

**Cognitive, Affective and Social Psychological Correlates of Psychopathic
Personality Traits in Offenders and Non-Offenders**

by

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Abstract

This thesis aimed to investigate the cognitive, affective and social-psychological correlates of psychopathic traits in offenders and non-offenders. In particular, the aim was to examine the differential effects of primary (selfish, uncaring) and secondary (reckless, prone to boredom) psychopathic traits on self-report and behavioural responses across a series of experiments. The results of Chapter 2 indicate that both primary and secondary psychopathic traits are associated with reduced empathic functioning. However, while primary traits were associated with reduced affective empathy, secondary traits were associated with reduced affective, cognitive, and social skills empathy. These results were further supported by the findings from economical decision-making games in Chapter 3. These results suggest that while elevated levels of secondary psychopathic traits may be linked with a lack of generosity for the out-group, such individuals may also show pro-social sentiment for the in-group. To better understand the cognitive mechanisms underlying empathic functioning in relation to psychopathic traits, Chapter 4 used eye tracking during an expression recognition task. Results revealed that primary psychopathic traits were linked with abnormal eye scan paths, indicated by reduced dwell time on the eye region of emotional faces. Chapter 5 aimed to further investigate these findings in a sample of sexual and violent offenders, with results revealing poor recognition of fearful faces relative to other emotions among sexual offenders. Furthermore, primary but not secondary psychopathic traits were linked with poorer performance for fearful face recognition. Taken together these findings show that primary and secondary psychopathic traits are linked with different patterns of performance on psychological tests relevant to socio-emotional functioning. These findings support the view that the variance accounted for by these traits should be considered separately in psychopathy research and in clinical practice.

~ To mum, dad and Natalie ~

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Dissemination

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CHAPTER 1: INTRODUCTION TO THE THESIS

1.1. Aims of the thesis

The principle aim of this thesis is to examine the socio-emotional responses associated with aspects of psychopathic personality in offenders and non-offenders. Psychopathic personality refers to a set of interpersonal/affective and lifestyle/antisocial features (Hare, 1991, 2003). The interpersonal/affective features of psychopathy include a callous disregard for others, a lack of remorse or guilt, and superficial charm. On the other hand, the lifestyle and antisocial features of psychopathy include irresponsibility, impulsivity and antisocial behaviour. Socio-emotional responses linked with psychopathic personality may include insecurity of attachment, abnormal recognition of socio-emotional cues including emotional facial expressions, and patterns of selfish and uncooperative behaviour.

However, the finding of psychopathic subtypes complicates the presence of inappropriate socio-emotional responses in relation to psychopathic personality. To date, experimental psychologists have made use of electrophysiological and neuropsychological techniques to investigate abnormalities in aversive conditioning, anticipatory emotional responses and the processing of emotional stimuli among psychopaths, and individuals with psychopathic tendencies. The results of such research indicate deficits in the experience of negative affect and abnormal processing of others distress. However, the majority of experimental psychopathy research has neglected to distinguish between variants of psychopathic personality. Two major subtypes of psychopath have been identified and are referred to as *primary* and *secondary*

psychopathy. Primary psychopathy is thought to represent a heritable disorder of personality which is characterised by a callous disregard for others. Secondary psychopathy on the other hand is thought to represent an acquired disturbance of emotional function which arises from early life trauma and environmental stressors. However, these two subtypes may also be distinguishable on the presence of trait anxiety. Although classical descriptions of psychopathy emphasise a lack of anxiety and neuroticism, investigations of these subtypes indicates that while primary psychopaths are characterised by a marked lack of fear and anxiety, secondary psychopaths demonstrate elevated levels of anxiety and neuroticism. These differences may have implications for the management and treatment of primary and secondary psychopathic offenders.

1.2. Organisation of the thesis

The first chapter of this thesis will present a literature review on the concept of psychopathy, detailing the historical development of the concept before focusing on methods for the assessment of psychopathic personality. The literature review then outlines the presence of psychopathic subtypes and explores the implications of these subtypes for the investigation of motivational, emotional, and behavioural features of the disorder. This section will also explore the relationship of several personality variables with traits associated with primary and secondary psychopathic subtypes, including social anxiety, attachment insecurity, and empathic functioning.

The thesis will then introduce a series of four chapters which assess primary and secondary psychopathic traits in offenders and non-offenders in relation to: socio-emotional functioning;

intergroup bias in economical decision making; eye scan paths in non-offenders; and emotional face recognition in sexual and violent offenders. The study reported in Chapter 2 aimed to examine differences in the socio-emotional and behavioural correlates of primary and secondary psychopathy. Because it has been shown that that social phobia may represent the diametric opposite to [primary] psychopathy, it was hypothesised that psychopathy and social phobia would differentially correlate with a number of variables linked with these two disorders, including attachment insecurity, disgust sensitivity, and empathic functioning. Chapter 3 investigates generosity and altruism to the in- and the out-group in a series of economical decision-making games. Emotional detachment from others, which is characteristic of those with high primary psychopathic traits, may lead to failures in the formation of close knit in-groups. Thus, primary psychopathy may be linked with a pattern of selfishness which is independent of group membership. Secondary psychopathy on the other hand may be linked with selfish responses but only when dealing with members of the out-group. These hypotheses, which are consistent with Mealey's (1995a, b) seminal theory of primary and secondary psychopathy, were tested using a series of economical decision making games which are potentially sensitive to differences in in-group liking and out-group derogation. Finally, Chapters 4 and 5 aimed to examine the relationships of primary and secondary psychopathy with emotional facial expression recognition in non-offenders (Chapter 4) and serious sexual and violent offenders (Chapter 5). The contribution of abnormal eye scan paths to deficits in the recognition of emotional facial expressions in relationship to primary and secondary psychopathic traits was also investigated among non-offending participants (Chapter 4).

In the closing section of this thesis a general discussion reviews important findings from the empirical chapters. In particular, this discussion will highlight the implications of abnormal eye scan paths for recognizing emotionally expressive faces in relation to primary psychopathic traits; differences in eye scan paths may reflect deficits in the allocation of attention to the more emotionally salient features of emotional faces. A failure to attend to these features may be linked with deficits in the processing and recognition of others distress cues. Consistent with this hypothesis, elevated levels of primary psychopathy, but not secondary psychopathy, were shown to interact with accuracy in fearful face recognition among offenders and non-offenders. Finally, psychopathic traits are also shown to be important in the degree of intergroup bias during economical decision-making tasks. More specifically, secondary psychopathy may be linked with increased generosity toward members of the in-group. This observation challenges the commonly held assumption that psychopaths will always behave in a selfish manner and may be linked with disruption in the neurobiological circuits underlying attachment formation and liking for the in-group.

1.3. A historical overview of psychopathic personality

Psychopathy refers to a rare and severe disorder of personality linked with generally antisocial behaviour and violence. However, the clinical features of psychopathy, including a callous disregard for others and a lack of behavioural controls, may be identified in both offending and non-offending population.

Traditional descriptions of psychopathy draw largely up on the seminal work of Hervey Cleckley (1941), entitled '*The Mask of Sanity*.' Drawing upon clinical experience, Cleckley refers

to a subset of psychiatric patients who, beneath a façade of normalness, present as severely callous, devoid of human emotion, and incapable of remorse or guilt. These patients presented with superficial charm and good intelligence, inadequately motivated antisocial behaviour, and an incapacity for love. Cleckley also highlights the notable absence of ‘nervousness’ or anxiety among this subset of psychiatric patients. The criteria outlined by Cleckley are still relevant to modern day conceptualizations of psychopathy, and were adapted for use in the Hare Psychopathy Checklist – Revised (PCL-R; Hare, 1991, 2003), the gold standard in the measurement of psychopathic personality. The PCL-R refers to a 20-item construct rating scale widely used in the assessment of psychopathic personality. Adapted largely from the clinical criteria outlined by Cleckley (1941), the PCL-R makes use of semi-structured interview and file based information to score the presence of traits and features of psychopathy. Items are scored using a 3-point rating system, whereby each item can receive a score of 0, 1, or 2, indicating the extent to which each item is present for a given individual. Total scores therefore range from 0-40, with higher scores indicative of a greater degree of psychopathic personality. While a cut-off score of 30 has been suggested for a PCL-R diagnosis of psychopathy in North America (Hare, 1991, 2003), Cooke and Michie (1999) suggest that a cut-off of 30 in North America is equivalent to 25 in Scotland.

The PCL-R contains two broad Factors pertaining to the clinical features of psychopathy. The first of these factors, Factor 1, measures the interpersonal/affective features of psychopathy: glibness/superficial charm; grandiose sense of self-worth; pathological lying; conning/manipulative; lack of remorse or guilt; shallow affect; callous/lack of empathy; failure

to accept responsibility for own actions. Factor 2, on the other hand, measures the lifestyle/antisocial features associated with psychopathy: need for stimulation/proneness to boredom; parasitic lifestyle; poor behavioural controls; promiscuous sexual behaviour; early behaviour problems; lack of realistic, long term goals; impulsivity; irresponsibility; many short-term marital relationships; juvenile delinquency; revocation of conditional release; criminal versatility (added to 2nd edition (Hare, 2003)). Although the PCL-R is deemed the gold standard in the assessment of psychopathic personality, derivatives of the PCL-R have also been developed; these include the PCL-Screening Version (PCL-SV; Hart, Cox, & Hare, 1995), a 12-item version of the PCL-R, and the PCL-Youth Version (Forth, Kosson, & Hare, 2003), a 20-item modified version of the PCL-R for use with adolescents. Other self-report instruments for the assessment of psychopathic traits include the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996), and the Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, & Fitzpatrick, 1995).

1.4. Psychopathic subtypes

1.4.1. Recognition of subtypes

Although the PCL-R measures two distinct factors, the use of a total score largely ignores the relative influence of the individual factors. Furthermore, the finding of three- (Cooke, Michie, & Hart, 2006) and four-factor models of the PCL-R using factor analytical methods may be indicative of psychopathic variants. Competing structural models of the PCL-R has led to an on-going debate as to whether antisocial behaviour represents a core trait of psychopathic personality, as argued by Neumann and colleagues (Neumann, Vitacco, Hare, and Wupperman,

2005), or is merely a downstream correlate of the other recognised traits (Cooke, Michie, Hart, & Clark, 2004; Skeem & Cooke, 2010). The latter would be consistent with a three factor model which excludes those items relevant to antisocial behaviour (Cooke & Michie, 2001; Cooke et al., 2006). However, as suggested by Skeem, Johansson, Andershed, Kerr, and Louden (2007), the multifaceted nature of the PCL-R along with variability in score configurations across the different facets may support the existence of psychopathic variants. The existence of variants, or subtypes of psychopathic personality may have implications in both clinical and research settings. For example, in a research setting, pooling primary and secondary psychopathic variants together in to one homogenous sample may be to ignore potentially important differences between the two subtypes. In a clinical or forensic setting, the existence of subtypes may be important with respect to the management and treatment of clients and offenders.

The suggestion of psychopathic variants is not a recent conjecture. Almost simultaneous with the work of Cleckley (1941), subtypes of psychopathy were also proposed. One of the first to distinguish between such variants of psychopathy was Karpman (1941) who suggested primary and secondary variants; the primary variant described was synonymous with the clinical description outlined by Cleckley. However, in distinguishing between primary and secondary variants, Karpman notes that some of those presenting as psychopathic showed heightened levels of neuroticism and anxiety. This is in contrast to the description outlined by Cleckley, which emphasised a lack of nervousness and an inability to feel emotions such as fear, guilt, and anxiety. When considered together, these features of negative emotionality may hold potential for differentiating between primary and secondary psychopaths.

Lykken (1957) explored the existence of psychopathic subtypes and observed important differences between those who largely conformed to the clinical description outlined by Cleckley (1941), and those who failed to resemble the Cleckley prototype in some important respects. These variants were labelled as primary, and secondary, respectively. Lykken (1957) demonstrated that prototypical primary psychopaths showed poorer electrodermal conditioning relative to controls and secondary psychopaths during an aversive classical conditioning task. Furthermore, extinction of the conditioned electrodermal response was more rapid in primary relative to secondary psychopaths and controls. Primary psychopaths also presented as less anxious than secondary psychopaths and showed a preference for fearful relative to mundane activities, suggestive of fearlessness. Thus, early findings suggest that these subtypes of psychopath exist and that they can be differentiated on the basis of classically conditioned biosignals, indicative of differential underlying bio-psychological mechanisms.

1.4.2. Are psychopaths anxious?

According to Karpman (1941), the clinical manifestations of psychopathy may be similar in both primary and secondary variants, including shallow regard for others, lack of guilt and remorse, irresponsibility, and antisocial personality. However, the criminalistic and antisocial behaviours of these two variants may be differentially motivated. Central to Karpman's (1941) distinction between primary and secondary psychopathy is the trait feature of anxiety, a long-term disposition toward feelings of anxiety across various situations. Karpman believed, similar to Cleckley (1941), that a chronic lack of anxiety was characteristic of the primary psychopath. However, he also concluded that secondary psychopaths experienced high levels of neuroticism

and anxiety which he argued reflected early psycho-social learning, the product of disturbances in early experience.

Kosson and Newman (1995), in a review of studies of PCL identified psychopaths, suggest that primary and secondary variants may be distinguishable on the basis of emotional and cognitive function and emotion and self-regulation. Furthermore, Skeem et al. (2007) highlight that studies have successfully differentiated high- and low-anxious psychopaths on the basis of passive avoidance learning, emotional response modulation, and the fear potentiated startle reflex. These and other findings suggest that while primary psychopaths show deficiencies in relation to these aetiological markers, such deficits cannot be observed among high anxious secondary psychopaths. This is consistent with a heritable component to primary psychopathy.

Further evidence for an important role of trait anxiety in differentiating between psychopathic subtypes is provided by studies assessing the relationship of trait anxiety with scales which map on to PCL-R Factor 1 and Factor 2 scores. While Factor 1 of the PCL-R measures interpersonal and affective features relevant to primary psychopathy, Factor 2 assesses lifestyle and antisocial features thought to be related to secondary psychopathy. Scales which measure these factors have been found to differentially relate to trait anxiety, such that negative correlations have been observed with scales assessing Factor 1 features and positive correlations have been identified in association with scales tapping Factor 2 features (Hare, 1991; Verona, Patrick, & Joiner, 2001). For example, while Hale, Goldstein, Abramowitz, Calamari, and Kosson (2004) failed to observe a negative relationship between primary traits and anxiety sensitivity, a positive relationship was found between antisocial deviance, trait

anxiety, and levels of negative emotionality. Hicks and Patrick (2006) analysed the association of PCL-R factors 1 and 2 with variables including emotional distress, fearfulness, and anger hostility. The analysis revealed that Factor 1 was negatively associated with emotional distress and fearfulness whereas positive associations of Factor 2 were seen with emotional distress, fearfulness, and anger hostility.

Further evidence for the distinction between primary and secondary psychopathy has accumulated through the use of factor analysis in both offending and non-offending samples. For example, Vassileva, Kosson, Abramowitz, and Conrod (2005) investigated the presence of psychopathic subtypes among incarcerated psychopathic offenders using PCL-R Factor 1 and 2 scores, a measure of anxiety and diagnoses of drug and alcohol dependence. Data were subjected to cluster analysis which revealed four distinct clusters. Two of these clusters resembled the primary and secondary subtypes, with primary psychopaths showing high Factor 1 and average Factor 2 scores, less severe drug and alcohol problems and low anxiety. Secondary psychopaths on the other hand showed high Factor 2 and modest Factor 1 scores together with severe drug and alcohol problems, and elevated anxiety scores. The remaining clusters related to a group that showed some features of psychopathy and antisociality, and a non-psychopathic group. These results provide evidence for the primary/secondary distinction in an offending population and are indicative of elevated levels of anxiety among secondary psychopaths.

Similar results have also been obtained with non-offender samples. Falkenbach, Poythress, and Creevy (2008), used similar methods to Vassileva et al. (2005) to explore subclinical

psychopathic subtypes in a college sample. The authors included various measures, including assessments of psychopathy factors, anxiety and behavioural activation and inhibition, which led to the identification of two prototypes which closely resembled the primary and secondary variants. Thus, while those who resembled the primary subtype showed low anxiety scores, the secondary prototype showed higher levels of anxiety and behavioural inhibition and activation. A further two clusters were also identified; a low anxiety group and a normal temperament group.

Despite becoming increasingly popular, the concept of psychopathic subtypes remains controversial. This controversy surrounds the finding of heightened levels of trait anxiety among secondary subtypes, while psychopathy, as defined by Cleckley (1941), highlights the apparent fearlessness and lack of nervousness among such individuals. However, it should be noted that a reliance on self-report measures of anxiety in psychopathy research may limit the extent to which conclusions can be drawn on the basis of the findings outlined above. A deceitful and manipulative interpersonal style represents a hallmark of psychopathic personality (Hare, 1991). These traits of psychopathy may also be linked with deceitful and dishonest responding on self-report measures (Lilienfeld & Fowler, 2006). Nonetheless, research findings suggest that psychopaths show no greater levels of social desirable responding or positive impression management relative to non-psychopaths (Hare, 1991; Lilienfeld & Andrews, 1996).

