in press; Stanley et al., in press). Therefore, it was anticipated that the TriPM scales would be positively correlated with the theoretically related PPI-R factors. Consistent with this hypothesis, TriPM Boldness correlated strongly and positively with the PPI-R:SF Fearless Dominance factor (r=.62, p<.001), and was uncorrelated with the PPI-R:SF Self-centred Impulsivity factor (r=.01, p=.91). TriPM Disinhibition was uncorrelated with the PPI-R:SF Fearless Dominance factor (r=.03, p=.77), but was strongly positively correlated with the PPI-R:SF Self-centred Impulsivity factor (r=.70, p<.001).

TriPM Meanness was not significantly correlated with PPI-R:SF Coldheartedness (r=.20, p=.08). This finding was unexpected as theoretically the meanness component of psychopathy is seen as similar to the content of the PPI-R Coldheartedness scale (Patrick et al., 2009). The TriPM Meanness scale is comprised of low empathy items, as well as items measuring physical, relational and destructive aggression, honesty, and excitement seeking. Within the TriPM each of these subcomponents can also be coded. In order to further explore the relationship between PPI-R:SF Coldheartedness and TriPM Meanness, correlations were run between Coldheartedness and the subcomponents of Meanness. The only subcomponent with which Coldheartedness

showed a significant correlation was empathy (r=.30, p<.01), while other Meanness subcomponents measuring aggression, dishonesty and excitement seeking were unrelated to Coldheartedness. Therefore, it appears that TriPM Meanness shares the low empathy component of psychopathy with PPI-R Coldheartedness, but that the other subcomponents of TriPM Meanness are distinct from PPI-R Coldheartedness, at least in the present sample. As noted above, the TriPM Meanness scale correlated more highly with TriPM Disinhibition in the current sample than in previous samples (r=.60 in the current sample compared to r∼.40 in previous samples; Patrick, 2010; Stanley et al., in press).Thus, in the current sample, TriPM Meanness was more closely related to Disinhibition than to Coldheartedness, likely due to the subcomponents of meanness measuring aggression, dishonesty, and excitement seeking, which are conceptually similar to components of disinhibition. These subcomponents are also likely to have produced the strong positive correlation between TriPM Meanness and the PPI-R:SF Self-centred Impulsivity factor (r=.64, p<.001). The correlation between TriPM Meanness and PPI-R:SF Self-centred Impulsivity is much stronger than anticipated given the distinction between these components of psychopathy emphasised in the Triarchic Model. TriPM Meanness was uncorrelated with the PPI-R:SF Fearless Dominance factor (r=.18, p=.12).

When looking at the correlations between the TriPM and the PPI-R:SF scales, TriPM Boldness correlated positively with all three of the PPI-R:SF scales which load on the Fearless Dominance factor (Social Influence r=.30, p<.01; Fearlessness r=.38, p<.001; Stress Immunity r=.50, p<.001). TriPM Disinhibition correlated positively with all scales loading on the PPI-R Self-centred Impulsivity factor (Machiavellian Egocentricity r=.66, p<.001; Rebellious Nonconformity r=.51, p<.001; Carefree

Nonplanfulness r=.33, p<.01; and Blame Externalization r=.39, p<.01). Contrary to expectation, TriPM Meanness showed a similar pattern of correlations to Disinhibition, positively correlating with Machiavellian Egocentricity (r=.67, p<.001), Rebellious Nonconformity (r=.61, p<.001), and Blame Externalization (r=.34, p<.01), but was uncorrelated with Carefree Nonplanfulness (r=.08, p=.49).

Table 4.4: Correlations of Psychopathic Personality Inventory-Revised: Short Form factor and scale scores with Triarchic Psychopathy Measure scale scores, and State Trait Anxiety Inventory – Trait Anxiety scores.

	TriPM				
	Bold	Mean	Disin	Total	STAI-T
PPI-R:SF	.36**	.64**	.58**	.76**	-.05
PPI-I:FD	.62**	.18	.03	.33*	-.45**
Social Influence	.30*	.09	.04	.18	-.18
Fearlessness	.38**	.33*	.24	.44**	-.10
Stress Immunity	.50**	-.16	-.29*	-.05	-.61**
PPI-II:SCI	.01	.64**	.70**	.69**	.28
Machiavellian Egocentricity	-.02	.67**	.66**	.68**	.29*
Carefree Nonplanfulness	-.11	.08	.33*	.18	.19
Blame Externalisation	-.04	.34*	.39**	.36**	.17
Rebellious Nonconformity	.22	.61**	.51**	.65**	.09
Coldheartedness	.07	.20	.04	.15	-.10

Bold= Boldness; Mean = Meanness; Disin =Disinhibition; PPI-I:FD=Fearless Dominance factor; PPI-II: SCI= Self-centred Impulsivity factor.
**p<.001, *p<.01

Previous research indicates that total PPI-R scores are either uncorrelated or weakly positively correlated with STAI Trait Anxiety, while the PPI-R Fearless Dominance factor is inversely related to trait anxiety, and the Self-centred Impulsivity factor is positively correlated with Trait Anxiety (Lilienfeld & Widows, 2005). Consistent with previous research, in the current sample STAI Trait Anxiety was uncorrelated with PPI-R:SF total score (r=-.05, p=.68), but was moderately negatively correlated with the PPI-R:SF Fearless Dominance factor (PPI-I; r=-.45, p<.001). The correlation between the PPI-R:SF Self-centred Impulsivity factor (PPI-II) and STAI Trait Anxiety was small and in the expected direction (r=.28, p=.01).

In order to explore the relationship between individual psychopathy traits and trait anxiety, correlations were run between all eight PPI-R:SF scales and STAI Trait Anxiety. Interestingly, while Trait Anxiety was related to both PPI-R:SF factors, the Trait Anxiety scale was uncorrelated with all individual PPI-R:SF scales except for Stress Immunity, with a strong negative correlation (r=-.61, p<.001). The significant correlation between PPI-R:SF Stress Immunity and STAI Trait Anxiety is theoretically consistent, as the Stress Immunity scale emphasises an absence of anxiety. The non-significant relationship between STAI Trait Anxiety and the PPI-R:SF Fearlessness scale (r=-.10, p=.34) is consistent with a distinction between neurotic anxiety and fearfulness emphasised by some authors (e.g., Lykken, 1995).

The relationship between the TriPM and STAI had not been examined prior to the current study. Given the relationships between the TriPM and PPI-R scales, and the relationship between the PPI-R and STAI Trait Anxiety scale, an inverse relationship between Boldness and STAI Trait Anxiety was hypothesised, along with a positive correlation between Disinhibition and STAI Trait Anxiety. As expected, TriPM Boldness was strongly negatively correlated with Trait Anxiety (r=-.63, p<.001), while

Disinhibition was moderately positively correlated with Trait Anxiety(r=.38, p<.01). Meanness showed a weak positive correlation with Trait Anxiety (r=.29, p<.01). As with the PPI-R:SF Total score, TriPM total score was uncorrelated with Trait Anxiety (r=.07, p=.51).

The correlations described above are largely consistent with the expectations of the Triarchic Model of psychopathy, and with previous research. The exception was that TriPM Meanness showed a stronger relationship with scales measuring disinhibition (TriPM Disinhibition and PPI-R:SF Self-centred Impulsivity) than in previous research. In the current sample, TriPM Meanness was more strongly related to disinhibition than to Coldheartedness.

4.3 PPI-R:SF Median Split

For comparison with the approach taken in the majority of previous research, a dichotomous psychopathy variable was desired for the analyses to be presented in Part Two. Therefore, a median split of PPI-R:SF total scores was used to assign participants to a high or low psychopathy group. The PPI-R:SF total score was used for this median split as the PPI-R provides a well validated global measure of psychopathy, allowing for comparison with previous research which typically utilises global measures of psychopathy. Moreover, creating a PPI-R total score is consistent with the PPI-R manual, whereas the TriPM manual does not suggest creating a total TriPM score. Therefore, total PPI-R:SF scores were considered the most appropriate global indicator of psychopathy with which to split the sample into a high and low psychopathy group.

The low psychopathy group had an average PPI-R:SF Total score of 119.78 (*SD*=10.70), while the high psychopathy group had an average PPI-R:SF total score of 145.18 (*SD*=9.38). An independent samples t-test confirmed that the high and low

psychopathy groups had significantly different PPI-R:SF total scores: $t(79)=11.35$, $p<.001$.

In order to investigate whether the high and low psychopathy groups differed across the range of psychopathy traits, a series of independent samples t-tests were conducted comparing the high and low psychopathy groups on all questionnaire scales. The means and standard deviations for each group, as well as the t-test statistic, are reported in Table 4.5. These findings indicate that while the two groups were constructed using a median split of PPI-R:SF total scores, the two groups do differ on nearly all scales of psychopathic traits. The scales on which the two groups do not differ are those measuring traits of anxiety and empathy. The similarity between the two groups on these traits should be borne in mind when the two groups' performance is compared on the tasks presented in Part Two of this thesis.

The high and low psychopathy groups were also compared on RoC*RoI, a measure of risk of re-imprisonment over 5 years. The difference between the two groups approached significance ($p=.07$), with the high psychopathy group showing a somewhat higher risk of re-imprisonment. A Chi-square analysis was conducted to compare the low and high psychopathy groups on the offence type of the most serious conviction for which participants were currently incarcerated. The two groups did not differ significantly on offence types, $\chi^2(3, N=81)=1.87$, $p=.60$, with similar numbers in each group being currently incarcerated for violent, sexual, drug, and property offence types. When considering their conviction histories, the two groups did not differ significantly on the total number of convictions ($p=.73$), the number of violent convictions ($p=.67$), or the number of sexual convictions ($p=.13$) they had accrued. The low and high psychopathy groups did differ significantly in age, with the high psychopathy group being significantly younger than the low psychopathy group.

Table 4.5: Comparison of high and low PPI:R-SF median split groups on questionnaire variables, risk of re-imprisonment, conviction history variables, and age.

Questionnaire scale	Low PPI Mean (*SD*)	High PPI Mean (*SD*)	T-test *t*-value
Psychopathic Personality Inventory			
Machiavellian Egocentricity	12.31 (4.07)	17.68 (4.06)	5.94**
Social Influence	16.93 (3.23)	18.35 (3.03)	2.05*
Fearlessness	16.69 (5.61)	21.30 (5.05)	3.88**
Coldheartedness	13.17 (3.56)	13.92 (4.14)	0.88
Rebellious Nonconformity	11.91 (2.89)	18.03 (3.55)	8.51**
Blame Externalisation	17.13 (5.48)	21.03 (4.63)	3.46**
Carefree Nonplanfulness	12.02 (3.57)	14.64 (4.35)	2.96**
Stress Immunity	19.61 (5.16)	20.18 (3.50)	0.58 (*df*=70.52)
Factor 1: Fearless Dominance	53.23 (9.28)	59.87 (6.56)	3.71**
Factor 2: Self-Centred Impulsivity	53.38 (9.81)	71.38 (8.02)	9.03**
PPI Total Score	119.78 (10.70)	145.18 (9.38)	11.35**
Triarchic Psychopathy Measure (TriPM)			
Boldness	49.44 (9.06)	53.46 (6.61)	2.28*
Meanness	31.00 (7.47)	42.31 (10.41)	5.63**
Disinhibition	48.50 (12.19)	60.25 (8.38)	5.05**
TriPM Total	128.93 (17.33)	156.01 (17.48)	7.00**
State Trait Anxiety Inventory (STAI)			
Trait Anxiety	39.34 (9.98)	40.19 (9.05)	0.40
Risk of Re-imprisonment			
RoC*RoI	.48 (.26)	.58 (.22)	1.89
Conviction History Variables			
Total No. Convictions	46.37 (43.58)	49.75 (42.72)	0.35
No. Violent Convictions	5.98 (6.32)	5.43 (5.35)	0.42
No. Sexual Convictions	2.46 (6.99)	0.70 (2.31)	1.52 (*df*=48.83)
Age	42.93 (12.06)	32.73 (7.75)	4.54**(*df*=68.46)

*p<.05, **p<.01; *df*=79 for all t-tests, except where stated.

4.4 Factor Analysis

In order to integrate the data from participants' responses across the three questionnaires, a Principal Components Analysis (PCA) was conducted using all questionnaire scale scores as individual items: three TriPM scales, eight PPI-R:SF scales, and the STAI Trait Anxiety scale. It was anticipated that a three-factor solution would provide the best fit to the data, consistent with the Triarchic Model and with previous research showing a three factor solution when TriPM, PPI-R and other psychopathy scales were simultaneously entered into an exploratory factor analysis (Marion et al., in press; Sellbom & Phillips, in press).

Two PPI-R:SF scales, Coldheartedness and Carefree Nonplanfulness, did not load well on the current factor solution and were removed from the analysis. Therefore, the PCA reported here is for the remaining 10 questionnaire scales. Although initially constructed using oblique rotation, the PCA was repeated using an orthogonal rotation (varimax), as the resulting two factors were uncorrelated[1]. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, *KMO*=.72, well above the acceptable limit of 0.50 (Field, 2009). Bartlett's test of sphericity $\chi^2(45)=342.08$, $p<.001$ indicated that correlations between items were sufficiently large for PCA. Two components had eigenvalues over Kaiser's criterion of 1, and in combination explained 58.83% of the variance. The scree plot also indicated that a two component solution best fitted the data. This two-factor solution was contrary to the expected three-factor solution[2]. It was hypothesised that PPI-R Coldheartedness and TriPM Meanness would load together on a third factor. However, Coldheartedness did not load well in the

[1] The two factors were uncorrelated when constructed using either oblique (oblimin; *r*=.01, *p*=.99) or orthogonal (varimax; *r*=-.01, *p*=.95) rotations.
[2] A Confirmatory Factor Analysis was also conducted which showed an equivalent factor structure.

current analysis, while TriPM Meanness loaded strongly on a factor shared with TriPM Disinhibition. The exclusion of PPI-R:SF Coldheartedness from the factor solution may have contributed to the identification of a two rather than three factor solution. Similar to the PPI-R factor structure, Coldheartedness may be best retained as an additional component alongside the two factors.

Table 4.6: Factor loading of each questionnaire scale (loadings below 0.30 suppressed).

Questionnaire Scale	Factor 1 loadings: *Bold Fearlessness*	Factor 2 loadings: *Mean/ Disinhibited*
PPI Machiavellian Egocentricity		.85
TriPM Meanness		.84
TriPM Disinhibition		.81
PPI Rebellious Nonconformity	.35	.77
PPI Blame Externalisation		.52
TriPM Boldness	.87	
STAI Trait Anxiety	-.75	.39
PPI Stress Immunity	.69	-.36
PPI Fearlessness	.54	.41
PPI Social Influence	.44	

Table 4.6 displays the factor loadings after rotation, with factor loadings below 0.30 suppressed. The highest loadings on factor 1 include the scales TriPM Boldness, STAI Trait Anxiety (negative loading), and PPI-R:SF Stress Immunity. These scales

measure emotional stability, including an absence of anxiety and fear. This factor has been labelled "*Bold Fearlessness"*, reflecting its conceptual similarity to both Boldness and the PPI-R Fearless Dominance factor. The scales which load most highly on factor 2 are PPI-R:SF Machiavellian Egocentricity, TriPM Meanness, TriPM Disinhibition, and PPI-R:SF Rebellious Nonconformity. These scales measure antisocial and manipulative components of psychopathy. This factor has been labelled "*Mean/ Disinhibited"*, reflecting the high loadings of both meanness and disinhibition. Unlike previous factor solutions using the PPI-R and TriPM, TriPM Meanness loaded with TriPM Disinhibition, rather than in a distinct factor with PPI-R Coldheartedness.

For each participant, scores were generated on the two factors using the regression method. This method assigns a participant a standardised score for each factor based on that participant's scores on the scales which load on the factor. These scores are also weighted for how strongly each scale loads on the factor. These factor scores for each participant, generated using the regression method, are used in the analyses to be presented in Part Two of this thesis.

While this PCA was conducted for the purposes of data reduction, and not as an exploratory factor analysis, it is worth considering the implications of the current factor structure. The emergence of two uncorrelated factors is consistent with approaches to psychopathy which view the construct as comprised of distinct, uncorrelated components, rather than as a unitary construct (e.g. Lilienfeld & Widows, 2005; Patrick et al., 2007). The current two factor structure is consistent with factor analytic findings on the Psychopathic Personality Inventory (PPI-R; Lilienfeld & Widows, 2005), with the two factors found in the current PCA closely resembling the content of the two factors derived from the PPI-R. The exception is the PPI-R:SF Carefree Nonplanfulness scale,

which usually loads on the PPI-R Self-centred Impulsivity factor, but did not load well on either factor in the current PCA, and was therefore removed from the analysis. Also consistent with previous PPI-R factor analyses, the PPI-R:SF Coldheartedness scale did not load well on either factor.

The highest loadings on the Bold Fearlessness factor include the questionnaire scales measuring lack of anxiety and fear, self-confidence and social-assurance, resilience, dominance, and eagerness to engage in risks. Thus, the content of the current Bold Fearlessness factor is highly consistent with the construct of boldness outlined in the Triarchic Model of Psychopathy (Patrick, et al., 2009). Moreover, in their description of the Triarchic Model, Patrick and colleagues align the trait component of boldness with the PPI-R Fearless Dominance factor (Patrick et al., 2009), consistent with the findings of the current research. This factor is also consistent with the 'Boldness' factor identified in research conducting exploratory factor analyses using the TriPM, PPI-R and other psychopathy scales, where TriPM Boldness and the PPI-R scales Stress Immunity, Social Influence and Fearlessness loaded together (Marion et al., in press; Sellbom & Phillips, in press). The construct of boldness appears to be well covered by the questionnaires in the current research, and scores on the Bold Fearlessness factor are believed to be a good indicator of this component of psychopathy.

The highest loadings on the Mean/ Disinhibited factor include the questionnaire scales measuring impulsivity, irresponsibility, boredom proneness, aggression, and a willingness to lie, manipulate and bend the rules. The Mean/ Disinhibited factor resembles the PPI-R Self-centred Impulsivity factor, with three of the four scales which load on Self-centred Impulsivity loading on the current Mean/ Disinhibited factor. The fourth scale from the Self-centred Impulsivity factor, which did not load onto either

factor in the current PCA, was Carefree Nonplanfulness. The Carefree Nonplanfulness scale measures a casual disregard toward the future (Lilienfeld & Widows, 2005), and seems to show conceptual similarity with some components of disinhibition, such as a lack of dependability and planful control. Therefore, it was expected than PPI-R Carefree Nonplanfulness scale would load with Disinhibition and the other three scales comprising the PPI-R Self-centred Impulsivity factor. It remains unclear why Carefree Nonplanfulness did not load well on the current PCA factor structure.

Loadings on the current Mean/ Disinhibited factor supported the association between disinhibition and the PPI-R Self-centred Impulsivity factor hypothesised in the Triarchic Model (Patrick et al., 2009). However, counter to hypotheses, TriPM Meanness also loaded highly on this factor. This finding is inconsistent with previous exploratory factor analyses using the TriPM, PPI-R and other psychopathy measures, which found distinct Meanness and Disinhibition factors, with Meanness loading on a shared factor with PPI-R Coldheartedness(Marion et al., in press; Sellbom & Phillips, in press). Interestingly, in both of these previous factor solutions, PPI-R Machiavellian Egocentricity loaded on both the meanness and disinhibition factors, but showed a higher loading on meanness (Marion et al., in press; Sellbom & Phillips, in press). In the current PCA, Machiavellian Egocentricity showed the highest loading of all scales on the Mean/ Disinhibited factor. PPI-R Machiavellian Egocentricity measures a ruthless willingness to manipulate and take advantage of others (Lilienfeld & Widows, 2005). The strong loading of the Machiavellian Egocentricity scale, as well as the other scale loadings on the current Mean/ Disinhibited factor, indicate that this factor is characterised by aggressive disinhibition, and appears consistent with the Triarchic Model conceptualisation of both disinhibition and meanness.

The loading of TriPM Meanness and Disinhibition on the same factor is consistent with the higher correlation found between the two scales in the current sample than in previous samples. The loading of these two scales on a shared factor is also consistent with the origins of these two scales as part of a broader externalising spectrum inventory, as described in Chapter One (Krueger et al., 2007). TriPM Disinhibition items were selected from those items most strongly related to the overarching externalising factor, while TriPM Meanness items were derived from those items loading most highly with a subordinate 'callous aggression' factor (Patrick, 2010). Perhaps, in the current study, callous aggression is not a distinct subfactor from the broader externalising spectrum, with both meanness and disinhibition components combining into a broader aggressive disinhibition factor.

However, Patrick and colleagues viewed meanness and disinhibition as distinct components, counter to the current factor structure. Patrick and colleagues suggest that meanness is the product of a fearless temperament in combination with adverse developmental experiences, such as abuse (Patrick et al., 2009). It is easy to see how an individual could develop traits of aggressive disinhibition (i.e., high scores on the current Mean/ Disinhibited factor) in response to these adverse life events, perhaps even in the absence of an underlying fearless temperament. Thus, it could be that boldness is driven by an underlying fearlessness distinct from the aetiology of meanness and disinhibition, while meanness and disinhibition are related outcomes of adverse developmental experiences, at least within criminal samples where meanness and disinhibition traits may be most likely to co-occur.

The Coldheartedness scale's failure to load on the PCA factor solution indicates that low empathy continues to present as a distinct component of psychopathy from the

Bold Fearlessness and Mean/ Disinhibited components, consistent with the nonsignificant correlations between PPI-R Coldheartedness and all other scales. In the present sample it appears that it is specifically the low empathy component of psychopathy which is distinct, and not meanness more broadly, with meanness traits such as aggression and dishonesty likely accounting for the strong relationship observed between TriPM Meanness and Disinhibition. PPI-R Coldheartedness appears to be the best index available in the current study of low empathy. Therefore, while the PPI-R Coldheartedness scale did not load on either factor in the current PCA, it remains an important component to consider in addition to the two factors, in much the same way as Coldheartedness is retained alongside the two PPI-R factors in the PPI-R factor solution. Specifically, Coldheartedness may be important to understanding the relationship between psychopathy and performance on the facial affect recognition task described in Part Two as it is the low empathy component of psychopathy which is most theoretically relevant to performance on this task.

Part Two: What deficits characterise psychopathy?

Part Two of this thesis investigates the relationship between psychopathy and two important tasks on which theory suggests psychopaths are impaired: facial affect recognition and fear conditioning. The measurement of psychopathy described in Part One will be used to investigate performance on these two tasks. The current research seeks to further explore whether deficits on these tasks are related to psychopathy, and specifically which psychopathic traits are related to performance on the two tasks.

Chapter Five: Etiological theories of psychopathy

The first section of this chapter introduces etiological theories of psychopathy relevant to the current investigation. The second section reviews the research testing these theories.

5.1 Low Fear Theories of Psychopathy

Several theories emphasise a lack of fearfulness as the crucial mechanism in the development of psychopathy. Lykken (1957, 1995) is credited with the original low fear account of psychopathy. The Behavioural Inhibition System/ Behavioural Activation System (BIS/BAS) account of psychopathy is a popular variation of the original low fear account. Both Lykken's theory and the BIS/BAS account of psychopathy will be described below. Variants of these two low fear theories exist, but provide much the same argument as to the psychopaths' fundamental deficit.

5.1.1 Lykken's Low Fear Hypothesis (1957, 1995)

Lykken described the development of psychopathy as the result of innate fearlessness. Lykken uses the term 'fear quotient' to refer to an individual's temperamental fearfulness. In this model, fear is described as "an aversive state that elicits arousal and escape behaviour" (Lykken, 1995, p. 135), with the implication that the fear quotient represents either how aversive the experience of the fear reaction is, or how easily the fear reaction is activated for a given individual. As humans, we possess an innate capacity to experience fear. However, the fear quotient indicates that the extent of this innate capacity is not uniform across individuals. A fear reaction to some stimuli is innate, such as a loud and unexpected noise, while fear of other stimuli is learned via conditioning processes. In normal development, when an act is punished or results in an aversive outcome, an association is learnt between the act and the aversive outcome. Therefore, when an impulse to commit the act occurs in future, this impulse will elicit fear due to its previous pairing with the aversive outcome (Lykken, 1995). As a result of that fear, an individual will typically avoid committing the act. This avoidance behaviour results in reduced fear, and therefore further reinforces the avoidance of the forbidden act (Lykken, 1995).

Lykken (1957) proposed that psychopaths have a low fear quotient, meaning that they have a markedly attenuated experience of fear. It is worth noting that this is an attenuated experience of fear, and not a complete absence of fear. Thus, psychopaths may be able to show a fear response to some stimuli, but this response is expected to be smaller than that of non-psychopaths. Moreover, this deficit is specific to fear, rather than an attenuated experience of emotion more generally. In childhood, the low fear quotient can be observed as temperamental fearlessness and an inability to learn from

punishment (Lykken, 1995). Lykken suggests that when the impulse to commit an act which has previously been punished occurs, individuals with a low fear quotient will have a weaker fear response, and therefore be less likely avoid the punished act. Thus, not only is the psychopath theorised to be less responsive to fearful stimuli, but also less able to learn aversive conditioned associations. This deficit renders punishment and intimidation as largely ineffective, meaning that socialisation processes which rely on learning through punishment are ineffective at socialising the individual with a low fear quotient against antisocial behaviour (Lykken, 1995). As the psychopath cannot be adequately socialised, they do not develop a conscience, predisposing them toward impulsive and antisocial behaviours (Lykken, 1995). Because of their innate fearlessness, the psychopath remains indifferent to the probability of punishment for their actions throughout their life.

The low fear quotient creates what Lykken refers to as a 'talent for psychopathy', that is, a predisposition toward developing psychopathy. Lykken (1995) did not view temperamental fearlessness as inevitably resulting in psychopathy. However, it renders children difficult to socialise making this outcome of high likelihood, as typical parenting practices that rely on the use of punishment to prevent antisocial behaviour and develop conscience will be ineffective with these relatively fearless children (Lykken, 1995).

Fearlessness versus low anxiety: Lykken (1957, 1995) draws an important distinction between 'neurotic anxiety' and 'manifest anxiety'. Individuals high on neurotic anxiety are nervous, self-critical and dissatisfied. Most questionnaire measures of anxiety measure neurotic anxiety, such as the Taylor Anxiety Scale (Taylor, 1953), the Welsh Anxiety Scale (Welsh, 1952), and the Spielberger Anxiety Scales (Spielberger,

1968). Neurotic anxiety resembles modern conceptualisations of trait anxiety, as measured by the State Trait Anxiety Inventory – Trait Anxiety scale included in the present study's measurement of psychopathy. Therefore, neurotic anxiety will be referred to as trait anxiety for the remainder of this thesis.

Manifest anxiety refers to fearfulness and harm avoidance. Measures of manifest anxiety appear to be relatively unrelated to measures of trait anxiety (Lykken, 1995). Lykken emphasises that it is manifest anxiety which differentiates primary and secondary psychopaths. That is, in Lykken's view, low manifest anxiety in concert with high scores on the key Cleckleyan personality traits of psychopathy differentiate 'true' psychopathy (i.e., primary psychopathy) from other types of antisocial personalities (Lykken, 1995). Manifest anxiety is considered to be synonymous with fearfulness. The PPI-R:SF fearlessness scale is the best measure of (an absence of) fearfulness in the current study. For ease of differentiation between trait anxiety and manifest anxiety, manifest anxiety will be referred to as fearfulness for the remainder of this thesis.