When considering the self-report of trait anxiety, an additional issue arises in that the conceptual distinction between fear and anxiety may be blurred (Sylvers, Lilienfeld, & LaPrairie, 2011). Thus, measures of trait anxiety and trait fear, otherwise referred to as harm avoidance

measures (Sylvers et al., 2011), may lack construct validity. However, it is argued by Gray and McNaughton (2000) that self-report as yet represents the only direct measure for understanding and defining the subjective experience of trait fear and trait anxiety. Future research may seek to use physiological measures including heart rate and heart rate variability, startle response, and the galvanic skin response, alongside self-report measures of trait fear and trait anxiety, to gain a finer understanding of the interplay between these two constructs in psychopathy research. Despite measurement and conceptual issues, it remains the case therefore that some of those who score highly on trait measures of psychopathy present with high levels of negative emotionality and trait anxiety. Attention to these identified subtypes both in research and in forensic clinical assessments may be beneficial in the effective management and treatment of psychopathic offenders.

1.5. Dissociating psychopathy from antisocial personality disorder

Antisocial personality disorder (ASPD) refers to a diagnostic category of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). Fazel and Danesh (2002), based on a systematic review of 62 surveys, found that while 61-68% of male offenders had a diagnosis of a personality disorder, 46-48% had a diagnosis of ASPD. A diagnosis of ASPD may be made where an individual presents with a number of criteria deemed relevant to antisocial behaviour, including a life persistent pattern of antisocial behaviour, impulsivity, and irresponsibility. Although many of the ASPD criteria are behavioural in nature, they also include a personality-based factor referencing a lack of remorse. An additional criterion which must be met for a diagnosis of ASPD is the presence of a diagnosis of conduct

disorder (see section 1.6.1. for a definition of conduct disorder) before the age of 15. Thus, a diagnosis of ASPD can only be made where there is considerable evidence of disregard for societal norms and rules from childhood through adolescence.

Both psychopathy, as defined by the PCL-R, and ASPD refer to behavioural criteria related to antisocial deviance. However, these two sets of criteria may be differentiated on the basis of personality factors. Accordingly, a diagnosis of ASPD does not require the individual to present with the callous-unemotional affective style, that is, the core feature of psychopathy. This parallels the way in which a diagnosis of CD in children under the age of 15 does not require the presence of callous-unemotional (CU) traits. Thus, while almost all individuals with a diagnosis of psychopathy would fulfil criteria for a concomitant diagnosis of ASPD, roughly only one-third of those with a diagnosis of ASPD would fulfil PCL-R diagnostic criteria for psychopathy (Coid, 1998).

Kosson, Lorenz, and Newman (2006) compared individuals with a diagnosis of both psychopathy and ASPD, with individuals with a diagnosis of ASPD in the absence of psychopathy, and with those with a diagnosis of neither disorder. Although ASPD diagnosed offenders with and without psychopathy had higher rates of offending relative to controls, those with a diagnosis of psychopathy showed the most severe pattern of criminal behaviour. In addition to analysing behavioural patterns, the authors also investigated emotional word processing between the three groups of offenders. Participants in these three groups were presented with emotionally charged and neutral words and asked to categorise them as English words or non-words. Relative to those with intact processing of emotion, psychopathic offenders show a lack

of affective facilitation, that is, the phenomenon whereby affective words can be classified more quickly than neutral words. It was found that psychopaths were no quicker to respond to affective words relative to neutral words. If ASPD represents a distinct syndrome to that of psychopathy, distinguishable by the presence of antisocial behaviour in the absence of interpersonal affective characteristics, then one would expect a differential relationship between emotional processing and criminal behaviour in those with a dual-diagnosis of psychopathy and ASPD and those with an ASPD only diagnosis. Consistent with this hypothesis, Kosson et al. (2006) found that individuals with a dual diagnosis of psychopathy and ASPD showed a lack of affective facilitation which was predictive of the number of charges of non-violent crimes. However, this relationship was not apparent among those with a diagnosis of ASPD without psychopathy. Thus, although there is only a limited literature on the nature of ASPD as a syndrome that is independent of psychopathy (DeBrito & Hodgins, 2009), the findings outlined above would suggest that these two disorders are distinguishable on the basis of an affective-interpersonal component which is exclusive to those with a diagnosis of psychopathy.

A consideration of how psychopathy differs from other disorders associated with antisocial behaviour may therefore be beneficial to understanding of psychopathic personality. A consideration of early psychopathic and antisocial tendencies in children may also advance understanding of the development and aetiology of psychopathic personality. The presence of a syndrome among young children which is synonymous with psychopathy offers an important opportunity to study the developmental antecedents to psychopathic personality and antisocial behaviour tendencies. The findings of experimental, longitudinal and twin based studies of

heritability therefore may contribute to the field of psychopathy and develop understanding of psychopathy in adulthood.

1.6. Childhood correlates of psychopathy

1.6.1. Conduct Disorder

Psychopathic personality, although usually diagnosed in adult incarcerated populations, may be evident through the developmental period. An interest in psychopathy among adolescent populations can be seen in the work of Frick, O'Brien, Wootton, and McBurnett (1994).

However, concerns have been raised regarding the applicability of the concept or diagnosis of psychopathy to adolescent populations. These concerns typically relate to the transient nature of callous unemotional traits in adolescent samples, and to potentially harmful, negative long term consequences of the label for the individual concerned (Salekin, 2002; Skeem, Monahan, & Mulvey, 2002). In spite of these concerns it has been argued that psychopathy research among younger samples may add to the existing understanding of behavioural problems among adolescents, including those with a DSM-IV-TR (American Psychiatric Association, 2000) diagnosis of conduct disorder (CD).

However, disorders relating to behavioural problems in children may differ from psychopathy. For example, while diagnoses of CD typically focus on overt behavioural symptoms, including threatening and intimidating behaviour, forcing someone in to sexual activity, or deliberate fire setting, the construct of psychopathy confers an additional interpersonal/affective component (Frick, 1998). Therefore, while adolescents with CD may behave in an antisocial manner and show impulsivity and irresponsibility, they may lack the

callous-unemotional traits which are at the core of psychopathic personality. For example, Forth and Burke (1998) suggest that while 97-100% of adolescent offenders qualify for a diagnosis of CD, less than 30% met a diagnosis of psychopathy as measured using the PCL-YV. Thus, of those adolescents who have been diagnosed with a behavioural disorder, including CD, only a small minority may present with the callous and unemotional traits of psychopathic personality.

1.6.2. Callous and unemotional traits

It is generally accepted that there may be various complex patterns of etiological, behavioural, and motivational factors underlying childhood antisocial behaviour (Frick, Cornell, Bodin, Dane, Barry, & Loney, 2003). Furthermore, it has been suggested that young children demonstrating severe conduct problems may be differentiated by the presence or absence of a callous and unemotional affective style. The traits associated with this affective style are similar to those which make up Factor 1 of the PCL-R and those deemed to be at the heart of psychopathic personality (Cleckley, 1941). Thus, it has been suggested that the measurement of callous-unemotional (CU) traits in children with conduct problems may represent a means of extending the construct of psychopathy to children. For example, Barry et al. (2000) used teacher ratings of CU traits to divide children with a dual diagnosis of attention deficit/hyperactivity disorder along with either oppositional defiant disorder or conduct disorder, into two groups. Results revealed that those children who showed a high degree of CU traits displayed characteristics typically associated with psychopathy, including an absence of fear. Furthermore, these traits have been found to be stable from childhood to adolescence

(Munoz & Frick, 2007) and are predictive of adult psychopathy (Burke, Loeber, & Lahey, 2007; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007).

The use of CU traits to distinguish between groups of antisocial youths has enabled important findings to emerge in relation to both the severity and stability of antisocial behaviour. For example, Christian, Frick, Hill, Tyler, and Frazer (1997) assessed the severity of conduct problems in relation to CU traits among antisocial youths. Using a combination of parent and teacher ratings to assess CU traits, and interviews to establish presence of oppositional defiant disorder and conduct disorder, a number of clusters were revealed. For one of these clusters, the authors noted high rates of oppositional defiant disorder and conduct disorder, as well as elevated levels of CU traits. Furthermore, this cluster also showed a very severe pattern of antisocial behaviour, with varied and severe conduct problems and a high frequency of police contacts. The presence of CU traits in this group distinguished these youths from those in other clusters, and was indicative of the presence of the psychopathy construct.

Callous-unemotional traits have also been found to differentiate between those youths who show a pattern of premeditated goal directed aggression, and those who demonstrate a more reactive, impulsive form of aggression (Frick, Cornell, Barry, Bodin, & Dane, 2003; Kruh, Frick, & Clements, 2005). However, impulsivity and narcissistic personality show a stronger association with conduct problems and delinquency in youth samples (Corrado, Vincent, Hart, & Cohen, 2004). Thus, the measurement of CU traits appears to predict a distinctive, goal directed pattern of behaviour among a subgroup of youths with conduct problems. Furthermore, it has been suggested that a callous disregard for others may be associated with a reduced proclivity to

inhibit acts of aggression in response to others distress cues (Blair, 1995, 2001). Consistent with such a model, Pardini (2006) found that the presence of CU traits mediated a relationship between fearlessness and violence, indicating that the antisocial acts of youths with CU traits may reflect fearlessness and a callous disregard for others. This is in contrast to the failures in impulse inhibition and high levels of reactive aggression which are characteristic of the antisocial acts of youths with CD without psychopathy.

Recent evidence suggests that the callous-unemotional traits observed among some individuals with a diagnosis of CD may have a genetic component. This is consistent with Karpman's (1941) suggestion that the core personality characteristics of psychopathy may represent a heritable form of personality, as opposed to being the result of early trauma or familial dysfunction. Genetic influences on psychopathy have been studied using a personality based approach by Blonigen, Carlson, Krueger, and Patrick (2003). The authors identified a substantial genetic influence using the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) to measure psychopathic personality traits in a sample of 353 male twins. A further twin study by Taylor, Loney, Bobadilla, Iacono, and McGue (2003) estimated the total genetic variance in the detachment features of psychopathy to be at 42%. Furthermore, a shared genetic influence with antisocial behaviour was estimated at 23%. These results indicate a genetic influence on the personality features of psychopathy which is independent of genetic influences on antisocial features.

More recently, Larson, Andershed, and Lichtenstein (2006) investigated the genetic and environmental contributions to psychopathic personality in a sample of 1,090 monozygotic and

dizygotic twins. The authors measured three distinct dimensions of psychopathic personality; interpersonal, affective, and behavioural/lifestyle features. Findings indicated that, as well as an overall genetic influence on the three-factor construct of psychopathy, there were also unique genetic contributions to the affective and lifestyle/antisocial dimensions. Viding, Blair, Moffitt, and Plomin (2005) also investigated callous-unemotional traits and antisocial behaviour in a much larger sample of 3,687 twin pairs aged around 7 years. Results revealed a strong genetic influence for callous-unemotional traits. Analyses showed that for twin pairs showing both antisocial behaviour and high callous-unemotional traits there was a substantial genetic influence in the absence of an effect of shared environment. In contrast however, for twin pairs showing high levels of antisocial behaviour in the absence of callous-unemotional traits there was only a moderate genetic influence as well as an influence of shared environment. Further analysis of 1,865 of these twin pairs at age 9 indicated that there remained a strong genetic influence for callous-unemotional traits. Furthermore, the heritability of callous-unemotional traits was found to be greater after controlling for symptoms of hyperactivity.

1.7. Developmental factors and psychopathy

1.7.1. Family factors

Individuals who show high levels of antisocial behaviour often report traumatic early experiences within the family environment. This can include either neglect or physical and/or sexual abuse, attachment insecurity, and high levels of parental/domestic violence. Thus, family factors have also been examined in relation to the concept of psychopathy. Karpman (1941) posits that secondary psychopathy may be viewed as an emotional response to a harsh

environment. It is suggested that family factors including parental rejection, neglect and punishment may contribute to features such as emotional instability and antisocial behaviour which are characteristic of the secondary variant. In contrast, it is postulated that the primary variant is reflective of some genetic abnormality and cannot be explained as an environmental adaptation or emotional response (for reviews, see Skeem et al., 2003; Poythress & Skeem, 2006). In summary, Karpman (1941) viewed primary psychopathy as the result of an *inherited* affective deficit; whereas secondary psychopathy was thought to reflect an *acquired* affective disturbance (Skeem et al., 2007).

In support of a link between psychopathy and early family factors, Bowlby (1969) stated that maternal deprivation in the first five years of life may have irreversible negative effects, including the development of an affectionless character and juvenile delinquency. It is also suggested by McCord and McCord (1964) that parental factors, including parental rejection and harsh punishment, may influence the development of psychopathic personality. It has been found that family factors and parenting problems predict offending and chronic offending (Farrington and West, 1993) as well as elevated antisocial personality scores (Farrington, 2000). Thus, early environment and harsh parenting may be antecedent to secondary psychopathic traits and tendencies. Further evidence for the role of early family factors in the development of psychopathic personality has been presented by Campbell, Porter, and Santor (2004). These authors found that scores on the Psychopathy Checklist – Youth Version (PCL-YV; Forth, Kosson, & Hare, 2003) were associated with the experience of physical abuse and were predicted by a history of non-parental living arrangements. Similarly, Weiler and Widom (1996) noted

significantly higher PCL scores among victims of childhood abuse and neglect. Marshall and Cooke (1999), however, identified a greater incidence of poor parental supervision and neglect among psychopathic relative to non-psychopathic offenders although there were no observable differences in the experience of early physical abuse.

Further evidence for the role of early family factors in the development of psychopathic personality has also been noted in longitudinal studies. For example, Lang, Klinteberg, and Alm (2002) followed a cohort of Swedish males and identified a relationship of early victimization with both later violence and elevated PCL-R scores. Also, in a prospective 40-year follow up study with 411 boys from age 8 to 48 years, known as the Cambridge Study in Delinquent Development, Farrington (2003) identified several family risk factors for the development of psychopathy and antisocial deviance. Results showed that out of 33 males with a score of 10 or more on the PCL-SV at follow up, 97% had been convicted, with a mean number of convictions of 9.3. Furthermore, this group presented as phenotypically dissimilar to those with lower scores on the PCL-SV, in terms of both conviction rate and mean number of convictions.

Farrington and colleagues in their investigation of family factors, separated these in to seven categories, as follows: (1) child rearing problems, including poor supervision, ill-discipline, and a rejecting style of parenting; (2) abuse and/or neglect; (3) family disruption/parental conflict; (4) large family size; (5) criminal or antisocial parents and/or siblings; (6) characteristics of parents including young age, presence of substance abuse; and (7) socio-economic factors, including low financial income and a poor standard of housing (Farrington, 2006). Here Farrington noted that poor parental supervision at age eight was predictive of elevated levels of psychopathy at age

48. Furthermore, results indicated that poor parental supervision predicted antisocial deviance but was not predictive of interpersonal-affective scores. These results are therefore consistent with Karpman's (1941) suggestion that early family factors are linked with the development of secondary, but not primary, psychopathic tendencies. However, these conclusions are complicated by the finding that harsh or erratic parenting was found to be predictive of both interpersonal-affective and antisocial scores. Furthermore, physical neglect at age eight was found to predict total, interpersonal-affective, and antisocial scores at age 48. Farrington (2000) also showed that factors such as: disrupted family background (including early separation from a parent); coming from a large family size by the age of 10; being born to a teenage mother, were predictive of high antisocial personality scores at age 32, and elevated levels of psychopathy at age 48 (Farrington, 2006).

Thus, the Cambridge Study provides support for an influence of early family factors on levels of antisocial personality and PCL-R Factor 2 features which characterise secondary psychopathy. However, the finding that many of these factors were also associated with the interpersonal-affective component and over all psychopathy scores at age 48 limits the degree to which these findings are consistent with a primary/secondary distinction in the influence of early family factors, as posited by Karpman (1941).

1.7.2. Attachment

1.7.2.1. The attachment bond

The attachment bond is established in development between an infant and their primary caregiver and acts as a template for future intimate and romantic relationships (Collins & Read,

1994). It is noted that an individual's attachment style can confer a sense of worth, or on the other hand, worthlessness dependent upon the nature of the attachment (Ward, Hudson & Marshall, 1996). Four major patterns of attachment behaviour have been identified and described in the developmental literature (see Figure 1). Three of these styles were based upon findings resulting from the strange situation paradigm of Ainsworth et al. (Ainsworth, Blehar, Waters, & Wall, 1978). One of styles is referred to as secure while the other two are types of insecure attachment, referred to as ambivalent and avoidant. The fourth pattern, termed disorganised, was identified in later research and represents a mixed avoidant-anxious type (Crittenden, 1988; Main & Solomon, 1990).

A secure attachment, stemming from a warm and caring bond between the child and main caretaker, results in the child developing an internal working model of others as safe and caring (Baldwin, 2005). Hazan and Shaver (1987) suggest that a secure style of attachment allows the individual to enter in to future romantic relationships with a sense of warmth and care giving. According to a two dimensional model of attachment experiences, proposed by Bartholomew and Horowitz (1991), early attachment experiences provide a template whereby the individual can enter in to future romantic relationships with a positive view of both the self and others. Where the individual has a positive view of both the self and others the individual is considered to have a secure attachment style. However, a negative view of the self and/or others is reflective of attachment insecurity.

According to Bartholomew and Horowitz (1991) an ambivalent attachment style is characterised by a negative view of the self and positive view of others. An ambivalent

childhood attachment style results from an inconsistent style of parenting resulting in a preoccupation with past attachment experiences (Cassidy & Berlin, 1994; Holmes, 1993). Ambivalence in attachment is associated with an increased risk of social withdrawal and rejection, along with feelings of incompetence (Finzi, Ram, Har-Even, Shnitt, & Weizman, 2001). According to Henry and Wang (1998), an ambivalent attachment causes the child to live in fear of often threatened rejection, whilst being uncertain of relationship quality (Henry & Wang, 1998).

Disorganised (fearful according to Bartholomew and Horowitz, 1991) individuals hold a negative view of both self and others. Such attachments are associated with parental maltreatment during infancy (Carlson, Cicchetti, Barnett, & Braunwald, 1989; Schuengel, & Bakermans-Kranenburg, & Van IJzendoorn, 1999) and are also elevated in samples where the mother has a background of drugs and/or alcohol abuse (Van IJzendoorn et al., 1997) and/or cases where the primary caregivers have experienced an unresolved loss or trauma of their own (Ainsworth & Eichberg, 1991; Main & Hesse, 1990). Conflict can occur whereby the parents in being frightened or frightening can become a source of fear instead of comfort for the child. Although disorganised individuals desire intimacy, an overriding fear of rejection means any closeness with romantic partners is avoided and sex is sought after in an impersonal manner (Ward, Hudson, & Marshall, 1996).

A controlling and interfering parenting style, whereby independence is discouraged and achievement and self-reliance are emphasised at the cost of intimacy, is characteristic of dismissive/avoidant attachment styles (Belsky, 1999). Later in life, dismissively attached

individuals display hostility and a lack of feeling for others (Ward, Hudson, & Marshall, 1996), epitomizing their positive view of the self and negative view of others. As a result of typically low empathy, coldness and hostility, offences committed by those who are dismissively attached are often aggressive and, when feelings of satisfaction are derived from expressing hostility, sadistic tendencies may develop (Ward, Hudson, & Marshall, 1996).

Cognitive representations of the self and interpersonal relationships, which are born out of the initial early attachment experiences, continue throughout childhood (Main & Cassidy, 1988) and into romantic adult relationships (Feeney & Noller, 1990; Hendrick & Hendrick, 1989). Thus, similar classification systems have been developed for use in adult attachment research with individuals classified in to one of four adult attachment styles: (1) secure, (2) preoccupied, (3) dismissive, and (4) fearful (Bartholomew & Horowitz, 1991). It is argued that these four adult attachment styles are reflective of two basic attachment dimensions – anxiety over abandonment and the avoidance of intimacy (Brennan, Clark, & Shaver, 1998; Shaver & Hazan, 1993). Validated self-report questionnaires have been developed to assess these two dimensions (Brennan et al., 1998). Brennan et al. suggest that while a secure attachment style is characterised by low levels of anxiety and avoidance, preoccupied and dismissive styles reflect high levels of attachment anxiety and avoidance, respectively. A fearful style is associated with high scores on both of these dimensions.

A number of studies have been conducted to investigate the stability and continuity of attachment experiences. Such long term studies track attachment experiences from the early stages of development, through adolescence and in to adulthood, taking into account the

effects of negative life events (Waters, Merrik, Treboux, Crowell & Albersheim, 2000; Weinfeld, Sroufe & Egeland, 2000; Hamilton, 2000). Waters, Hamilton and Weinfeld (2000) consider negative life events to include: the death of a parent; foster care and parental divorce; chronic and severe illness of parent or child; being a child of a single parent; parental psychiatric disorder; drug and alcohol abuse; and child experience of physical or sexual abuse. In each of these studies attachment behaviours in the early stages of attachment development were measured using the Ainsworth and Wittig (1969) Strange Situation and in later adolescence using the Berkeley Adult Attachment Interview (George, Kaplan & Main, 1985).

Overall, attachment classifications from childhood to adolescence do seem to be stable. For example, Waters, Merrik, Treboux, Crowell and Albersheim (2000) found that overall, 72% of a sample of white middle-class infants received the same attachment classification in adulthood as they did in infancy 20 years earlier. However, it should be noted that almost half (44%) of those infants whose mothers reported negative life events changed attachment ratings between infancy and early adulthood, suggesting an important role of mothers past experiences in continuity of attachment. In contrast, only 22% of those whose mothers reported no significant negative life events changed classification.

Further work on the stability of attachment between infancy and early adulthood was carried out by Hamilton (2000) in the context of nonconventional family lifestyles. It was found that attachment classification in infancy was a significant predictor of attachment classification in early adulthood, with 77% stability overall and no differences between adolescents reared in conventional or nonconventional families. Finally, Weinfeld et al. (2000) found no evidence for

attachment continuity in a high risk sample of 57 young adults chosen originally at high risk for poor developmental outcomes. These findings highlight the long-term consequences of traumatic early experiences and negative life events for the continuity of attachment classifications and experiences from early development through to adulthood.

1.7.2.2. Attachment, psychopathy, and offending

As noted by Farrington (2006), family factors play a significant role in the development of antisocial behaviour and have been linked with the development of psychopathic traits in adulthood. These early family factors can include, but are not limited to neglect, sexual and physical abuse. However, it should be noted that the effects of neglect and physical/sexual abuse may be separable in terms of negative consequences for development and/or socio-affective functioning. Thus, in examining the effects of negative early life experiences, it may be important to disentangle the effects of neglect relative to physical and/or sexual abuse. Nonetheless, it is now widely accepted that for many offenders, the experience of traumatic early attachment experiences can result in problematic or insecure styles of attachment between the child and their primary caregiver (Craissati, 2009).

Finzi et al. (2001) compared attachment styles and levels of aggression in physically abused, neglected, and control group children who were neither physically abused nor neglected. Results revealed that children who had suffered early physical abuse demonstrated a higher incidence of the avoidant attachment style relative to neglected and control group children. In contrast, neglected children, relative to abused children and non-abused, non-neglected children, showed higher levels of the anxious/ambivalent attachment style. Thus, while neglect

was associated with higher levels of attachment anxiety, physical abuse conferred elevated levels of attachment avoidance. Furthermore, control group children showed a higher incidence of secure attachment relative to both neglected and abused children. The three groups were also shown to differ in terms of levels of aggression, including assaultive behaviour, aggressive behaviour, antisocial behaviour, and impulse control. Across all four aggressiveness subscales, physically abused children were found to score higher than both neglected and control children indicating elevated levels of aggressive antisocial behaviour. However, no differences were observed between neglected and control group children. Finally, significant positive correlations were revealed between avoidant attachment scores and assaultive, antisocial, aggressive and impulse control behaviours. These results clearly demonstrate the harmful effects of early traumatic experiences and suggest implications for future emotional development, personality traits and behaviours.

The suggestion that attachment insecurity may be related to personality and antisocial behaviour is partially supported by the findings of van Ijzendoorn et al. (1997) who found no differences in attachment classifications between personality-disordered offenders and non-offenders. However, an increased incidence of the 'unresolved' and 'cannot classify' attachment styles was identified among a clinical sample of offenders relative to a nonclinical, non-offender sample. Thus, these results indicate an association between attachment, particularly unresolved attachment styles, psychopathology and offending behaviours.

Other studies have also successfully demonstrated a link between antisocial behaviour and specific insecure attachment styles. For example, Allen, Hauser and Borman-Spurrell (1996)

identified a relationship between derogation of attachment - representative of a dismissive state of mind with regard to attachment experiences – and criminality and hard drug use in a sample of 25 year olds who had been psychologically hospitalised as adolescents. A dismissing style of attachment has also been linked with diagnoses of ASPD and self-reported antisocial personality traits in a group of hospitalised adolescents (Rosenstein & Horowitz, 1996) as well as being most characteristic among a sample of rapists (Ward, Hudson & Marshall, 1996). In relation to the construct of psychopathy in particular, there are only limited findings in relation to attachment insecurity.

In one of the only studies to directly investigate attachment classifications among incarcerated psychopathic offenders, Frodi, Dernevik, Sepa, Philipson and Bragesjö (2001) assessed a sample of 14 incarcerated offenders using the PCL-SV and the Adult Attachment Interview. The authors also measured childhood rearing memories, including recollections of emotional warmth, neglect, favouritism of a sibling and interfering parenting. Results showed that all participants were classified as either dismissive of attachment related experiences (64%) or undisclosed/cannot classify (36%), with no participants classified as secure in attachment. The finding that over half of the sample was dismissive of attachment indicates that participants had few childhood memories, were either derogated or overprotected by their mothers, and had little understanding of the meaning of attachment related experiences. Notably, there were no differences in attachment classifications between those scoring high (>16) and low (<12) on the PCL-SV. Although it is suggested by the authors that this may be due to the small range (9-19 on a scale of 0-24) in PCL-SV responses, the finding is nonetheless problematic for

attachment based accounts of psychopathic personality. Instead, the results of Frodi et al. (2001) are more consistent with an attachment based theory of generally antisocial behaviour, rather than a specific link with the development of psychopathic personality traits. These results suggest that attachment insecurity may therefore represent a general predisposition for personality disorder and antisocial behaviour.

Although findings from incarcerated psychopathic offenders have proved to be inconclusive with regards to a relationships between psychopathy and attachment behaviours, results from a non-offending sample suggest relationships between psychopathic traits and the dimensions of attachment anxiety and avoidance. For example, Mack, Hackney, and Pyle (2011) examined the relationships between primary and secondary psychopathic traits and attachment anxiety and avoidance in a sample of 209 college students. Contrary to the hypothesis that primary psychopathic traits would be related to attachment avoidance but not attachment anxiety, results showed that there was a significant positive relationships between primary psychopathy and attachment avoidance, but only in those who scored highly for attachment anxiety. These results are therefore consistent with an attachment based account of psychopathy, as considered by Fowles and Dindo (2006).

1. 8. Motivational patterns

1.8.1. Motivations for offending among psychopaths

Modern conceptualizations of psychopathy, including the PCL-R, emphasise not only the importance of the core affective traits of psychopathic personality, including callousness and shallow affect, but also the presence of lifestyle and behavioural features. These factors which

are assessed on Factor 2 of the PCL-R contribute to a life of antisocial deviance. Thus, in offending populations, the study of psychopathy is linked with generally antisocial behaviour. However, a more refined view of psychopathy may become apparent when one considers differences between subtypes of psychopaths in terms of their respective patterns of offending.

Groups of offenders may be broadly categorised on the basis of their offence specificity. For example, specialist offenders who commit one very specialised offence pattern may be contrasted with more generally antisocial and violent offenders (Mitchell & Beech, 2011). Mitchell and Beech (2011) argue that these different types of offenders may be distinguishable on the basis of their underlying neurobiology and levels of psychopathic personality. Thus, it would be expected that there would be a strong relationship between violent and antisocial behaviour and levels of psychopathic personality. In support of this prediction, in an early investigation of the relationship between psychopathy and violent aggression, Hare and Jutai (1983) showed that twice as many psychopathic as non-psychopathic offenders had been charged with a violent offence. More recently, in an analysis of the number of violent crimes committed by psychopathic compared with non-psychopathic offenders, it was found that while psychopaths had been convicted of 7.32 violent crimes on average, non-psychopathic offenders presented with an average number of 4.52 violent crimes (Porter, Birt, & Boer, 2001). Thus, high levels of psychopathy confer a greater risk for violence and anti-sociality. With this in mind, efforts have been made to utilise PCL-R scores as part of risk assessment for violent recidivism. In a review of the literature on the utility of PCL-R scores to predict violent, non-violent, and sexual recidivism, Hemphill, Hare, and Wong (1998) report average significant correlations of

PCL-R scores with recidivism as .27 for violent recidivism, .27 for general recidivism, and .23 for sexual recidivism, indicative of a general relationship between psychopathy and sexual, violent, and non-sexual, non-violent offending. Furthermore, findings were consistent in showing that PCL-R added significant predictive power for recidivism over and above the variance accounted for by other routine predictors, including criminal history and a diagnosis of personality disorder (Hemphill et al., 1998).

Although psychopathy has been found to be predictive of recidivism in violent offenders, the underlying motivations for violence in psychopaths may differ to those of non-psychopathic offenders. For example, aggression can be described as either reactive or instrumental. While reactive aggression refers to a hot or impulsive act of violence in response to some form of provocation, threat, or danger, instrumental aggression refers to goal-directed acts of violence (for example, to gain money or drugs). Based on their pathological personality traits, it has been hypothesised that psychopaths may show an increased incidence of instrumental aggression relative to non-psychopathic offenders. In support of this hypothesis, it has been shown that instrumentally violent offenders can be distinguished from reactive offenders on the basis of levels of psychopathy (Cornell, Warren, Hawk, Stafford, Oram, & Pine, 1996). Furthermore, it was found by Woodworth and Porter (2002) that murders by psychopaths were significantly more instrumental than murders by non-psychopaths, with nearly all murders perpetrated by psychopaths shown to be instrumental. Furthermore, Porter, Woodworth, Earle, Drugge, and Boer (2003) showed that in a small sample of psychopathic and non-psychopathic perpetrators of sexual homicide, there was a greater element of sadistic and gratuitous violence in those

murders committed by psychopaths relative to non-psychopaths. Thus, while it remains that psychopaths may show reactive as well as instrumental violence (see Bushman & Anderson, 2001), the violence of psychopaths has been shown to be particularly motivated by personal gain.

1.8.2. Motivational factors in primary and secondary psychopathy

Primary psychopaths tend to be typified by 'cold' or instrumental aggression, while secondary psychopaths tend to be characterised by 'hot' or impulsive, reactive outbursts of aggression (Skeem et al., 2007). However, it has been found that a greater incidence of violence among psychopathic offenders may be attributable to Factor 2 scores to a greater extent than Factor 1 scores. For example, Harpur, Hare, and Hakstian (1989) used 20 PCL items to discriminate violent from non-violent recidivists. It was found that out of the ten items which contributed the greatest discriminatory power, 8 were from Factor 2, with only two Factor 1 items. Further evidence for a greater contribution of Factor 2/social deviance relative to Factor 1 items to violent recidivism has been presented by Skeem and Mulvey (2001). These authors found that the predictive power of PCL-SV items for violence risk was not based on items measuring the core callous-unemotional traits of psychopathy, but rather those items that assess antisocial deviance. Therefore, while primary psychopathy may be consistent with early descriptions of the psychopathic personality, secondary psychopaths may represent a greater risk for violent recidivism.

1.9. Neuropsychological and neurobiological markers of psychopathy

1.9.1. Facial expression recognition

It is argued that the instrumental, goal directed violence which characterises primary psychopaths may be linked with a failure to recognise another's distress. Blair (1995, 2001) employs a cognitive neuroscience perspective to account for the goal directed violence displayed by psychopaths. It is argued by Blair (1995) that a failure to recognise others distress, and a failure to experience another's distress as aversive, will have implications for the development of affective empathy and the process of socialisation. Blair posits that a failure to recognise facial expressions of emotion may be indicative of an affective empathy deficit in psychopathy. To test this hypothesis, researchers have used tests of facial expression recognition to examine the processing of emotional faces among psychopaths and individuals with psychopathic tendencies. The aim of such research was to establish whether psychopathy is linked with a deficit in recognizing the emotional states of others, as well as the extent to which any deficit in facial expression recognition is global, or specific to certain expressions of emotion. Such a deficit may explain the lack of affective empathy among psychopathic offenders, as noted by Hare (1991, 2003).

Facial expression recognition in relation to psychopathy has been examined by Blair, Colledge, Murray, and Mitchell (2001), who assessed sensitivity to facial expressions of emotion of varying intensity among children with psychopathic tendencies. Expressions of varying intensity may be created by morphing expressive faces with neutral faces. This morphing procedure allows for a continuum of expressive faces to be created which range in intensity from neutral through to 100% expressive. Morphed stimuli allow for a more refined investigation of differences in the processing of emotionally expressive faces. Results of Blair

and colleagues (2001) revealed that, relative to control children, children with psychopathic tendencies demonstrated a reduced sensitivity to sad expressions with a concomitant and more pronounced deficit for fearful expressions. Here it was found that even at 100% intensity, children with psychopathic tendencies failed to correctly classify fearful faces. This finding was consistent with the earlier findings of Blair and Coles (2000), which showed that recognition of sad and fearful faces among children aged 11-14 years was inversely associated with both the callous/unemotional and impulsivity/conduct aspects of psychopathic personality.

Later work by Blair and colleagues sought to investigate emotional facial expression recognition among adult psychopaths (Blair et al., 2004). Psychopathic and non-psychopathic offending participants were identified using the PCL-R and were presented with standardised stimuli depicting the six core emotional expressions; anger, disgust, fear, happy, sad, and surprise. Results revealed that psychopathic participants were deficient in the recognition of fearful facial expressions, in terms of showing a lower accuracy score and an increased number of errors relative to non-psychopathic participants. These results are consistent with earlier findings of Blair et al. (2001) in relation to children with psychopathic tendencies. However, additional studies have also revealed a deficit for sadness among personality-disordered offenders which was associated with psychopathy scores on the PCL-SV (Dolan & Fullam, 2006), and a deficit for disgust expressions which was present only when participants responded with their left hand (Kosson et al., 2002).