Differences in trait anxiety have been heavily emphasised in recent work differentiating between primary and secondary psychopaths (e.g., Arnett, Smith & Newman, 1997; Skeem et al., 2007), with fearfulness receiving much less attention, counter to Lykken's theory. More problematically, the two constructs are at times conflated and treated as synonymous, though research suggests that trait anxiety and fearfulness are indeed distinct (see Depue & Lenzenweger, 2001). This distinction has important implications for understanding psychopathy, with research which conflates anxiety and fearfulness further confusing our understanding of psychopathy. Drawing this distinction between trait anxiety and fearfulness will help to clarify our understanding of psychopaths' experience of fear and anxiety, and the relationship

between these traits and other variables. However, psychopathy may involve a combination of low fear and low anxiety, with the possibility that psychopaths show an inherent low fearfulness, but that this absence of fearfulness makes anxiety a less likely experience(Fowles & Dindo, 2006). Thus, both anxiety and fearfulness may be relevant in psychopathy, and both may be related to psychopaths' difficulty in learning fear associations.

5.1.2 Behavioural inhibition and behavioural activation systems

Another influential theory of reduced fearfulness in psychopathy involves the behavioural inhibition and behavioural activation systems. The behavioural inhibition system (BIS) is the biological system that determines sensitivity to punishment (Gray, 1970). The behavioural activation system (BAS) is the corresponding system for reward sensitivity, determining how heavily influenced an individual's behaviour will be by the potential for reward (Fowles, 1987). In this model there are two potential pathways to psychopathy; first, an underactive BIS system, whereby individuals have a reduced responsiveness to punishment may produce psychopathy. The underactive BIS route to psychopathy is consistent with Lykken's low fear hypothesis (Lykken, 1995). The second pathway is an overactive BAS whereby individuals are so strongly driven by reward that they engage in behaviours with high potential for reward but also high potential for punishment. The high potential for punishment would outweigh the potential for reward in those with a normally functioning BAS, but in those with an overactive BAS the incentive of the reward is so strong that it outweighs the potential for punishment. Lykken (1995) suggests that the overactive BAS produces secondary, high anxious psychopaths, while the underactive BIS produces primary, low anxious psychopaths. Secondary psychopaths are susceptible to high levels of anxiety, and

generate stress in their own lives by their actions in pursuit of reward (Fowles, 1987). Unlike primary psychopaths, these secondary psychopaths would not be expected to show reduced physiological responses in anticipation of fear (Lykken, 1995). An alternative suggestion is that psychopathy is the result of a joint abnormality in both of these systems, with an overactive reward system (BAS) and an underactive punishment system (BIS), resulting in individuals who are strongly driven toward reward, and largely unaffected by the potential for punishment (Fowles & Dindo, 2006).

As noted above, low fear theories of psychopathy hypothesise that psychopaths will show reduced responsiveness to fear-inducing stimuli, and will have difficulty learning conditioned fear associations. Therefore, fear conditioning paradigms provide a useful test of the low fear theories. The present research uses a fear conditioning task to test low fear theories of psychopathy. The extant research evidence on psychopathy and fear conditioning is reviewed later in this chapter.

5.2 The Violence Inhibition Mechanism

An alternative etiological theory, the Violence Inhibition Mechanism (VIM), views an inability to respond to others' distress as the crucial mechanism in the development of psychopathy (Blair, 1995; Blair, Mitchell & Blair, 2005). This theory describes a mechanism whereby normally developing individuals are deterred from committing antisocial acts such as violence by witnessing others' distress to their antisocial actions. Witnessing another individual's distress — displayed in cues such as facial expressions — activates what is termed the *Violence Inhibition Mechanism* (VIM). This mechanism relies on the individual finding the experience of someone else's distress personally aversive. VIM activation involves increased autonomic activity, increased attention, and activation of the threat response system (Blair et al., 2005). It is implied in the

description of this system that the activation of the VIM is experienced as aversive, and therefore we are motivated to avoid the activation of this system. As a result, we are likely to act in ways that avoid or minimise others' distress. Over time we learn that moral transgressions, such as hitting someone, result in that person's distress and thereby our own aversive physiological reaction to that distress (Blair et al., 2005). Like all learning, we can learn these associations through personal experience, or vicariously by witnessing others engage in these actions. Thus, the VIM acts as an agent of moral socialisation in that it prevents us from engaging in socially inappropriate actions which cause others' distress[3]. In psychopathy, the VIM is hypothesised not to function properly, preventing the psychopath from experiencing an aversive response to others' distress. Thus, moral socialisation driven by the VIM does not occur in psychopathy.

These deficits in responding to others' distress imply problems in empathic responding; low empathy features in most, if not all, descriptions of psychopathy. Broadly, empathy is "an affective response more appropriate to someone else's situation than to one's own" (Hoffman, 1987, p. 48). Thus, the ability to show empathy requires that a person is able to both accurately perceive another individual's emotional state, and is able to respond accordingly. Although it is often believed that psychopaths intentionally disregard the feelings of others, it may be that the lack of empathy characteristic of psychopathy results from an inability to accurately perceive others' emotional responses. Therefore it may be expected that psychopaths would have difficulty accurately identifying others' emotional expressions.

[3] Blair developed this model to account for psychopaths' undersocialised behaviour. This lack of socialisation leads to aggressive and violent behaviours. However, an impaired VIM is hypothesised to lead to a pattern of 'antisocial' behaviour and behaviour that is unaffected by others' distress. Thus, while Blair terms this mechanism the **Violence** Inhibition Mechanism, if functional this mechanism does more than just inhibit violence; it likely deters a range of other undesirable behaviours.

Consistent with the VIM theory, there is evidence showing psychopaths to be less physiologically reactive than non-psychopaths when viewing images of others' distress (e.g. Blair, Jones, Clark & Smith, 1997), and when witnessing others receiving electric shocks (e.g., Aniskiewicz, 1979; House & Milligan, 1976; however see also Sutker, 1970). A larger body of research has investigated the relationship between psychopathy and the ability to recognise others' facial expressions of emotion. Blair and colleagues (2005) cite studies showing impaired recognition of fearful and sad facial expressions as evidence for an impairment in the functioning of the VIM. The suggestion seems to be that if psychopaths do not experience VIM activation in response to witnessing facial expressions of distress, these expressions will be difficult for them to identify. However, while physiological responses may enhance one's ability to accurately label others' emotions, it seems unlikely that these physiological responses would be the sole resource used in identifying others' emotions (e.g., Halberstadt, Winkielman, Niedenthal & Dalle, 2009). It could also be argued that without an intact ability to recognise others' emotions, the VIM could not function. That is, if we were not able to accurately recognise others' expressions of distress, how would we be able to find these specific expressions aversive? Therefore, facial affect recognition may be important to the Violence Inhibition Mechanism account of psychopathy in two ways: an impairment in facial affect recognition may prevent VIM functioning, or impaired VIM functioning may create difficulties in facial affect recognition. The present research investigates facial affect recognition in psychopathy. As it has currently been articulated, the VIM theory hypothesises that psychopaths will be impaired at recognising facial expressions of distress as a result of their impairment in VIM functioning.

The role of anxiety in psychopathy was highlighted above regarding low fear theories of psychopathy. Importantly, trait anxiety has also been linked to affect recognition, with individuals scoring highly on measures of trait anxiety showing better accuracy at recognising fearful facial expressions than those participants with low trait anxiety scores (Surcinelli, Codispoti, Montebarocci, Rossi & Baldaro, 2006; however see also Cooper, Rowe & Penton-Voak, 2008). Therefore it may be expected that levels of trait anxiety would influence affect recognition ability within psychopathy. No research to date has investigated the relationship between anxiety and affect recognition with psychopathic samples.

5.3 The Integrated Emotion System

The Integrated Emotion System (IES) theory integrates the low fear and VIM theories described above into one etiological theory of psychopathy. The IES makes the same predictions regarding task deficits as both the VIM and low fear theories (Blair et al., 2005). The IES theory describes the amygdala as the neural mechanism underlying both sets of impairments (Blair et al., 2005). Indeed, there is evidence that the amygdala is implicated in affect recognition, with research finding increased activation of the amygdala during facial affect recognition (Baird et al., 1999), and findings that patients with bilateral amygdala damage show impaired affect recognition, particularly of fearful facial expressions (Adolphs, Tranel, Damasio & Damasio, 1994, 1995; Broks et al., 1998;Calder et al., 1996). According to the IES theory, their amygdala impairment renders the psychopath unable to develop 'affect representations' of others' distress, producing the deficits associated with the VIM. It remains somewhat unclear whether these 'affect representations' describe the individual's own affective response (i.e., aversive VIM activation), or the representation of others' affective states (i.e.,

recognising their distress). Therefore, psychopaths' impairment could take one of two forms: psychopaths may have difficulty recognising another individual's distress, and therefore fail to show a VIM autonomic reaction; or alternatively, psychopaths may be able to recognise the other's distress, but fail to show a VIM-related increase in autonomic response. Both routes would implicate an impaired amygdala, and would cause a disruption in the VIM system, meaning that psychopaths are not deterred from engaging in behaviours which cause others' distress (Blair et al., 2005).

The amygdala also plays a key role in the experience of fear and the learning of aversive conditioned associations (e.g., Bechara et al., 1995; Buchel, Morris, Dolan & Friston, 1998; LaBar, Gatenby, Gore, LeDoux & Phelps, 1998). Thus, the IES theory suggests that psychopaths' amygdala deficit also produces an attenuated experience of fear, and difficulty learning to anticipate aversive outcomes, as suggested by the low fear theories of psychopathy (Blair et al., 2005). Therefore, psychopaths' socialisation may be disrupted not only by their absence of 'affect representations' of others' distress, but also by their difficulty in learning the association between an affect representation and an antisocial action.

The IES theory suggests that low fearfulness and reduced responsiveness to others' distress result from the same underlying mechanism (i.e., a dysfunctional amygdala). Therefore, deficits in these two processes should be related, and psychopaths should be impaired on both tasks included in the present research: fear conditioning and affect recognition. Only one study has simultaneously assessed affect recognition and fear conditioning, using a sample of female adolescents with conduct disorder; however the relationship between performance on the two tasks was not investigated (Fairchild, Stobbe, van Goozen, Calder & Goodyer, 2010). In this sample,

sadness recognition was related to psychopathy, but fear conditioning was not. No other published research to date has investigated the relationship between affect recognition and fear conditioning, either in psychopathic or other samples. Research has investigated these two tasks individually in relation to psychopathy; these two bodies of research are reviewed below.

5.4 Facial affect recognition and psychopathy

In the typical facial affect recognition task, participants are presented with an image of a face showing an emotional expression. After viewing the face they are asked to select which emotion they think the person was feeling from a list of emotions. The commonly assessed emotions include happiness, sadness, anger, fear, disgust, and surprise. These six emotions are those identified as 'basic' human emotions: a unique facial expression and physiology is associated with each (Ekman, 1992). When a smaller number of emotions are desired, it is common for researchers to include only faces showing happiness, sadness, anger and fear.

Two recent meta-analyses have investigated affect recognition findings among psychopathic and criminal groups and found inconsistent results. Wilson, Juodis and Porter (2011) found that those defined as psychopathic across studies showed a poorer ability to recognise emotions than non-psychopaths. Small effect sizes were observed for the processing of all emotional expressions, with effect sizes largest for the recognition of sad and fearful expressions (Wilson et al., 2011). Consistent with the VIM theory, this finding indicates that psychopaths were most impaired at recognising distress emotions in others' expressions, relative to non-psychopathic controls. The second meta-analysis demonstrated that antisocial populations were poorer at recognising fearful and sad expressions than comparison participants, but found no

moderating effect of psychopathy (Marsh & Blair, 2008). These results indicate that deficits in the recognition of others' distress may be related to antisocial behaviour generally, but not specifically related to the core personality traits of psychopathy (Marsh & Blair, 2008). However, the studies included in Marsh and Blair's meta-analysis define antisociality in a number of ways, including the use of measures of psychopathy. Thus, the role of antisociality and psychopathy is somewhat conflated in this meta-analysis.

Where studies have investigated the relationship between affect recognition and traits of psychopathy, correlations tend to be highest between affect recognition and the antisocial facet or antisocial/lifestyle factor of the PCL-R (Dolan & Fullam, 2006; Hastings et al., 2008). These findings further support a relationship between antisociality and affect recognition, rather than between psychopathy and affect recognition. However, Iria and Barbosa (2009) clearly differentiated between high and low psychopathy groups in both offender and community samples, and found an effect of psychopathy on fear recognition, but no effect of criminality. Similarly, Mitchell and colleagues (2006) showed that criminal psychopaths were poorer at recognising fearful expressions relative to both low-psychopathy offender and community comparison groups. These studies suggest a fear recognition deficit related to psychopathy, rather than a deficit related to criminality or antisociality.

Theoretically, we would expect psychopaths' deficits in affect recognition to be related to those traits associated with low empathy and detachment from others rather than the antisocial traits. In relation to the measurement of psychopathy described in Part One, PPI-R:SF Coldheartedness would be expected to show the strongest relationship with affect recognition in the current study, as it is the best measure of low

empathy in the present research. Given that very few studies have investigated the relationship between affect recognition and traits of psychopathy, a central goal of this thesis is to move beyond the investigation of psychopathy as a unitary whole and utilise a trait-based approach to measuring psychopathy.

As noted above, there is inconsistency among the affect recognition findings. A closer look at the individual studies investigating the relationship between psychopathy and affect recognition indicates that differences in methodology play an important role in the inconsistency among affect recognition findings. These studies are summarised in Table 5.1.

Task Differences: One key methodological difference between studies investigating affect recognition in psychopathy is the use of full intensity or morphed facial expressions. The typical affect recognition task presents photographs showing examples of prototypical facial expressions. These photographs are of models posing an emotional expression, and may not be naturalistic, or reflect the ambiguity with which emotions are often expressed in real life. Recognition of these prototypical expressions may therefore be too easy for tasks using them to detect subtle differences between groups of participants (Hastings et al., 2008). An alternative approach has been to create more ambiguous expressions using morphed faces. Using this morphing technique, images can be created that correspond to different levels of emotional intensity, such as a 70% angry expression. For an example see Figure 6.1.

Table 5.1: Comparisons of sample and method characteristics across facial affect recognition studies with adult participants

	Sample Characteristics				Task Set Up		Results
Study	Participants (psychopathic)	Psychopathy measure	Psychopathy Criterion	Comparison Criterion	Face Intensity	Stimulus presentation	Psychopathy-related errors
Blair & Cipolotti, 2000	Offenders, *N*=10 (5)	PCL-R	≥30	≤20	Morph (0-100)	Animated	Fear
Blair et al., 2004	Offenders, *N*=38 (19)	PCL-R	≥30	≤20	Morph (0-100)	Animated	Fear
Book et al., 2007	Offenders, *N*=59; Community controls *N*=60	PCL-SV (offenders) LSRP (all)	Continuous		Full	Static	Nil
Del Gaizo & Falkenbach, 2008	Students, *N*=175	PPI	Continuous		High & Low intensity	Static	Fear (less errors)
Dolan & Fullam, 2006	DP Offenders, *N*=49 (22); Community controls *N*=49	PCL-SV	≥17	<17	Morph (25, 50, 75, 100)	Static	Sad
Glass & Newman, 2006	Offenders, *N*=111 (50)	PCL-R	≥30	≤20	Full	Static	Nil
Gordon, Baird & End, 2004	Students, *N*=20	PPI	Factor 1 Median Split (high)	Factor 1 Median Split (low)	Full	Static	Nil

Hastings et al., 2008	Offenders, *N*=145	PCL-SV	Continuous		Morph (60, 100)	Static	Sad, Happy (correlations) Nil (Regression)
Iria& Barbosa, 2009	Offenders, *N*=33 (22); community controls, *N*=29 (16)	PCL-SV	>18	<12	Full	Static	Fear
Kosson et al., 2002	Offenders, *N*=37 (34)	PCL-R	≥30	≤20	Full	Static	Disgust
Mitchell et al., 2006	Offenders, *N*=10 (5)	PCL-R	≥30	≤20	Morph (0-100)	Animated	Fear
Montagne et al., 2005	Students, *N*=32 (16)	BIS/BAS	high BAS/ low BIS	Low BAS/ high BIS	Morph (0-100)	Animated	Fear

PPI = Psychopathic Personality Inventory; Factor 1 = Fearless Dominance Factor of the PPI; BIS/BAS = Behavioural Inhibition System/ Behavioural Activation System Scale; DP = Meet ICD-10 dissocial personality criteria; LSRP=Levenson Self Report Psychopathy Scale.

Participants can be shown these morphed images as *static* images of less intense emotional expressions, and asked to identify the emotion. Alternatively, these morphed expressions can be used in an *animated morph*. In this form of the morph task, participants see a series of morphed images, beginning with a neutral expression which morphs into a prototypical emotional expression through a number of phases of increasing emotional intensity (Blair et al., 2004). Participants receive a recognition score based on how early on in the morph sequence they were able to accurately recognise the displayed emotion, with recognition at weaker intensities indicating better affect recognition ability.

The Violence Inhibition Mechanism theorises that psychopaths should be impaired specifically at the recognition of distress emotions: fear and sadness, and not globally impaired at affect recognition (Blair et al., 2005). Indeed, no studies have found evidence of global affect recognition deficits among psychopaths. However, the research is inconsistent as to whether psychopaths are impaired at recognising any emotions, and if they are impaired, which emotions they are impaired at recognising.

When prototypical emotional expressions are used with psychopathic samples, the majority of studies find no evidence for deficits in emotion recognition (Book et al.,2007; Glass & Newman, 2006; Gordon et al., 2004). However, one study found evidence for impaired recognition of fearful expressions (Iria& Barbosa, 2009), while another found evidence of impaired disgust recognition (Kosson et al., 2002). Although deficits in the recognition of fear are consistent with the VIM theory, disgust recognition deficits are not hypothesised. Deficits in the recognition of disgust have not been replicated.

The studies that find a deficit in fear recognition among psychopathic offenders almost exclusively use the animated morph methodology. Where the animated morph task is used, those with high psychopathy scores consistently require significantly more morph phases before recognising fearful expressions, and continue to make recognition errors of fearful faces at the 100% emotional intensity (Blair et al., 2004; Mitchell et al., 2004; Montagne et al., 2005).

In contrast, the studies using static morphs provide no evidence for a psychopathy-related deficit in fear recognition (Del Gaizo & Falkenbach, 2008; Dollan & Fullam, 2006; Hastings et al., 2008), and limited evidence of a psychopathy-related deficit in the recognition of sadness (Dolan & Fullam, 2006; Hastings et al., 2008). One study found a relationship between psychopathy and *better* recognition of fearful expressions (Del Gaizo & Falkenbach, 2008); this finding has not been replicated. Different results across task methodologies are evident despite a relatively consistent approach to the measurement of psychopathy within offender samples, relying on the Psychopathy Checklist-Revised (PCL-R) or the Psychopathy Checklist: Screening Version (PCL:SV).

Were it simply that the prototypical expressions were too easily recognised to identify differences between psychopaths and non-psychopaths, we would expect both static and animated morph tasks to uncover psychopathy-related differences. The exclusivity of fear recognition deficits to the animated morph methodology indicates that there may be something specific to this task methodology which produces problems in the recognition of fear, rather than a robust psychopathy-related fear recognition deficit.

In the animated morph paradigm, participants are instructed to label the emotion as soon as they are able to discern what emotion they think is being shown. The morph continues to evolve and participants are able to alter their initial response as the facial expression becomes less ambiguous. It may be that the reason high psychopathy scorers perform poorly at fear recognition in this paradigm is that they choose an inaccurate expression at earlier, more ambiguous intensities and fail to modify that response. This failure to alter their response would be consistent with Newman's response modulation hypothesis which argues that once a dominant response is established, psychopaths are poor at responding to peripheral information indicating that a change in response is required (Hiatt & Newman, 2006). It is possible then, that the reason this deficit is evident for fearful expressions is that they tend to be most difficult to recognise for all participants. As a result, all individuals may be more likely to choose inaccurately for fearful expressions at lower intensities, but non-psychopaths may be better at altering their responses as the expression becomes less ambiguous. Thus, it may be a response modulation deficit rather than a fear recognition deficit that results in the observed relationship between psychopathy and poorer fear recognition using the animated morph paradigm.

Errors: Also worth considering are the errors made by participants. The VIM theory predicts a deficit in the recognition of sadness and fear, as psychopaths are unresponsive to others' distress. Therefore, we would expect that psychopaths would mislabel fearful and sad expressions as other, non-distress emotions. Only one study reports participants' specific errors, providing the errors participants made in labelling the 100% intensity expressions in the animated morph paradigm (Blair et al., 2004).

The type of errors made was similar between psychopaths and non-psychopaths, with both groups most commonly misidentifying fearful expressions as surprised. Psychopaths made a greater number of distress recognition errors, but these errors were not different in kind to the errors made by non-psychopaths. Psychopaths also showed a tendency toward over-identifying fearful expressions, in particular labelling surprised and angry faces as fearful. This finding appears inconsistent with the VIM model which suggests that psychopaths are insensitive to fear. However, both failing to recognise fear in fearful faces and recognising fear in non-fearful faces indicate poor discrimination of this emotion.

Summary: The findings reviewed above provide an inconsistent picture of psychopaths' ability to recognise others' emotional expressions. The strongest evidence of affect recognition deficits comes from studies using the animated morph methodology which consistently identify deficits in psychopaths' ability to recognise fearful expressions. As outlined above, these findings may be the result of methodological issues rather than deficits in fear recognition. The current study seeks to improve upon this methodology, and will do so using morphed facial expressions presented as static images in random order. The use of morphed expressions enables a range of intensities of the facial expressions to be presented, and thus any subtle differences in recognition ability between psychopaths and non-psychopaths should be detected. Presenting these morphs as static images in random order avoids the problem of participants having to switch their response as a new response is required to each phase of the morphed expression. That is, the current methodology assesses participants' recognition, and avoids the potential problem of response perseveration. In addition, an important goal in the present research is to investigate the relationship

between psychopathic traits and affect recognition rather than relying on measurements of psychopathy as a unitary construct.

5.5 Fear conditioning and psychopathy

Research investigating psychopaths' fear responding has typically used classical conditioning tasks which measure participants' 'unconditioned response' (UCR): responses to an unconditioned fearful stimulus, such as electric shock. These tasks also measure participants' 'conditioned response' (CR): their responses to a neutral stimulus which is consistently paired with the fearful stimulus. Discrimination is also assessed, which measures participants' ability to learn that the conditioned stimulus (CS+) predicts the fearful stimulus (UCS), relative to a neutral stimulus (CS-) which is never paired with the fearful stimulus. These tasks commonly measure participants' autonomic responses, and thus do not require participants to consciously experience fear. One common measure is Galvanic Skin Response (GSR), a measure of change in the electrical conductivity across the skin in response to increased perspiration, which increases with the psychological experience of emotional arousal, such as fear and anxiety.

A summary of those studies measuring GSR in aversive conditioning with psychopaths is presented in Table 5.2. Fear conditioning studies with psychopaths have produced an inconsistent pattern of findings. These studies suggest that psychopaths show poorer fear conditioning relative to low psychopathy offenders (Hare, 1965; Hare & Quinn, 1971; Lykken, 1957). However, at times psychopaths' level of responding is consistent with community samples (Lykken, 1957; Hare, 1965). Rather than reduced responding among psychopaths, there is some evidence of increased responding among the low psychopathy group relative to community controls (Hare, 1964; Lykken, 1957).

Hare (1965) suggests that this finding may indicate higher levels of anxiety among the non-psychopathic offender group, resulting in greater GSR reactivity (Hare, 1965).

Other studies indicate that psychopaths fail to discriminate between stimuli (Birbaumer et al., 2005; Flor et al., 2002). However, the pattern of poor discrimination is inconsistent with low fear theories, often showing heightened responses to both the CS+ and the CS- (i.e., over-generalisation of learning) rather than an absence of responding to either the CS+ or CS- (Birbaumer et al., 2005; Flor et al., 2002). Interestingly, while showing poor discrimination on GSR measures, psychopaths were able to cognitively identify the conditioned association, rating that the unconditioned stimulus was more likely to follow the CS+ than the CS- (Birbaumer et al., 2005). The authors suggest that psychopaths may have acquired some explicit knowledge of the CS-UCS association, but not processed the emotional significance of that information (Birbaumer et al., 2005).

Methodological problems are also present in a number of these studies. These studies at times fail to control for differences between groups' unconditioned responses in analysing conditioned responses (Hare & Quinn, 1971). Moreover, several studies do not use validated measures of psychopathy, instead rating participants on fit with Cleckley's psychopathy criteria which may be relatively subjective (e.g., Hare, 1965; Hare & Quinn, 1971; Lykken, 1957). One study (Flor et al., 2002) used noxious odour as the unconditioned stimulus, which may produce an aversive response rather than a fear response. However, this study showed a pattern of conditioning similar to that found in most fear conditioning studies, with reduced conditioned responses and poor discrimination between stimuli among the psychopathic group (Flor et al., 2002). Thus, while there is some evidence for impaired conditioning among psychopaths, this

evidence is inconsistent across studies, methodologically flawed, and offers some inconsistencies with low fear theories of psychopathy.

Only one study to date has investigated the relationship between specific traits of psychopathy and fear conditioning. This study used images of neutral facial expressions as conditioned stimuli, paired with electric shocks as the unconditioned stimulus, with a sample of university students. A relationship was found between the fearless dominance factor of the Psychopathic Personality Inventory-Revised (PPI-R) and reduced responding to the conditioned stimulus, as well as poorer discrimination between the CS+ and CS- (Lopez, Poy, Patrick & Molto, 2013). As described in Part One, the fearless dominance factor of the PPI-R includes those scales measuring low fear and anxiety. Therefore, the relationship between fearless dominance and fear conditioning is consistent with low fear theories of psychopathy. The Bold Fearlessness factor derived in the current research strongly resembles the PPI-R fearless dominance factor, and is hypothesised to predict poor fear conditioning in the present research. The present research utilises a similar approach to the study described above by Lopez and colleagues; traits of psychopathy are used to investigate the relationship between psychopathy and fear conditioning, and images of faces are used as conditioned stimuli as these faces are social stimuli, relevant to the social learning of fear associations. The present research extends upon the research by Lopez and colleagues, using a sample of incarcerated offenders, with higher psychopathy scores than typically found in student samples. In addition, the present research investigates the relationship between this fear conditioning task and facial affect recognition.

Table 5.2: Comparison of studies investigating GSR during aversive conditioning with psychopathic participants.

		Task Set Up				Results: Difference in psychopaths' response	
Study	Participants	Psychopathy measure	CS	UCS	Outcome measure	Conditioned Response	Unconditioned Response
Birbaumer et al., 2005	Psychopathic offenders, *N*=5 Community controls, *N*=7	PCL-R	Neutral faces	Painful pressure	Learning; Discrimination	No learning of CS+ assoc, less CS+/ CS- discrimination	No difference
Flor et al., 2002	Non-criminal psychopaths, *N*=9 Community controls, *N*=12	PCL-SV/ PCL-R	Neutral faces	Foul odour	Discrimination	Less CS+/ CS- discrimination	No difference
Hare, 1965	Psychopathic offenders, *N*=11 Non-psychopathic offenders, *N*=11 Students, *N*=11	12-item Cleckley criteria checklist	Number countdown, 1-12 (UCS on 8)	Electric shock	Increase in GSR across numbers 4 to 7	Less GSR increase than two non-P groups	No difference
Hare & Quinn, 1971	Offenders: psychopaths, *N*=18 non-psychopaths, *N*=18 'mixed' group, *N*=18	Fit with Cleckley criteria	Tones	Electric shock	Learning; Discrimination	Greater learning & discrimination by non-P group than P and mixed groups	Lower than non-P and mixed groups

Lykken, 1957	Inpatients: primary psychopaths, *N*=19 'neurotic sociopaths', *N*=20. Students, N=15	Fit with 14 Cleckley criteria	Buzzer	Electric shock	Learning, Discrimination	Less learning than students; Discrimination no sig diff's.	Not reported
Lopez et al., 2013	Students, *N*=74	PPI-R (continuous)	Neutral faces	Electric shock	Discrimination	No PPI-R total effect, high Fearless Dominance = less discrimination, non-sig correlation between Impulsive Antisociality factor and more discrimination	No relationship

5.6 The present research

As noted above, the present research includes both a facial affect recognition and a fear conditioning task. This research seeks to investigate performance on these two tasks in relation to the etiological theories of psychopathy introduced at the start of this chapter, and to investigate the relationship between task performance and traits of psychopathy.