In reviews of the literature on the neuroanatomical substrates of emotion, both Adolphs (2002) and Blair (2003) note that the amygdala is implicated in the processing of facial

emotional expressions. However, the amygdala response may be specific to the processing of particular emotions, with deficits in the recognition of fearful facial expressions linked in particular with dysfunction of the amygdala. For example, Adolphs, Tranel, Damasio, and Damasio (1994) showed that a patient with bilateral amygdala damage presented with a specific deficit in the recognition of fearful facial expressions. These data are supported by Calder (1996) who presented evidence from two patients with bilateral amygdala damage which supports the role of the amygdala as a specific neural substrate for the recognition of fearful affect from emotional faces. Both patients showed deficits in the recognition of fear, as well as problems in a forced choice task categorising morphed facial expressions. The results of this forced choice recognition task showed that although control participants successfully categorised expressions as the emotion expressed to a greater intensity, the bilateral amygdala patients demonstrated problems that were particularly pronounced for expressions which were morphed with fear (Calder., 1996). Similarly, Broks et al. (1998) observed a fear recognition deficit among post-encephalitic neuropsychological patients presenting with extensive amygdala damage which was in contrast to that of a similar patient who presented with good emotion recognition and a largely intact amygdala region. Results showing a deficit in expression recognition which is specific to fear following bilateral amygdala damage are supported by a meta-analysis from Murphy, Nimmo-Smith, and Lawrence (2003) of 106 brain imaging studies on human emotion. Murphy et al. (2003) conclude that the processing of fear was selectively associated with amygdala damage, while other expressions, including anger, showed greater associations with other anatomical regions.

However, some inconsistencies have been noted in research findings regarding the role of the amygdala in relation to the recognition of facial expressions of emotion. One such inconsistency is focused on differences in the recognition of fearful affect following bilateral relative to unilateral amygdala damage. Although there is convincing evidence for a deficit in the recognition of fearful facial affect following bilateral amygdala damage, there are findings which suggest that a similar deficit may not be present following unilateral damage to the amygdala. Thus, intact recognition of fearful facial expressions has been observed among patients with unilateral amygdala damage (Adolphs, Tranel, Damasio, & Damasio, 1995). These findings show that when amygdala damage is localised to either the left or the right hemisphere, patients demonstrate similar levels of accuracy to both brain damaged and non-brain damaged controls in the classification of fearful facial expressions (Adolphs et al., 1995).

A further inconsistency in the findings of impaired facial expressions recognition following amygdala damage relates to the specificity of the amygdala to the processing of fearful expressions. For example, although the findings of Adolphs et al. (1999) support a deficit in fearful face recognition following bilateral amygdala damage, their data most strongly support a hypothesis that the amygdala is part of a more general neural system involved in the recognition of expressions which signal potential harm to the observer. Thus, such expressions may include anger as well as fear. This conclusion is in conflict with the hypothesis that the amygdala represents a specific neuro-anatomical substrate for the recognition of fearful expressions. Indeed, Adolphs et al. (1999) suggest that their data argue against such a hypothesis. Adolphs et al. (1999) suggest that a deficit in fearful face recognition is not simply

due to the misclassification of fearful faces as another emotion, but rather the result of a failure to retrieve knowledge related to that emotion. Additional evidence against the specificity of the amygdala to the processing of fearful facial expressions is presented by Adolphs and Tranel (2004) who found impaired judgments of sadness relative to happiness among amygdala patients. The findings of Adolphs and Tranel (2004) indicate that for patients with bilateral amygdala damage, there was a deficit for expressions of sadness which was not observed in relation to expressions of happiness. Thus, while the role of the amygdala in the processing of emotional facial expressions may not be specific to fearful displays of facial affect, this role may be specific to negative emotions associated with distress, notably fear and sadness.

1.9.2. Toward a neurobiological model of fearful face recognition deficits in psychopathy

In addition to findings in the neuropsychological patient literature, findings from brain imaging studies with neurologically intact participants can aid understanding of the relationship of the amygdala response to the processing of fearful facial expressions. For example, findings have shown enhanced amygdala activity in the left amygdala in response to fearful facial expressions (Breiter, et al., 1996; Morris et al., 1996; Morris et al., 1998). As further evidence for a relationship between amygdala functioning and fearful expression recognition, Morris et al. (1996) found that the neural response in the amygdala was heightened with increasing intensity of fearful expressions, and decreased in association with increasing intensity of happy expressions. Some researchers claim that the amygdala may respond preferentially to expressions of fear. For example, Whalen et al. (2001) used fMRI to show that responsiveness of the amygdala was greater for fearful expressions compared with either angry or neutral faces.

Based on findings that deficits in the recognition of fearful affect are linked with amygdala dysfunction, it is hypothesised that individuals with high levels of psychopathy should also show dysfunction of the amygdala. In a test of this hypothesis, Gordon, Baird, and End (2004) examined neural activity in non-offenders categorised as being high and low scorers on the Psychopathic Personality Inventory (PPI) during a facial emotion versus facial identity recognition task. Although the results failed to indicate behavioural differences between the two groups, there were significant differences in the neural regions recruited during the emotion recognition condition. Participants scoring high on the emotional-interpersonal dimension of psychopathy recruited areas associated with executive function and working memory, including right dorsolateral prefrontal cortex, combined with reduced amygdala recruitment. These results may indicate a cognitive strategy for emotion recognition among high scorers on the emotional-interpersonal dimension of the PPI. This dimension is synonymous with the affective-interpersonal features which load on to Factor 1 of the PCL-R and may therefore be associated to a greater degree with primary psychopathy. Surprisingly however, participants scoring high on the social deviance dimension of the PPI showed increased activity of the amygdala during the emotion recognition condition. Thus, while amygdala dysfunction may be central to the affective interpersonal features associated with primary psychopathy, a similar pattern of neural activity may not be characteristic of the secondary subtype.

Although the findings of Gordon et al. (2004) are suggestive of amygdala dysfunction in participants with elevated scores on the PPI, there is a limit in the extent to which these findings

may be applied to clinically relevant forms of psychopathy. Thus, researchers have assessed neural responses to emotionally expressive faces among criminal psychopaths and children with callous-unemotional traits. In a study of criminal psychopaths, Deeley et al. (2006) identified differences in activity of the fusiform gyrus during the processing of fearful relative to neutral faces among psychopaths and non-psychopaths; while psychopaths showed reduced recruitment of fusiform gyrus, non-psychopaths showed the opposite pattern. Perhaps surprisingly, there were no observable differences in the degree of the amygdala response to fearful expressions between psychopaths and non-psychopaths. However, it should be noted that the findings from this study may be limited by a small sample size, with only six out of fifteen participants meeting criteria for psychopathy according to a cut-off score of 25 on the PCL-R. The remaining nine participants were healthy men from the general community (Deeley et al., 2006).

In contrast to the findings of Deeley et al., decreased amygdala activity has been noted in children with callous-unemotional traits during the processing of emotional expressions (Marsh et al., 2008; Jones, Laurens, Herba, Barker, & Viding, 2009). For example, Marsh and colleagues (2008) showed that youths with CU traits showed reductions in the amygdala response during the processing fearful facial expressions relative to youths with ADHD and healthy controls. Furthermore, relative to healthy controls and youths with ADHD, youths with CU traits showed reduced functional connectivity between ventromedial prefrontal cortex (VMPFC) and the amygdala. In addition, in the CU traits group the degree of functional connectivity between the VMPFC and the amygdala was negatively correlated with symptom severity. These results

suggest that a lack of connectivity between the VMPFC and the amygdala may contribute to deficits in the processing of fearful facial expressions and the presence of callous-unemotional traits among antisocial youth (Marsh et al., 2008). These results are indicative that reduced functional connectivity between the VMPFC and the amygdala may represent a neuro-marker for psychopathy in adulthood.

1.9.3. Eye scan paths, fearful face recognition, and psychopathy

In addition to deficits in fearful face recognition, amygdala patients also show a reduced tendency to fixate the eye region of emotionally expressive faces. Adolphs and colleagues (2005) investigated eye scan paths for emotionally expressive faces in a bilateral amygdala patient, SM, with an established fear deficit (see Adolphs et al., 1994). Findings over a number of tasks revealed that SM made less use of information from the eye region relative to controls. SM failed to use high spatial frequency information from the eyes in the recognition of both fearful and happy faces, yet made normal use of information from the mouth, reflected in intact recognition of happy faces. An additional task revealed that while control subjects performance in fearful face recognition was significantly reduced when information from the eye region was digitally removed, SM's performance remained constant. In a final task, eye tracking techniques were used to track the eye scan paths of SM and controls during an expression recognition task. Findings revealed that SM, relative to controls, failed to fixate on the eye region for fearful as well as other emotional expressions. However, when instructed to fixate the eye region, SM acquired normal levels of performance.

These findings indicate that SM's fear recognition deficit seems to arise from a reduced tendency to spontaneously fixate the eye region of emotionally expressive faces during free viewing. While the initial findings based on SM are supportive of a crucial role of the amygdala in the recognition of fearful faces, consistent with other findings from the neuropsychological literature, normalised performance following the instruction to fixate the eye region is inconsistent with such reports. While the amygdala may be critical in directing visual attention toward the eye region of expressive faces, fearful face recognition at a normal level is nonetheless possible in patients with bilateral amygdala damage. This suggests that the amygdala may not be necessary for the correct classification of fearful faces based upon relevant visuo-affective information from the eye region of expressive faces.

The finding that SM's impaired performance in fearful face recognition reflected a reduction in spontaneous fixations of the eye region is suggestive that a similar deficit may be evident in psychopathy. As noted above, children who display callous-unemotional traits show reduced amygdala activity in response to fearful facial expressions of emotion. Thus, this subgroup of children may be expected to show improved fearful face recognition following instructions to fixate the eye region in an emotion recognition task. This hypothesis was investigated by Dadds and colleagues (2006) who showed that when instructed to look at the eye region, children with callous-unemotional traits showed improved fear recognition. However, performance remained impaired when children were instructed to fixate the mouth region.

These findings were extended upon by Dadds et al. (2008) with the use of eye tracking techniques. Again, the hypothesis that a fear recognition deficit would be linked with a

reduction in the number of spontaneous fixations of the eye region was investigated among children with callous-unemotional traits. As expected, callous-unemotional traits were linked with a deficit in fearful face recognition. Furthermore, there was an association of callous-unemotional traits with shorter duration and a reduced number of fixations of the eye region and fewer first fixations to the eye region. Also, these indices of attention to the eye region correlated with recognition performance for fearful faces. These findings are consistent with both a deficit in the recognition of fearful faces and the finding of amygdala dysfunction among children and adults with psychopathic tendencies.

Blair (2003) considers that emotional facial expressions may be viewed as reinforcers for repeating future behaviours. Thus, while the presence of a fearful expression following a particular behaviour may serve to reduce the probability of repeating that behaviour, a happy expression may serve to increase the probability for repeating that behaviour. Blair proposed that the reinforcement value of facial expressions may account for the qualities of affective empathy, viewed by Blair as an emotional reaction to another's emotional state. In order to test the hypothesis that facial expressions are reinforcers, Hooker et al. (2006) investigated differences in neural activity in response to facial expressions under conditions where stimulus reinforcement learning could and could not take place. Hooker et al. (2006) presented fearful and happy facial expressions either alone (ambiguous condition) or as a response to a novel and potentially threatening object. It was found that the amygdala response was greatest when the expressive face was presented in the company of an object. This finding indicates that the amygdala responds not to the degree of ambiguity (when the expressions is presented in the

absence of an object), but to the degree of stimulus reinforcement learning which has taken place between the presented facial expressions and the presented novel object (Hooker et al., 2006).

1.10. Psychopathy and aversive conditioning

The above finding of Hooker et al. (2006) that amygdala activity was enhanced during trials in which fearful faces were presented alongside a potentially threatening object is consistent with a body of research which suggests that the amygdala is crucial in the process of conditioning an emotional response (LaBar & LeDoux, 1996; Phillips & LeDoux, 1992). Aversive conditioning refers to a process of classical conditioning whereby a neutral stimulus is paired with an aversive stimulus. After several pairings, an association is formed between the neutral stimulus and the aversive stimulus such that the neutral stimulus, when presented in the absence of the aversive stimulus, elicits a learnt aversion response. The role of the amygdala in the processing of fearful affect and the process of aversive conditioning is perhaps best understood when considering the extensive animal literature. These studies include those conducted with primate and rodent subjects.

The process of aversive conditioning is however dependent upon the ability to process and experience fear among other negative emotional states. Early findings in relation to the role of the amygdala in the experience of fear were presented by Kluver and Bucy (1939) who showed that monkeys with widespread lesions of the anterior temporal lobe, including the amygdala and hippocampus, demonstrated reduced levels of fearfulness. More recently, Kalin et al. (2001) have shown that chemical lesions of the amygdala in the monkey brain, which destroyed cells

while leaving axons passing through the amygdala intact, resulted in a lack of fearfulness but normal levels of trait like anxiety. Thus, findings from the animal literature are consistent with those in the human literature in demonstrating a role of the amygdala in the experience of fear.

Animal studies are also consistent with the human literature with regard to the role of the amygdala in the process of aversive conditioning. For example, it was found by Weiskrantz (1956) that following lesions of the amygdala, monkeys showed slower rates of aversive conditioning. This early work is supported by later studies (Aggleton, 1993; Aggleton & Passingham, 1981) which together are consistent in the conclusion that the amygdala represents a crucial part of the neurocircuitry which is required for the formation of conditioned aversive responses (Rosen & Donley, 2006).

A large body of research in the rodent brain has led to the finding that specific nuclei within the amygdala may be differentially involved in the processing of fear. For example, lesions of the basolateral amygdala in the rat brain have been linked with the elimination of conditioned fear memories (Gale et al., 2004). The lateral nucleus of the amygdala receives both cortical and sub-cortical inputs. It is suggested that this nuclei functions to integrate various forms of sensory information during the process of aversive conditioning (Doron & LeDoux, 1999; Linke, De Lima, Schwegler, & Pape, 1999; Pitkanen, Savander, & LeDoux, 1997). Furthermore, the lateral nuclei send both direct and indirect projections to the central nucleus of the amygdala (Pitkanen et al., 1997). The central nucleus of the amygdala is therefore in a position whereby an orchestrated fear response may be generated (Rosen & Schulkin, 1998).

The process of aversive conditioning can also be examined in human participants using functional neuroimaging techniques, including fMRI. Various functional imaging studies have revealed a crucial role of the amygdala in the learning of conditioned emotional responses (see Buchel & Dolan, 2000). For example, Buchel, Morris, Dolan, and Friston (1998) used fMRI to investigate the underlying neural substrates for the conditioning of a fear response following pairings of human faces with an aversive tone. The authors utilised an experimental paradigm whereby participants were presented with the conditioned stimulus, a human face, in the presence of the unconditioned stimulus (US), an aversive tone, and in the absence of the US. Analyses compared neural activity for faces which had previously been paired with the US, with activity for faces which were unpaired. Analyses revealed rapid habituation of the amygdala response following presentation of faces that had already been paired with the US, relative to faces which had not undergone conditioning. Based on the implication that as in the animal literature, the conditioning of an aversive response in human participants requires functionality of the amygdala, it may be hypothesised that psychopaths would show a deficit in the learning of conditioned stimulus-reinforcement associations. This hypothesis would be in-keeping with findings of abnormal patterns of amygdala activity in experimental tasks with psychopathic offenders.

A number of techniques may be used to measure the amygdala response in humans during the process of aversive conditioning. Amygdala activity during the learning of conditioned fear responses in psychopaths has been measured using event related potentials (ERPs) (Flor, Birbaumer, Hermann, Ziegler, & Patrick, 2002) and the BOLD (blood oxygen level dependent)

response in fMRI (Birbaumer et al., 2005; Veit et al., 2002). Early results showed that relative to non-psychopaths, non-offending psychopaths did not exhibit a conditioned response.

Furthermore, ERP responses indicated disruption in the integration of subcortical and cortical structures which underlie the formation of aversive stimulus-response associations (Flor et al., 2002). Later research by Birbaumer and colleagues (2005) subjected highly psychopathic criminal offenders and age matched non-offending controls to an aversive conditioning paradigm whereby painful pressure was paired with neutral faces. While results revealed an expected pattern of activity among control participants, including a differential response of the amygdala to paired and unpaired stimuli, activity in similar regions among psychopaths was absent. Psychopaths also showed a failure to develop conditioned skin conductance responses which is also indicative of a failure in the aversive conditioning process. However, care should be taken when drawing conclusions on the basis of these findings with results based on a comparison of ten psychopathic participants with ten healthy men from the community.

The finding of reduced amygdala activity and deficits in limbic-subcortical - cortical interactions are consistent with the neurodevelopmental account of psychopathic personality outlined by Blair, Peschardt, Budhani, Mitchell, and Pine (2006). This account suggests that deficient functioning in regions of the PFC and the amygdala underlie failures in the formation of learned aversive responses. PFC and amygdala dysfunction in psychopathy are suggested to result in a failure to associate others distress, often communicated via facial expression information, with actions that harm others. Thus, Blair et al. (2006) suggest that amygdala dysfunction in psychopathy interferes with fearful and sad facial expression recognition as well

as the process of aversive conditioning. A failure to process another's communications of distress via facial expressive information will thus interfere with the pairing of another's distress with acts of violent aggression. It is this that Blair et al. argue may interfere with the development of affective empathy and early moral socialisation.