Facial affect recognition: In the current study, participants will view statically presented images of facial expressions. A series of morphs that vary in intensity will be used to more closely approximate the range of intensities which make up the animated morph sequence. The inclusion of a greater number of expression intensities may identify subtle differences between groups which may be masked when fewer morph intensities are used. Presenting these faces as static images rather than as an animated sequence removes the potential problem of participants' failure to shift response option. Another benefit of this approach is that different intensity static morphs can be presented randomly, and thus avoid the influence of other decision making factors present when the increasing intensities are presented sequentially.

The current study investigates affect recognition using sad, fearful, angry and happy facial expressions. In line with the VIM theory, it is anticipated that those scoring highly on measures of psychopathy will show poorer recognition of fearful and sad facial expressions than those with low psychopathy scores. As the VIM posits a deficit specific to distress emotions, no difference in the recognition of happy and angry faces is anticipated between high and low psychopathy scorers.

Secondly, there is limited research investigating which traits of psychopathy are related to deficient, or intact, affect recognition. Given the heterogeneity within the

psychopathy construct, it is important to understand which traits of psychopathy are related to task performance. Thus, the second goal of this research is to investigate the relationship between affect recognition and psychopathy traits. These analyses will use the two factors identified through the Principal Components Analysis presented in Part One. Analyses will also be conducted using measures of those traits that are most theoretically relevant to affect recognition. The VIM theory suggests that psychopaths' lack of responsiveness to others' distress means that they do not experience personal distress when they cause hurt to others, and are therefore not socialised to avoid hurting others. Thus, we would expect this deficit in responding to others' distress to be related to traits of callousness, emotional detachment from others, and aggression toward others. The PPI-R:SF Coldheartedness and TriPM Meanness scales are the best measures of these traits in the present assessment of psychopathy. Therefore, Coldheartedness and Meanness are expected to be the best predictors of affect recognition ability, with higher scores on these scales predicting poorer affect recognition.

The current research improves upon the measures of affect recognition used in previous research. No published research on the relationship between psychopathy and affect recognition uses measures which account for participants' response biases. As an example of the importance of response bias, if only rates of accuracy are considered and an individual labels every facial expression as sad regardless of its true emotion, the individual will look very accurate at recognising sad expressions. However, the individual in this example is not able to recognise sad facial expressions well; rather, this individual shows a bias toward calling all facial expressions sad. The ability to be good at recognising an emotion requires that we are not only able to recognise that emotion (i.e., sensitivity), but that we are also able to tell that emotion apart from other

emotions (i.e., specificity). For this reason, considering participants' response bias is very important. The current study will employ methods from signal detection theory in order to account for both participants' accurate responses (hit rate) and their inaccurate responses (false alarms). This signal detection approach should enable a more accurate account of participants' affect recognition abilities, and of how these abilities relate to psychopathy.

Fear Conditioning: In the present study Galvanic Skin Response will be recorded from participants while they complete a fear conditioning task. Participants' pattern of responses to the unconditioned stimulus (UCS+), the conditioned stimulus (CS+), and the neutral stimulus (CS-) will be investigated in order to determine whether psychopaths show a reduced pattern of physiological responding consistent with the low fear theories. Analyses will assess both participants' ability to learn the conditioned association, and their ability to discriminate between the conditioned and neutral stimuli. Angry faces are used as conditioned stimuli in the present study as they are a social stimulus, allowing the investigation of fear conditioning to stimuli with greater relevance to social interactions. Angry faces are used rather than any other emotional expression as angry faces are a fear-relevant stimulus which conditions more readily to a fear association (Olsson & Phelps, 2004). Following the low fear theories, a reduced level of physiological responding to the CS+ is expected among those scoring highly on measures of psychopathy. This reduced responding should present as psychopaths showing less learning of the conditioned association, and a failure to discriminate between the CS+ and the CS-.

Second, the present research will investigate the relationship between traits of psychopathy and fear conditioning. Theoretically, deficits in fear conditioning are linked to psychopaths' attenuated experience of fear and anxiety (Lykken, 1957, 1995).

Therefore it is hypothesised that reduced physiological responses to the CS+ and poorer discrimination will be associated with higher scores on the *Bold Fearlessness* factor derived from the Principal Components Analysis presented in Part One, and in particular the Fearlessness and Stress Immunity scales of the PPI-R:SF and the STAI Trait Anxiety scale.

As described earlier in this chapter, a distinction is drawn between anxiety and fearfulness. It remains unclear if psychopaths' fear conditioning performance is associated with fearfulness, trait anxiety, or both. The current study includes measures of both trait anxiety (measured by higher scores on the State Trait Anxiety Inventory – Trait Anxiety scale and lower scores on the PPI-R:SF Stress Immunity scale) and fearfulness (measured by low scores on the PPI-R:SF Fearlessness scale). Therefore, the current research will investigate the relationship between fear conditioning, fearfulness, and trait anxiety. Following Lykken's low fear hypothesis (1957, 1995), it is hypothesised that poor fear conditioning will be most strongly related to low fearfulness.

Combining Facial Affect Recognition and Fear Conditioning: The Integrated Emotion System (IES) theory suggests that deficits on these two tasks result from the same underlying mechanism: psychopaths' impaired amygdala function (Blair et al., 2005). Therefore, consistent with the IES, it is hypothesised that performance on the affect recognition and fear conditioning tasks will be related, and that impaired performance on these two tasks will co-occur in those individuals with high psychopathy scores.

Moreover, the etiological theories described in this chapter suggest that deficits in responding to others' emotions and in learning to anticipate aversive outcomes make

socialisation difficult, and thereby contribute to the development of psychopathy. Thus, performance on these two tasks is expected to predict scores on psychopathy measures, with poorer task performance predicting higher psychopathy scores.

Chapter Six: Method

6.1 Participants

The same sample of 81 male criminal offenders described in Part One of this thesis were participants in Part Two. An additional group of 42 (23 female and 19 male) students from Victoria University completed the facial affect recognition task. This group was included as the task had not been piloted or used before, and a non-offender sample was desired for comparison purposes. Questionnaire data on the scales described in Part One was not collected for the student sample. Demographic information was not available on the student participants.

6.2 Procedure

As described in Part One, participants were informed about the study and given the opportunity to consent or decline to participate. After completing the consent process, participants completed two tasks: the facial affect recognition task and the fear conditioning task. The order of these tasks was counterbalanced across participants. Before completing the conditioning task, participants were offered the opportunity to hear the noise burst that would be presented as the unconditioned stimulus during the task. For those who expressed concern over the volume of the noise, the noise was adjusted slightly, from approximately 110dB to approximately 105dB. This reduction in volume was used for approximately 5 participants. The conditioning task began with a period of calibration to establish a baseline level of electrodermal activity for each participant over a period of approximately 30-60 seconds. Participants completed both tasks on a Dell laptop computer. A second Dell laptop was set up to record the GSR output from the AD Instruments Power Lab. The set up was arranged so that

participants were not able to see the screen of the laptop computer where GSRs were recorded. After completing both the affect recognition and the fear conditioning tasks, participants completed the questionnaires described in Part One.

6.3 Measures

6.3.1 Facial Affect Recognition Task

A facial affect recognition (FAR) task was developed to measure participants' ability to recognise others' emotional expressions across a range of different intensities. This task included angry, fearful, sad and happy facial expressions. These emotions are commonly included in facial affect recognition studies, and represent four of the six 'basic' human emotions which are readily identified across cultures (Ekman & Friesen, 1971). Surprise and disgust are the other two basic emotions, but were excluded from the current study because there is no theoretical reason to expect a relationship between psychopathy and impaired recognition of disgust or surprise.

The emotional faces used as stimuli in this task came from the Karolinska Directed Emotional Faces (KDEF; Lundqvist, Rykt & Ohman, 1998) and Radboud Faces Database (RaFD; Langer et al., 2010) face datasets. These two face datasets include images of actors instructed to display a range of emotional expressions including the 4 used in this study. These images show the actor from the neck up, facing the camera front on, set against a neutral background (for an example see Figure 6.1). Images from five actors were included in the current study (3 male, 2 female; 1 from the KDEFs and 4 from the RaFD). The KDEF was developed in Sweden, while the RaFD includes Dutch and Moroccan actors. Some of these individuals are easily identifiable as foreign to New Zealand. A set of emotional faces using New Zealand models was not available, so

models were selected from these existing face sets with the intention of selecting models that appeared least racially dissimilar from study participants. The models were also selected on the basis that all four emotional expressions included in this study were recognised with relatively high levels of accuracy in validation research (Goeleven, De Raedt, Leyman & Verschuere, 2008; Langer et al., 2010).

The morphing software FaceMorpher 2.51(Luxand Inc, Alexandria, VA.) was used to create morphs of the selected faces. The four emotional expressions and the neutral face for each model were entered into FaceMorpher 2.51 Software and 40 points were selected on each face: 16 points around the outer edges of the face, and 24 points to identify the face's internal features. Using the selected points, FaceMorpher 2.51 Software morphed each emotional expression with the neutral expression through 10 steps, resulting in 11 frames for each face from neutral (i.e., 0% emotional intensity) increasing in 10% increments to the prototypical emotional face (i.e., 100% emotional intensity). Because the 10% intensity expressions looked much the same as a completely neutral face, and in order to minimise the number of trials, neutral faces were excluded from the task. Therefore, a final dataset of 200 images was created with 5 models, each showing the 4 different emotional expressions, with 10 morphs of increasing intensity from 10% to 100% for each emotion. For each emotional expression at each intensity there were 5 images from which accuracy rates were calculated. Examples of these morphed stimuli are presented in Figure 6.1. A complete set of the morphed emotional expressions is attached as Appendix 3. An additional face was morphed in the same way for use in practice trials. Eight practice trials were included, with two images of each emotion. These practice trials included one higher intensity morph for each emotion (70 – 100%) and one lower intensity morph for each

emotion (10 – 40%) so that participants had a practice for each type of emotion and a range of intensity levels.

Figure 6.1: An example of the morphed emotional expressions used in the facial affect recognition task.

The facial affect recognition task was programmed in E-Prime 2.0 Software (Schneider, Eschman & Zuccolotto, 2002). Offenders completed the task on a Dell laptop computer. The computer had a 15-inch screen, with a refresh rate of 60 Hertz. Student participants completed the task on a Dell desktop computer, with a 19-inch screen and a refresh rate of 60 Hertz. Participants were given the following instructions: "You will see faces showing different emotional expressions. Your task is to identify what EMOTION you think the person is feeling. You will see a face, then use the mouse to identify what emotion you saw." Participants were also advised that some of the faces would be easier to identify than others, and that even when they were unsure which emotion they had seen, they were to pick the emotion that they thought was closest to the emotion expressed in the face. Participants completed 8 practice trials; when they

were satisfied that they understood the task and were ready to begin, they were asked to press the space key and test trials began. Faces were presented in randomised order for each participant. Trials were separated into 5 blocks so that participants were able to take a break after every 40 trials, and could resume the next block whenever they were ready by pressing the space key. Each face was presented in the centre of the screen for 500ms. On screen, the face stimuli were approximately 200mm wide by 150mm high, and were presented against a white background. At face offset, participants were asked to select which emotion they had just seen with the instruction "Click on the emotion that you saw" at the top of the screen. Participants selected their response by using the computer mouse to click on one of 4 boxes presented in each quadrant of the screen labelled with an emotion: *angry*, *fearful*, *sad* and *happy*. After completing all 200 trials participants were thanked for completing the task.

Two offenders were uncomfortable using the computer. These participants were asked to state their response aloud, and the researcher used the mouse to select the response option they chose. No additional assistance was given to these participants to help them to select a response option.

E-Prime 2.0 Software was set up to record which emotion the participant selected, and if this response was correct or incorrect. As noted in Part One, one participant was excluded from the dataset due to invalid performance on the facial affect recognition task. When viewed across expression intensities, this participant performed at chance level regardless of increasing emotional intensity, and was a significant outlier relative to all other participants.

Data Preparation: In order to analyse the facial affect recognition data, data were reduced using two methods. First, participants' accuracy was calculated for each

emotion at each intensity; for the five faces presented for each emotion at each intensity, the proportion of correct responses were calculated (values of 0 to 1). Second, *A'* values were calculated; *A'* values are an approach to measuring discriminability between stimuli using signal detection theory, which considers both sensitivity to a given emotional expression, and specificity in telling that emotional expression apart from other expressions (Stanislaw & Todorov, 1999). The use of *A'* is commonly recommended when working with a small number of responses that are not normally distributed (Stanislaw & Todorov, 1999)[4]. Participants' *A'* values were calculated for each emotion at each intensity using the formula

$$A' = \begin{cases} .50 + \dfrac{(H - F)(1 + H - F)}{4H(1 - F)} & \text{when } H \geq F \\ .50 - \dfrac{(F - H)(1 + F - H)}{4F(1 - H)} & \text{when } H < F \end{cases}$$

where H is the Hit Rate, and F is the False Alarm Rate.

These hit and false alarm rates were calculated following the loglinear approach described by Stanislaw and Todorov (1999). Using the following formulae:

$$\text{Hit Rate} = (H + 0.50)/(N + 1)$$

where H is equal to the number of correct recognitions (between 0 and 5 for each emotion at each intensity), and N is equal to the number of trials on which that emotion is presented; and

$$\text{False Alarm Rate} = (FA + 0.50)/(N + 1)$$

[4] The *A'* measure used here technically applies to a two alternative forced choice method, whereas the current method has four response options and is thus a four alternative forced choice method. *A'* values are used here to measure discriminability across all trial types, and do not separately account for the three possible error types on any one trial. Separate analyses were conducted using accuracy rates which produced a very similar pattern of results.

where N is equal to the number of trials on which that emotion is not presented, and FA is equal to the number of false alarms for that emotion. That is, using the emotion label (e.g., sad) to any of the other emotional expressions (e.g., angry, fearful, or happy faces).

Values of *A'* range from 0 to 1, with a value of 0.50 indicating that the participant cannot discriminate one type of stimulus from another (e.g., a happy face from the other emotions) and a value of 1 indicating perfect discrimination of one stimulus from the others (Stanislaw & Todorov, 1999; values increasingly less than .50 indicate good discrimination, but consistent reversing of the response labels).

6.3.2 Fear Conditioning Task

The fear conditioning task was developed to measure participants' Galvanic Skin Responses (GSRs) to an unconditioned fear-inducing stimulus — a loud noise burst— and their GSRs to a conditioned stimulus — an angry face — which was paired with the noise burst. An angry face was used as the conditioned stimulus as it is both a social stimulus, and a fear-relevant stimulus, meaning that it conditions more readily to a fear association (Olsson & Phelps, 2004).

Participants were advised that they would see images of faces showing emotional expressions, and that they would hear loud bursts of noise at different times throughout the task. Participants were asked to put on a pair of Panasonic headphones through which the noise bursts would be heard. Participants were offered the opportunity to hear the noise burst before beginning the experiment. Two GSR electrodes were attached to the participant's non-dominant hand, on the medial phalange of the index and middle fingers.

Face stimuli were selected for the task in a similar way to those used in the affect recognition task. Two male angry faces were selected on the basis that they were easily identifiable as angry, and that they did not appear racially dissimilar to the New Zealand population. Faces used in the affect recognition task were not included in the fear conditioning task. The two faces selected as stimuli came from different face sets (one from the KDEF and one from the RaFD). These two face sets appear slightly different due to the models wearing different coloured t-shirts and being set against different coloured backgrounds. In order to make these stimuli appear as similar as possible they were converted to black and white and the contrast increased.

Noise bursts were created using Audacity 1.2.6 Software. The noise burst which was selected for the current study was a white noise burst of 500ms length. It was manipulated and amplified so that it played through a pair of Panasonic headphones at approximately 110dB[5].

E-Prime 2.0 Software was used to programme the fear conditioning task. Participants completed one block of baseline habituation trials in which they were randomly presented with each face twice, without any noise bursts being presented. Acquisition trials followed directly after the habituation trials with no break. Six acquisition trials were included for each face, with a total of 12 acquisition trials presented in random order. One of the 2 faces was allocated as the conditioned stimulus (CS+), and was paired with the unconditioned noise burst (UCS+). Which face was assigned as the CS+ was counterbalanced across participants. These 12 acquisition trials were followed by a screen advising participants to take a break for as long as they

[5] Pilot research was conducted with a fear conditioning task using this loud tone as an unconditioned stimulus. This pilot research indicated that the 110dB white noise burst was an appropriate unconditioned stimulus which produced both unconditioned and conditioned responses among a student sample.

required, then to press the space bar to continue. Twelve subsequent extinction trials were presented in random order, six for each face, in which noise bursts were no longer presented. For each trial participants were presented with a fixation cross in the centre of the screen for 1000ms and then the face was presented for 6000ms. For CS+ trials, the noise burst was presented immediately following face offset. Within each block of trials (habituation, acquisition, and extinction), the CS+ and CS- faces were presented in random order.

Participants were not required to make any explicit responses throughout the task, other than to press the space key to move between the acquisition and extinction blocks. Galvanic Skin Response (GSR) was recorded continuously throughout the conditioning task. The electrodes worn by the participant were attached to an AD Instruments GSR Amplifier and Power Lab system. These outputs were then transmitted to a second Dell laptop computer where the GSR data were recorded using Lab Chart Version 7 Software (AD Instruments Inc, Colorado Springs, CO.). Data were recorded at a rate of 1000 samples per second. GSR was the only dependent variable in the fear conditioning task.

Extraction of GSR data: The conditioning task in E-Prime 2.0 Software was programmed to communicate with the Lab Chart Version 7 Software which recorded GSR responses. This communication involved E-Prime2.0 Software sending triggers at the onset and offset of each face presentation. For CS+ faces, offset of the face coincided with onset of the noise burst. These triggers were used as reference points to select appropriate windows of GSR activity related to the stimuli presented.

GSR was analysed according to guidelines established by Dawson and colleagues (Dawson, Schell & Filion, 2000); GSR measures were based on the peak amplitude of the

response. First, data were visually inspected, and trials indicating movement or other artefacts in the GSR data were excluded from analysis. These artefacts are evident as sudden peaks or troughs in the data record which do not appear to be related to the task stimuli[6]. Examples of GSR responses considered to be stimulus-relevant and valid, and of GSR responses considered to indicate artefacts in the data log are presented in Figure 6.2. Trials on which artefacts were observed were recorded as missing data for that trial.

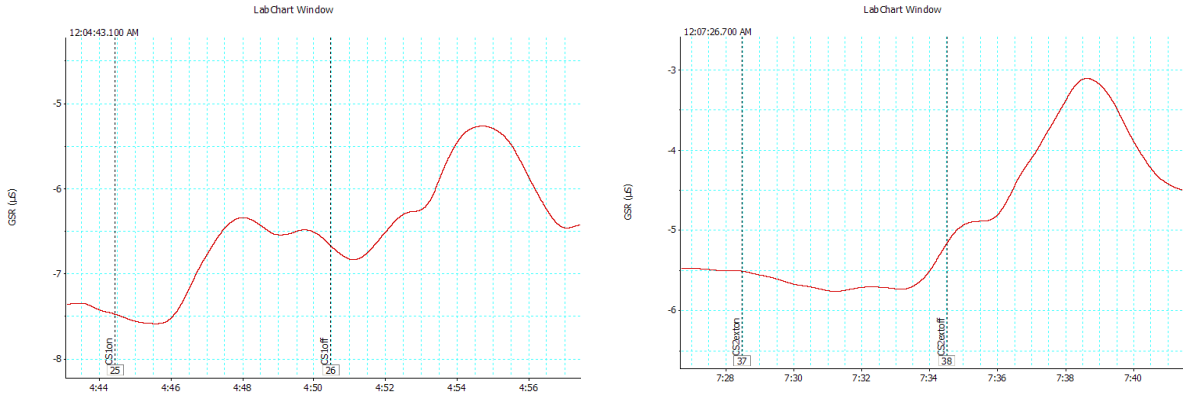
Next, acquisition phase data were visually inspected for any increase in GSR following face onset or offset (concurrent with noise onset for UCS+ trials). GSR responses have approximately a 3-second lag between stimulus onset and observable change in GSR (Dawson et al., 2000). Therefore, for CS+ and CS- trials, any increase in GSR response beginning within 2 to 4 seconds following face onset was considered to be a GSR response to the face. For UCS+ and UCS- trials, any increase in GSR beginning 2 to 4 seconds following face offset was considered to be a GSR response to the noise. Where a GSR increase was evident, this section of the data log was selected and the difference from trough to peak was extracted. That is, the extracted value reflects the magnitude of the increase in GSR following the stimulus. For those trials where there was no measurable increase in GSR response, or where any increase in GSR was less than .03 microsiemens[7], a value of zero was assigned as the GSR response to that trial, indicating that the participant did not show a response on that trial.

[6] Artefacts in the GSR data log can be created by a number of things, such as the participant moving the hand on which the electrodes are attached, or taking a large breath. Thus, data from several trials were excluded due to the presence of these artefacts.

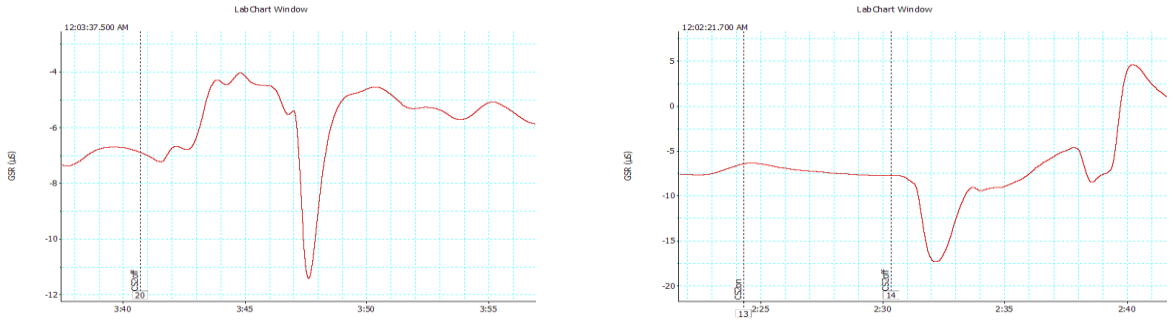
[7] GSR changes measuring less than 0.30 (or often 0.50) microsiemens are commonly replaced with values of 0 as they are deemed to be too small to relate to changes of practical significance (Dawson et al., 2000).

Figure 6.2: Examples of stimulus relevant and stimulus irrelevant changes in the continuous GSR record.

Stimulus Relevant Changes



Stimulus Irrelevant Changes



A similar procedure was conducted to extract data from the extinction phase where the UCS was no longer presented. As the UCS was no longer presented, only one response was expected, rather than a separate conditioned and unconditioned response. Therefore, a window beginning 2 seconds following the face onset until 4 seconds following face offset was examined for any increase in GSR response linked to the presentation of the face. Where an increase in GSR was observed, the magnitude of that response was recorded using the same procedure described above for acquisition trials. Where no increase in GSR response was observed, or where an increase was less than .03 microsiemens in magnitude, a value of 0 was assigned for that trial. Figures 7.6

and 7.7 indicate that participants' GSR responses to the CS+ and CS- had habituated to baseline levels by the end of the acquisition block. Therefore, it seemed unlikely that participants would continue to respond differently to the CS+ and CS- during the extinction block. Moreover, no hypotheses for these extinction trials were indicated based on the low fear theories of psychopathy. Therefore, analyses of these extinction trials are not presented in the results[8].

This data extraction resulted in a measure of the magnitude of GSR increase for two responses on each acquisition trial — the CR (CS+ and CS-) and the UCR — and one response on each extinction trial. These GSR values were then transformed using a log transformation, Log(1+GSR), which is the convention for normalising GSR data.

[8] A repeated-measures ANOVA was conducted on these extinction block data and showed no significant main effect of group (high and low PPI-R:SF median split groups), $F(1,78)=0.60$, $p=.44$, no significant main effect of stimulus (CS+ and CS-), $F(1,78)=0.34$, $p=.56$, and no significant main effect of trial (6 trials), $F(5,74)=1.09$, $p=.38$. No interaction effects were statistically significant.

Chapter Seven: Results and Discussion

The results presented below are separated into three parts: first, facial affect recognition findings will be presented, followed by fear conditioning findings, and finally the results investigating the relationship between performance on the two tasks are presented. For consistency with the approach taken in most previous research, a high psychopathy and a low psychopathy group are compared on task performance. These high and low psychopathy groups were defined using the median split of PPI-R:SF total scores described in Part One. Then, regression analyses are used to investigate the relationship between continuous scores on psychopathy traits and task performance.

Theories of psychopathy imply that deficits on the tasks measured here contribute to the development of psychopathy. Therefore, performance on the two tasks should be predictive of scores on measures of psychopathy. However, for consistency with previous research, the majority of analyses presented here use psychopathy scales to predict task performance. In section 7.3 the ability of scores on the two tasks to predict psychopathy scores is investigated.

7.1 Facial Affect Recognition Task

The facial affect recognition results first investigate differences between high and low psychopathy groups in discriminating between emotional expressions. Student sample data are also available for this affect recognition task, as a student sample was included to provide normative data on this newly developed variant of the affect recognition task. Therefore, comparisons between the high and low psychopathy group and the student group are also included. Following the group comparisons, regression analyses are presented using psychopathic traits to predict affect recognition performance on the four emotions. These analyses utilise the two PCA derived factors

from Part One, as well as theoretically related scales from the PPI-R:SF and the TriPM, specifically, the PPI-R:SF Coldheartedness and TriPM Meanness scales.

7.1.1 Recognition of 100% Emotional Expressions

One common approach to measuring affect recognition is to analyse participants' responses to prototypical emotional expressions (i.e., 100% expressions). In order to analyse these responses in the current study participants' mean accuracy scores on the 100% faces were calculated using the proportion of correct recognitions for each emotion at the 100% expression intensity. As the VIM theory of psychopathy posits a deficit in recognising fearful and sad facial expressions, it was hypothesised that the high psychopathy group would show poorer recognition of fearful and sad expressions relative to both the low psychopathy and student groups. A repeated measures ANOVA was conducted with emotion as the repeated measures factor with 4 levels. The between-subjects variable was group, with 3 levels: students, high psychopathy offenders and low psychopathy offenders. High and low psychopathy offender groups were based on the median split of PPI-R:SF total scores described in Part One. Proportion of correct recognitions was entered as the dependent variable. This ANOVA showed a significant main effect of emotion, $F(3,117)=21.50$, $p<.001$, $\eta_p^2=0.36$. This main effect of emotion was further investigated using paired samples t-tests comparing the recognition of each emotion across the full sample. In order to control for multiple comparisons, a significance value of $p<.01$ was set for statistical significance. As shown in Table 7.1, these t-tests showed that participants recognised happy expressions ($M=.98$, $SD=.09$) significantly more accurately than all other emotions, while angry expressions ($M=.92$, $SD=.16$) were recognised significantly more accurately than sad expressions, and the difference between recognition of angry and fearful faces

approached statistical significance. Recognition accuracy did not differ between sad (*M*=.88, *SD*=.17) and fearful expressions (*M*=.88, *SD*=.19).

Table 7.1: T-test comparisons of participants' accuracy to the 100% facial expressions.

	Angry	Fearful	Sad
Fearful	*t*=2.19, *p*=.03, *d*=.23		
Sad	*t*=2.53, *p*=.01, *d*=.24	*t*=0.15, *p*=.88, *d*=.00	
Happy	*t*=4.30, *p*<.01, *d*=.48	*t*=6.06, *p*<.01, *d*=.67	*t*=5.86, *p*<.01, *d*=.73

All *df*=121.

The repeated measures ANOVA also showed a significant main effect of group, $F(2,119)=6.73$, $p<.01$, $\eta_p^2=0.10$, with Tukey post-hoc analyses showing that the only significant difference was between the student and the high psychopathy groups ($p<.01$), with the student group showing more accurate recognition. As shown in Table 7.2, the low psychopathy group typically showed levels of accuracy that were between those of the other two groups, but did not differ significantly from either the high psychopathy group or the student group. The interaction effect between emotion and group was not statistically significant, $F(6,236)=0.83$, $p=.55$, $\eta_p^2=0.02$, indicating that the high psychopathy group was impaired, relative to students, on all emotions. Means and standard deviations for each groups' proportion of correct responses are displayed in Table 7.2.

The Violence Inhibition Mechanism (VIM) and Integrated Emotion System (IES) theories of psychopathy described in Chapter Five predict an impairment among psychopaths in recognising sad and fearful expressions. The main effect of group with Tukey post hoc tests showed the high psychopathy group to be poorer at recognising

emotions relative to the student group. The absence of an interaction effect between group and emotion signalled that this difference between groups was consistent across all emotions, inconsistent with the hypothesis of specific deficits in the recognition of fearful and sad expressions. There were no significant differences in emotion recognition between the low and high psychopathy offender groups, indicating that within the offender sample psychopaths were not significantly worse at recognising any emotions. Overall, recognition accuracy was high (mean accuracy above 80%) indicating that overall participants were able to recognise 100% intensity emotional expressions with a high level of accuracy.

Table 7.2: Mean accuracy (standard deviation) of student, high and low psychopathy offender groups to the 100% faces for 4 emotions.

	Student *N*=42	Low PPI *N*=40	High PPI *N*=40
Angry	.97 (.07)	.91 (.16)	.89 (.20)
Fearful	.92 (.14)	.87 (.21)	.85 (.20)
Sad	.93 (.11)	.87 (.17)	.83 (.22)
Happy	.99 (.03)	.99 (.05)	.96 (.14)

The analyses presented above using rates of recognition accuracy use a method consistent with the reporting of affect recognition accuracy in a number of previous studies. However, the current study also used *A'* values to evaluate a participant's ability to discriminate between emotions. As described in the method section, *A'* values account for both hit rate and false alarms in order to produce scores which correct for each individual's response biases in emotion identification. Therefore, the analysis

above was re-run using participants' *A'* values for discriminating between emotions at the 100% intensity level.

A repeated measures ANOVA was conducted with emotion as the repeated measures factor, with 4 levels. The between-subjects variable was group, with 3 levels: students, high psychopathy offenders and low psychopathy offenders. *A'* values to the 100% faces were entered as the dependent variable. This ANOVA showed a significant main effect of emotion, $F(3,117)=23.08$, $p<.001$, $\eta_p^2=0.37$, indicating that participants were responding differently across emotions. This main effect of emotion was again further investigated using paired-samples t-tests to compare *A'* values for each emotion across all participants. In order to control for multiple comparisons, a significance value of $p<.01$ was set for statistical significance. Consistent with the previous analysis of raw accuracy, participants were able to discriminate happy expressions ($M=.96$, $SD=.03$) significantly more accurately than all other emotions, while angry expressions ($M=.94$, $SD=.05$) were discriminated significantly more accurately than sad or fearful expressions. Participants' ability to discriminate sad ($M=.93$, $SD=.05$) and fearful expressions ($M=.93$, $SD=.06$) did not differ significantly. Table 7.3 shows the t-test values for these comparisons.

Table 7.3: T-test comparisons of participants' discriminability of 100% facial expressions, as measured by *A'.*

	Angry	Fearful	Sad
Fearful	$t=4.67$, $p<.01$, $d=.18$		
Sad	$t=2.57$, $p=.01$, $d=.20$	$t=1.08$, $p=.28$, $d=.00$	
Happy	$t=4.79$, $p<.01$, $d=.49$	$t=7.65$, $p<.01$, $d=.63$	$t=6.59$, $p<.01$, $d=.73$

All $df=121$.

The repeated measures ANOVA also showed a significant main effect of group, $F(2,119)=7.20$, $p<.01$, $\eta_p^2=0.11$, with Tukey post-hoc analyses showing that the difference was again between the student and the high psychopathy groups ($p<.01$), with the difference between the student and low psychopathy groups approaching significance ($p=.08$). Again, the low and high psychopathy groups did not differ significantly from one another. Group means and standard deviation values for *A'* are presented in Table 7.4. The interaction effect between emotion and group was not statistically significant, $F(6,236)=0.89$, $p=.51$, $\eta_p^2=0.02$.

These results indicated that the high psychopathy group was significantly poorer than the student group at recognising all emotional expressions, but did not differ from the low psychopathy group. This finding is consistent with the previous analysis, but is again counter to the hypothesis that psychopaths would be impaired at recognising sad and fearful expressions relative to both the student and low psychopathy offender groups. Consistent with the current research, most studies using prototypical expressions find no affect recognition deficits (Book et al., 2007; Glass & Newman, 2006; Gordon et al., 2004), and those that show deficits are inconsistent regarding which emotions psychopaths are impaired at recognising (e.g., disgust, Kosson et al., 2002; fear, Iria& Barbosa, 2009). However, the current findings are inconsistent with those studies using the animated morph methodology, as these studies consistently show psychopaths to make more fear recognition errors once the morph has evolved to the prototypical or 100% emotional expression (Blair et al., 2004; Blair & Cipolotti, 2000; Mitchell et al., 2006).

The similarity between findings using the raw proportion of correct recognition and *A'* values indicated that the differences observed in accuracy between groups were

not produced by differences in response bias. However, when response bias was controlled for, the difference between the low psychopathy group and the student group approached significance.

Table 7.4: Mean *A'*(standard deviation) scores of the student, high psychopathy, and low psychopathy offender groups to the 100% faces for 4 emotions.

	Student *N*=42	Low PPI *N*=40	High PPI *N*=40
Angry	.96 (.02)	.94 (.05)	.93 (.06)
Fearful	.94 (.03)	.92 (.06)	.91 (.07)
Sad	.95 (.03)	.93 (.05)	.91 (.07)
Happy	.97 (.01)	.96 (.02)	.95 (.04)

7.1.2 Errors

As noted in Chapter Five, only one previous study has reported on the errors psychopaths make during an affect recognition task. Therefore, an exploratory investigation of the errors made by participants was conducted here. This investigation used only responses to the 100% faces, as these faces display the least ambiguous emotional expressions and therefore errors in recognising these faces indicate more impaired affect recognition. Table 7.5 shows participants' percentage of accurate responses, as well as their percentage of each type of error, split into the student, high psychopathy, and low psychopathy offender groups.

Table 7.5: Percentages of the 100% faces correctly identified and misidentified as each emotion by the student, low psychopathy offender and high psychopathy offender groups.

	Correct emotion			
Face Called	Angry	Fearful	Sad	Happy
Angry				
Student	97.10	4.30	0.50	0.00
Low PPI	90.50	7.00	2.50	0.00
High PPI	88.50	6.00	2.00	0.00
Fearful				
Student	1.40	92.40	6.70	0.00
Low PPI	4.50	87.00	10.00	0.50
High PPI	5.00	84.50	12.50	1.00
Sad				
Student	1.40	3.30	92.80	0.50
Low PPI	3.50	3.50	87.00	1.00
High PPI	3.50	6.50	83.00	3.00
Happy				
Student	0.00	0.00	0.00	99.50
Low PPI	1.50	2.50	0.50	98.50
High PPI	3.00	3.00	2.50	96.00

Consistent with the above analysis, Table 7.5 indicates that both offender groups made more errors than the student group, and the high psychopathy group tended to make the largest number of errors. However, the pattern of errors was similar between

the three groups, with the most common error among all groups being the labelling of sad expressions as fearful. Counter to theories of psychopathy, the high psychopathy group showed no specialised pattern of deficits, but rather appear to show poorer overall recognition than the student group. The pattern of errors presented here is similar to those presented by Blair and colleagues (2004), which showed psychopathic offenders to make more errors than a non-psychopathic offender group, but that the pattern of errors made was largely similar.

7.1.3 Response Bias

Previous research on psychopathy and facial affect recognition does not control for participants' incorrect responses using either response bias or false alarm rates. Participants' response bias was analysed in order to explore any differences in response bias between groups. The above analyses indicated that response bias on 100% faces did not affect results. The analysis presented here sought to investigate response bias to neutral images. The 10% intensity faces used in the current task were assumed to be functionally neutral. Therefore, responses to these 10% intensity faces were used to assess for biases in response selection of emotion labels. Five faces were presented at the 10% intensity for each of the 4 emotions: 20 trials in total. The proportion of these 20 trials on which a participant used each emotion label was calculated. If participants had no bias, we would expect them to choose each emotion equally often, giving a proportion of 0.25 for each emotion.

Across the whole sample there was a general response bias toward sad (*M*=.49, *SD*=.26); participants tended to call about half of the neutral faces sad. The options angry and happy were used approximately one fifth of the time by the full sample (anger *M*=.22, *SD*=.19; happy *M*=.21, *SD*=.20), while fear was the least used option

(*M*=.08, *SD*=.12). A repeated measures ANOVA was conducted, with emotion as the repeated measures variable (4 levels; angry, fearful, sad, happy) and group as the between subjects variable (3 levels; high psychopathy offenders, low psychopathy offenders, and students). The dependent variable was the proportion of times a participant used each emotion label to the neutral faces. This ANOVA showed a significant main effect of emotion, $F(3,117)=92.84$, $p<.001$, $\eta_p^2=0.70$, reflecting the general pattern described above, with sad being the most frequently selected response option. The main effect of group was not significant. However, a significant interaction effect between emotion and group was found, $F(6,236)=4.69$, $p<.001$, $\eta_p^2=0.11$.

In order to further investigate this interaction effect, a series of one-way ANOVAs was conducted to compare the three groups' response bias on each emotion. The means and standard deviations for each group, as well as the ANOVA results for each emotion are reported in Table 7.6. These ANOVAs showed a significant main effect of group in 'angry' response bias, $F(2,119)=9.58$, $p<.001$, with Tukey post hoc tests showing that the low psychopathy offender group were significantly less likely to label a neutral face as angry (*M*=.12, *SD*=.12) than the student group (*M*=.30, *SD*=.23; $p<.001$), or the high psychopathy group (*M*=.23, *SD*=.18; $p=.03$). The high psychopathy and student groups did not differ significantly from each other on response bias toward labelling faces as angry ($p=.20$).

A main effect of group on 'happy' response bias was also observed, $F(2,119)=3.86$, $p=.02$. Tukey post hoc tests indicated the difference was between the student group and the low psychopathy group ($p=.02$), with the low psychopathy group (*M*=.26, *SD*=.25) being more likely to call the neutral faces happy than the student group (*M*=.15, *SD*=.15). The high psychopathy offender group (*M*=.21, *SD*=.16)was not significantly different to either the low psychopathy ($p=.46$) or the student group

(p=.27). ANOVAs comparing the three groups' response biases were not statistically significant for 'fearful', $F(2,119)=1.59$, p=.21, or 'sad' facial expressions, $F(2,119)=0.74$, p=.48.

Table 7.6: Means (standard deviations) and ANOVA data for the student, high and low psychopathy offender groups' response bias for 4 emotions.

	Student N=42	Low PPI N=40	High PPI N=40	ANOVA $F(2,119)$
Angry	.30 (.23)	.12 (.12)	.23 (.18)	9.58**
Fearful	.06 (.10)	.09 (.13)	.10 (.13)	1.59
Happy	.15 (.15)	.26 (.25)	.21 (.76)	0.74
Sad	.50 (.26)	.52 (.24)	.46 (.27)	3.86*

*p<.05;**p<.01

These response bias results indicate that the three groups do show differences in response bias to functionally neutral expressions. These differences in response bias are not suggested by theories of psychopathy. It may be that the groups' response biases also differ to ambiguous morphed facial expressions. Previous investigations of psychopathy and affect recognition do not report or control for response biases, and their findings may therefore reflect biases in responding rather than reflecting participants' ability to recognise emotions. The remainder of the affect recognition analyses utilise *A'* values which account for accuracy independent of response biases.

7.1.4 Affect recognition of morphed expressions

The remaining analyses focus on participants' responses to the morphed facial expressions. First, these analyses investigate the performance of the high psychopathy, low psychopathy, and student groups' performance across morphed expression intensities. Given psychopaths' hypothesised deficit in recognising fearful and sad facial expressions, it is anticipated that the high psychopathy group will require significantly more intense facial expressions in order to accurately recognise fearful and sad expressions relative to the two other groups.

For this analysis, *A'* values were calculated at each intensity (10-100%) for each emotion. Figures 7.1 through 7.4 show the average *A'* as a function of expression intensity across the three groups for each emotion. The student group shows consistently higher *A'* values than the two offender groups, indicating better recognition of all emotions at most intensities. The two offender groups' performance across emotions appears very similar. Across all groups, the pattern of values indicates that participants' responses to faces at the lowest intensities were close to chance (*A'* values close to 0.5), and recognition increased as the expressions increased in emotional intensity, with participants showing good discrimination (*A'* values close to 1) as faces increased in emotional intensity.

In order to reduce the volume of data, 20% emotion intensity increments were used for analysis rather than 10% increments[9]. Figures 7.1 to 7.4 above indicate that 20% intensity increments preserved the variation in the data. A repeated-measures ANOVA was conducted with two repeated measures, emotion with 4 levels (angry, fearful, happy, sad) and intensity with 5 levels (20, 40, 60, 80, 100%), and group as the

[9] The following ANOVA was also run with 10% increments, with intensity as a between subjects factor with 10 levels. This produced the same pattern of results as presented above using 20% increments.

between-subjects variable (3 levels; students, high psychopathy offenders, low psychopathy offenders). The dependent variable in this ANOVA was participants' ability to accurately discriminate between emotions based on *A'* values.

Figure 7.1: Average *A'* values as a function of emotional intensity for angry facial expressions across 3 groups.

Figure 7.2: Average *A'* values as a function of emotional intensity for fearful facial expressions across 3 groups.

Figure 7.3: Average *A'* values as a function of emotional intensity for happy facial expressions across 3 groups.

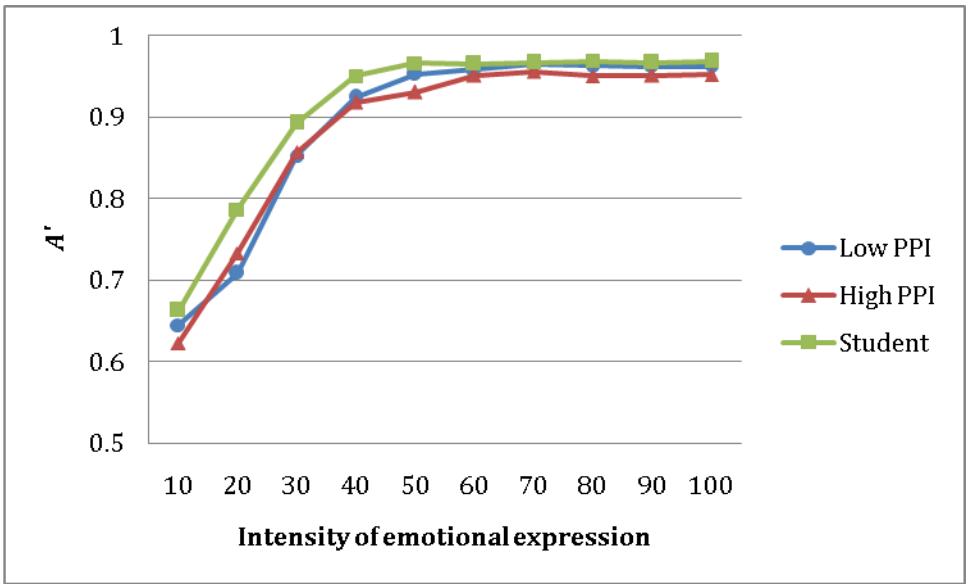


Figure 7.4: Average *A'* values as a function of emotional intensity for sad facial expressions across 3 groups.

This ANOVA showed a significant main effect of intensity, $F(4,116)=306.94$, $p<.001$. The graphs above indicate that participants' *A'* values were greater when the

facial expressions were of stronger intensity. The ANOVA also showed a significant main effect of emotion, $F(3,117)=96.79$, $p<.001$, indicating that participants' responses differed across the four emotions. There was also a significant main effect of group, $F(2,119)=10.78$, $p<.001$, with Tukey post-hoc tests showing a significant difference between the student group and both offender groups (low PPI $p<.001$; high PPI $p<.01$), but no difference between the low and high psychopathy groups ($p=.96$).As shown in Table 7.7, the student group showed consistently higher *A'* values than both the low and high psychopathy groups.

The interaction between intensity and emotion was statistically significant, $F(12,108)=14.86$, $p<.001$, indicating a different pattern of responding across emotions as intensity increased. Figures 7.1 to 7.4 indicate that *A'* values increased more at earlier intensities for recognition of happy faces relative to other facial expressions. The interaction effect between intensity and group was also statistically significant, $F(8,234)=2.68$, $p<.01$, indicating that the groups differed in their pattern of responding across intensities. The figures above indicate that the student group tended to show higher *A'* values at lower intensities than the two offender groups, and that the student group reached asymptotic performance at lower intensities than the high and low psychopathy offender groups. The interaction effect between emotion and group was not statistically significant, $F(6,236)=.57$, $p=.75$, indicating that each groups' pattern of responses were similar across emotions. The 3-way intensity by emotion by group interaction was not statistically significant, $F(24, 218)=1.22$, $p=.23$. These findings indicate that the interaction between group and intensity was present for all emotions, with the student group showing better discriminability at earlier intensities for all emotions. The mean values for each group for this analysis are presented in Table 7.7.

Table 7.7: Mean (standard deviation) values of *A'* for student, low psychopathy, and high psychopathy offender groups, across four emotional expressions at five levels of expression intensity.

		Intensity of facial expression				
		20%	40%	60%	80%	100%
Emotion	Group					
Angry						
	Low PPI	.70 (.12)	.85 (.11)	.91 (.08)	.94 (.07)	.94 (.07)
	High PPI	.74 (14)	.88 (.08)	.91 (.10)	.92 (.08)	.93 (.06)
	Student	.75 (.10)	.91 (.05)	.95 (.02)	.96 (.02)	.96 (.02)
Fearful						
	Low PPI	.60 (.15)	.79 (.11)	.90 (.08)	.92 (.06)	.92 (.06)
	High PPI	.63 (.16)	.81 (.12)	.90 (.07)	.90 (.07)	.91 (.07)
	Student	.66 (.19)	.87 (.08)	.94 (.03)	.95 (.04)	.94 (.03)
Happy						
	Low PPI	.71 (.14)	.92 (.04)	.96 (.02)	.96 (.02)	.96 (.02)
	High PPI	.73 (.16)	.92 (.05)	.95 (.04)	.95 (.05)	.95 (.04)
	Student	.79 (.08)	.95 (.02)	.97 (.01)	.97 (.01)	.97 (.01)
Sad						
	Low PPI	.58 (.13)	.79 (.12)	.89 (.07)	.92 (.06)	.93 (.05)
	High PPI	.62 (.17)	.78 (.13)	.90 (.08)	.91 (.11)	.91 (.07)
	Student	.62 (.15)	.87 (.07)	.94 (.07)	.95 (.03)	.95 (.03)

Taken together, these results indicate that the student group showed a greater ability to discriminate between emotional expressions than either offender group. The

student group also showed a better ability to discriminate between emotions on more ambiguous morphed expressions than the two offender groups. Counter to hypotheses, the high psychopathy group did not differ significantly from the low psychopathy group. The two offender groups performed very similarly, with both offender groups showing poorer affect recognition than the student group. Moreover, on morphed expressions, both offender groups showed relatively high recognition accuracy, even at lower intensities such as the 50 and 60% intensity expressions. Thus, even the high psychopathy offenders were generally highly accurate at recognising others' emotions, further suggesting that psychopaths do not show a major deficit at affect recognition.

Most studies using statically presented morphed facial expressions have failed to find psychopathy-related deficits in affect recognition (Del Gaizo & Falkenbach, 2008; Hastings et al., 2008). However, Dolan and Fullam (2008) did show an impairment in sadness recognition among psychopaths. The similarity in responding between the low and high psychopathy groups is in contrast with the findings from the Blair animated morph methodology which show that psychopathic offenders consistently require more intense emotional expressions before they can accurately recognise fearful expressions than non-psychopathic offenders (Blair et al., 2004; Blair & Cipolotti, 2000; Mitchell et al., 2006). The current study used similarly ambiguous facial expressions to those used in these previous animated morph studies. However, the current study presented these stimuli as static images, while the studies by Blair and colleagues presented participants with an animated morph (Blair et al., 2004; Blair & Cipolotti, 2000; Mitchell et al., 2006). This difference in the way morphed images were presented may account for the differences between the findings of the current task and findings from the animated morph task. As discussed in Chapter Five, the animated morph results may indicate problems in altering responses rather than deficits in recognising fear.

7.1.5 A' values for 40% Faces

The affect recognition data were then condensed further; for use in the regression analyses presented later in the results, a single recognition value was extracted for each emotion. The data reported in Figures 7.1 through 7.4, and in Table 7.7 indicated that the majority of the sample appeared to show a relatively high level of accuracy in recognising emotions by the 40% intensity, but that there was still considerable variability within the sample at this intensity, and performance was on neither the ceiling nor the floor. Therefore, participants' accuracy to the 40% intensity face, as measured by *A'* values, was considered to be the best individual outcome measure for each emotion. Table 7.8 shows the average *A'* accuracy scores for each of the three groups at the 40% intensity for each emotion.

Table 7.8: Means (standard deviations) and ANOVA values for the student, high psychopathy and low psychopathy offender groups mean *A'* scores to the 40% faces for 4 emotions.

	Student *N*=42	Low PPI *N*=40	High PPI *N*=40	ANOVA *F*(2,119)
Angry	.91 (.05)	.85 (.11)	.88 (.08)	5.06**
Fearful	.87 (.08)	.79 (.11)	.81 (.12)	5.89**
Happy	.95 (.02)	.92 (.04)	.92 (.05)	8.27**
Sad	.87 (.07)	.79 (.12)	.78 (.13)	7.35**

**p<.01

A repeated measures ANOVA was conducted with *A'* values to the 40% intensity faces as the dependent variable. Emotion was entered as the repeated measure, with 4

levels (angry, fearful, sad, happy). Group was entered as a between subjects factor, with 3 levels (high psychopathy, low psychopathy, student). Consistent with the previous analyses, this repeated measures ANOVA showed a significant main effect of emotion, $F(3,117)=59.67$, $p<.001$, $\eta_p^2=0.61$, and a significant main effect of group, $F(2,119)=10.98$, $p<.001$, $\eta_p^2=0.16$. Tukey post-hoc tests showed a significant difference between the student group and both the low psychopathy group ($p<.001$) and the high psychopathy group ($p<.01$), with the student group showing higher recognition accuracy. The low and high psychopathy offender groups did not differ from one another. The interaction effect between emotion and group approached but did not reach statistical significance, $F(6,234)=1.92$, $p=.08$, $\eta_p^2=0.05$.

This interaction effect was followed up with a series of one-way ANOVAs where group (3 levels) was entered as the independent variable, and *A'* values to the 40% intensity expression was entered as the dependent variable for each emotion in a separate ANOVA. These ANOVAs showed a significant main effect of group for each emotion. Tukey post hoc tests showed that for fearful, sad, and happy faces, the student group showed significantly better discriminability than both offender groups, while the two offender groups did not differ. Interestingly, for the recognition of angry facial expressions, the student group showed significantly better discriminability than the low psychopathy group ($p<.01$), but was not significantly different from the high psychopathy group ($p=.20$). Thus, counter to all previous analyses showing a difference between the student and high psychopathy groups, this difference was between the student group and the low psychopathy group. The low and high psychopathy groups did not differ significantly on any emotional expression. These results indicate that the student group showed consistently better discriminability between all emotions than the low psychopathy offender group, and outperformed the high psychopathy group on

discriminability for all emotions except anger. The low and high psychopathy offender groups showed a similar ability to discriminate between emotions for all emotional expressions. Again, these results are consistent with the majority of previous research using statically presented morphs which find no evidence of affect recognition deficits (Del Gaizo & Falkenbach, 2008; Hastings et al., 2008).

Across all analyses, the low and high psychopathy groups were not significantly different. However, both offender groups were poorer at affect recognition than the student group. Thus, while there appeared to be no relationship between psychopathy and affect recognition, there was a difference between the student and offender samples. The difference between offenders and students was consistent across all emotions, providing evidence that the students were generally better at affect recognition, but no evidence that this difference in performance affected specific emotions.

The Violence Inhibition Mechanism and Integrated Emotion System theories suggest a deficit specific to the recognition of distress emotions. However, the current results provided no evidence of a specific recognition deficit either among the high psychopathy group or among the offender sample as a whole. Moreover, when errors were investigated, the student group tended to make the fewest errors, but the pattern of errors was largely consistent between the student, low psychopathy and high psychopathy groups.

7.1.6 Factor Prediction of Performance on the FAR task

The affect recognition results presented thus far indicate that overall, the high psychopathy offender group does not differ on affect recognition from the low

psychopathy offender group. Thus, there does not appear to be an effect of psychopathy on affect recognition performance evident in these between groups analyses.

Regression analyses were conducted in order to further investigate any potential effect of psychopathy on affect recognition performance. Two separate regression analyses were conducted. First, the two factors of psychopathy identified in the Principal Components Analysis discussed in Part One were used as predictors to investigate the major components of psychopathy in relation to affect recognition[10]. As described in Part One, these factors include a Bold Fearlessness factor, measuring an absence of fear and anxiety, and the presence of self-assurance, and a Mean/ Disinhibited factor, measuring the presence of externalising behaviours, aggression, and use of others for one's own gain. Questionnaire data were only obtained from participants in the offender sample, and not from participants in the student sample. Therefore, the data presented here are only from the offender sample. The affect recognition outcome variables used in these regression analyses were the *A'* values for the 40% faces for each emotion. The two PCA factors did not significantly predict participants' accuracy in recognising angry,R^2=.00,F(2,77)=.08, p=.92; fearful, R^2=.02,F(2,77)=0.68, p=.51; happy, R^2=.02,F(2,77)=0.83, p=.44; or sad, R^2=.04,F(2,77)=1.40, p=.25 facial expressions[11]. Therefore, the two components of psychopathy were not significant predictors of participants' accuracy at recognising any of the four facial expressions.

[10] The factor scores used here were those generated from the regression method described in Part One, using an orthogonal rotation. The analyses using these regression scores were also conducted using the factor scores generated from the regression method using an oblique rotation (oblimin) and returned equivalent results.

[11] The same series of regressions were run with PPI-R:SF total scores as the predictor variable. Consistent with the results presented earlier, PPI-R:SF total scores did not significantly predict participants' FAR accuracy for any of the four emotional expressions.