If the process of aversive conditioning represents an important component of moral socialisation and victim empathy then a relationship should be apparent between offending behavior and the degree of learning during aversive conditioning trials. Gao, Raine, Venables, Dawson, and Mednick (2010) investigated electrodermal activity, that is changes in the electrical properties of the skin induced by, for example, changes in perspiration, during a fear conditioning paradigm. This longitudinal study involved the measurement of electrodermal activity during an aversive conditioning paradigm in 200 male and female children at ages 3, 4, 5, 6, and 8 years. Results showed that poor fear conditioning during childhood was linked with higher incidences of aggressive behaviour aged 8 in both male and female children. Gao and colleagues suggest that proficient fear conditioning during childhood may confer protective effects against later aggression and violent criminality.

Similarly, Raine, Venables, and Williams (1996) showed that enhanced classical conditioning among antisocial adolescents at age 15 was associated with desistance from crime by age 29. On the other hand, antisocial adolescents who displayed poor classical conditioning showed higher levels of adult criminality. Given the crucial role of the amygdala in stimulus-reinforcement learning, results of these studies may be indicative of a role of amygdala dysfunction in the development of aggressive behaviours through childhood and adolescence

and in to adulthood. These results are therefore consistent with Blair's neurodevelopmental account of psychopathy.

1.11. Clinical correlates

1.11.1. The relationship between psychopathy and social phobia

On a conceptual level, it could be suggested that psychopathy and social phobia may be negatively associated (Veit et al., 2002). For example, while psychopaths present as fearless and show a callous disregard for others, individuals with social phobia are characterised by feelings of fear of negative evaluation and anxiety in social situations (Eastwood et al., 2005). In contrast to the extroverted characteristics associated with psychopathic personality, socially phobic individuals tend to avoid social interactions and performance situations and present with a lack of social skills or a failure to effectively utilise the social skills they may have developed (Rapee & Spence, 2004). The hypothesis that these two dimensional constructs may be negatively correlated was tested by Hofmann, Korte, and Suvak (2009) in a sample of male and female undergraduate students. The authors found significant, albeit very weak, negative correlations between psychopathy and social anxiety among both male and female participants using self-report measures of both of these traits. However, these findings may be limited by the use of the Social Psychopathy Scale (SPS; Edelman & Vivian, 1988) for the measurement of psychopathic traits. This measure predates the formal criteria for psychopathy as outlined in the PCL-R and may therefore measure a construct which is not consistent with modern conceptualisations of the psychopathy construct.

Furthermore, sufferers of social phobia may also differ from psychopaths in respect of amygdala functioning, particularly during tasks which are relevant to emotional expression. It has been noted above that children with callous-unemotional traits and adults with psychopathic tendencies both show reduced amygdala activity in response to facial expressions of emotion (Deeley et al., 2006; Gordon et al., 2004). However, the opposite pattern has been observed among those with elevated levels of social anxiety. For example, Yoon, Fitzgerald, Angstadt, McCarron and Phan (2007) have shown that patients with Generalised Social Phobia demonstrate amygdaloid hyperactivity in response to high intensity socio-emotional stimuli. Increased amygdala activation has also been noted in patients with Generalised Social Phobia in response to angry and contemptuous faces (Phan, Fitzgerald, Nathan & Tancer, 2006; Stein, Goldin, Sareen, Eyler Zorrilla & Brown, 2002).

Research has also revealed a conditioning contribution to social anxiety that is indicative of opposing patterns of neural activation in psychopathy and social phobia. Schneider et al. (1999) conditioned an aversive response to neutral facial expressions following pairings with a negative odour among participants with and without social phobia. While control participants demonstrated signal decreases in the amygdala and hippocampus, the opposite pattern of activity was observed among highly socially phobic participants. In addition, Craske et al. (2008) suggest that more sensitive aversive conditioning in young children may represent a biomarker for anxiety disorders.

Research by Lissek et al. (2008) examined differences in fear conditioning among sufferers of social anxiety disorder and age and gender matched healthy controls using socially relevant

stimuli. This experiment involved pairing neutral facial expressions with audio-visual conditioned stimuli, including: negative insults with critical faces; positive compliments with happy faces; neutral comments with neutral faces. Results showed that highly socially anxious participants demonstrated greater eye blink startle magnitudes in response to neutral facial expressions following conditioning with negative, relative to positive and neutral, unconditioned stimuli. In contrast, control group participants did not differ in startle magnitudes between conditioned and unconditioned stimuli.

The results outlined above suggest that there are clear differences in the neural circuits which underlie the learning of conditioned aversive associations in sub-cortical regions in socially phobic and non-phobic participants. The pattern of activity observed in sufferers of social phobia is in sharp contrast to that observed in psychopaths, who tend to show reduced amygdala activity during aversive conditioning trials. These differences in amygdala activation profiles in psychopaths and sufferers of social phobia are clearly demonstrated by Veit et al. (2002). Veit et al. investigated differences in neural activity in criminal psychopaths, sufferers of social phobia and healthy controls during the aversive conditioning of a painful response to neutral faces. Differences in neural activity were observed in several regions, including the orbitofrontal cortex, the amygdala, the insula, and the anterior cingulate cortex. In each of these regions, socially phobic participants showed elevated levels of neural activity relative to controls. However, a pattern of hypoactivity was noted among psychopathic offenders who showed only a brief amygdala response followed by no further activity (Veit et al., 2002).

1.11.2. The relationships of psychopathy and social phobia with antisocial behaviour

Veit and colleagues (2002) suggest that a hypoactive fronto-limbic circuit may represent an underlying neural mechanism toward the development of antisocial behaviour and psychopathic personality. However, although psychopathy is linked with high rates of offending, including extreme levels of violence and aggression, a hyperactive fronto-limbic circuit, characteristic of social phobia, may also be linked with some forms of antisocial behaviour.

For example, in a study which aimed to assess comorbidity of DSM-IV axis I and II psychiatric diagnoses with paedophilia, Raymond et al. (1999) observed that out of a group of 45 paedophilic sex offenders, 17 (37.8%) had received a diagnosis of social phobia in their lifetime, whilst 14 (31.1%) met the criteria for a current diagnosis of social phobia (Raymond, Coleman, Ohlerking, Christenson & Miner, 1999). This link was further examined by Hoyer, Kunst, and Schmidt (2001), who used quantitative and qualitative methods to assess levels of social anxiety and social phobia in male sexual offenders with a diagnosis of a paraphilia, a biomedical term used to describe sexual arousal that is outside the range of usual sexual interests (Beech & Harkins, 2012). The paraphilias examined by Hoyer et al. (2001) included paedophilia ($n = 23$) and sexual sadism ($n = 19$). These paraphiliacs were pooled in to one group on the basis of similarity across psychological variables including social anxiety scores and socio-demographic factors. Results revealed that paraphiliacs showed higher levels of social phobia compared with sexual offenders with an impulse control disorder and forensic non-sex offender controls. Of 42 offenders with a paraphilia, 51% and 26% scored above clinical cut-offs for social interaction anxiety and social phobia respectively. These figures are in contrast to those for sex offenders with an impulse control disorder (30% and 27%) and forensic controls (14% and 21%).

Mitchell and Beech (2011) suggest that psychological variables such as social anxiety and psychopathy are central to a model which distinguishes between *generalist* and *specialist* patterns of offending. According to this model, while generalist offenders are characterised by elevated levels of psychopathy and a varied pattern of generally antisocial behaviour, specialist offenders are typified by a specific offence type in the absence of other criminal activity. This specialised pattern of offending is characteristic of paedophilic child abusers. Paedophilic offenders are characterised by grooming behaviours where by contact is made with children and a relationship is developed with the intention of sexual activity. Paedophiles typically have numerous same and opposite sex child victims, often in the absence of other types of criminal behaviour. Paedophilia therefore represents a very specialised, slow and planned pattern of offending. However, it should be noted that paedophilia refers to a specific psychiatric diagnosis as listed in the DSM-IV-TR (APA, 2000) and is not equivalent to sexual abuse, which refers to a criminal offence. Thus, while a diagnosis of paedophilia may elevate the chance of committing a sexual offence against a child, not all sexual offenders against children meet DSM-IV-TR criteria for a diagnosis of paedophilia (Seto, 2008).

As described above, findings indicate that paedophilic offenders may also be characterised by elevated levels of social anxiety. Thus, as well as being distinguishable from generally antisocial offenders on the basis of psychopathic personality traits and levels of social phobia, Mitchell and Beech argue that these personality variables and associated patterns of offending may be underpinned by levels of the attachment related neuropeptides oxytocin (OT) and vasopressin (AVP). However, caution should be used in the extent to which the

generalist/specialist distinction and hypothesised patterns of personality traits are applied to individual offenders. Although the patterns outlined by Mitchell and Beech (2011) refer to observable patterns of offending, not all cases will fit with this observed trend. Notorious exceptions to this trend may include Marc Dutroux and Jürgen Bartsch, both of whom were convicted for the sexual abuse and murder of numerous child victims. Thus, despite committing sexual offenses against children which may have been of a paedophilic nature, these may nonetheless show elevated levels of psychopathic personality traits.

1.12. Oxytocin

1.12.1. Does oxytocin play a role in offending behaviour?

The oxytocin (OT) and vasopressin (AVP) neuropeptides are released from the paraventricular nucleus of the hypothalamus into numerous brain structures, including the amygdala. The administration or release of oxytocin into the limbic system, including the amygdala, drives the need to form and the cementing of attachment bonds (Insel & Winslow, 1991; Panksepp, Nelson, & Bekkedal, 1997; Nelson & Panskepp, 1998). The effects of oxytocin on several aspects of social cognition and behaviour have been studied following intranasal administration of the neuropeptide. For example, intranasal oxytocin has previously been linked to increased trust (Baumgartner, Heinrichs, Vonlanthen, Fischbacher, & Fehr, 2008; Kosfeld, Heinrichs, Zac, Fischbacher, & Fehr, 2005), increased success in the Reading the Mind in the Eyes Test (Domes, Heinrichs, Michel, Berger, & Herpertz, 2007), and reduced neural activation in response to fear (Kirsch et al., 2005).

Intranasal oxytocin has also been shown to decrease the release of the stress hormone cortisol in males who had suffered early parental separation (Meinlschmidt & Heim, 2006), increase positive communication and decrease cortisol release during and following conflict (Ditzen, Schaer, Gabriel, Bodenmann, Ehlert, & Heinrichs, 2009), and increase the experience of attachment security in insecurely attached individuals (Buchheim et al., 2009). However, research has also shown oxytocin levels to be high in social anxiety disorder, with elevated oxytocin levels linked with increased dissatisfaction with social relationships (Hoge, Polack, Kaufman, Zac, & Simon, 2008). Furthermore, elevated levels of an attachment related neuropeptide arginine vasopressin have also been found in relation to anxiety in animal models (Pitkow et al., 2001).

Levels of oxytocin may be affected by traumatic childhood experiences which disrupt attachment formation. For example, Fries, Ziegler, Kurian, Jacoris, and Pollak (2005) found that levels of oxytocin and vasopressin were reduced in children following severe neglect. These results indicate that early experience can impact upon the oxytocin and vasopressin systems which are essential in attachment formation and emotional regulation. Based on the results of Fries et al. (2005) it was hypothesised by Mitchell and Beech (2011) that that primary psychopathic personality, characterised by a lack of attachment experiences (McCord & McCord, 1964), may be linked with low levels of OT. On the other hand, it was suggested that higher levels of OT may be linked with social phobia. This hypothesis was recently tested by Mitchell et al. (2012).

Mitchell et al. (2013) investigated basal urinary levels of the oxytocin neuropeptide among 47 forensic psychiatric patients and 21 staff members of the Van der Hoeven secure forensic hospital in Utrecht, the Netherlands. Urinary levels of oxytocin act as a marker of cerebral levels (Amico, Ulbrecht, & Robinson, 1987; Feldman, Gordon, Schneiderman, Weisman, & Zagoory-Sharon, 2010; Feldman et al., 2012). Results revealed that basal urinary OT levels (oxytocin pg/mg creatinine) were higher among the patient sample relative to controls (15.57 vs. 5.78). Furthermore, patients with a PCL-R score of 26 or above, and therefore above the European cut-off for psychopathy, showed elevated levels of oxytocin relative to patients who scored below this cut-off (27.53 vs. 10.55). It was further revealed that oxytocin levels in the patient sample were positively associated with PCL-R Factor 2 scores, indicative of a relationship between elevated levels of oxytocin and the lifestyle/antisocial features of psychopathy. More specifically, significant positive correlations of basal urinary oxytocin levels and Factor 2 items pertaining to early behavioural problems and juvenile delinquency were observed. Thus, although basal urinary oxytocin levels seem to be elevated among psychopathic patients, these specific item correlations suggest that this result may reflect adverse and traumatic early experiences.

As highlighted by the authors, this result is counter intuitive and does not seem to support earlier findings which indicate a role of oxytocin in pro-social behaviours, including trust (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005), emotional empathy (Hurlemann et al., 2010), and altruism (Barraza, McCullough, Ahmadi, & Zak, 2011). However, one possibility is that the results of Mitchell and colleagues reflect abnormal functioning of oxytocin receptors

among psychopathic individuals. Consistent with this possibility, single nucleotide polymorphisms of two oxytocin receptor genes have been noted among children displaying extreme, persistent aggressive behaviours (Malik, Zai, Abu, Nowrouzi, & Beitchman, 2012). Alternatively, the results of Mitchell et al. may be indicative of a relationship of oxytocin with not only pro-social, but also antisocial behaviours.

1.12.2. Oxytocin and pro-social versus antisocial behaviour

The relationship of oxytocin with both pro-social and antisocial behaviours may be explained by a role of oxytocin in differentiating between members of the in- and the out-group. In a review of the literature on the effects of oxytocin on in-group cooperation, De Dreu (2012) argues that oxytocin motivates in-group favouritism and in-group cooperation but defence-motivated behaviours towards members of the out-group. For example, De Dreu et al. (2010) observed a pattern of parochial altruism among males following intranasal oxytocin self-administration. Results revealed that oxytocin promoted in-group love, whereby participants donated more money to an in-group pool but chose not to make donations which, despite similar gains for the in-group, would prove costly for the out-group.

Other research by De Dreu and colleagues (De Dreu, Greer, Van Kleef, Shalvi, & Handgraaf, 2011) suggests that oxytocin promotes human ethnocentrism. De Dreu and colleagues thus showed that following self-administration of oxytocin relative to placebo, participants were more positive about their in-group relative to out. They held more positive implicit associations about the in-group relative to the out-group, ascribed more secondary human emotions to members of the in-group relative to the out-group and reduced the willingness to sacrifice in-

group targets to save a larger collective, but did not reduce willingness to sacrifice out-group targets. De Dreu and colleagues conclude that these results were driven by an effect of oxytocin on in-group favouritism over out-group derogation. These results are again consistent with a role for oxytocin in behaving pro-socially toward the in-group at the expense of the out-group.

1.13. Motivation for current empirical work

Much of the experimental work conducted in both offending and non-offending participants focuses upon psychopathy as a unitary construct, often identifying psychopathic participants on the basis of total PCL-R scores. However, this may conceal important underlying differences between primary and secondary features of psychopathic personality. The aim of this thesis was to examine the socio-emotional correlates of primary and secondary psychopathy and the effects of psychopathic traits on social cognitive and emotional functioning. These experiments included investigations of the relationships between primary and secondary psychopathic traits with empathic functioning and attachment insecurity, the effects of primary and secondary psychopathic traits on behavioural responses towards members of the in-group and the out-group, eye scan paths during emotional expression recognition in non-offenders, and expression recognition among imprisoned sexual and violent offenders.

The opening experiment (Chapter 2) examines the interrelationships of primary and secondary psychopathic personality in a group of non-offenders, with the aim of distinguishing two opposing behavioural patterns which are consistent with hypothesised differences between generalist and specialist types of offender. This work has a focus on the influence of attachment insecurity on social phobia and psychopathy, and the relationship of other personality

constructs which may be characteristic of offenders who display generalist and specialist patterns of offending.

Chapter 3 aimed to examine the effects of primary and secondary psychopathic traits on responses during economical decision making tasks. Earlier research indicates that OT levels are elevated among psychopathic offenders and positively correlated with PCL-R factor 2 scores. Furthermore, the findings of De Dreu and colleagues (2010) suggest that OT is linked with in-group favouritism. Thus, it was hypothesised that behavioural responses toward members of the in-group and the out-group during economical decision making games may differ for those with low and high levels of secondary psychopathic traits. This distinction between members of the in-group and the out-group may influence motivational factors for offending as well as victim choice in individuals with psychopathic tendencies. Thus, it was hoped that these experiments would help to generate a more refined understanding of the behavioural motivations of individuals with high levels of primary and secondary psychopathic traits.

Chapter 4 was motivated by results from Chapter 2 which showed that primary psychopathy and secondary psychopathy were linked with reduced levels of affective empathy. The recognition of facial expressions of emotion is assumed to be crucial for generating an emotionally empathic response to another's suffering. However, children with callous-unemotional traits show a deficit in fearful face recognition which is linked with a reduced tendency to fixate the eye region of expressive faces. Thus, Chapter 4 aimed to examine the independent effects of primary and secondary psychopathic traits on facial expression

recognition and eye scan paths for emotionally expressive faces in a non-clinical non-offending sample.