Second, theoretically relevant scales were used as predictors of affect recognition performance. As described in Part One, the TriPM Meanness scale and the PPI-R Coldheartedness scale both include the low empathy and emotional detachment components of psychopathy. Therefore, these scales are believed to be most theoretically relevant to facial affect recognition abilities. As the PPI-R:SF Coldheartedness scale was not included in the PCA factor solution, a series of regression analyses were run with these theoretically relevant scales — TriPM Meanness and PPI-R:SF Coldheartedness — entered as predictors of participants' *A'* values to the 40% intensity expressions. The combined model of TriPM Meanness and PPI-R:SF Coldheartedness was not significant in the prediction of affect recognition accuracy for angry, R^2=.01,F(2,77)=.38, p=.69; fearful, R^2=.03,F(2,77)=1.33, p=.27; happy, R^2=.03,F(2,77)=1.05, p=.36; or sad, R^2=.01,F(2,77)=0.34, p=.71 facial expressions. Therefore, despite a theorised relationship between TriPM Meanness, PPI-R Coldheartedness and affect recognition ability, Meanness and Coldheartedness were not significant predictors of affect recognition accuracy for any of the four emotions[12]. Taken together, these regression analyses indicate that scores on measures of psychopathy were unrelated to participants' affect recognition performance, including those theoretically relevant scales measuring low empathy and emotional detachment[13].

[12]As noted in Chapter 5, trait anxiety is also related to affect recognition performance. Therefore, this regression analysis was re-run with STAI Trait Anxiety entered into the first step in order to control for any effect of trait anxiety. STAI Trait Anxiety was not a significant predictor of any FAR outcome variables, and the inclusion of STAI Trait Anxiety did not alter the pattern of results when PPI-R:SF Coldheartedness and TriPM Meanness were entered into the second step.

[13] In order to investigate whether any specific psychopathy traits were related to facial affect recognition performance, the same series of regressions were run with the eight PPI-R:SF scale scores entered as predictor variables. PPI-R:SF scale scores did not significantly predict participants' affect recognition accuracy for any of the four emotional expressions.

This finding is consistent with previous research by Book and colleagues (2007) and Glass and Newman (2006) who found no relationship between continuous psychopathy scores and affect recognition. However, Dolan and Fullam (2006), and Hastings and colleagues (2008) showed relationships between total PCL-R scores and affect recognition, and some specific relationships, predominantly with the PCL-R antisocial facet or lifestyle/antisocial factor. In the current study, even the theoretically relevant scales failed to predict scores on the affect recognition task.

7.1.7 Facial Affect Recognition Results Summary

Across analyses, the low and high psychopathy groups did not differ significantly from one another on any affect recognition measures, including recognition of both full intensity (i.e., 100%) expressions, and lower intensity morphed expressions. The student group showed significantly better performance than the high psychopathy group on almost all measures, including recognition of 100% intensity expressions and lower intensity morphed expressions. The low psychopathy group did not differ significantly from the student group on accuracy for the full intensity expressions, but this difference did approach significance once response bias was controlled for. Moreover, the low psychopathy group did show significantly poorer recognition of lower intensity morphed expressions than the student group. Across analyses, the low psychopathy group's performance appeared more similar to that of the high psychopathy group's than to the student group's. Thus, within the offender sample there appeared to be no relationship between psychopathy and affect recognition. Similarly, regression analyses showed that psychopathy variables were unable to significantly predict affect recognition, including the theoretically relevant scales PPI-R:SF Coldheartedness and TriPM Meanness. Thus, differences were observed between

students and offenders, but no differences relating to psychopathy were observed. Possible reasons for the observed difference between students and offenders are discussed in the general discussion in Chapter Eight.

The previous research in this area has produced mixed results, with some studies showing evidence of psychopathy-related affect recognition deficits (e.g. Blair &Cipolotti, 2000; Blair et al., 2004; Iria& Barbosa, 2009; Mitchell et al., 2004; Montagne et al., 2005), and other studies showing no evidence of affect recognition deficits (Book et al., 2007; Del Gaizo & Falkenbach, 2008; Glass & Newman, 2006; Gordon et al., 2004). As discussed in Chapter Five, these different findings may be the result of differences in task methodology across studies, such as the use of the animated morph or statically presented facial expressions. The results of previous studies may also be affected by issues of response bias which have not been controlled for in these studies. The results now turn to the analysis of participants' performance on the fear conditioning task.

7.2 Conditioning Task

The results presented here include a comparison of the high and low psychopathy groups' pattern of GSR responses to the conditioned and unconditioned stimuli. Based on low fear theories of psychopathy, it was hypothesised that the high psychopathy group would show lower GSR responses to the conditioned stimulus relative to the low psychopathy group, and less discrimination between the CS+ and CS-. Subsequently, the PCA-derived factors discussed in Part One were used to predict performance on the fear conditioning task. The scales most theoretically relevant to fear conditioning are those measuring anxiety and fearfulness: PPI-R:SF Fearlessness, PPI-R:SF Stress Immunity, and STAI Trait Anxiety. All three of these scales load onto the

Bold Fearlessness factor (trait anxiety shows an inverse loading); higher scores on the Bold Fearlessness factor were expected to predict smaller conditioned GSR responses.

7.2.1 Unconditioned Response

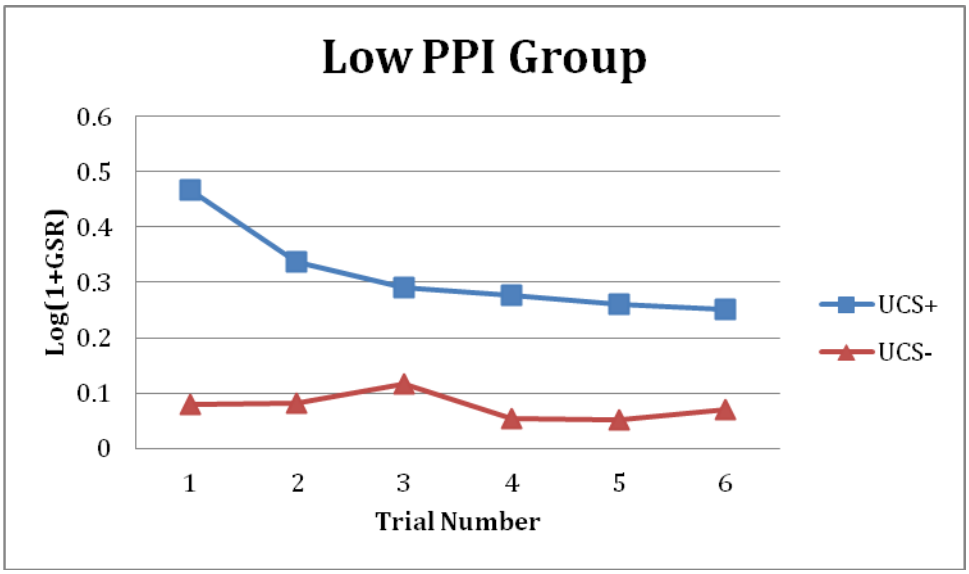
This first section of the fear conditioning results presents the low and high psychopathy groups' responses to the aversive unconditioned stimulus (UCS+) across trials. To analyse responses to the unconditioned stimulus across trials, a repeated measures ANOVA was conducted with unconditioned responses as the dependent variable. The ANOVA had 2 within-subjects variables: trial (6 levels) and stimulus (2 levels; UCS+ and UCS-[14]), and psychopathy group as the between-subjects variable with 2 levels (high psychopathy and low psychopathy). A Sidak correction was used to correct for multiple comparisons. Participants with missing data on any trial were excluded from the analysis, resulting in a sample of 25 participants in the low psychopathy group, and 19 participants in the high psychopathy group in this ANOVA. This ANOVA was conducted for the purpose of identifying the pattern of responses across trials, with further analyses presented below. The subsequent analyses maximise sample size and are thus more robust. Figure 7.5 shows participants' GSR responses to the unconditioned stimulus, and includes all available data.

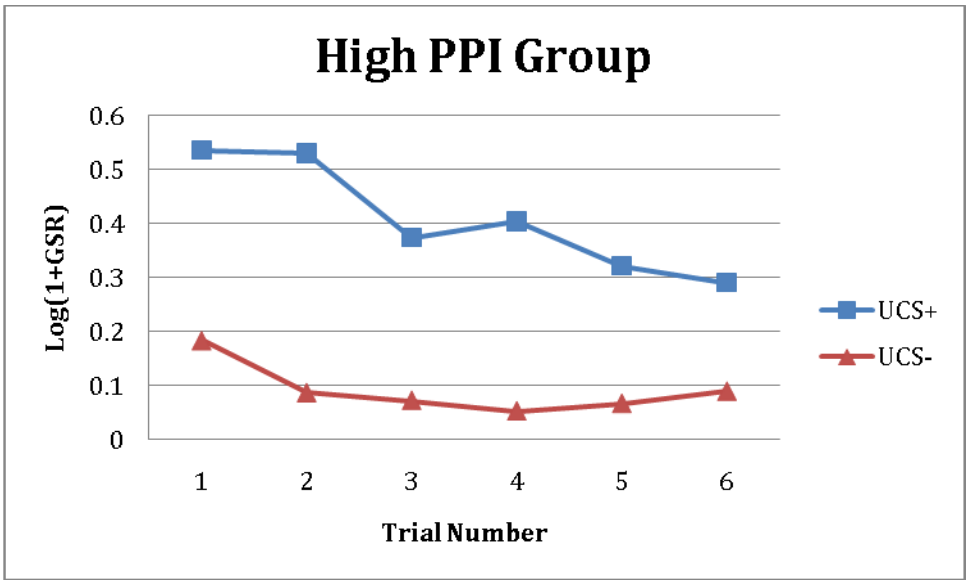
This ANOVA found a significant main effect of stimulus, $F(1,42)=49.99$, $p<.001$,$\eta_p^2=0.54$, on unconditioned responses. As indicated in Figure 7.5, responses were consistently larger to the UCS+ than the UCS-. This difference indicates that participants were showing significant GSR responses to the noise burst. A significant main effect of trial, $F(5,38)=3.96$, $p<.01$, $\eta_p^2=0.34$, was also found. As figure 7.5 shows, responses were largest on the earliest trials, decreasing as trials progressed, indicating

[14] NB: The UCS+ is an aversive noise burst; the UCS- is not a stimulus, but represents a response during the window corresponding to that of the UCS+, and is used for comparison purposes.

that participants habituated to the noise. No significant interaction effect between stimulus and trial was found. There was no significant main effect of group, $F(1,42)=1.76$, $p=.19$, $\eta_p^2=0.04$, and no significant interaction effects between group and other variables. These results suggest that both the high and low psychopathy groups were responding to the UCS+ in the same way. Thus, psychopathy did not appear to influence participants' responses to the UCS.

Figure 7.5: Unconditioned GSR responses to the UCS+ and UCS- by PPI psychopathy group.





Reactivity: In order to reduce the number of dependent variables, and to extract a single outcome variable for use in the regression analyses to be presented later in the results, participants' responses to the first UCS presentation were used as a single measure of their reactivity to the unconditioned stimulus; this variable has therefore been labelled *reactivity*. This single variable was available for the majority of the sample: 38 participants in the low psychopathy group, and 38 participants in the high psychopathy group.

As demonstrated in figure 7.5, responses to the UCS+ were largest on trial one, and habituated over time. The high and low psychopathy groups' reactivity scores were compared using an independent samples t-test. Consistent with the ANOVA presented above, the t-test found no significant difference between the high psychopathy group (M=.54, SD=.69) and the low psychopathy group (M=.47, SD=.24) on response to the first UCS presentation, $t(74)$=.59, p=.56. A small Cohen's d effect size of 0.14[15] further suggested that the two groups' responses were highly similar.

Similar responses between groups to the UCS is consistent with the majority of previous research using a range of aversive stimuli, including electric shock (Hare, 1965), foul odour (Flor et al., 2002) and painful pressure (Birbaumer et al., 2005).This similarity in unconditioned response between groups is important for interpreting conditioned responses. Different responding to the unconditioned stimulus between groups may artificially create a difference in response to the conditioned stimulus as participants should show a conditioned response proportionate to their unconditioned response. Therefore, since the two groups in the current study did not differ on their

[15] Cohen's *d* effect sizes indicate the magnitude of the difference between two groups. Effect sizes between 0.30 and 0.80 are considered of medium magnitude, while effect sizes above 0.80 are considered of large magnitude (Pallant, 2007).

response to the unconditioned stimulus, any difference in their response to the conditioned stimulus is specific to their conditioned response.

7.2.2 Conditioned Response

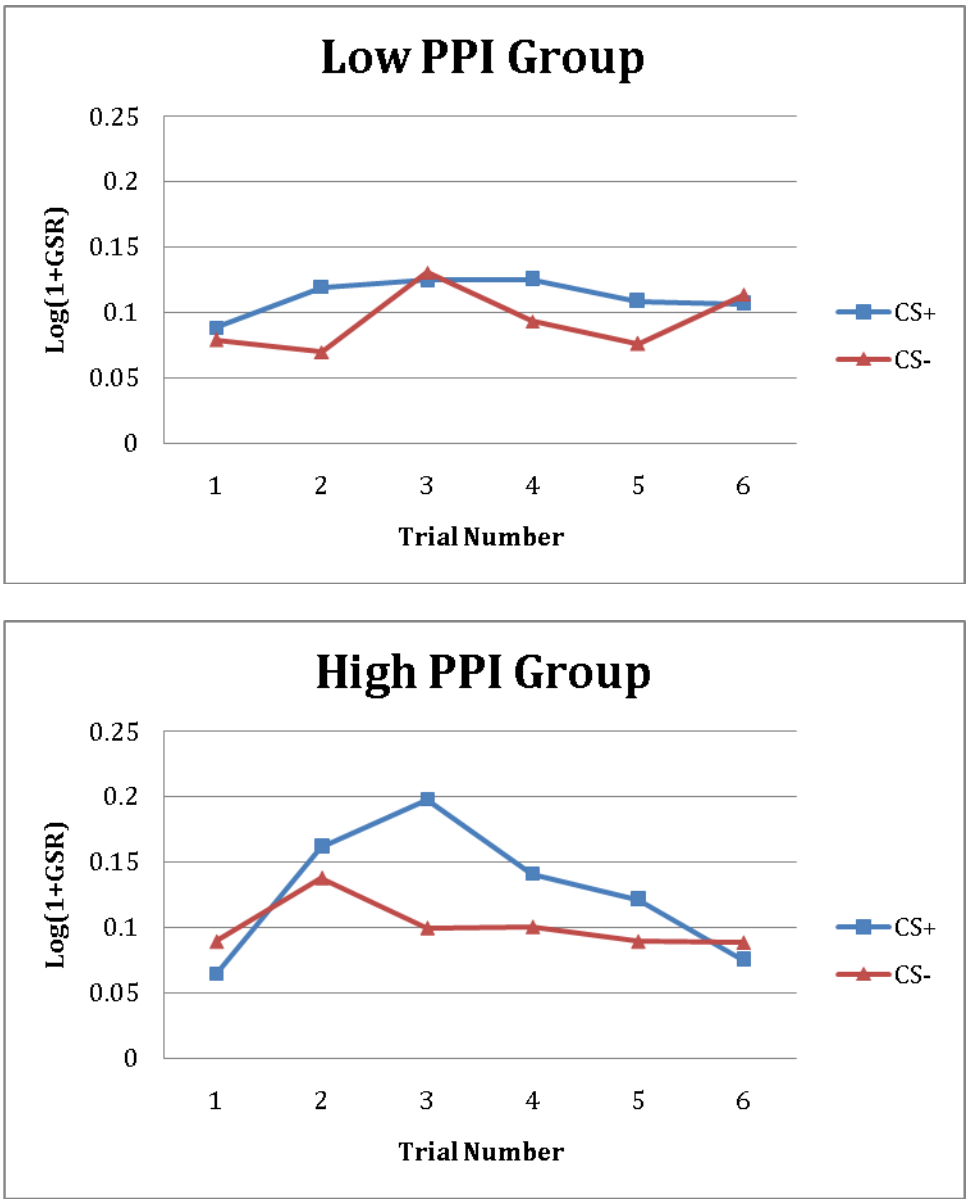
This next section investigates participants' conditioned responses, comparing the performance of the low and high psychopathy groups across trials, and to both the CS+ and the CS-. Consistent with the low fear theories of psychopathy, it was hypothesised that the high psychopathy group would show smaller GSR responses to the CS+ than the low psychopathy group. It was further hypothesised that this reduced responding to the CS+ would result in psychopaths failing to discriminate between the CS+ and the CS-. To analyse the difference in responses to the conditioned stimuli between the high and low psychopathy groups across trials, a repeated measures ANOVA was conducted with 2 repeated-measures variables: trial (6 levels) and stimulus (2 levels; CS+ and CS-), and group as the between-subjects variable with 2 levels (high psychopathy and low psychopathy). A Sidak correction was used to correct for multiple comparisons. Figure 7.6 shows participants' GSR responses to the two faces (CS+ and CS-) across conditioning trials, and includes all available data. The ANOVA excluded participants with missing data on any trial from the analysis, reducing sample size to 25 low psychopathy participants, and 17 high psychopathy participants. Again, this analysis was conducted for the purpose of identifying the pattern of responses across trials, with the subsequent analyses maximising sample size.

This ANOVA showed a significant main effect of stimulus, $F(1,40)=8.80$, $p<.01$, $\eta_p^2=0.18$. As seen in Figure 7.6, participants showed larger GSR responses to the CS+ than to the CS-. This finding is consistent with participants showing a learned response to the CS+ in anticipation of the unconditioned stimulus. The main effect of trial was not

statistically significant, $F(5,36)=2.02$, $p=.10$, $\eta_p^2=0.22$, indicating a similar level of GSR responding by participants across trials. The main effect of psychopathy group was not statistically significant, $F(1,40)=0.29$, $p=.59$, $\eta_p^2=0.01$, indicating similar responding between the low and high psychopathy groups.

No two-way interaction effects reached statistical significance. However, the three-way interaction effect between trial, stimulus, and group approached significance, $F(5,36)=2.18$, $p=.08$, $\eta_p^2=0.23$, indicating a tendency for the two groups to respond differently to the two stimuli across trials. Figure 7.6 shows that those in the low psychopathy group tended to have a flatter pattern of scores across trials to both the CS+ and the CS-, whereas those in the high psychopathy group showed a pattern of GSR responses to the CS+ which increased from trial one to trial three, and then decreased from trial four to trial six, while their responses to the CS- were relatively flat across trials. The pattern of responses to the CS+ by the high psychopathy group is consistent with that typically shown in conditioning research, where conditioned responses peak as the CS-UCS contingency is learnt, and then habituate over time. Thus, those in the high psychopathy group showed a more typical conditioning pattern than the low psychopathy group, with the low psychopathy group showing a flatter pattern of responses to the CS+. This finding is in direct contradiction to the hypothesis that high psychopathy scorers would show reduced conditioned responses. In order to further investigate the relationship between psychopathy and conditioning, learning and discrimination variables were derived from the GSR data.

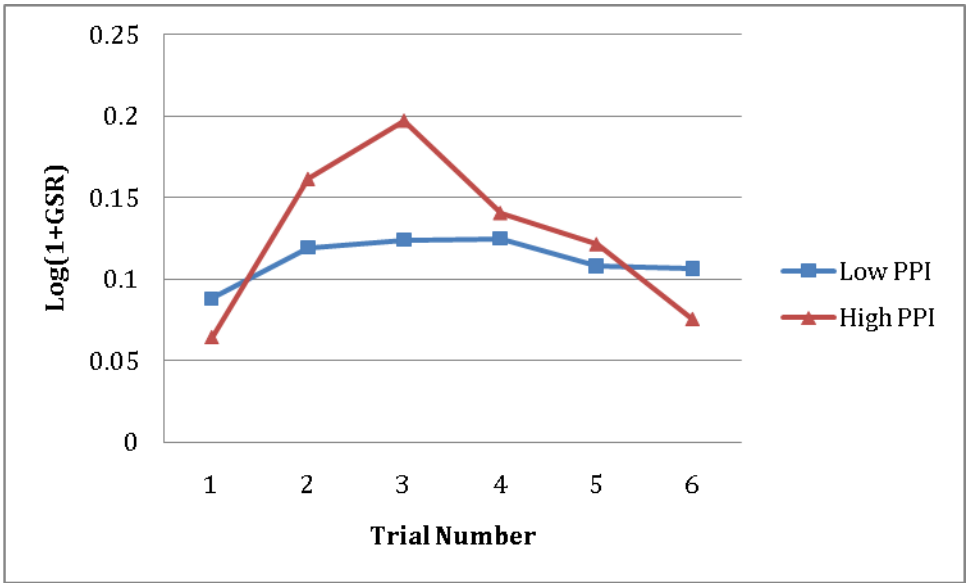
Figure 7.6: GSR responses to the CS+ and CS- by PPI psychopathy group.



Learning: A measure of learning was extracted by taking each participant's GSR response to the CS+ on trial three minus their response to the CS+ on trial one. Figure 7.7 shows a comparison of the high and low psychopathy groups' GSR responses to the CS+ across trials. As indicated in figure 7.7, trial three is where participants show the highest level of responding to the CS+ before they begin to habituate. Therefore trial three was considered to be the best indicator of the learnt response. On trial one,

participants had not yet heard the noise burst paired with the face, therefore this trial acted as a baseline level of responding to the face. The increase in response from trial one to trial three is taken as a measure of the learnt CS+ response, and is henceforth referred to as the variable *learning*. The learning variable was able to maximise sample size by including all participants with data available on the CS+ trials 1 and 3, irrespective of missing data on other trials. For the learning variable, data were available for 36 participants in the low psychopathy group, and 36 participants in the high psychopathy group.

Figure 7.7: Low and high PPI psychopathy group GSR responses to the CS+.



An independent samples t-test was conducted to compare the high and low psychopathy groups on the learning variable. The difference between the two groups approached statistical significance, $t(70)=1.79$, $p=.08$, with the high psychopathy group showing greater learning ($M=.13$, $SD=.24$) than the low psychopathy group ($M=.05$, $SD=.17$). A Cohen's d effect size of 0.38 indicated a medium size difference between the two groups' scores.

In order to further understand each group's pattern of learnt responses, paired sample t-tests were conducted for the high and low psychopathy groups separately, investigating each group's change in responding from trial one to trial three. The low psychopathy group showed no significant change in conditioned response from trial one (M=.08, SD=.11) to trial three (M=.13, SD=.17), $t(35)=1.69$, p=.10, d=0.35. The high psychopathy group showed significantly larger GSR responses to trial three (M=.20, SD=.20) than to trial one (M=.07, SD=.10), $t(35)=3.36$, $p<.01$, d=0.82. Thus, the low psychopathy group failed to show evidence of a learnt response, while the high psychopathy group did show a learnt response to the CS+. This finding is counter to the hypothesis that the high psychopathy group would show less learning of the conditioned association. Of note, the two psychopathy groups responses to trial one alone were not significantly different, as shown by an independent samples t-test, $t(73)=.96$, p=.34, d=0.22. This finding indicates that there was no difference in responding between the two groups to the CS+ prior to the onset of the UCS.

Discrimination: In line with the low fear theories of psychopathy, it was predicted that the high psychopathy group would show a poorer ability to discriminate between the CS+ and CS-, and that this poor discrimination would be driven by an absence of responding to both the CS+ and the CS-. A variable measuring participants' ability to discriminate between the conditioned stimulus (CS+) and the control stimulus (CS-) was created to test this hypothesis. Again, trial three was used as participants' responses to the CS+ were at their peak on this trial before showing habituation, for both the low and high psychopathy groups. The *discrimination* variable was calculated by subtracting participants' GSR response to the CS- on trial three from their GSR response to the CS+ on trial three. Therefore this variable measures how much stronger the participant's response was to the CS+ compared to the CS- at the height of

conditioning[16]. The discrimination variable was able to maximise sample size by including all participants with data available on trial three for the CS+ and CS-, irrespective of missing data on other trials; 37 participants in the low psychopathy group, and 36 participants in the high psychopathy group had discrimination data.

An independent samples t-test was conducted to compare high and low psychopathy groups on discrimination between the CS+ and CS-. The two groups' scores were significantly different, $t(71)=3.57$, $p<.01$, with the high psychopathy group showing significantly greater GSR discrimination between the CS+ and CS- ($M=.12$, $SD=.17$) than the low psychopathy group ($M=.00$, $SD=.14$). The effect size (Cohen's d) was 0.77, indicating a medium size difference between the two groups' scores. These findings indicate that those scoring highly on psychopathy showed a greater ability to discriminate between the conditioned stimulus (CS+) and the control stimulus (CS-). This finding is the opposite of what was hypothesised based on low fear theories of psychopathy.

Visual inspection of Figure 7.6 suggests that the difference in discrimination was driven by the low psychopathy group's failure to show increased responding to the CS+ relative to the CS-. Follow up analysis using paired samples t-tests for the high and low psychopathy groups separately found that the low psychopathy group showed no significant difference between responses to the CS+ ($M=.13$, $SD=.17$) and the CS- ($M=.13$, $SD=.17$) on trial three, $t(36)=.29$, $p=.77$, $d=0.00$. The high psychopathy group however, showed significantly larger responses to the CS+ on trial 3 ($M=.21$, $SD=.20$) than to the CS- on trial three ($M=.09$, $SD=.11$), $t(35)=4.36$, $p<.001$, $d=0.74$.

[16] As figure 7.6 shows, the low psychopathy group's responses to the CS+ and CS- were very similar on trial 3, and there seemed to be a small peak in responses to the CS- on trial 3 among this group. In order to check that this peak was not masking any potential effect of stimulus, a series of paired samples t-tests were conducted to compare the low psychopathy group's responses to the CS+ and CS- on each trial. These paired-samples t-tests found no significant difference between responses to the CS+ and CS- on any trial for the low psychopathy group.

Taken together, the learning and discrimination findings suggest that the low psychopathy group failed to show a significant increase in GSR response to the CS+ across repeated pairings with the unconditioned stimulus. Therefore, the low psychopathy group showed no evidence of discrimination between the CS+ and CS- as they did not show increased responding to either stimulus. This pattern of results was expected of the high psychopathy group in line with low fear theories of psychopathy. However, the high psychopathy group did show evidence of both a learnt response to the CS+ and an ability to discriminate between the CS+ and the CS-. Therefore, the results observed in the current study show the opposite pattern to that hypothesised in the low fear theories of psychopathy. In relation to the Behavioural Inhibition/ Behavioural Activation System (BIS/BAS) theory of psychopathy, we would expect the proposed deficit in sensitivity to punishment (i.e., underactive BIS functioning) to render psychopaths less responsive to learning the conditioned association in the current research (Fowles, 1987). Alternatively, if an over-responsiveness to reward (i.e., an overactive BAS) produced psychopathy, we would expect no difference between the high and low psychopathy groups in the current study as the fear conditioning task does not involve any reward (Fowles, 1987). The poorer performance of the low psychopathy group on the fear conditioning task is inconsistent with the BIS/BAS theory of psychopathy regardless of the emphasis on an underactive BIS or an overactive BAS.

Previous research with psychopathic offender samples has shown reduced GSR responses to the CS+ relative to non-psychopathic offenders (Hare, 1965; Hare & Quinn, 1971) and non-psychopathic community controls (Hare, 1965; Lykken, 1957). No previous research has found a low psychopathy offender group to show reduced conditioned responses relative to a high psychopathy offender group. Thus, the current

findings are inconsistent with previous research. Two previous studies have shown that psychopathic participants fail to discriminate between the conditioned stimulus (CS+) and the neutral stimulus (CS-) relative to non-psychopathic community groups (Birbaumer et al., 2005; Flor et al., 2002). In contrast to these previous findings, it was the low psychopathy group who showed a failure to discriminate in the current research. However, the failure to discriminate appeared to show a different pattern in the current research to that shown in these previous studies. The current low psychopathy group failed to respond to either the conditioned or neutral stimuli, and thus failed to discriminate, while participants' self-report ratings of the contingency in previous research show increased expectancy of the UCS following both the CS+ and the CS- (Birbaumer et al., 2005; Flor et al., 2002). Thus, in these studies participants' failure to discriminate between stimuli may be the result of over-generalisation of the conditioned association, rather than a failure to learn the association. These two previous studies used participants recruited from the community, unlike the current offender sample, which may have influenced results. One possibility is that community psychopaths are more anxious, and this anxiety increases their anticipation of the aversive stimulus, thus producing heightened responses to both the CS+ and CS-. While recruited from the community, the sample collected by Birbaumer and colleagues (2005) was comprised of offenders and can therefore not be considered to represent a sample of 'successful' (i.e., non-criminal) psychopaths.