Although deficits in the recognition of fearful facial expressions are widely noted among those with psychopathic tendencies, it is unknown whether a deficit in fearful face recognition is also influenced by secondary traits, and whether or not differences in fearful face recognition influence the offence type. In Chapter 5, a test of facial expression recognition with faces of varying intensity was employed to examine the association of fearful face recognition with primary and secondary psychopathic traits, and offence type.

CHAPTER 2: INFLUENCE OF ADULT ATTACHMENT STYLE ON PRIMARY AND SECONDARY PSYCHOPATHIC PERSONALITY TRAITS AND MEASURES OF SOCIO-AFFECTIVE FUNCTIONING

2.1. Introduction

As noted in the introductory section 1.7.2., Bowlby (1969, 1973, 1980) defines attachment as the inborn biological need of an infant to maintain close contact with its main caregiver. This relationship between the infant and their primary caregiver provides a model for future interpersonal, intimate and romantic relationships (Collins & Read, 1994; Hazan & Shaver, 1987). Brennan, Clark, and Shaver (1998) suggest that romantic attachment style is reflective of two basic attachment dimensions – attachment anxiety (anxiety over abandonment) and attachment avoidance (avoidance of intimacy). Classification systems for attachment in adulthood have led to the identification of four major romantic attachment styles: secure, preoccupied, dismissive, and fearful (Bartholomew & Horowitz, 1991). Brennan et al. (1998) suggest that a secure attachment style is characterised by low levels of both the anxiety and avoidance dimensions. Conversely, the preoccupied style is characterised by heightened levels of attachment anxiety, while a dismissive style is thought to reflect high levels of attachment avoidance. Finally, a fearful style is associated with heightened scores on both of these dimensions. These attachment styles can be mapped on to earlier attachment styles in childhood along the dimensions of anxiety and avoidance (see Figure 1).

Childhood attachment styles

		Anxiety	
		Low	High
Avoidance	Low	<i>Secure</i>	<i>Ambivalent</i>
	High	<i>Avoidant</i>	<i>Disorganised</i>

Adult attachment styles

		Anxiety	
		Low	High
Avoidance	Low	<i>Secure</i>	<i>Preoccupied</i>
	High	<i>Dismissive</i>	<i>Fearful</i>

Figure 1. The four styles of attachment seen in childhood and adulthood (Note that attachment style in both instances is reflective of differing degrees of the avoidance and anxiety dimensions).

Traumatic early attachment experiences can have serious, adverse consequences for social and emotional development (Craissati, 2009; Mikulincer & Florian, 1998) and have been linked

with difficulties in achieving both physical and emotional intimacy. It is argued by Mitchell and Beech (2011) that elevated levels of social phobia may lead to difficulties in achieving emotional intimacy, while elevated levels of disgust sensitivity and exaggerated contamination concerns may be linked with fears of physical intimacy. However, relationships between many of these constructs have yet to be established. In support of the Mitchell and Beech (2011) model, an insecure preoccupied attachment style has been linked with an increased risk of social withdrawal, social rejection, and feelings of incompetence (Finzi, Ram, Har-Even, Shnitt, & Weizman, 2001). Furthermore, there is evidence to suggest that preoccupied (Bar-Haim, Dan, Eshel, & Sagi-Schwartz, 2007) and fearful styles of attachment (Bifulco, Kwon, Jacobs, Moran, Bunn, & Beer, 2006) are linked with an increased incidence of social phobia.

Sufferers of social phobia are characterised by heightened fears of negative evaluation and anxiety in social situations (Carleton, Collimore, & Asmundson, 2007; Rapee & Spence, 2004). These characteristics can result in the evasion of social interactions (Eastwood et al., 2005) and may explain poor social skills performance in socially anxious individuals (Thompson & Rapee, 2002). Thus, feelings of rejection and incompetence, fears of negative evaluation, and the avoidance of social interactions may contribute to fears of emotional intimacy with romantic partners.

Sufferers of social phobia are also particularly sensitive to threatening and contemptuous faces (Phan, Fitzgerald, Nathan, & Tancer, 2006; Stein, Goldin, Sareen, Eyler Zorrilla, & Brown, 2002). This may confer a heightened ability to detect others negative appraisals, leading to discomfort and anxiety in social interactions and preventing the development of emotional

intimacy. Furthermore, sufferers of social phobia also present with abnormalities in the processing of disgust, with abnormal neural responses to expressions of disgust and an increased tendency to rate disgust faces as negative compared with angry faces (Amir, Klumpp, Elias, Bedwell, Yanasak, & Miller, 2005; Amir, Najmi, & Bomyea, 2010). Disgust sensitivity refers to an individual's responsiveness to disgust inducing stimuli including food, animals, body products, sex, body envelope violations, death, and hygiene (Haidt, McCauley, & Rozin, 1994).

A heightened sensitivity to disgust in social phobia may also predict discomfort with intimate physical contact. For example, it is argued by de Jong, van Lankveld, Elgersma, and Borg (2010) that disgust may represent an underlying mechanism for sexual dysfunction, with a particular role in the disruption of sexual arousal. Similarly, Mitchell and Beech (2011) suggest that those with a heightened sensitivity to disgust may experience fear at the prospect of physical intimacy and subsequently avoid intimate contact with romantic partners.

An increased sensitivity to disgust may also lead to exaggerated efforts to avoid physical contact with potential sources of contamination, including body products. This link is supported by the finding of an increased sensitivity to disgust among individuals presenting with exaggerated fears of contamination in both clinical (Woody & Tolin, 2002; Shapira et. al., 2003) and non-clinical (Mancini, Gragnani, & D'Olimpio, 2001; Olatunji, Williams, Lohr, & Sawchuck, 2005) populations. Contamination concerns are particularly prevalent among patients with obsessive-compulsive disorder (OCD; DSM-IV-TR, 2000) who tend to report low sexual pleasure, increased disgust in relation to intimate contact, and diminished sexual functioning (Fontenelle et al., 2007; Vulink, Denys, Bus & Westenberg, 2006). Exaggerated contamination concerns may

therefore contribute to fears of physical intimacy. These fears may be particularly exaggerated at the prospect of coming in to contact with the bodily fluids of intimate partners (Mitchell, Keylock, Campbell, Beech, & Kogan, 2012). Furthermore, contamination concerns in relation to bodily fluids appear to be age related, with greater contamination concerns in response to fluids originating from older, relative to younger persons (Mitchell et al., 2012). Thus, social phobia and exaggerated disgust and fear of contamination reactions may act to shift the focus of sexual attraction away from adult partners, and represent a motivational factor in the pursuit of intimacy with young children (Mitchell & Beech, 2011; Mitchell et al., 2012).

Mitchell and Beech (2012) suggest that this personality profile, characterised by anxiety in social situations, and elevated levels of disgust and fear of contamination, may be characteristic of individuals with paedophilic tendencies. Such individuals show a specialised pattern of offending, typically grooming young children over extended periods of time. This specific pattern of antisociality is in contrast to that of individuals with elevated levels of psychopathy. Such individuals show a persistent and chronic pattern of varied and extreme antisocial behaviour and have thus been termed generalists.

As noted in section 1.3., psychopathy refers to a severe disorder of personality characterised by callous-unemotionality, impulsivity and antisocial behaviour. These features of psychopathic personality may be understood in terms of two core components: an affective/interpersonal component, and an antisocial/lifestyle component. Hare and colleagues (Hare, 1991; Harpur et al., 1989) obtained evidence for these two underlying dimensions of psychopathy through factor analyses of the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003), a

commonly used tool in the diagnosis of psychopathy. Factor 1 of the PCL-R is representative of the affective-interpersonal dimension of psychopathy, while Factor 2 measures impulsivity, irresponsibility and antisocial behaviour (Benning et al., 2003; Hare, 1991, 2003; Harpur et al., 1989). The two factor structure of the PCL-R is also paralleled in self-report assessments of psychopathy, including the Levenson Primary and Secondary Psychopathy scales (LPSP; Levenson et al., 1995). These self-report scales were designed for the assessment of psychopathic personality traits among non-offending or non-incarcerated populations.

As was raised in section 1.11.1., some have suggested that psychopathy may represent the diametric opposite to social phobia, with a negative correlation between these two constructs identified in a large, clinically normal sample (Hofmann et al., 2009). Furthermore, deficits in the recognition of fearful facial expressions of emotion have been noted amongst participants with psychopathy (Blair et al., 2004, Montagne et al., 2005). Furthermore, children with psychopathic tendencies have demonstrated deficits in the recognition of fearful (Dadds et al., 2006) and fearful and sad facial expressions of emotion (Blair et al., 2001). Evidence for deficits in the recognition of disgust facial expressions amongst adult psychopaths has also been demonstrated (Kosson et al., 2002). This pattern of performance stands in contrast to the increased sensitivity to negative facial expressions amongst socially phobic participants, noted above. Furthermore, evidence for deficits in emotional learning during aversive conditioning trials amongst psychopathic participants has also been presented (Birbaumer et al., 2005). This is in contrast to the increased sensitivity to aversive conditioning demonstrated by socially phobic individuals (Schneider et al., 1999). This dissociation is perhaps most strongly highlighted

by Veit et al. (2002), who found contrasting patterns of brain activation between socially phobic and psychopathic participants during an aversive conditioning task.

The aim of the current study was to investigate the possible relationships in a non-offending sample of attachment insecurity with social phobia and psychopathic personality traits. Also of interest were the relationships of social phobia and psychopathy with various socio-affective constructs which may be linked with the avoidance of physical and emotional intimacy. These constructs which have also been shown to be characteristic of paedophilic child abusers include disgust sensitivity, fear of contamination, empathic functioning, and emotional congruence with children. Three hypotheses were developed for the current investigation: 1) it was predicted that there would be significant positive correlations of attachment anxiety with social phobia and of attachment avoidance with primary and secondary psychopathic traits. It was also hypothesised that there would be negative correlations between psychopathic traits and social phobia, while primary psychopathy was hypothesised to show a negative correlation with scores on a measure of affective empathy; 2) it was hypothesised that there would be significant positive correlations of social phobia with disgust sensitivity, fear of contamination and emotional identification with children; 3) it was hypothesised that there would be significantly elevated levels of social phobia among those categorised as preoccupied/fearful in attachment.

Although not a specific hypothesis, a further aim was to establish whether a relationship of attachment anxiety with emotional identification with children was explained by a direct relationship or a relationship mediated by social phobia. Parade, Leerkes, and Blankson (2010) observed a mediating effect of social phobia on the relationship between attachment to parents

and outcomes of close relationships. However, in the present study we hypothesised that negative romantic attachment experiences, and resulting increases in social anxiety, may lead to the development of an enhanced emotional identification with children.

2.2. Method

2.2.1. Participants and Design

A sample of 42 male and 39 female undergraduate and postgraduate students was recruited from the University of Birmingham. Participants had a mean age of 20.09 (SD =3.31) with a range of 18-30 years. Participants received either course credit or a monetary reward of ten pounds for their participation. Ethical approval for the current research was submitted to and approved by the University of Birmingham Committee for Ethical Review. All participants met the researcher in a quiet laboratory in the Psychology Department and were required to sign their informed consent before commencing participation. Participants were required to complete all measures; one participant declined to complete a measure of romantic attachment style due to lack of experience in intimate relationships.

2.2.2. Measures

2.2.2.1. Experiences in Close Relationships Scale

The Experiences in Close Relationships Scale (ECR; Brennan et al, 1998) was designed to provide a self-report measure of romantic attachment style. The ECR assesses attachment along two primary dimensions, anxiety (over abandonment) and avoidance (of intimacy), with scores along these two dimensions defining an individual's attachment style as either secure, preoccupied, dismissive or fearful. The scales has a total of 36 items, 18 items representative of the anxiety dimension and 18 representing the avoidance dimension. Items are scored using a 7-point Likert scale, with responses ranging from 1(disagree strongly) – 7(agree strongly).

Adequate reliability for both the avoidance and anxiety scales is reported by Brennan et al. (1998) with Cronbach's alpha estimates of .94 and .91 respectively.

2.2.2.2. Liebowitz Social Anxiety Scale (LSAS)

Social phobia was assessed using The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). The LSAS consists of 24 items rated on a 4 point Likert scale (0 = no fear - 3 = severe fear) designed to measure fear and avoidance across a variety of social interactions and performance situations. Good test-retest reliability of the LSAS has previously been demonstrated for the whole score (.83) and the fear (.79) and avoidance (.83) subscales (Baker, Heinrichs, Kim, & Hofmann, 2002). The LSAS has also demonstrated acceptable internal validity, with a Cronbach's alpha estimate of .95 for the whole scale, while the fear and avoidance subscales also demonstrate acceptable internal validity, with Cronbach's alphas of .91 and .92 respectively (Baker et al., 2002).

2.2.2.3. Disgust Scale – Revised (DS-R)

The Disgust Scale – Revised (DS-R; Haidt, McCauley & Rozin, 1994, modified by Olatunji et al. (2007) is based on the original scale of Haidt et al. (1994) and used to measure trait sensitivity to disgust. The DS-R is comprised of 27 items (25 items plus two 'catch' items) which are rated on a 5-point Likert scale (0-4). Higher scores on the DS-R reflect an increased tendency to experience disgust in response to potentially disgust inducing stimuli. Exploratory and confirmatory factor analyses revealed three dimensions of disgust which were being tapped by the DS-R: Core Disgust, Animal Reminder Disgust and Contamination-Based Disgust (Olatunji et

al., 2007). Olatunji et al. (2007) report a respectable Cronbach's alpha estimate for the DS-R of 0.87. Internal consistency estimates for the 3 subscales were also acceptable, $\alpha = 0.8, 0.82$ and 0.71 for the Core Disgust, Animal Reminder Disgust and Contamination Based Disgust subscales respectively.

2.2.2.4. Contamination Subscale - Vancouver Obsessional Compulsive Inventory (VOCI)

The contamination subscale of the VOCI (Thordarson, Radomsky, Rachman, Shafran, Sawchuck & Hakstian, 2004) consists of 12 items rated on a 5 point Likert scale. The Contamination subscale may be used for measuring fearfulness of contamination in both OCD and non-clinical samples. Test-retest reliability estimates of 0.53 and Cronbach's alpha coefficient of 0.87 have been reported for the Contamination subscale of the VOCI in a student sample (Thordarson et al., 2004).

2.2.2.5. Emotional Congruence Scale – Children and Sex Questionnaire

This scale was designed by Beckett (1987) to examine an individuals' perceived ability to understand, relate to and identify with the thoughts and feelings of children. Moderate levels of emotional congruence with children may be viewed as normal, particularly for parents as this conveys sensitivity towards the needs of children (Fisher, Beech, & Browne, 1999). Thornton (1994) reported a Cronbach's alpha of $.90$ in a sample of 270 child molesters. The test-retest reliability of this scale was reported by Beech (1998) as 0.63 in a sample of 45 untreated child molesters.

2.2.2.6. Empathy Quotient

The Empathy Quotient (EQ, Baron-Cohen & Wheelwright, 2004) is of use for measuring empathy in adults of normal intelligence and contains 60 items, 40 of which measure empathy with the remaining twenty acting as filler items. A score of 0, 1 or 2 is available for each item of the EQ, yielding a maximum score of 80 and a minimum score of zero. A Cronbach's alpha of 0.92 has been established for the EQ (Baron-Cohen & Wheelwright, 2004).

2.2.2.7. Levenson Primary and Secondary Psychopathy Scales

The Levenson Primary and Secondary Psychopathy Scales (LPSP; Levenson et al., 1995) were developed for the purpose of assessing psychopathic attributes in non-institutionalised individuals. There is a total of 26 items, 16 of which assess primary psychopathic tendencies, with the remaining ten items assessing secondary attributes. Items are rated on a 4 point Likert scale. Principle components analysis revealed a two-factor structure (Levenson et al., 1995) which paralleled that of the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003). Levenson et al. have demonstrated acceptable internal validity of the LPSP in an undergraduate sample, with a Cronbach's alpha of .82 for the primary subscale and .63 for the secondary subscale, a value considered by the authors to be adequate for a ten-item scale. Items used in the primary scale focus on the selfish and uncaring characteristics of primary psychopaths. Secondary psychopathy items tap proneness to boredom and impulsivity.

2.2.3. Method for analysis

Relationships between measures were analysed for both the full sample and separately for male and female participants using Pearson's correlation coefficient and Spearman's Rho. Furthermore, to investigate the unique relationships of primary and secondary psychopathic

traits with other variables, partial correlation was used to control for the influence of the other type of trait, that is, the effects of secondary psychopathy were controlled for in analyses of primary psychopathic traits and vice-versa. This method for analysis is consistent with the suggestion of Hicks and Patrick (2006), who suggest that a more fine grained understanding of psychopathy can be achieved through an investigation of the separable influences of interpersonal/affective and lifestyle/antisocial features of psychopathy. Further analyses used mediation analysis to examine potential mediators in the relationships between attachment anxiety and emotional congruence with children and between attachment anxiety and fear of contamination. Finally, ANOVA was used to investigate differences in social phobia between attachment classifications.

2.3. Results

2.3.1. Relationships between measures

Data for the VOCI fear of contamination subscale and Levenson's primary psychopathy scale were found to be significantly different from normal ($K-S = .16$, $df = 80$, $p < .001$) and ($K-S = .12$, $df = 80$, $p < .01$) respectively. Therefore, Spearman's Rho correlations were used to test relationships with these constructs. All other associations were tested using Pearson's correlation coefficient. Table 1 shows correlations between the variables attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional congruence with children and empathy. Separate correlations for male and female participants are presented in Table 2 and Table 3, respectively.