In a sample of university students, total PPI-R scores were unrelated to fear conditioning (Lopez et al., 2013). However, when factor scores were investigated, poorer fear conditioning was significantly associated with higher scores on the Fearless Dominance factor of the PPI-R, and a non-significant correlation was observed between higher scores on the Impulsive Antisociality factor of the PPI-R and *better* fear

conditioning once the shared variance between factors was accounted for. The results of the present research most resemble this non-significant correlation between higher Impulsive Antisociality and better fear conditioning. Thus, the better conditioning performance of the high psychopathy group may reflect higher scores on traits of impulsive antisociality, similar to the Mean/ Disinhibited factor derived in the Principal Components Analysis presented in Part One. The relationship between fear conditioning and traits of psychopathy is addressed in the following section, with analyses investigating the relationship between fear conditioning and continuous scores on psychopathy variables.

7.2.3 Prediction of fear conditioning using continuous psychopathy scores

The pattern of results described above, with the high psychopathy group showing better fear conditioning, was unexpected. One possibility for this unexpected pattern of results may be the role of anxiety. As described in Part One, primary and secondary variants of psychopathy differ on trait anxiety (e.g., Skeem et al., 2007). The relationship between psychopathy and fear conditioning may be moderated by anxiety. A hierarchical regression analysis was conducted to test this potential interaction, with PPI:R-SF total scores and STAI Trait Anxiety scores entered into the first step as predictors of each of the fear conditioning variables: reactivity, learning and discrimination. The interaction between PPI-R:SF and STAI Trait Anxiety scores was then entered as a predictor into the second step of the regression. As this regression analysis was investigating an interaction effect, scores on the predictor variables were centred. For reactivity to the UCS, the model was not significant, indicating that PPI-R:SF, STAI Trait Anxiety, and the interaction between PPI-R:SF and STAI were not significant predictors of reactivity. The regression model was also non-significant in the

prediction of the learning variable. This result is somewhat surprising given that the groups-based analyses showed a difference between the high and low psychopathy groups which approached significance on the learning variable. The regression model was significant in the prediction of discrimination between the CS+ and the CS-. These results are presented in Table 7.9.

Table 7.9: Regression equation for the prediction of Discrimination by PPI-R:SF, STAI-Trait Anxiety, and the interaction between PPI-R:SF and STAI.

	B	SE b	β	*p*
Step 1[a]				
PPI-R:SF	0.004	0.001	.38*	<.01
STAI Trait Anxiety	0.001	0.002	.06	.57
Step 2[b]				
PPI-R:SF	0.004	0.001	.37*	<.01
STAI Trait Anxiety	0.001	0.002	.07	.53
PPI-R:SF x STAI Trait Anxiety	0.000	0.000	.05	.71

[a]R^2=.14 (F(2,70)=5.66, p<.01).[b]R^2=.14 (F(3,69)=3.77, p<.05), R^2 *Change* = .002, p=.71.
*p<.01.

The first step of PPI-R:SF and STAI Trait Anxiety scores did significantly predict discrimination, with only PPI-R:SF scores showing a significant relationship. The interaction between PPI-R:SF and STAI scores entered into the second step did not add significantly to the prediction of discrimination scores. These results indicate that total psychopathy scores were predictive of discrimination, with higher psychopathy scores

predicting better discrimination. Trait anxiety was not a significant predictor of discrimination, and neither was the interaction between psychopathy and anxiety. Therefore, the relationship between psychopathy and discrimination is not mediated by an interaction between psychopathy and anxiety.

In order to investigate the relationship between performance on the fear conditioning task and the components of psychopathy, a series of regression analyses was conducted using the PCA derived factors described in Part One as predictors of performance on the conditioning task[17]. The conditioning outcome variables used in these regression analyses were *learning*, *discrimination*, and *reactivity* explained above. The PPI-R scales Fearlessness and Stress Immunity, and the STAI Trait Anxiety scale measure different components of fearfulness and anxiety theoretically relevant to psychopaths' ability to learn fear associations. All three of these scales load more highly on the Bold Fearlessness factor than the Mean/ Disinhibited factor. Therefore, the Bold Fearlessness factor was expected to predict fear conditioning.

The two PCA factors did not significantly predict learning, R^2=.04; F(2,69)=1.27, p=.29, or reactivity,R^2=.03; F(2,72)=0.96, p=.39. However, the two factors were significant in the prediction of discrimination. As reported in Table 7.10, the Mean/ Disinhibited factor significantly predicted discrimination, with higher Mean/ Disinhibited scores related to better discrimination between the CS+ and the CS-. This finding suggests that *higher* psychopathy scores on the Mean/ Disinhibited factor relate to *better* discrimination. This finding is consistent with the group comparisons presented above, but conflicts with low fear theories which suggest that higher

[17] As for the affect recognition results presented earlier, the factor scores used here were those generated from the regression method described in Part One, using an orthogonal rotation. The analyses using these regression scores were also conducted using the factor scores generated from the regression method using an oblique rotation (oblimin) and returned equivalent results.

psychopathy should be related to *poorer* fear conditioning. The Bold Fearlessness factor was not a significant unique predictor, despite the loadings of the theoretically relevant scales PPI-R:SF Fearlessness, PPI-R:SF Stress Immunity, and STAI Trait Anxiety on this factor[18]. The relationship between discrimination and the Mean/ Disinhibited factor, and the absence of a relationship between Bold Fearlessness and conditioning is counter to the low fear theories of psychopathy which suggest that fear conditioning performance should be related to fearfulness and anxiety.

Table 7.10: Regression equation for the prediction of Discrimination by the two PCA-derived factor scores.

	B	SE b	β	*p*
Constant	0.05	0.02		
Factor 1: Bold Fearlessness	0.02	0.02	.09	.41
Factor 2: Mean/ Disinhibited	0.06	0.02	.38*	<.01

R^2=.15 (F(2,70)=6.09, p<.01). *p<.01.

These findings are inconsistent with recent findings showing a relationship between impaired fear conditioning and the Fearless Dominance factor of the PPI-R (Lopez et al., 2013). However, inspection of the data presented by Lopez and colleagues also showed a non-significant positive correlation between the Impulsive Antisociality factor of the PPI-R and fear conditioning when partial correlations were used to control

[18] When the Mean/Disinhibited factor and the Bold Fearlessness factor were entered in separate steps into a hierarchical multiple regression, the Bold Fearlessness factor did not add significantly to the prediction model, R^2 *Change*=0.01, p=.41.

for the shared variance between the two PPI-R factors. This correlation indicates a relationship between higher Impulsive Antisociality and better fear conditioning. While non-significant, the direction of this relationship is consistent with the findings of the present research. The present research uses a similar methodology to that used by Lopez and colleagues, using a trait-based measurement of psychopathy and using images of facial expressions as conditioned stimuli, which may account for the similarity in findings. Differences in the sample between the present research and Lopez and colleagues' study may account for the different relationship between conditioning and the Fearless Dominance and Bold Fearlessness factors; the current sample was comprised of incarcerated offenders, while Lopez and colleagues' sample utilised university students.

As already noted, the conditioning findings presented above are highly inconsistent with low fear theories of psychopathy. The pattern of results observed in the present study is the opposite of the hypothesis that *higher* scores on psychopathy variables would predict *poorer* fear conditioning. The current findings show that those scoring highly on measures of psychopathy, especially those measures of mean and disinhibited psychopathic traits, are *better* able to learn conditioned fear associations than those offenders with low scores on these measures.

7.3 Integrating affect recognition and conditioning findings

This final section of the results investigates the relationship between performance on the two tasks, correlating outcome measures from each task. The ability of outcome variables from these two tasks to predict psychopathy scores is also investigated. The Integrated Emotion System theory suggests that both facial affect recognition and fear conditioning performance involve the amygdala, with the amygdala

deficit which characterises psychopathy rendering psychopaths unable to perform normally on these two tasks. Thus, according to the Integrated Emotion System theory, deficits on the two tasks should co-occur in psychopathy. Following this theory, it was anticipated that performance on the two tasks would be correlated. Moreover, the etiological theories of psychopathy suggest that the deficits in responding to others' emotions and learning from fear produce psychopathy by making socialisation difficult. Thus, performance on these two tasks was expected to predict scores on psychopathy measures, with poorer task performance predicting higher psychopathy scores.

7.3.1 Correlations between affect recognition and conditioning variables

Correlations were calculated between the four outcome variables from the facial affect recognition task — the *A'* for each emotion at the 40% intensity —and the three outcome variables in the conditioning task — learning, discrimination, and reactivity — to investigate the relationship between performance on the two tasks.

Table 7.11: Correlations between affect recognition and conditioning outcome variables.

	Conditioning Variables		
Affect Recognition	Learning	Discrimination	Reactivity
Angry	-.02	-.09	-.07
Fearful	-.11	-.05	-.12
Happy	-.08	-.07	-.15
Sad	-.11	-.01	.03

All *p* values greater than 0.10.

As shown in Table 7.11, there was no significant relationship between the two sets of variables, and all correlations were small, indicating no relationship between

performance on the facial affect recognition task and performance on the conditioning task. This finding is counter to the hypothesis generated from the Integrated Emotion System theory that performance on the two tasks would be related.

7.3.2 Prediction of psychopathy scores

The regression analyses presented earlier in this chapter used scores on measures of psychopathy to predict task performance on the facial affect recognition and fear conditioning tasks. These analyses are in keeping with the general trend in the literature to use psychopathy scores to investigate task performance. However, theoretically, task performance should predict psychopathy scores as deficits in the processes measured by these tasks are believed to contribute to the development of psychopathy. In order to investigate this relationship, outcome variables from the two tasks were entered as combined predictors in a regression analysis, with the two factors derived from the Principal Components Analysis conducted in Part One used as dependent variables. For the conditioning task, the predictor variables selected were the measures learning, discrimination, and reactivity described in section 7.2. For the affect recognition task, participants' *A'* values to the 40% intensity morph for each emotion were entered as predictor variables. The resulting set of seven predictor variables were entered into the regression equation. This set of seven variables was not a significant predictor of either scores on the Mean/ Disinhibited factor (R^2=.14, $F(5,57)=1.27$, p=.28), or the Bold Fearlessness factor (R^2=.13, $F(7,57)=1.20$, p=.32). These results indicate that none of the outcome variables from the affect recognition and conditioning tasks were able to predict scores on the two current factors.

These seven task variables were also entered into a regression analysis as predictors of total PPI-R:SF scores. This regression approached statistical significance.

As shown in Table 7.12, the only significant individual predictor of PPI-R:SF scores was discrimination, with higher discrimination scores predicting higher PPI-R:SF total scores. This finding is consistent with the results presented earlier, where the high psychopathy group showed better discrimination between the CS+ and CS-. This finding also shows that of all of the task variables, only participants' ability to discriminate between the CS+ and the CS- was predictive of psychopathy scores. Thus, counter to the hypothesis generated from the low fear, VIM, and IES theories of psychopathy that task performance would predict psychopathy scores, almost all task variables were unable to predict either total psychopathy scores or psychopathy factors. Moreover, the prediction of PPI-R:SF scores by discrimination scores was again in the opposite direction to that hypothesised by the low fear theories of psychopathy.

Table 7.12: Regression equation for the prediction of total PPI-R:SF scores by the outcome variables of the affect recognition and fear conditioning tasks.

	B	SE b	β	*p*
Constant	77.10	44.43		
Angry *A'* 40% intensity	25.30	22.83	.16	.27
Fearful *A'* 40% intensity	25.06	21.13	.17	.24
Happy *A'* 40% intensity	26.18	49.11	.07	.60
Sad *A'* 40% intensity	-17.53	18.88	-.14	.36
Learning	-10.71	11.84	-.13	.37
Discrimination	49.03	15.55	.45*	<.01
Reactivity	2.86	3.60	.10	.43

R^2=.19 (F(7,57)=1.91, p=.08). *p<.01.

The results presented here do not support the hypothesis generated from the Integrated Emotion System theory that performance on the two tasks would be related, or the hypothesis that poorer performance on the affect recognition and fear conditioning tasks would predict higher psychopathy scores. These findings question the assumption that impairments at recognising others' emotions and in learning conditioned fear associations lead to psychopathy, or at least that these impairments are the only route to psychopathy, as those with psychopathic traits in the current sample did not have these deficits.

Taken together, the current findings do not support current etiological theories of psychopathy which propose attenuated fear and reduced responsiveness to others' distress as core mechanisms in the development of psychopathy. The findings indicated no relationship between psychopathy and affect recognition, and no evidence of impaired fear conditioning among psychopaths. Rather, high psychopathy scores were associated with better fear conditioning, particularly better discrimination between the conditioned and neutral stimuli. Thus, in the current sample no psychopathy-related deficits were observed, counter to theories of psychopathy, and counter to common beliefs about the deficits which characterise psychopathy.

Chapter Eight: General Discussion

It was hypothesised that a three-factor solution would best fit the presentation of psychopathy in the present sample. However, a two-factor solution emerged which encompassed most of the questionnaire scales. In the current sample, psychopathic traits were comprised of a Bold Fearlessness factor measuring an absence of fear and anxiety, a Mean/ Disinhibited factor measuring aggressive disinhibition, and a distinct Coldheartedness scale measuring lack of empathy, which did not load on either factor. Counter to expectation, it was solely the Coldheartedness scale that presented as a distinct low empathy component, rather than a third factor comprised of Meanness and Coldheartedness. TriPM Meanness was uncorrelated with Coldheartedness, but was strongly correlated with Disinhibition. Importantly, the current sample showed psychopathy scores which indicated levels of psychopathy consistent with previous samples of criminal offenders.

The task findings indicate that psychopathy was unrelated to affect recognition ability, across traits of psychopathy, and that higher psychopathy — in particular, higher Mean/ Disinhibited factor scores — was associated with better fear conditioning. These results are inconsistent with low fear, Violence Inhibition Mechanism (VIM) and Integrated Emotion System (IES) theories of psychopathy. This chapter will first provide a discussion of the presentation of psychopathy in the current sample, and then discuss the unexpected pattern of findings shown on the experimental tasks. Finally, limitations of the current research will be addressed, and the implications of this research for theory and policy will be discussed.

8.1 Psychopathy in the present sample

One core argument of the Triarchic Model is that psychopathy presents as the combination of disinhibition and either boldness or meanness (Patrick et al., 2009). These two 'pathways' to psychopathy suggest two possible types of psychopath: a 'bold psychopath', and a 'mean psychopath'. The current findings are consistent with separate boldness and meanness components. However, the current findings indicate that little of the meanness component is distinct from disinhibition, at least within the current criminal sample. If the presence of disinhibition and meanness characterises one 'type' of psychopathy, then these two traits should only co-occur in a subset of the criminal population who are psychopathic. However, in the current sample meanness and disinhibition were strongly correlated across the entire offender sample. This finding suggests that the combination of meanness and disinhibition may reflect aggressive and disinhibited criminality, rather than a more specific psychopathic presentation.

Higher meanness scores were associated with higher anxiety in the current sample, seemingly inconsistent with the suggestion that meanness is associated with high emotional stability, and produced by an underlying fearless temperament (Patrick et al., 2009). Perhaps then, the conceptualisation of psychopathy as comprised of meanness and disinhibition reflects high anxious secondary psychopathy, while psychopathy comprised of boldness and disinhibition may reflect primary psychopathy, characterised by an absence of fear and anxiety.

The aggressive and disinhibited presentation evident in high Meanness and Disinhibition scores appears conceptually similar to the diagnosis of Antisocial Personality Disorder (ASPD; American Psychiatric Association, 2000). The diagnostic criteria for ASPD have long been criticised for their emphasis on criminal and antisocial

behaviours, and an absence of core personality components, such as cognitions, affectivity, and interpersonal functioning (e.g., Hare, Hart, & Harpur, 1991). Thus, ASPD appears to be over-inclusive of a range of offenders, and therefore capture a heterogeneous group. The emphasis on aggression and disinhibition is also consistent with the definition of psychopathy offered in the PCL-R, with its over-inclusiveness of highly antisocial individuals (Lilienfeld, 1994; Skeem & Cooke, 2010a). In particular, high scores on Meanness and Disinhibition seem consistent with an overarching PCL-R factor weighted heavily with disinhibited aggression (Patrick et al., 2007). These personality definitions which emphasise disinhibited aggression, are inclusive of a large and heterogeneous group of offenders. A less heterogeneous group of individuals may be identified as psychopathic if the definition of psychopathy was restricted to primary psychopathy (Lykken, 1995).

As noted above, the presence of boldness and disinhibition may indicate primary psychopathy, and better reflect the core psychopathy personality construct, including fearlessness. If the definition of psychopathy was constrained to the primary subtype, boldness may be crucial in differentiating psychopathy from other antisocial personalities. Given the strong correlation between meanness and disinhibition, it may be that psychopaths high on boldness and disinhibition would also score highly on meanness, at least within criminal samples. Perhaps then, criminal psychopathy would be best defined as the presence of all three components. In comparison, community samples may show greater independence of the meanness and disinhibition traits.

The heterogeneity within the current psychopathy construct, including both primary and secondary psychopathy, has been noted above and discussed in Part One of this thesis. This heterogeneity may contribute to the inconsistent findings in this area,

as different samples of psychopaths may differ on important traits. The confusion regarding the traits which define psychopathy indicates that it is important to clearly operationalise psychopathy, to consider the traits of psychopathy present within each sample, and to investigate how individual traits relate to other variables, such as task performance. The variation of psychopathic traits across samples also suggests the merits of comparisons within, rather than between, samples where there can be clarity about the nature of psychopathy within that sample.

8.2 Task Findings: Why do the current findings differ from hypotheses?

The findings on the experimental tasks used in this thesis were inconsistent with hypotheses. Importantly, these findings do not appear to be the result of methodological problems; these tasks do appear to provide a valid measurement of affect recognition and fear conditioning processes. The affect recognition data presented in figures 7.1 to 7.4 show good sensitivity curves, indicating increased affect recognition accuracy to increasing expression intensities. Moreover, in the fear conditioning task, unconditioned responses were observed in both the low and high psychopathy groups, and at least some participants showed evidence of having learnt the conditioned association. Therefore, the tasks used in the present research seem to be sensitive to affect recognition and fear conditioning, and indicate a genuine absence of psychopathy-related affect recognition and fear conditioning deficits in the current sample.

One possible explanation for the absence of psychopathy-related deficits is the ethnicity of participants. Research with North American participants suggests that deficits in passive-avoidance learning (Newman & Schmitt, 1998; Thornquist & Zuckerman, 1995), and fear potentiated startle (Baskin-Sommers, Newman, Sathasivam, & Curtin, 2011) are less related to psychopathy scores among Blacks than Whites. The

absence of task deficits here may reflect a greater similarity of the current samples' performance to that of Black North American participants than to that of White North Americans. The current sample was comprised of 42% New Zealand Maori, 12% Pacific Island, and 33% New Zealand European participants. Thus, the current findings may reflect the large proportion of non-white participants in the current study. The current sample was too small to split by ethnicity for further analyses, but these ethnic comparisons may be a useful avenue for future research. Similarity between the New Zealand population and American samples is often assumed, an assumption which may be inaccurate. More research within the New Zealand context is required to determine the similarity of performance between North American samples and both New Zealand European and New Zealand Maori participants. It may be that New Zealand Europeans perform similarly to White North American samples, but New Zealand Maori do not. However, there is limited New Zealand data investigating psychopathy, and the similarity between New Zealand European and White North American samples has not been examined; it may be that New Zealand European samples also differ in important ways to White North American samples.

Counter to the hypothesis that psychopaths would be impaired at affect recognition, both the low and high psychopathy offender groups consistently showed poorer recognition than the student group, indicating a difference between offenders and students, rather than between psychopaths and non-psychopaths. This finding appears consistent with meta-analytic findings showing a relationship between poor affect recognition and antisociality, rather than with psychopathy (Marsh & Blair, 2008). Where studies have looked at components of psychopathy rather than global psychopathy scores, relationships with affect recognition tend to be specific to the

antisocial components of psychopathy (Dolan & Fullam, 2006; Hastings et al., 2008). Thus, impaired affect recognition may be related more so to antisociality or criminality than to the core affective and interpersonal traits of psychopathy. The difference between offenders and students in the current research may reflect this relationship; the low and high psychopathy groups may have differed on the core affective and interpersonal components of psychopathy, but not on levels of antisociality. Consistent with this suggestion, the two groups did not differ significantly on risk of re-imprisonment within five years as measured by the RoC*RoI, which is rated largely on the basis of past criminal behaviour. Moreover, the PPI-R intentionally avoids assessing antisocial behaviour, and thus high and low psychopathy groups in the current study were differentiated on the basis of personality characteristics of psychopathy rather than by antisocial behaviour.

A number of other variables may account for the difference between the offender groups and the student group. Previous research has indicated that females outperform males on affect recognition tasks (e.g., McClure, 2000; Thayer & Johnsen, 2000). The offender sample was comprised solely of males, while the student sample was 55% female. Research has also indicated a relationship between higher global intelligence and better performance on affect recognition tasks (Adams & Markham, 1991; Moore, 2001), as well as between emotional intelligence and better affect recognition ability (Petrides & Furnham, 2003). Given that the student sample was comprised of university students, this sample is likely to be both more intelligent and better educated than the offender sample. Research has also indicated that impairments in facial affect recognition are associated with traumatic brain injury (TBI; Babbage, Yim, Zupan, Neumann & Tomita, 2011); rates of TBI are considerably higher within offender

samples than in the general population (Shiroma, Ferguson & Pickelsimer, 2010). It may also be that the offender sample made more errors as a whole because of a higher level of impulsive and careless responding than the student group. The current study was unable to control for any of these potential confounding variables. Future research should utilise a better matched non-offender control group, matching for variables such as intelligence and gender to investigate the relationship between antisociality, psychopathy, and affect recognition. It would also be beneficial to measure psychopathy in the non-offender control group; measurement of psychopathy in this group was not included in the present research.

While inconsistent across studies, some previous research has indicated specific emotion recognition deficits, most commonly in the recognition of fearful expressions (e.g. Blair & Cipolotti, 2000; Blair et al., 2004; Mitchell et al., 2004, Montagne et al., 2005). As described in Chapter Five, those studies finding evidence of fear recognition deficits typically use the animated morph task. A limitation of the animated morph method is that perseveration of an incorrect response may impair recognition accuracy. Previous research has shown psychopaths to perseverate more so than non-psychopathic offenders (e.g., Newman, Patterson & Kosson, 1987). Therefore, the findings from the animated morph task may reflect a deficit in failing to shift a response, as suggested by the Response Modulation Theory of psychopathy (Wallace, Vitale, & Newman, 1999). In the current task — where participants were required to select a new response for each facial expression — no affect recognition deficits were identified. The current findings also indicate a possible explanation for why deficits are specifically identified in fear recognition using the animated morph task. Participants in the present sample were least likely to use the response label fear to neutral faces. Based on the

infrequency with which fear was selected, it seems possible that participants in the animated morph task may rarely select fear as their initial response, and therefore psychopaths may look particularly impaired at recognising fearful faces if they fail to alter their initial response. A useful avenue for future research would be to compare performance on the animated morph task and the static morph task within subjects in order to ascertain whether it is indeed the use of an animated morph sequence which produces deficits not seen when static morphs are presented randomly.

The fear conditioning task in the present research used different stimuli to previous fear conditioning tasks, using an aversive noise burst as the unconditioned stimulus, and angry faces as the conditioned stimulus. Previous conditioning studies commonly use electric shock as the unconditioned stimulus (Lykken, 1957; Hare, 1965; Hare & Quinn, 1971), but painful pressure (Birbaumer et al., 2005) and noxious odour have also been used (Flor et al., 2002). Consistent with the current results, these studies have typically found no differences between groups on unconditioned responses (Birbaumer et al., 2005; Flor et al., 2002; Lykken, 1957). The aversive noise bursts appear to have produced a sufficient unconditioned response in both low and high psychopathy groups, suggesting that the noise burst was a suitable unconditioned stimulus.

Older fear conditioning studies in this area typically used tones or buzzers as the conditioned stimuli (Lykken, 1957; Hare & Quinn, 1971). More recent fear conditioning studies have used neutral faces (Birbaumer et al., 2005; Flor et al., 2002; Lopez et al., 2013), providing a social stimulus similar to the angry faces used in the present research. However, the angry faces used in the present research are a fear-relevant stimulus (Olsson & Phelps, 2004), and thus were expected to condition more readily to

a fear association than a neutral face. These previous studies typically show evidence of poorer conditioning, or poorer stimulus discrimination, among psychopathic participants (Birbaumer et al., 2005; Flor et al., 2002; Hare, 1965; Lykken, 1957; Hare & Quinn, 1971). It may be that the use of a fear-relevant conditioned stimulus enabled better learning of the conditioned association by those in the high psychopathy group; however, it is surprising that this learnt association was not observed in the low psychopathy group.

The main relationship identified in the present research was an association between higher scores on the Mean/Disinhibited factor and *better* discrimination between the CS+ and CS-. One previous study has investigated the relationship between traits of psychopathy and fear conditioning using similar social conditioned stimuli (Lopez et al., 2013). In this study higher scores on the fearless dominance factor of the PPI-R were associated with poorer fear conditioning (Lopez et al., 2013), counter to the absence of a relationship between fear conditioning and the Bold Fearlessness factor in the present research. However, a non-significant correlation can also be seen between higher PPI-R Impulsive Antisociality factor scores and better fear conditioning when the shared variance between factors was accounted for (Lopez et al., 2013), consistent with the direction of the relationship between the Mean/ Disinhibited factor scores and fear conditioning in the present research.

The use of similar measures of psychopathy and of facial expressions as conditioned stimuli may account for the similarity of these results. Investigating the effect of different emotional expressions as conditioned stimuli on participants' ability to learn the conditioned association may be a useful avenue for future research. Distress expressions — fear or sadness — may be particularly interesting as psychopaths would

be expected to show greater impairments to these stimuli, given their hypothesised unresponsiveness to others' distress and difficulty at learning fear associations.

As noted above, it remains unclear why only the high psychopathy group showed a conditioned response to the angry faces. It may be that those participants with high scores on the Mean/ Disinhibited factor learned the conditioned association better because of the use of angry faces as conditioned stimuli. The Triarchic Model of psychopathy suggests that meanness develops from an underlying fearless temperament in combination with adverse developmental environments, such as experiences of abuse (Patrick et al., 2009). Thus, individuals with high levels of meanness may be more attuned to others' anger as attention to signals of anger may have been adaptive for surviving in these adverse environments. If a fearless temperament was essential to the development of meanness, we would not expect individuals scoring highly on meanness to show greater conditioned fear. Perhaps then it is the adverse developmental experiences rather than the fearless temperament which is the crucial mechanism in the development of meanness. These adverse experiences may render these individuals particularly sensitive to fear associations using angry faces, while they may be less sensitive to other aversive associations which have not been so prevalent in their developmental experiences.