Table 1.

Complete table of correlations between attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional identification with children, and empathic functioning (n = 81).

	Attachment Anxiety	Attachment Avoidance	Social Phobia	Disgust	Fear of Contamination	Emotional Congruence
Attachment Avoidance	.04					
Social Phobia	.34**	.26*				
Disgust	.13	.06	.38**			
Fear of Contamination	^s .10	^s .20	^s .34**	^s .57**		
Emotional Congruence	.25*	.02	.25*	.10	^s .20	
Empathy Quotient	-.23*	-.13	-.16	.29**	^s .01	-.07

Note: Table shows Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Table 2.

Complete table of correlations between attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional identification with children, and empathic functioning for male participants (n = 42).

	Attachment Anxiety	Attachment Avoidance	Social Phobia	Disgust	Fear of Contamination	Emotional Congruence
Attachment Avoidance	-.026					
Social Phobia	.39*	.29				
Disgust	.05	.07	.47**			
Fear of Contamination	^s .18	^s .11	^s .35*	^s .45**		
Emotional Congruence	.29	.20	.48**	-.05	^s .18	
Empathy Quotient	-.34*	-.02	-.21	.06	^s -.05	-.26

Note: Table shows Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Table 3.

Complete table of correlations between attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional identification with children, and empathic functioning for female participants (n = 39).

	Attachment Anxiety	Attachment Avoidance	Social Phobia	Disgust	Fear of Contamination	Emotional Congruence
Attachment Avoidance	.01					
Social Phobia	.31	.24				
Disgust	.36*	.31	.40*			
Fear of Contamination	^s .08	^s .32*	^s .34*	^s .64**		
Emotional Congruence	.23	-.18	.04	.18	^s .20	
Empathy Quotient	-.08	-.13	-.20	.06	^s -.12	.04

Note: Table shows Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Correlations for all participants revealed significant correlations of attachment anxiety with social phobia in the positive direction, emotional congruence with children in the positive direction and empathy, in the negative direction. Furthermore, social phobia, sensitivity to disgust and fear of contamination were all positively correlated with each other. Disgust was also found to correlate positively with empathy. When correlations were computed separately for male and female participants, results for male participants showed that attachment anxiety was positively correlated with social phobia, while there was a negative relationship of attachment anxiety with empathy. Again, there were significant positive correlations between social phobia, disgust sensitivity and fear of contamination. Results for female participants revealed positive correlations between social phobia, disgust sensitivity and fear of contamination.

Table 4 shows zero-order and partial correlations of primary and secondary psychopathic traits with all other measures for the whole sample. Using partial correlation to control for the subscale of LSRP not under direct investigation allowed for the observation of the unique relationship of primary and secondary psychopathic traits with other measures. This analysis strategy is consistent with the finding of suppressor effects between PCL-R factors and 1 and 2 (Hicks & Patrick, 2006). A distinction between primary and secondary psychopathy has been suggested whereby primary psychopathy relative to secondary psychopathy more closely relates to the emotional detachment features of psychopathy (Levenson et al., 1995). Thus, stronger relationships of primary psychopathy relative to secondary psychopathy in relation to attachment avoidance may be expected. Results for the full sample showed that there were significant positive zero-order correlations of both primary and secondary psychopathy with attachment anxiety. Furthermore, there was a significant positive zero-

order correlation of secondary psychopathic traits with attachment avoidance. The correlations of secondary psychopathy with both attachment anxiety and avoidance remained significant when controlling for primary psychopathic traits, suggesting unique relationships between secondary psychopathic traits and attachment anxiety and avoidance. On the other hand however, the zero-order correlation of primary psychopathy with attachment anxiety was non-significant after controlling for secondary psychopathy, and may therefore have been influenced by a relationship with secondary psychopathic traits. These correlations may be consistent with a genetic based account of primary psychopathy (Mealey, 1995; Viding et al., 2005) whereby primary features are thought to reflect a genetic disturbance while secondary traits are thought to reflect adverse developmental experiences. Correlations for the whole sample also revealed significant negative zero-order and partial correlations of both primary and secondary psychopathic traits with empathic functioning.

Table 5 and Table 6 shows zero-order and partial correlations of primary and secondary psychopathic traits with all other measures, for male participants and female participants respectively. When correlations were examined for male and female participants separately the results did not support the finding of unique relationships of secondary psychopathic traits with both attachment anxiety and avoidance. It was found that only female participants showed a significant positive correlation with attachment avoidance after controlling for primary psychopathic traits. Furthermore, partial correlations revealed no significant relationships between either primary or secondary psychopathic traits with empathic functioning for either male or female participants

Table 4.

Zero-order and partial correlations of primary and secondary psychopathy with attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional congruence with children and empathy for all participants (n = 81).

Measure	Primary Psychopathy		Secondary Psychopathy	
	Zero-order	Partial (controlling for secondary psychopathy)	Zero-order	Partial (controlling for primary psychopathy)
Attachment Anxiety	^s .27*	.19	.30**	.24*
Attachment Avoidance	^s .20	.11	.39**	.35**
Social Phobia	^s -.03	-.06	.10	.10
Disgust	^s -.12	-.04	-.23*	-.22
Fear of Contamination	^s .13	.12	-.01	-.07
Emotional Congruence	^s -.06	-.03	.06	.06
Empathy Quotient	^s -.39**	-.36**	-.45**	-.37**

Note: Zero-order correlations refer to Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Table 5.

Zero-order and partial correlations of primary and secondary psychopathy with attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional congruence with children and empathy for male participants (n = 42).

Measure	Primary Psychopathy		Secondary Psychopathy	
	Zero-order	Partial (controlling for secondary psychopathy)	Zero-order	Partial (controlling for primary psychopathy)
Attachment Anxiety	^s .17	.32*	.32	.20
Attachment Avoidance	^s .17	.11	.53**	.20
Social Phobia	^s -.08	.08	.19	.02
Disgust	^s .19	.07	-.04	-.08
Fear of Contamination	^s .18	.21	-.04	.03
Emotional Congruence	^s -.08	.12	.06	.11
Empathy Quotient	^s -.34*	-.27	-.35*	-.28

Note: Zero-order correlations refer to Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Table 6.

Zero-order and partial correlations of primary and secondary psychopathy with attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional congruence with children and empathy for female participants (n = 39).

Measure	Primary Psychopathy		Secondary Psychopathy	
	Zero-order	Partial (controlling for secondary psychopathy)	Zero-order	Partial (controlling for primary psychopathy)
Attachment Anxiety	^s .37*	.09	.25	.3
Attachment Avoidance	^s .15	.14	.22	.52**
Social Phobia	^s .11	-.17	.04	.17
Disgust	^s .02	.16	.07	-.07
Fear of Contamination	^s .27	.18	.17	-.01
Emotional Congruence	^s .08	-.18	.14	.03
Empathy Quotient	^s -.29	-.31	-.33*	-.30

Note: Zero-order correlations refer to Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Additional zero-order and partial correlations were also performed to examine the relationships of psychopathic traits with three distinct subscales of the Empathy Quotient. These five-item subscales, identified by Muncer and Ling (2006), measured cognitive

empathy, social-skills empathy and emotional reactivity. The zero-order and partial correlations of primary and secondary psychopathic traits with the three distinct components of the Empathy Quotient for the whole sample, and for male and female participants, are shown in Tables 7, 8 and 9, respectively.

Table 7.

Zero-order and partial correlations of primary and secondary psychopathic traits with cognitive empathy, social skills empathy and emotional reactivity for all participants (n = 81).

Measure	Primary psychopathy		Secondary psychopathy	
	Zero-order	Partial (controlling for secondary psychopathy)	Zero-order	Partial (controlling for primary psychopathy)
Cognitive empathy	^S -.03	.06	-.3*	-.31**
Social skills empathy	^S -.16	-.1	-.24*	-.21
Emotional reactivity	^S -.43**	-.39**	-.22*	-.12

Note: Zero-order correlations refer to Pearson's correlation, unless indicated ^S = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Table 8.

Zero-order and partial correlations of primary and secondary psychopathic traits with cognitive empathy, social skills empathy and emotional reactivity for male participants (n = 42).

Measure	Primary psychopathy		Secondary psychopathy	
	Zero-order	Partial (controlling for secondary psychopathy)	Zero-order	Partial (controlling for primary psychopathy)
Cognitive empathy	^s .07	.12	-.2	-.22
Social skills empathy	^s -.14	-.11	-.15	-.12
Emotional reactivity	^s -.35*	-.34*	-.07	.00

Note: Zero-order correlations refer to Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Table 9.

Zero-order and partial correlations of primary and secondary psychopathic traits with cognitive empathy, social skills empathy and emotional reactivity for female participants (n = 39).

Measure	Primary psychopathy		Secondary psychopathy	
	Zero-order	Partial (controlling for secondary psychopathy)	Zero-order	Partial (controlling for primary psychopathy)
Cognitive empathy	^s -.02	.03	-.33*	-.33*
Social skills empathy	^s -.16	-.13	-.34*	-.32*
Emotional reactivity	^s -.27	-.27	-.07	-.04

Note: Zero-order correlations refer to Pearson's correlation, unless indicated ^s = Spearman's correlation.

** . Correlation is significant at the .01 level.

* . Correlation is significant at the .05 level.

Results of zero-order correlations for all participants showed that there was a significant negative correlation between primary psychopathic traits and the emotional reactivity subscale of the empathy quotient, indicating lower levels of affective empathy in relation to primary psychopathic traits. Furthermore, this relationship remained significant after controlling for the effects of secondary psychopathic traits. Although there was a negative zero-order correlation of secondary psychopathic traits with emotional reactivity, this correlation was non-significant after controlling for the effects of primary psychopathic traits. The finding of a unique negative association between primary psychopathic traits and

emotional reactivity was also replicated for male participants, however, the relationship was found to be non-significant for female participants.

Zero-order correlations also showed significant negative relationship of secondary psychopathic traits with cognitive empathy, social skills empathy and emotional reactivity. However, it should be noted that only a relationship of secondary psychopathic traits with cognitive empathy remained significant after controlling for primary psychopathy. Thus, while primary psychopathic traits may be linked with a reduction in affective empathy, these results suggest that secondary psychopathic traits may be linked with impairments in cognitive empathy. This relationship was also evident for analyses of female participants, but was absent among male participants.

2.3.3. Significant effects of social phobia and psychopathy between attachment groups

Using the avoidance and anxiety dimensions of attachment behaviour, attachment style categories were computed for all participants using classification coefficients (Fischer's linear discriminant functions) based on the original sample (N = 1082) of Brennan et al. (1998). This resulted in the classification of 37 (46%) participants as securely attached, 11 (14%) fearful, 20 (25%) preoccupied and 12 (15%) dismissive. A one-way ANOVA and associated post-hoc tests were carried out to investigate for significant effects of social phobia between the four attachment categories. A one-way ANOVA revealed a significant main effect of social phobia $F(3, 76) = 3.70, p < .05$. Hochberg's GT2 post-hoc tests revealed that mean social phobia scores were greater in participants with a fearful attachment style (disorganised in childhood) compared to securely attached individuals ($p < .05$; see Figure 2). There were no significant effects of either primary or secondary psychopathy between the four attachment groups.

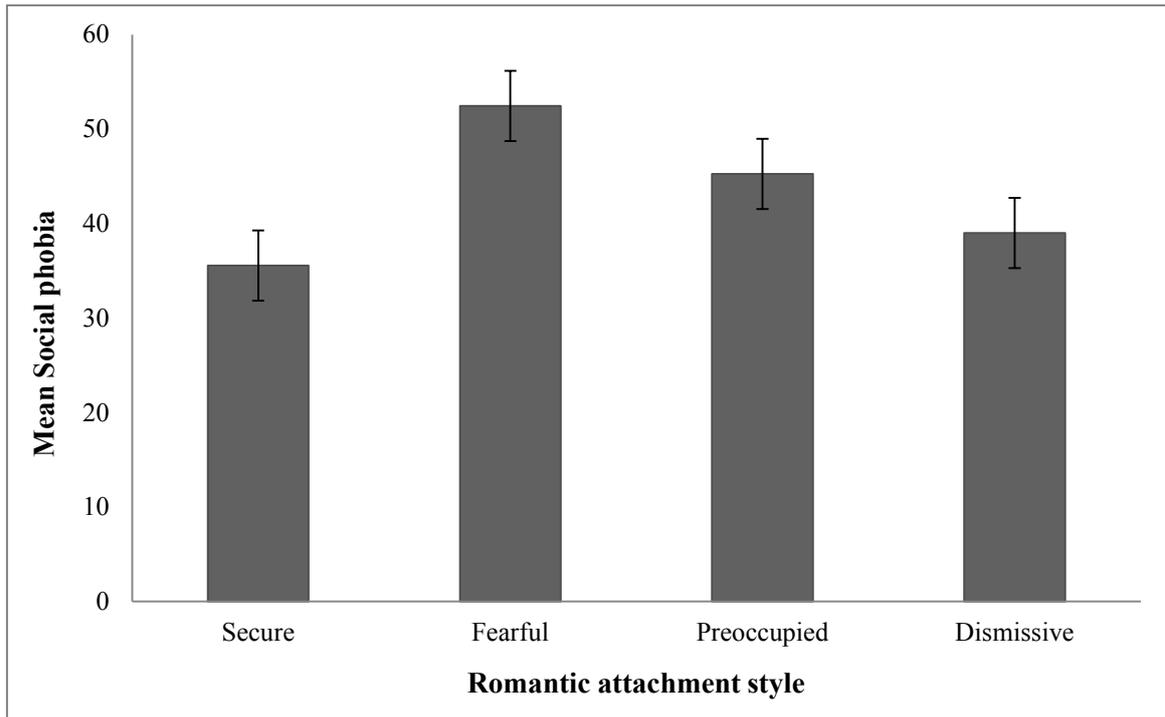


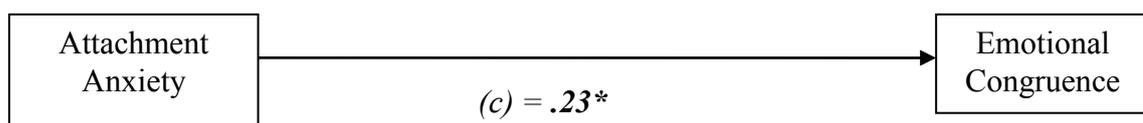
Figure 2. Mean social phobia scores for each attachment category. Error bars show standard error of the mean.

2.3.4. Mediation Analysis

Based on the above correlations two simple path diagrams including mediating variables were constructed (see Figures 3 and 4). Mediation analyses were performed using the 'INDIRECT' methods set out by Preacher and Hayes (2008). These steps allow for the generation of bias corrected and accelerated bootstrap confidence intervals (CI) for the indirect effects of the predictor on the outcome variable. Bootstrapping refers to the repeated extraction of multiple samples from the original dataset, from which indirect effects can then be calculated. Based on these indirect effects, a 95% confidence interval can be generated. Indirect effects in the following analyses were based on 1000 bootstrap re-samples. Tests were carried out using SPSS.

The path diagram in Figure 3 was constructed to test for the predictive power of attachment anxiety on emotional congruence with children. Social phobia was included as a mediating variable as it was found to correlate significantly with both the predictor and outcome variables. The simple path diagram in Figure 4 was constructed to test for the predictive power of attachment anxiety on fear of contamination. Again, due to significant correlations with both the predictor and outcome variables, social phobia was included as a mediating variable in this analysis. It should be noted here that although there was not a direct zero-order correlation between attachment anxiety and fear of contamination collapsed across male and female participants, indirect effects in the absence of a direct relationship are indeed possible. For example, Hayes (2009) argues that indirect effects can be tested for in models with mediating variables without the requirement for a direct relationship between variable X (attachment anxiety) and variable Y (fear of contamination).

A



B

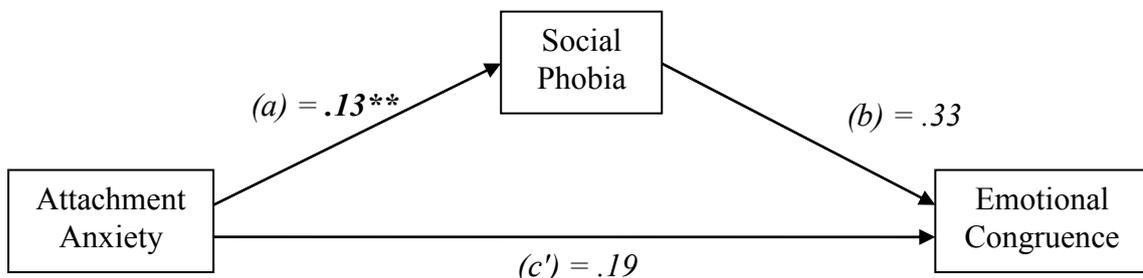
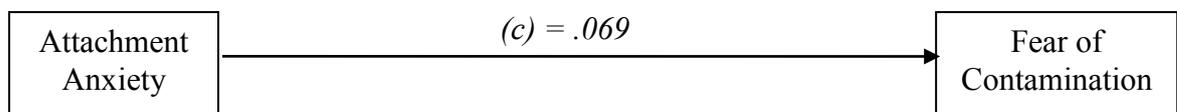


Figure 3. Simple mediation model for attachment anxiety: (A) path estimate for the total effect of attachment anxiety on emotional congruence with children (B) direct and indirect effects of attachment anxiety on emotional congruence with children.