Another explanation for the relationship between scores on the Mean/ Disinhibited factor and fear conditioning is the role of aggression. High scale loadings on the Mean/ Disinhibited factor include the TriPM Meanness scale, which directly references aggressive behaviour, as well as the PPI-R scales Machiavellian Egocentricity and Rebellious Nonconformity which, of all eight PPI-R scales, have shown the highest correlations with a personality measure of aggression (Lilienfeld & Widows, 2005). A

relationship between aggression and increased GSR reactivity has been shown across a range of tasks (Lorber, 2004). Therefore, the results of the current study may indicate a relationship between aggression and increased GSR responding, rather than the decreased GSR responding associated with the affective/ interpersonal traits of psychopathy (Lorber, 2004). Further investigation is warranted into the relationship between fear conditioning, psychopathy and aggression, and would benefit from the inclusion of explicit measurement of aggression.

8.3 Strengths and limitations

The current study raises questions about the presence of important deficits in psychopathy, as the current findings provided no evidence for psychopathy-related impairments. There were a number of strengths of this research. First, in relation to the affect recognition task, the current research used methods which move beyond the data presented in previous research, using *A'* to account for both accuracy and response bias. Previous research showing psychopaths to be impaired at recognising specific emotions, rather than all emotions, may reflect differences in response bias rather than an actual impairment in recognising these emotions. Further research in this area should utilise similar methods which account for both accuracy and response bias.

The current research also used a large number of morphed expressions in order to examine potentially subtle differences in affect recognition abilities. These morphs were presented as static images in random order, and thus were able to avoid potential biasing effects of presenting images in sequential order or using an animated morph. The inclusion of a student control group was also a strength of the current affect recognition investigation, and highlighted a difference between the offender sample and the student sample, while showing no effect of psychopathy. However, this student

group was a convenience sample, and a better matched non-criminal control group may prove useful in future research in order to investigate the relationship between antisociality, psychopathy and affect recognition.

In relation to the measurement of psychopathy, the current study included multiple questionnaires and enabled an investigation of specific psychopathic traits rather than a global measure of psychopathy. This trait-based approach provided useful information, and the Principal Components Analysis identified uncorrelated factors, supporting the idea that psychopathy is comprised of distinct sets of traits, rather than a unitary construct. The current research found that the expected psychopathic traits were unrelated to task performance, while some unexpected relationships were found. Moving beyond global assessment of psychopathy toward a trait-based approach will be informative for the psychopathy literature, and future research should investigate the relationship between psychopathic traits and other variables.

There are several important limitations to the current findings. First, these findings are based on a relatively small sample of 81 offenders. Given the small sample included here, and therefore the potential instability of the resulting factor structure, the results of the Principal Components Analysis (PCA)are not intended as a robust exploration of the factor structure of psychopathic traits, but rather an empirical strategy to reduce the current set of questionnaire scales into a more manageable set. While cautious of this limitation, the current results have been discussed in line with previous factor analyses. This discussion was included for the purposes of placing the current assessment in the context of previous investigations of psychopathy. Small sample sizes are typical in research investigating psychopaths' performance on experimental tasks, and may be one cause of the inconsistency of findings across

samples. Further research using larger samples is warranted. Moreover, the recruitment of the current sample was non-random, and may not adequately sample the full range of psychopathic personalities, such as volatile individuals who may have been in higher security units.

Due to time constraints within the prison setting, the short form of the PPI-R was used in this research rather than the full version. The short form of the PPI-R has not been validated, and three scales were observed to have inadequate or poor internal consistency within the present research. Nonetheless, the current assessment of psychopathy indicates similar levels of psychopathic traits to previous offender samples, and a factor structure similar to that of the PPI-R. Therefore, the current assessment of psychopathy appeared adequate for exploring the relationship between psychopathy and task performance.

Given the large number of outcome variables produced by the two tasks, a median split of psychopathy scores was used to produce high and low psychopathy groups for the initial analysis of these outcome variables. This median split was used to simplify analyses, and to enable a comparison of groups consistent with the approach taken in the majority of previous research. However, evidence suggests psychopathy to be a continuous rather than categorical construct (e.g. Edens et al., 2006), thus the median split is inconsistent with this view. Moreover, the low psychopathy group made a relatively poor control group for the fear conditioning task as they did not show learning of the conditioned association. Psychopathy scores were also used continuously, and provided results consistent with those found using the median split analyses.

8.4 Implications

Theory: The current findings were inconsistent with the low fear, Violence Inhibition Mechanism, and Integrated Emotion System theories of psychopathy. These theories all suggest deficits by which psychopathy develops, and hypothesise related impairments on the tasks used in this research. The presence of psychopathic traits alongside intact performance on these tasks suggests that the mechanisms proposed by these etiological theories are not necessary to produce psychopathy, or are at least not the only route to psychopathic traits.

As already noted, the current findings do not support the Violence Inhibition Mechanism (VIM; Blair, 1995) or Integrated Emotion System (IES; Blair et al., 2005) theories of psychopathy. However, the core argument of the VIM and IES theories is that psychopaths do not show physiological responses to others' distress. It is possible that even without experiencing a physiological reaction to the emotion, an individual could still accurately label the emotion. Therefore, a stronger test of the VIM and IES theories would be investigating psychopaths' autonomic reactivity to others' distress. An alternative suggestion is that intact recognition of others' distress is necessary to produce VIM activation (i.e., a physiological response). The current study did not record participants' physiological responses to the facial expressions. Further research is necessary to investigate the relationship between psychopathy and physiological responses to others' distress. A useful avenue for future research would be to assess both affect recognition accuracy and physiological responses to others' distress in the same sample, and to determine whether intact affect recognition is necessary for responding physiologically. Psychopaths have shown reduced physiological responses to viewing images of others' distress (Blair, Jones, Clark & Smith, 1997) and to other

individual's experience of aversive stimuli (Aniskiewicz, 1979; House & Milligan, 1976), but physiological responses to others' distress have not been investigated alongside affect recognition ability.

Policy: Psychopathy is used for several important decision-making processes within criminal justice settings, including considerations of treatability, indeterminate commitment, and death penalty sentencing (Cunningham & Reidy, 2002; DeMatteo & Edens, 2005; Edens, in press; Edens & Petrila, 2006; Edens, Petrila, & Buffington-Vollum, 2001, Ogloff & Lyon, 1998). These decisions all reflect the view that psychopaths are inherently different, and that this difference makes them more dangerous and untreatable, and thus candidates for tougher sentencing and exclusion from treatment. The present research found no evidence of psychopathy-related deficits. Alongside other studies showing no deficits, the current study draws into question these assumptions of psychopaths' 'otherness' or 'defectiveness'. Given the inconsistent evidence regarding psychopaths' deficits, it seems that caution is warranted in using these assumptions to make important policy decisions. Moreover, the lack of clarity regarding the psychopathy construct makes using psychopathy problematic for these policy decisions.

8.5 Summary

The overall aim of this research was to test whether psychopathic traits were related to impairments on affect recognition and fear conditioning tasks. While psychopathy in the current sample was largely consistent with previous research, the current results provided no evidence for impairments on the two tasks. These findings provide a significant challenge to etiological theories of psychopathy, and raise concerns regarding the use of psychopathy for criminal justice decision making based on the

assumption of impairments within psychopathy. Given the important practical considerations, the limitations of the research literature on psychopathy must be acknowledged, and more research is required to further our understanding of psychopathy.

References

Adams, K. & Markham, R. (1991). Recognition of affective facial expressions by children and adolescents with and without mental retardation. *American Journal of Mental Retardation, 96,* 21-28.

Adolphs, R., Tranel, D., Damasio, H., Damasio, A. (1994). Impaired recognition of emotion in facial expressions following bilateral damage to the human amygdala. *Nature, 372,* 669–672.

Adolphs, R., Tranel, D., Damasio, H,. Damasio, A. (1995). Fear andthe human amygdala. *Journal of Neuroscience, 15,*5879 –5891.

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition, Text Revision).* Arlington: American Psychiatric Association.

Aniskiewicz, A. S. (1979). Autonmoic componenets of vicarious conditioning and psychopathy. *Journal of Clinical Psychology, 35*, 60-67.

Arnett, P. A., Smith, S. S., & Newman, J. P. (1997). Approach and avoidance motivation in psychopathic criminal offenders during passive avoidance. *Journal of Personality and Social Psychology, 72*, 1413-1428.

Babbage, D. R., Yim, J., Zupan, B., Neumann, D., Tomita, M. R., & Willer, B. (2011). Meta-analysis of facial affect recognition difficulties after traumatic brain injury. *Neuropsychology, 25*, 277-285.

Baird, A. A., Gruber, S. A., Fein, D. A., Mass, L.C., Steingard, R. J., Renshaw, P. F., … Yurgelun-Todd, D. A. (1999). Functional magnetic resonance imaging of facial affect recognition in children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 38* , 195-199.

Bakker, L., Riley, D., & O'Malley, J. (1999). *Risk of reconviction: Statistical models predicting four types of re-offending*. Wellington, NZ: Department of Corrections Psychological Service.

Baskin-Sommers, A. R., Newman, J. P., Sathasivam, N., & Curtin, J. J. (2011). Evaluating the generalizability of a fear deficit in psychopathic African American offenders. *Journal of Abnormal Psychology, 120*, 71-78.

Bechara, A., Tranel, D., Damasio, H., Adolphs, R.,Rockland, C., & Damasio, A. R. (1995). Double dissociation of conditioning and declarative knowledge relative to the amygdala and hippocampus in humans. *Science, 269*, 1115–1118.

Birbaumer, N., Veit, R., Lotze, M., Erb, M., Hermann, C., Grodd, W., & Flor, H. (2005). Deficient fear conditioning in psychopathy: A functional magnetic resonance imaging study. *Archives of General Psychiatry, 62*, 799-805.

Blair, R. J. R. (1995). A cognitive developmental approach to morality: investigaing the psychopath. *Cognition, 57*, 1-29.

Blair, R. J. R. & Cipolotti, L. (2000). Impaired social response reversal: A case of 'acquired sociopathy'. *Brain, 123*, 1122-1141.

Blair, R. J. R., Jones, L., Clark, F., & Smith, M. (1997). The psychopathic individual: A lack of responsiveness to distress cues? *Psychophysiology, 34,* 192-198.

Blair, J., Mitchell, D., & Blair, K. (2005). *The Psychopath: Emotion and the Brain*. Oxford, UK: Blackwell Publishing.

Blair, R. J. R., Mitchell, D. G. V., Peschardt, K. S., Colledge, E., Leonard, R. A., Shine, J. H., Murray, L. K., & Perrett, D. I. (2004). Reduced sensitivity to others' fearful expressions in psychopathic individuals. *Personality and Individual Differences, 37*, 1111-1122.

Book, A. S., Quinsey, V. L., Langford, D. (2007). Psychopathy and the perception of affect and vulnerability. *Criminal Justice and Behavior, 34*, 531-544.

Broks, P., Young, A. W., Maratos, E. J., Coffey, P. J., Calder, A. J., … Hadley, D. (1998). Face processing impairments after encephalitis: Amygdala damage and recognition of fear. *Neuropsychologi*a, 36,59 –70.

Buchel, C., Morris, J., Dolan, R. J. & Friston, K. J. (1998). Brain systems mediating aversive conditioning: an event-related fMRI study. *Neuron, 20*, 947-957.

Calder, A. J., Young, A. W., Rowland, D., Perrett, D. I., Hodges, J. R., Etcoff, N. L. (1996). Facial emotion recognition after bilateral amygdala damage: Differentially severe impairment of fear. *Cognitive Neuropsychology, 13,* 699 –745.

Chapman, A. L., Gremore, T. M., & Farmer, R. F. (2003). Psychometric analysis of the Psychopathic Personality Inventory (PPI) with female inmates. *Journal of Personality Assessment, 80*, 164-172.

Cleckley, H. (1941). *The mask of sanity: an attempt to reinterpret the so-called psychopathic personality*. Oxford, UK: Mosby.

Cleckley, H. (1964). *The Mask of Sanity*, 4th edition. Saint Louis, MO: Mosby Co.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioural Sciences*. Hillsdale, NJ: Erlbaum.

Cooke, D. J. & Michie, C. (2001). Refining the construct of psychopathy: Towards a hierarchical model. *Psychological Assessment, 13*(2), 171-188.

Cooper, R. M., Rowe, A. C., & Penton-Voak, I. S. (2008). The role of trait anxiety in the recognition of emotional facial expressions. *Journal of Anxiety Disorders, 22,* 1120-1127.

Cunningham, M. D., & Reidy, T. J. (2002). Violence risk assessment at federal capital sentencing: Individualization, generalization, relevance,and scientific standards. *Criminal Justice and Behavior, 29,* 512–537.

Dawson, M. E., Schell, A. M. , & Filion, D. L. (2000). The electrodermal system. In J. T. Cacioppo, L. G. Tassinary, & G. G. Bernston (Eds), *Handbook of Psychophysiology*, 2nd edition (pp. 200-223). New York, NY: Cambridge University Press.

Del Gaizo, A. L., & Falkenbach, D. M. (2008). Primary and secondary psychopathic-traits and their relationship to perception and experience of emotion. *Personality and Individual Differences*, 45, 206-212.

Depue, R. & Lenzenweger, M. (2001). Neurobiology of personality disorders. In J Livesley (ed.), *Handbook of Personality Disorders*. New York, NY: Guilford Press.

Dolan, M. & Fullam, R. (2006). Face affect recognition deficits in personality-disordered offenders: Association with psychopathy. *Psychological Medicine, 36*, 1563-1569.

Edens, J. F. (2006). Unresolved controversies concerning psychopathy: Implications for clinical and forensic decision making. *Professional Psychology: Research and Practice, 37*, 59-65.

Edens, J. F., Marcus, D. K., Lilienfeld, S. O., Poythress, N. G. (2006). Psychopathic, not psychopath: Taxometric evidence for the dimensional structure of psychopathy. *Journal of Abnormal Psychology, 115*, 131-144.

Edens, J. F. & Petrila, J. (2006). Legal and ethical issues in the assessment and treatment of psychopathy. In C. J. Patrick (Ed.), *Handbook of Psychopathy*(pp.14-34). New York, NY: Guilford Press.

Edens, J. F., Petrila, J., & Buffington-Vollum, J. K. (2001). Psychopathy and the death penalty: Can the Psychopathy Checklist-Revised identify offenders who

represent “a continuing threat to society”? *Journal of Psychiatry and Law, 29*, 433-481.

Edens, J. F., Poythress, N. G. & Watkins, M. M. (2001). Further validation of the Psychopathic Personality Inventory among offenders: Personality and behavioral correlates. Journal of Personality Disorders, 15, 403-415.

Ekman, P. (1992). An argument for basic emotions? *Cognition and Emotion, 6*, 169-200.

Ekman, P. & Friesen, W.V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17*, 124–129.

FaceMorpher (Version 2.51) [Computer Software]. Alexandria, VA: Luxand Inc.

Fairchild, G., Stobbe, Y., van Goozen, S. H. M., Calder, A. J., Goodyer, I. M. (2010). Facial expression recognition, fear conditioning, and startle modulation in female subjects with conduct disorder. *Biological Psychiatry, 68*, 272-279.

Field, A. (2009). *Discovering Statistics using SPSS, Third Edition.* London, UK: Sage Publications.

Flor, H., Birbaumer, N., Hermann, C., Ziegler, S., & Patrick, C. J. (2002). Aversive Pavlovian conditioing in psychopaths: Peripheral and central correlates. *Psychophysiology, 39*, 505-518.

Fowles, D. C. (1987). Application of a behavioral theory of motivation to the concepts of anxiety and impulsivity. *Journal of Research in Personality, 21*, 417-435.

Fowles, D. C. & Dindo, L. (2006). A dual-deficit model of psychopathy. In C. J. Patrick (Ed.), *Handbook of Psychopathy* (pp.14-34). New York, NY: Guilford Press.

Glass, S. J. & Newman, J. P. (2006). Recognition of facial affect in psychopathic offenders. *Journal of Abnormal Psychology, 115*(4), 815-820.

Goeleven, E., DeRaedt, R., Leyman, L., & Verschuere, B. (2008). The Karolinska directed emotional faces: A validation study. *Cognition and Emotion, 22,* 1094-1118.

Gordon, H. L., Baird, A. A., & End, A. (2004). Functional differences among those high and low on a trait measure of psychopathy. *Biological Psychiatry, 56*, 516-521.

Gough, H.G. (1987). *California Psychological Inventory Administrator's Guide*. Palo Alto, CA: Consulting Psychologists Press, Inc.

Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy, 8*, 249-266.

Guay, J., Ruscio, J., Knight, R. A., & Hare, R. (2007). A taxometric analysis of the latent structure of psychopathy: Evidence for dimensionality. *Journal of Abnormal Psychology, 116*, 701-716.

Halberstadt, J., Winkielman, P., Niedenthal, P. M., & Dalle, N. (2009). Emotional conception: How embodied emotion concepts guide perception and facial action. *Psychological Science, 20*, 1254-1261.

Hare, R. D. (1965). Temporal gradient of fear arousal in psychopaths. *Journal of Abnormal Psychology*, *70*, 442-445.

Hare, R. D. (1980). A research scale for the assessment of psychopathy in criminal populations. *Personality and Individual Differences, 1*, 111–119.

Hare, R. D. (1985). Comparison of procedures for the assessment of psychopathy. *Journal of Consulting and Clinical Psychology, 53*, 7-16.

Hare, R. D. (1991). *The Hare Psychopathy Checklist- Revised*. Toronto, Ontario: Multi-Health Systems.

Hare, R. D. (2003). *The Hare Psychopathy Checklist-Revised* (2nd ed.). Toronto, Ontario, Canada: Multi-Health Systems.

Hare, R. D., Harpur, T. J., Hakstian, A. R., Forth, A. E., Hart, S.D. & Newman, J. P. (1990). The Revised Psychopathy Checklist: Reliability and factor structure.

Psychological Assessment: A Journal of Consulting and Clinical Psychology, 2, 338-341.

Hare, R. D., Hart, S. D., & Harpur, T. J. (1991). Psychopathy and the DSM-IV criteria for Antisocial Personality Disorder. *Journal of Abnormal Psychology, 100*, 391-398.

Hare, R. D. & Neumann, C. S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4*, 217-246.

Hare, R. D. & Quinn, M. J. (1971). Psychopathy and autonomic conditioing. *Journal of Abnormal Psychology, 77*, 223-235.

Harpur, T. J., Hare, R. D. & Hakstian, R. (1989). A two-factor conceptualization of psychopathy: Construct validity and implications for assessment. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 4*, 6-17.

Harris, G. T., Rice, M. E., & Quinsey, V. L. (1994). Psychopathy as a taxon: Evidence that psychopaths are a discrete class. *Journal of Consulting and Clinical Psychology, 62*, 387-397.

Hastings, M. E., Tangney, J. P., & Stuewig, J. (2008). Psychopathy and identification of facial expressions of emotion. *Personality and Individual Differences, 44*, 1474-1483.

Hathaway, S. R., & McKinley, J. C. (1940). A multiphasic personality schedule (Minnesota): I. Construction of the schedule. *Journal of Psychology, 10*, 249-254.

Hiatt, K. D. & Newman, J. P. (2006). Understanding psychopathy: The cognitive side. In C. J. Patrick (Ed.), *Handbook of Psychopathy* (pp.107-132). New York, NY: Guilford Press.

Hicks, B. M., Markon, K. E., Patrick, C. J., Krueger, R. F., & Newman, J. P. (2004). Identifying psychopathy subtypes on the basis of personality structure. *Psychological Assessment, 16*, 276-288.

Hoffman, M. L. (1987). The contribution of empathy to justice and moral judgement. In N. Eisenberg & J. Strayer (Eds.), *Empathy and its Development* (pp. 47-80). New York, NY: Cambridge University Press.

House, T. H. & Milligan, W. L. (1976). Autonomic responses to modeled distress in prison psychopaths. *Journal of Personality and Social Psychology, 34,* 556-560.

Iria, C. & Barbosa, F. (2009). Perception of facial expressions of fear: Comparative research with criminal and non-criminal psychopaths. *The Journal of Forensic Psychiatry & Psychology, 20*, 66-73.

Karpman, B. (1941). On the need of separating psychopathy into two distinct clinical types: The symptomatic and the idiopathic. *Journal of Criminal Psychopathology, 3,* 112-137.

Karpman, B. (1948). The myth of the psychopathic personality. *American Journal of Psychiatry, 104*, 523–534.

Kosson, D. S., Suchy, Y., Mayer, A. R., & Libby, J. (2002). Facial affect recognition in criminal psychopaths. *Emotion, 2*, 398-411.

Krueger, R. F., Markon, K. E., Patrick, C. J., Benning, S. D., & Kramer, M. D. (2007). Linking antisocial behaviour, substance use, and personality: An integrative quantitative model of the adult externalizing spectrum. *Journal of Abnormal Psychology, 116*, 645-666.

LaBar, K. S., Gatenby, J. C., Gore, J. C., LeDoux, J. E. &Phelps, E. A. (1998). Human amygdala activation during conditioned fear acquisition and extinction: a mixed-trial fMRI study. *Neuron, 20*, 937–945.

Lab Chart (Version 7) [Computer software]. Colorado Springs, CO: AD Instruments Inc.

Langner, O., Dotsch, R., Bijlstra, G., Wigboldus, D.H.J., Hawk, S.T., & van Knippenberg, A. (2010). Presentation and validation of the Radboud Faces Database. *Cognition & Emotion, 24*, 1377-1388.

Levenson, M., Kiehl, K., & Fitzpatrick, C. (1995). Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology, 68*, 151-158.

Lilienfeld, S. O. (1994). Conceptual problems in the assessment of psychopathy. *Clinical Psychology Review, 14*, 17-38.

Lilienfeld, S. O.& Andrews, B. P (1996). Development and preliminary validation of a self-report measure of psychopathic personality traits in noncriminal population. *Journal of Personality Assessment, 66*, 488-524.

Lilienfeld, S. O., & Fowler K. A. (2006). The Self-Report Assessment of Psychopathy: Problems, Pitfalls, and Promises. In C. J. Patrick (Ed.), *Handbook of Psychopathy* (pp.107-132). New York, NY: Guilford Press.

Lilienfeld, S. O. & Widows, M. R. (2005). *Psychopathic Personality Inventory Revised: Professional Manual.* Lutz, FL: Psychological Assessment Resources Inc.

Lopez, R., Poy, R., Patrick, C. J., & Molto, J. (2013). Deficient fear conditioing and self-reported psychopathy: The role of fearless dominance. *Psychophysiology, 50*, 210-218.

Lorber, M. F. (2004). Psychophysiology of aggression, psychopathy, and conduct problmes: A meta-analysis. *Psychological Bulletin, 130*(4), 531-552.

Lundqvist, D., Flykt, A., & Öhman, A. (1998). The Karolinska Directed Emotional Faces - KDEF, CD ROM from Department of Clinical Neuroscience, Psychology section, Karolinska Institutet, ISBN 91-630-7164-9.

Lykken, D. T. (1957). A study of anxiety in the sociopathic personality. *Journal of Abnormal and Social Psychology, 55*, 6-10.

Lykken, D. T. (1995). *The Antisocial Personalities.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Marcus, D. K., John, S.,& Edens, J. F. (2004). A taxometric analysis of psychopathic personality. *Journal of Abnormal Psychology, 113*, 626-635.

Marion, B. E., Sellbom, M., Salekin, R. T., Toomey, J. A., Kucharski, L. T., & Duncan, S. (in press). An examination of the association between psychopathy and dissimulation using the MMPI-2-RF validity scales. *Law and Human Behaviour.*

Marsh, A. A. & Blair, R. J. R. (2008). Deficits in facial affect recognition among antisocial populations: A meta-analysis. *Neuroscience and Biobehavioural Reviews, 32,* 454-465.

McClure, E. B. (2000). A meta-analytic review of sex differences in facial expression processing and their development in infants, children and adolescents. *Psychological Bulletin, 126*, 42–45.

McCord, W. & McCord, J. (1964). *The Psychopath: An Essay on the Criminal Mind*. New York, NY: Van Nostrand Reinhold Company.

Millon, C., Davis, R., & Grossman, S. (2006). *MCMI III: Millon Clinical Multiaxial Inventory*. Pearson Assessments.

Mitchell, D. G. V., Anvy, S. B., & Blair, R. J. R. (2006).Divergent patterns of aggressive and neurocognitive characteristics in acquired versus developmental psychopathy. *Neurocase: The Neural Basis of Cognition, 12*, 164-178.

Montagne, B., van Honk, J., Kessels, R. P. C., Frigerio, E., Burt, M., van Zandvoort, M. J. E., Perrett, D. I., & de Haan, E. H. F. (2005). Reduced efficiency in recognising fear in

subjects scoring high on psychopathic personality characterisitics. *Personality and Individual Differences, 38,* 5-11.

Moore, D. G. (2001). Reassessing emotion recognition performance in people with mental retardation: a review. *American Journal of Mental Retardation, 106*, 481-502.

Newman, J. P., Patterson, C. M., & Kosson, D. S. (1987). Response perseveration in psychopathy. *Journal of Abnormal Psychology, 96*, 145-148.

Newman, J. P. & Schmitt, W. A. (1998). Passive avoidance in psychopathic offenders: A replication and extension. *Journal of Abnormal Psychology, 107*, 527–532.

Ogloff, J. R. P., & Lyon, D. R. (1998). Legal issues associated with the concept of psychopathy. In D. J. Cooke, A. E. Forth, & R. D. Hare(Eds.), *Psychopathy: Theory, research, and implications for society* (pp.401–422). Mahwah, NJ: Kluwer.

Olsson, A. & Phelps, E. A. (2004). Learned Fear of "Unseen" Faces After Pavlovian, Observational, and Instructed Fear. *Psychological Science, 15*(12), 822-828.

Pallant, J. (2010). *SPSS Survival Manual, Fouth Edition*. New York, NY: McGraw Hill.

Patrick, C. J. (2006). Back to the future: Cleckley as a guide to the next generation of psychopathy research. In C. J. Patrick (Ed.), *Handbook of Psychopathy* (pp. 605-618). New York, NY: Guildford Press.

Patrick, C. J. (2010). *Operationalizing the Triarchic conceptualization of psychopathy: Preliminary description of brief scales for assessment of boldness, meanness, and disinhibition.* Unpublished test manual, Florida State University, Tallahassee, FL. Test is available on-line at: https://www.phenxtoolkit.org/index.php?pageLink=browse.protocoldetails&id=121601

Patrick, C. J., Fowles, D. C., & Krueger, R. F.(2009). Triarchic conceptualization of psychopathy: Development and origins of disinhibition, boldness, and meanness. *Development and Psychopathology, 21*, 913-938.

Patrick, C. J., Hicks, B. M., Nichol, P. E., & Krueger, R. F. (2007). A bifactor approach to modeling the structure of the psychopathy checklist-revised. *Journal of Personality Disorders, 21*(2), 118-141.

Petrides, K.V. & Furnham, A. (2003). Trait emotional intelligence. Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality, 17*, 39–57

Poythress, N. G., Edens, J. F. & Lilienfeld, S. O. (1998). Criterion-related validity of the Psychopathic Personality Inventory in a prison sample. *Psychological Assessment, 10,* 426-430.

Poythress, N. G. & Skeem, J. L. (2006). Disaggregating psychopathy: Where and how to look for subtypes. In C. J. Patrick (Ed.), *Handbook of Psychopathy* (pp. 172-192). New York, NY: Guildford Press.

Salekin, R. T., Rogers, R. & Sewell, K. W. (1996). A review and meta-analysis of the Psychopathy Checklist and Psychopathy Checklist-Revised: Predictive validity of dangerousnes. *Clinical Psychology: Science and Practice, 3*, 203-215.

Sandoval, A. R., Hancock, D., Poythress, N., Edens, J. F. & Lilienfeld, S. (2000). Construct validity of the Psychopathic Personality Inventory in a correctional sample. *Journal of Persoanlity Assessment, 74*, 262-281.

Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime User's Guide*. Pittsburgh, PA: Psychology Software Tools Inc.

Sellbom, M. & Phillips, T. R. (in press). An examination of the Triarchic Conceptualisation of Psychopathy in incarcerated and non-incarcerated samples. *Journal of Abnormal Psychology.*

Shiroma, E. J., Ferguson, P. L., Pickelsimer, E. E. (2010). Prevalence of traumatic brain injury in an offender population: A meta-analysis. *Journal of Correctional Health Care, 16*, 147-159.

Skeem, J. L. & Cooke, D. J. (2010a). Is criminal behaviour a central component of psychopathy? Conceptual directions for resolving the debate. *Psychological Assessment, 22*, 433-445.

Skeem**,** J., & Cooke, D. (2010b). One measure does not a construct make: Toward reinvigorating psychopathy research. Reply to Hare & Neumann (2010). *Psychological Assessment, 22,* 455-457*.*

Skeem, J. L., Johansson, P., Andershed, H., Kerr, M., & Louden, J. E. (2007). Two subtypes of psychopathic violent offenders that parallel primary and secondary variants. *Journal of Abnormal Psychology, 116*, 395-409.

Skeem, J. L., Polaschek, D. L. L. P., Patrick, C. J., & Lilienfeld, S. O. (2011). Psychopathic personality: Bridging the gap between scientific evidence and public policy. *Psychological Science in the Public Interest, 12*(3), 95-162.

Skilling, T. A., Harris, G. T., Rice, M. E., & Quinsey, V. L. (2002). Identifying persistently antisocial offenders using the Hare Psychopathy Checklist and DSM antisocial personality disorder criteria. *Psychological Assessment, 14*, 27-38.

Spielberger, C. (1968). *State-Trait Anxiety Inventory for Adults: Self-Evaluation Questionnaire.* Mind Garden, Redwood City.

Spielberger, C. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Stanislaw, H. & Todorov, N. (1999). Calculation of signal detection theory measures. *Behavior Research Methods, Instruments, and Computers, 31*, 137-149.

Stanley, J. H., Wygant, D. B., & Sellbom, M. (in press). Elaborating on the construct validity of the Triarchic Psychopathy Measure in a criminal offender sample. *Journal of Personality Assessment.*

Surcinelli, P., Codispoti, M., Montebarocci, O., Rossi, N., & Baldaro, B. (2006). Facial emotion recognition in trait anxiety. *Journal of Anxiety Disorders, 20*, 110-117.

Sutker, P. B. (1970). Vicarious conditioing and sociopathy. *Journal of Abnormal Psychology, 76*, 380-386.

Taylor, J. A. (1953). A personality scale of manifest anxiety. *The Journal of Abnormal and Social Psychology, 48*, 285-290.

Thayer, J. F. & Johnsen, B. H. (2000). Sex differences in judgement of facial affect: a multivariate analysis of recognition errors. *Scandinavian Journal of Psychology, 41*, 243-246.

Thornquist, M. H. & Zuckermann, M. (1995). Psychopathy, passive-avoidance learning and basic dimensions of personality. *Personality and Individual Differences, 19,*525–534.

Wallace, J. F., Vitale, J. E., & Newman, J. P. (1999). Response modulation deficits: Implications for the diagnosis and treatment of psychopathy**.** *Journal of Cognitive Psychotherapy*,*13*, 55-70.

Welsh, G. (1952). An anxiety index and an internalization ratio for the MMPI. *Journal of Consulting Psychology, 16*, 65-72.

Wilson, K., Juodis, M., & Porter, S. (2011). Fear and loathing in psychopaths: A meta-analytic investigation of the facial affect recognition deficit. *Criminal Justice and Behavior, 38*, 659-668.

Appendix One: Information and Consent Forms

Information Sheet: Face learning study

Who is doing this research?

This research is being carried out by Allanah Casey and Dr Devon Polaschek. Allanah is a PhD Student at Victoria University of Wellington and Dr. Polaschek is her research supervisor. This research is independent of the Department of Corrections. If you decide to take part, no one from the Department of Corrections will see your answers. It will not affect how the rest of your sentences goes, how the staff here manage you or the conditions under which you are released. No information will be given to Department of Corrections staff, unless you tell me today that you are about to go out after the session and seriously harm yourself or someone else. If you tell me this, I am ethically required to warn someone here at the prison so that everyone is safe. **This is the only exception.** Otherwise we keep your information completely to ourselves.

Why are we doing this research?

As you know, being able to learn new things is an important part of our lives. It's important for new jobs, for doing well in rehabilitation programmes, even for when you move to a new unit or prison. People differ in their ability to learn different types of things. In this study we are interested in how men learn to recognize faces. We think this type of learning may be important both for getting along well socially, and for how men change in rehabilitation programmes.

What happens if you agree to take part?

If you agree to take part, we will ask you to complete three things, two on the computer, and the third one is a paper questionnaire for you to complete. All up it will take about an hour.

The questionnaire asks about your personality. You will be asked to rate how much each item is like you. In the first part on the computer, you will be asked to look at some faces and say what the person with each face is feeling. For the second computer task we will be measuring your physical responses through your skin. You will be asked to attach several small electrodes to your hand. They measure changes in the moisture level of your skin that indicate how you are reacting. We will show you some more pictures of faces, and sometimes the computer also will play some loud noise for a short time. These noises often startle people, and you may find them a bit unpleasant, but they will not damage your ears. If you like you can hear one

now. That way, you can see if you are OK to take part in this task when the time comes, before you agree to doing the research.

We would also like permission to look at your prison records. Allanah Casey would like to record some information from your file that will help her estimate your risk of violence. It is important you know that the risk estimate **will not** be given to you or to the Department of Corrections – if they want a risk rating, they have to make one themselves. Our risk rating is only for **research purposes.**

If you agree to take part today but then decide part way through that you don't want to carry on, you can just tell Allanah. If you do change your mind about today's session, we will destroy any information that you have given to us and you will not be included in the research project.

What will happen to my answers?

We will look after them very carefully. You will be given a special ID number that we make up for you. The computer does not record anything personal about you. It records your answers just as a bunch of numbers in a file, along with your ID number. The information Allanah takes from your prison file will also be identified only by ID number. All your information will be kept in a secure place at the university. Only the overall grouped results will ever be made available to the Department, or made public, **NOT** your personal results.

If the research goes well it will be published in a scientific journal and we will talk about it at professional conferences. You will know that you contributed to an important study that helped us know more about men in prison, and how to help them. But no one else will be able to tell that you took part.

Want to know about the final outcome of this research?

One of the interesting things about taking part in research is hearing how it came out. So, when we have finished the whole study we would like to send you a written summary of the results, some time in 2013. If you would like to receive a summary of the research you can give us an address where we could send a summary.

In the meantime, please don't talk about this research with other people in the unit. If you do, it could spoil our results and the answers we have will not be as useful. Thanks for taking the time to read and hear about this research. Do you have any questions?

Allanah Casey & Devon Polaschek
School of Psychology, Victoria University of Wellington, P O Box 600, Wellington

VICTORIA UNIVERSITY OF WELLINGTON
Te Whare Wananga o te Upoko o te Ika a Maui

Statement of Consent to Participate in the Face learning study

I have read and understood the information sheet about this study. I have asked any questions I wanted to ask, and I am happy with the answers.

I agree to take part in this research. I give my permission for the researchers to use the information I provide, and to access my prison files, for the purposes mentioned on the information sheet.

Name: _____

Signature: _____

Date: _____

When we have finished the whole study we would like to send you a written summary of the results, some time in 2013. If you will still be in prison then, remember that other inmates and staff may get to see your mail. You can give us the address of someone outside the prison who we can send this summary to if you would prefer.

Address for summary to be sent to:

_____

_____

Appendix Two: Full correlation matrix

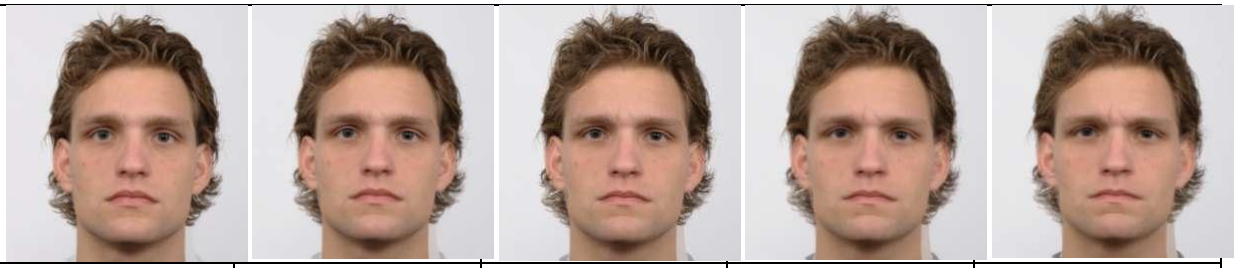
	PPI-R:SF										TriPM				STAI
	PPI-I:FD	So Inf	Fear	Str Im	PPI-II:SCI	M Eg	C Non	Bl Ext	R Non	Cold	Bold	Mean	Disin	Total	Trait
PPI-R:SF	.60**	.37**	.58**	.16	.81**	.63**	.40**	.35**	.82**	.19	.36**	.64**	.58**	.76**	-.05
PPI-I:FD		.50**	.78**	.58**	.08	.01	.05	-.20	.42**	.02	.62**	.18	.03	.33*	-.45**
So Inf		-	.20	.00	.13	.25	.13	-.20	.21	.00	.30*	.09	.04	.18	-.18
Fear			-	.09	.23	.13	.03	.00	.49**	-.10	.38**	.33*	.24	.44**	-.10
Str Im				-	-.23	-.34*	-.03	-.25	.04	.15	.50**	-.16	-.29*	-.05	-.61**
PPI-II:SCI					-	.81**	.41**	.66**	.78**	-.07	.01	.64**	.70**	.69**	.28
M Eg						-	.14	.42**	.59**	-.03	-.02	.67**	.66**	.68**	.29*
C Non							-	-.12	.24	.21	-.11	.08	.33*	.18	.19
Bl Ext								-	.31*	.24	-.04	.34*	.39**	.36**	.17
R Non									-	-.09	.22	.61**	.51**	.65**	.09
Cold										-	.07	.20	.04	.15	-.10
TriPM														-	.07
Bold											-	.12	-.06	.39**	-.63**
Mean												-	.60**	.86**	.29*
Disin													-	.81**	.38*

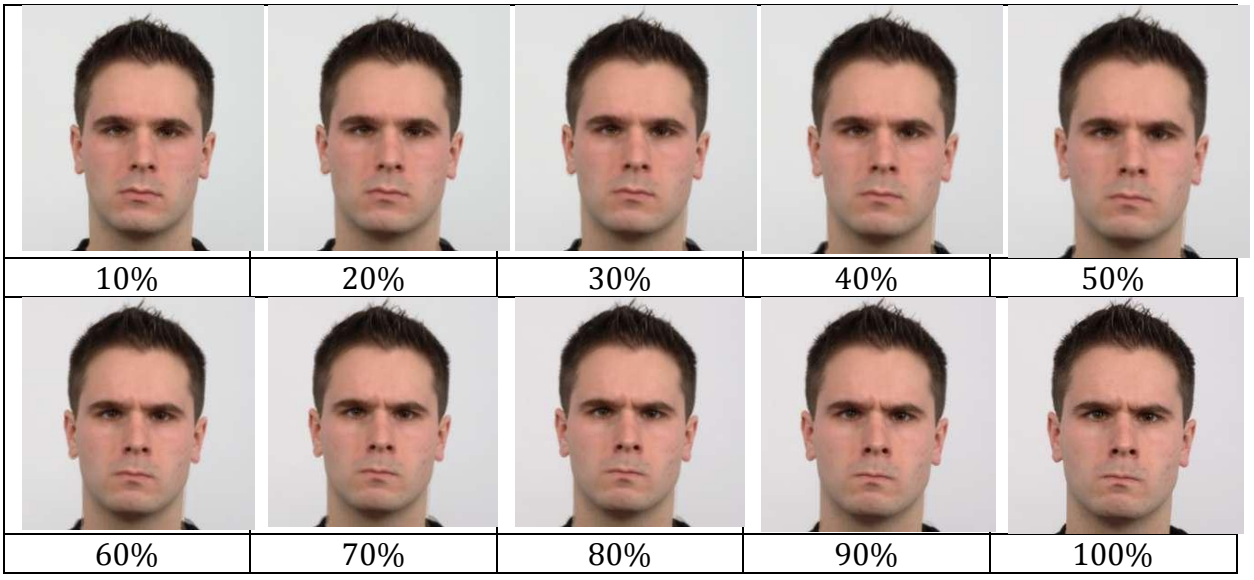
**p<.001, *p<.01

Appendix Three: Facial morph stimuli

Anger Morphs

				
10%	20%	30%	40%	50%
				
60%	70%	80%	90%	100%

				
10%	20%	30%	40%	50%
				
60%	70%	80%	90%	100%



10%	20%	30%	40%	50%
60%	70%	80%	90%	100%

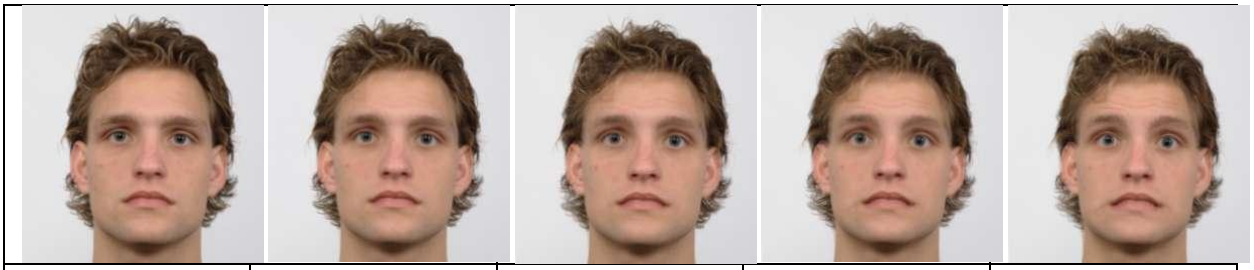
10%	20%	30%	40%	50%
60%	70%	80%	90%	100%

10%	20%	30%	40%	50%
60%	70%	80%	90%	100%

Fear Morphs

10%	20%	30%	40%	50%

60%	70%	80%	90%	100%



10%	20%	30%	40%	50%

60%	70%	80%	90%	100%

10%	20%	30%	40%	50%

60%	70%	80%	90%	100%

10%	20%	30%	40%	50%

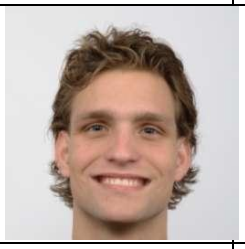
60%	70%	80%	90%	100%

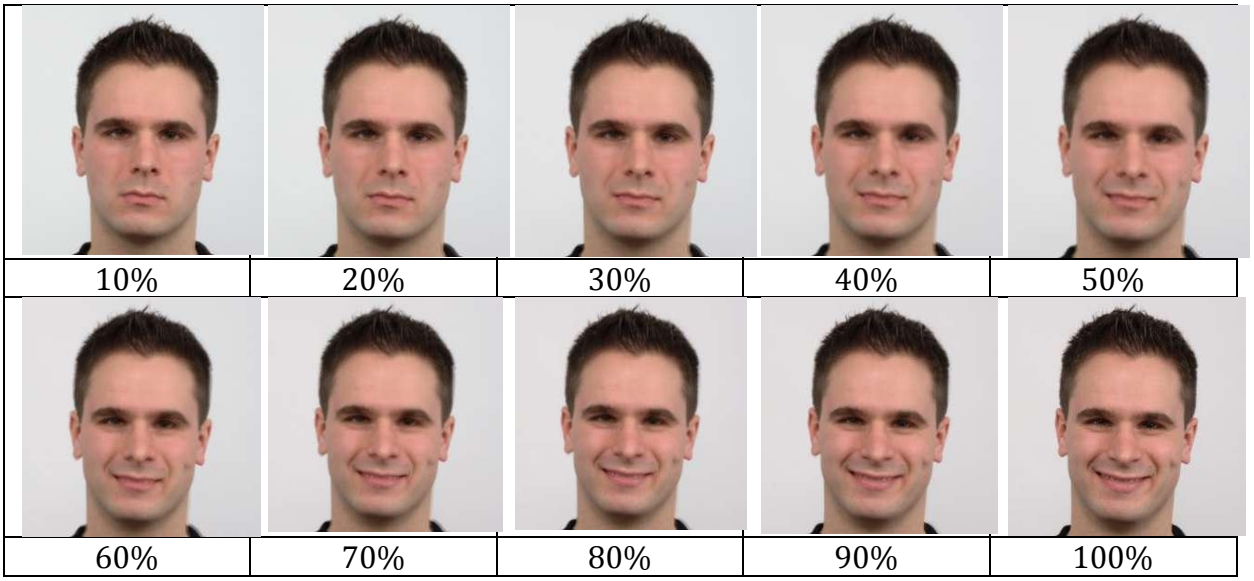
10%	20%	30%	40%	50%

60%	70%	80%	90%	100%

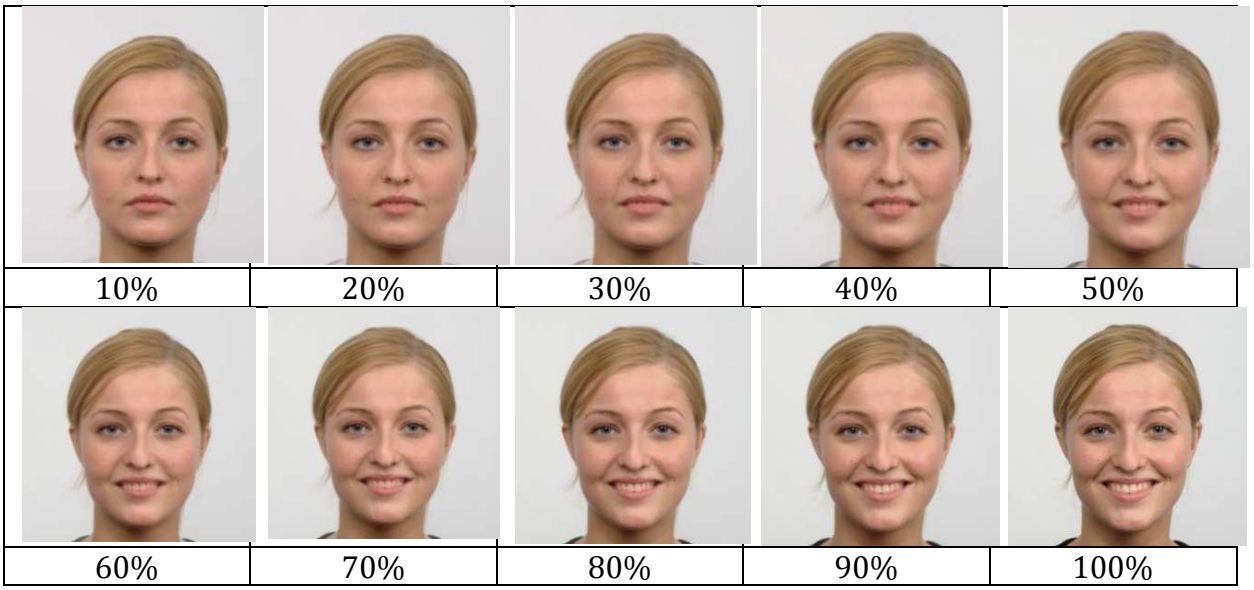
Happy Morphs

				
10%	20%	30%	40%	50%
				
60%	70%	80%	90%	100%

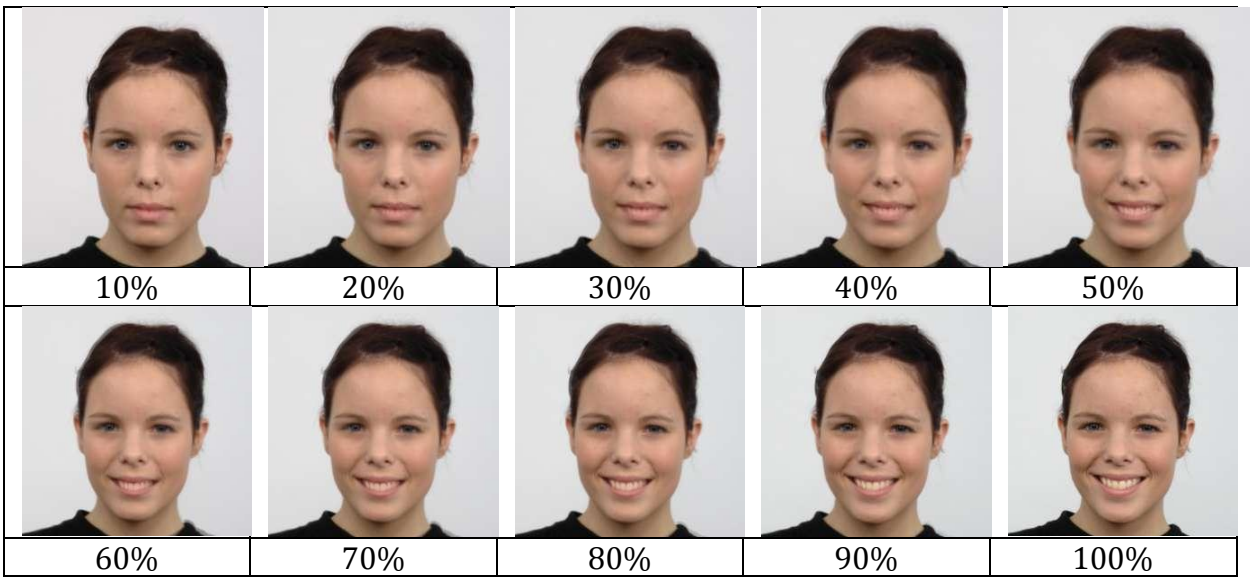
				
10%	20%	30%	40%	50%
				
60%	70%	80%	90%	100%



10%	20%	30%	40%	50%
60%	70%	80%	90%	100%



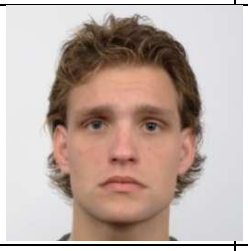
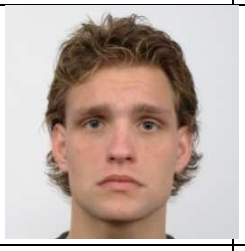
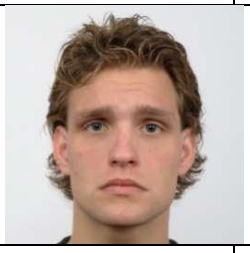
10%	20%	30%	40%	50%
60%	70%	80%	90%	100%

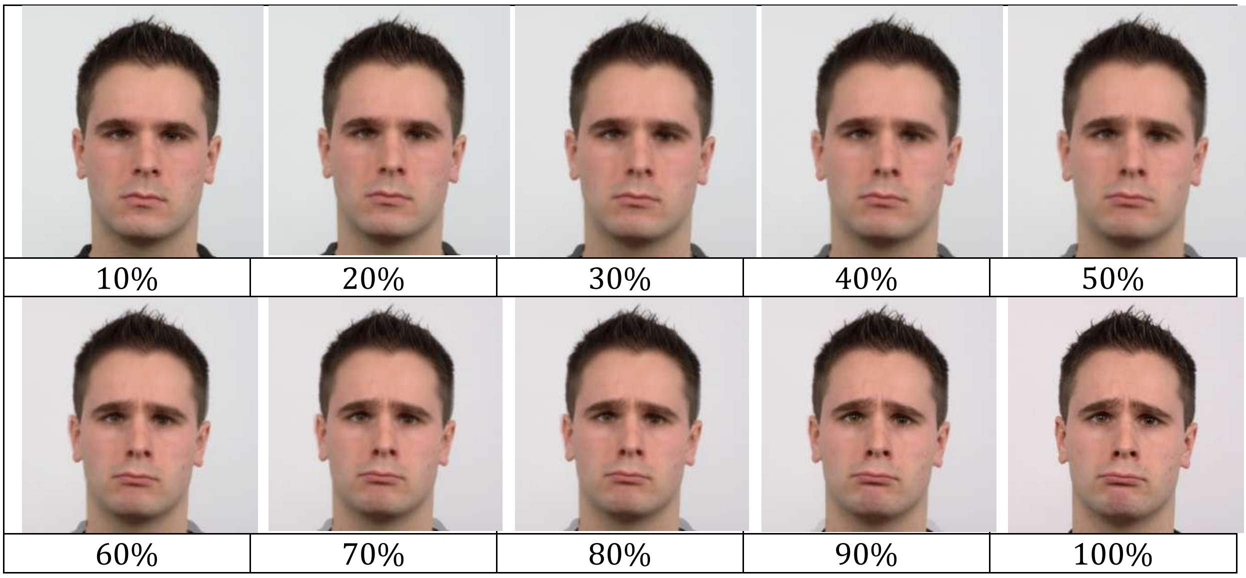


10%	20%	30%	40%	50%
60%	70%	80%	90%	100%

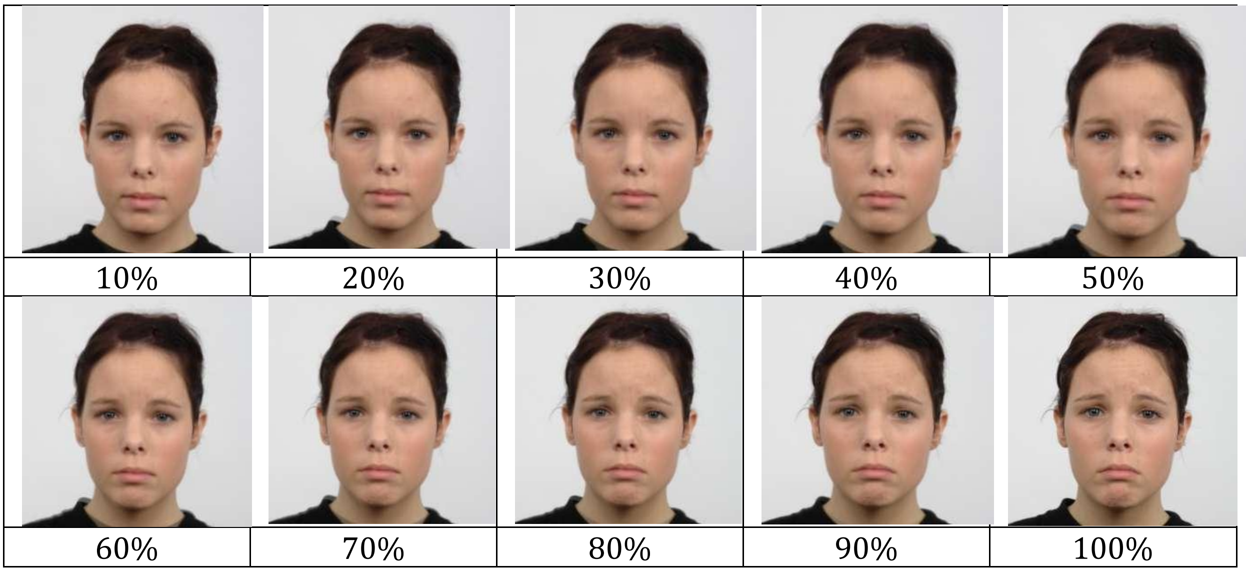
Sad Morphs

				
10%	20%	30%	40%	50%
				
60%	70%	80%	90%	100%

				
10%	20%	30%	40%	50%
				
60%	70%	80%	90%	100%


10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


10%
20%
30%
40%
50%
60%
70%
80%
90%
100%