The indirect effect for social phobia in Figure 3 was found to be non-significant, with a point estimate of .0434, S.E. = .0389, $Z = 1.1159$, $p = .2645$, and a 95% bias corrected and accelerated bootstrap CI of -.0183 to .1405, indicating that social phobia did not mediate the relationship between attachment anxiety and emotional congruence with children. The indirect effect for social phobia in Figure 4 was significant, with a point estimate of .0798, S.E. = .0361, $Z = 2.208$, $p = .0273$, and a 95% bias corrected and accelerated bootstrap CI of .0202 to .2269, indicating that social phobia acts as a mediator in the relationship between attachment anxiety and fear of contamination.

A



B

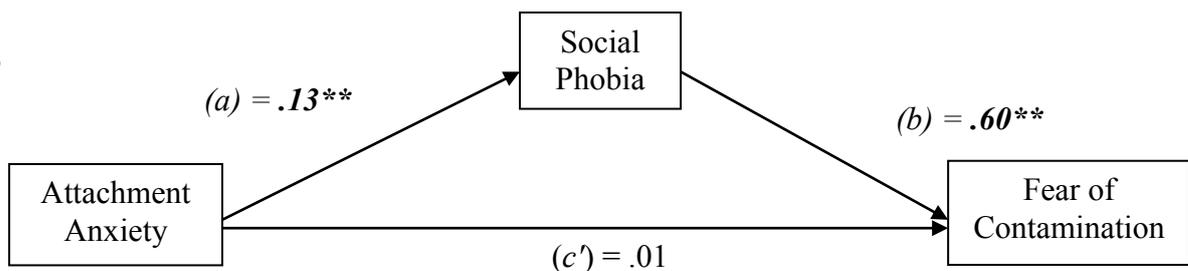


Figure 4. Simple mediation model for attachment anxiety: (A) path estimate for the total effect of attachment anxiety on fear of contamination (B) direct and indirect effects of attachment anxiety on fear of contamination.

2.4. Discussion

The aim of this study was to establish the inter-relationships between attachment anxiety and avoidance, social phobia, disgust sensitivity, fear of contamination, emotional congruence with children and empathic functioning. A further aim was to establish whether or not there were unique relationships of primary and secondary psychopathic traits with any of these constructs. Consistent with hypotheses, the results of the current investigation demonstrated significant inter-relationships between adult attachment style, social phobia, disgust sensitivity, fear of contamination and emotional congruence with children. Similar relationships were also present when results were broken down by sex for male and female participants. Significant relationships of primary and secondary psychopathy with aspects of empathic functioning and attachment insecurity were also established. However, many of these relationships failed to exist when analysed separately for male and female participants. These differing patterns of results may reflect differences in levels of psychopathic traits for male and female participants, or gender based differences in the manifestation of psychopathic features (see Coid et al., 2009).

Based on the results collapsed across sex of participant, two possible patterns of behaviour may be hypothesised. The first of these possible behavioural patterns may be typified by attachment anxiety and avoidance, heightened levels of primary and secondary psychopathy and decreases in empathic functioning, including deficits in cognitive empathy, social-skills, and emotional reactivity, as well as a reduced sensitivity to disgust. The second pattern of correlations is characterised by increased attachment anxiety, a heightened degree of social phobia and increases in emotional congruence with children, disgust sensitivity and fear of contamination.

Significantly elevated levels of social phobia in individuals demonstrating a fearful style of attachment, as measured using the Experiences in Close Relationships scale, were also identified. A fearful attachment style is characterised by both the avoidance of intimacy and anxiety over abandonment. In-keeping with this finding, it was demonstrated that both attachment anxiety and avoidance, as measured using the ECR, were positively correlated with social phobia. These findings are consistent with the earlier results of Bifulco et al. (2006) that social phobia was elevated amongst females with a fearful attachment style. Furthermore, both attachment anxiety and social phobia were found to be positively correlated with emotional congruence with children. We hypothesised that the association of attachment anxiety with emotional congruence with children may have been mediated by social phobia, such that individuals, who experience increased social anxiety stemming from insecure attachments, may seek contact with young children to fulfil their social and emotional needs. However, a mediation analysis suggested that a direct relationship, and not a relationship mediated by social phobia, was the more likely explanation for this association.

In addition, significant interrelationships were identified between social phobia, sensitivity to disgust and fearfulness of contamination. An indirect effect, through social phobia, of attachment anxiety on fearfulness of contamination was also identified. These results suggest that individuals demonstrating elevated levels of social phobia, stemming from heightened levels of attachment anxiety, are also more likely to experience exaggerated fears of contamination. Thus, attachment anxiety may be linked with both emotional and physical fears of intimacy. Results also indicate that disgust sensitivity may be indicated in both individuals with elevated levels of social phobia and exaggerated fears of

contamination. The role of disgust sensitivity in exaggerated fears of contamination has previously been elucidated by Woody & Tolin (2002). In addition, Amir et al. (2005) demonstrated that patients with social phobia also show abnormal processing of disgust related stimuli. These results suggest that individuals who experience increased fears of negative evaluation during social situations also experience greater fears of contamination during physical contact with others. This relationship may be driven by heightened amygdala reactivity, which is associated with both social phobia (Phan et al., 2006) and exaggerated contamination concerns (van den Heuvel et al., 2005; Schienle, Schäfer, Hermann, Walter, Stark & Vaitl, 2006).

Significant positive correlations of secondary psychopathy with attachment anxiety and avoidance were also found. Although primary psychopathy was found to correlate with attachment anxiety, further analysis using partial correlations suggests that these relationships may be driven by shared variance between primary and secondary psychopathy. On the other hand, there were relationships of secondary psychopathy with attachment anxiety and avoidance after controlling for the effects of primary psychopathic traits. A relationship of psychopathic personality with attachment insecurity is consistent with the results of Frodi et al. (2001) who showed that incarcerated psychopaths scoring highly on the PCL-R are characterised by a dismissing style of attachment (Frodi et al., 2001). However, these findings are in contrast to theories which propose that emotional detachment is a central component to primary psychopathic tendencies (Levenson et al., 1995; Mealey, 1995b). Rather these results suggest that attachment insecurity, both emotional detachment from others and increased fears of abandonment, may be characteristic of those with heightened levels of secondary psychopathic traits.

Relationships were also identified of primary and secondary psychopathic traits with empathic functioning. However, it should be noted that these relationships varied when analysed separately for male and female participants. Results collapsed across sex showed that both primary and secondary psychopathic traits correlate negatively with global empathic functioning, as measured using the EQ. However, subsequent analyses suggest more fine grained relationships of primary and secondary psychopathy with empathic functioning. Consistent with the suggestion of Blair (2008), these findings suggest that the callous and unemotional traits associated with primary psychopathy are linked with a deficit in affective empathy, but not cognitive empathy. However, although secondary psychopathy was also linked with decreased emotional reactivity, significant inverse correlations were also identified between secondary psychopathy and social-skills and cognitive empathy components. A negative correlation between secondary psychopathy and disgust sensitivity was also identified and is consistent with a specific deficit in classifying disgust amongst psychopathic offenders (Kosson et al., 2002).

To summarise, these results indicate that while social phobia may be linked with attachment anxiety, disgust sensitivity and emotional congruence with children, psychopathic traits may be linked with attachment anxiety and avoidance and empathy deficits in a non-offending sample. As a result of the findings described in this chapter, it is predicted that these relationships may be indicative of two distinct patterns of offending. The first pattern of offending may be characterised by attachment anxiety and avoidance, reduced empathic functioning and high levels of psychopathic traits. However, although primary psychopathic traits correlated with secondary psychopathy, following partial correlations there were no relationships of primary psychopathic traits with either

attachment anxiety or avoidance. Furthermore, primary psychopathic traits were only found to negatively correlate with affective empathy. As such, secondary psychopathic traits, with relationships to attachment anxiety and avoidance and deficits in empathic functioning, may play a more central role to this pattern of offending relative to primary psychopathic traits. This pattern of correlations may be characteristic of '*generalist*' and anti-social offenders. Such offenders have a proclivity toward being impulsive and irresponsible with deficits in empathic functioning.

The second pattern of offending suggested by the relationships observed in the current sample may be characterised by attachment anxiety, social phobia, an increased sensitivity to disgust, exaggerated fears of contamination, and elevated emotional congruence with children. It may be hypothesised that these constructs would co-occur at heightened levels in the fixated paedophile. Such individuals demonstrate an increased incidence of social phobia (Baxter, Marshall, Barbaree, Davidson & Malcolm, 1984; Raymond et al., 1999; Hoyer et al., 2001), heightened levels of emotional congruence with children (Thornton, 2002) and exaggerated fears of contamination (Mitchell et al., 2011).

A combination of social phobia and exaggerated fears of contamination may make intimate contact with adults a frightening prospect for individuals with paedophilic tendencies. Such individuals may experience extreme fears of both negative evaluation and contamination during intimate sexual contact with adults (see Mitchell et al., 2011, Mitchell & Beech, 2011). However, these fears may be significantly reduced during interactions with children, who represent a lesser threat of contamination and a reduced risk of negative evaluation. It is suggested by Mitchell et al. (2011) that contamination may be most feared following intimate contact with adults. It would not be unreasonable for one to assume that

the likelihood of physical contact with contaminants and the subsequent harbouring of dangerous pathogens would increase with age. Therefore, children may be seen to represent a greatly reduced threat of contamination.

Although the findings presented in this chapter may indicate meaningful relationships in a non-offending sample between psychopathic traits, attachment insecurity and empathic functioning, it should nonetheless be noted that these findings may be limited by methodological issues. These issues include a reliance on a non-offending sample meaning that conclusions cannot be drawn about paedophilic and generally antisocial offenders on the basis of these results. Furthermore, these relationships have been observed solely on the basis of self-report. This may be particularly problematic with respect to individuals with elevated psychopathic traits, with a deceitful and manipulative interpersonal style included among the core features of psychopathy (Hare, 1991, 2003). An additional problem of self-report measurement has been highlighted by Polashek (2003) who considers that empathy scales may include items that measure other constructs, for example perspective taking rather than cognitive empathy, and also highlights inherent difficulties in accurately appraising one's own level of empathic functioning (Polashek, 2003). Future research with offending participants may aim to use latent class analysis or cluster analytical techniques in order to derive distinct subgroups of participants on the basis of the variables of interest outlined in this chapter.

The results presented here and the findings of Mitchell et al. (2012) suggest that primary and secondary psychopathy may be differentially linked with other variables of socio-emotional importance. The ways in which these traits are linked with differential responses during cognitive-affective tasks may be tested using experimental manipulations.

Such manipulations should be sensitive to emotional detachment from others, which may be indicated by levels of pro-social and anti-social sentiment, including generosity and guilt. These social emotions have been linked with the ways in which participants respond on economical decision making games when asked to carve up imaginary rewards between themselves and another individual. These games include the Dictator Game, whereby responses are thought to reflect generosity and guilt, and the Ultimatum Game, whereby participants are required to allocate and either accept or reject monetary offers.

Chapter 3 will examine the effects of primary and secondary psychopathic personality traits on responses in the dictator game and ultimatum game. Responses on these games will provide an objective measure of the extent to which those scoring highly for primary and secondary psychopathic traits are influenced by feelings of generosity and guilt. Given that the influence of such social emotions may vary as a function of who the interaction takes place with, participants were asked to make responses to both members of the in-group and the out-group. The results of these tasks will further the results of Chapter 2 by providing a more objective means of assessing the relationship of primary and secondary psychopathic traits with pro-social and antisocial sentiments, including generosity and altruism, as well as selfishness and spite.

CHAPTER 3: EXAGGERATED INTERGROUP BIAS IN ECONOMICAL DECISION MAKING GAMES: DIFFERENTIAL EFFECTS OF PRIMARY AND SECONDARY PSYCHOPATHIC TRAITS

3.1. Introduction

The term psychopathy refers to a severe disorder of personality, characterised by callousness and a lack of care for others, poor empathic functioning and a lack of remorse or guilt (Cleckley, 1941; Hare, 1991). The presence of such interpersonal and affective abnormalities differentiates psychopathy from other syndromes characterised by marked levels of criminality and aggression, including ‘sociopathy’ and antisocial personality disorder (Hervé, 2007; Patrick, 2007). For example, antisocial personality disorder (ASPD), as defined in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; APA, 2000), refers to a set of behavioural criteria including aggression toward people or animals, destruction of property, deceptiveness or stealing and serious rule violations. However, with the exception of one item (absence of remorse), these criteria do not reference the hallmark interpersonal/affective features of psychopathy. Indeed, it has been debated whether or not criminally antisocial behaviour is central to the syndrome of psychopathy or merely a downstream correlate of the underlying personality features (Cooke & Michie, 2001, Cooke et al., 2004, Skeem & Cooke, 2010).

In support of a theoretical distinction between psychopathy and ASPD, findings indicate that offenders with ASPD plus psychopathy show a more severe pattern of offending relative to those with ASPD in the absence of psychopathy, and those with neither diagnosis (Kosson et al., 2006). Additional evidence points to differences in the processing of emotional stimuli

between psychopaths and non-psychopaths with ASPD (Kosson et al., 2006, Verona, Sprague, & Sadeh, 2012). For example, psychopathy deficits in event related brain potentials during a Go/No-Go task have been revealed, indicating blunted processing of emotionally negative words among psychopaths relative to non-psychopaths with ASPD (Verona et al., 2012). However, variants of clinically diagnosable psychopathy have also been suggested, with the most common distinction made between 'primary' and 'secondary' subtypes (Karpman, 1941).

Primary and secondary subtypes of psychopathy may be differentiated on the basis of levels of neuroticism and anxiety, with the secondary variant failing to resemble the Cleckley's traditional description in some important respects (Karpman, 1941; Lykken, 1995). While primary psychopaths present with low levels of trait anxiety the opposite is true for secondary psychopathic individuals (Skeem et al., 2007). In support of this distinction, differences in electrodermal skin responses have been noted during aversive conditioning trials with primary and secondary psychopathic individuals (Lykken, 1957). Furthermore, cluster analytical methods with samples of offenders and non-offenders also provide evidence for a primary/secondary distinction in psychopathic personality (Vassileva, Kosson, Abramowitz, & Conrod, 2005; Falkenbach, Poythress, & Creevy, 2008).

In her seminal article on the 'sociobiology of sociopathy', Mealey (Mealey, 1995a, 1995b) outlines a game theoretic model for anti-sociality. In particular, Mealey (Mealey, 1995a, 1995b) refers to two subtypes of sociopath: 'primary' and 'secondary'. It should be noted that while the primary subtype most closely resembles traditional descriptions of psychopathy (Cleckley, 1941; Hare, 1991) the secondary variant may more closely conform to the criteria for ASPD, or descriptions of secondary psychopathy. As such, although both

primary and secondary subtypes present with high levels of antisocial behaviour, it is suggested by Mealey (Mealey, 1995b) and others (Karpman, 1941; Lykken, 1995), that the behaviour of these subtypes may be differentially motivated. Consistent with traditional descriptions of psychopathy (Cleckley, 1941; Hare, 1991), Mealey argues that primary psychopaths antisocial behaviour stems from high levels of callous unemotionality and a lack of remorse for others (Mealey, 1995a, 1995b). In addition, it is argued that these traits may reflect a genetic predisposition toward psychopathy (Mealey, 1995b), a position which has received recent support (Larsson et al., 2006; Viding et al., 2007). In contrast, it is suggested that the antisocial deviance of secondary sociopaths may stem from adverse early experiences, including an abusive and neglectful childhood environment. This early background may leave the individual at an evolutionarily competitive disadvantage. Thus, selfish behaviours are selected which allow the individual to compete for resources.

The use of such selfish and non-cooperative behaviours may be tested under controlled circumstances using game theoretic tasks. Such tasks include the Prisoner's Dilemma Game (PDG), which has been used to test the use of cooperative and non-cooperative strategies in relation to psychopathic personality. For example, it has been shown that psychopaths have a strong tendency to make competitive, non-cooperative responses compared with non-offenders (Mokros, Menner, Eisenbarth, Alpers, Lange, & Osterheider, 2008). Furthermore, these non-cooperative responses were also found to yield higher individual rewards. The PDG has also been used to test the use of non-cooperative strategies among adults with psychopathic tendencies, revealing a negative association of psychopathic personality traits with cooperation (Curry, Chesters, & Viding, 2011; Rilling et al., 2007).

Mealey (Mealey, 1995a, 1995b) suggests that primary psychopaths, lacking in interpersonal emotions including empathy, guilt and loyalty, may adopt a social interactional style characterised by a fixed antisocial strategy. Although the use of a fixed antisocial strategy may be at odds with descriptions of primary psychopaths as manipulative and conning, it is suggested that the primary psychopath uses a cost-benefit approach to achieve immediate personal gain. As such, the use of conning and deceitful strategies may be of greatest benefit under circumstances where an immediate pay-off for antisocial strategies is unlikely, leading to the use of deceitful pro-social strategies. However, as highlighted by Mealey (Mealey, 1995a, 1995b), the fixed use of cheating strategies may have long term losses under circumstances where continued social interactions occur. For example, where a player develops a reputation for defection interactions may become less frequent, thereby limiting the opportunity for future profit. Thus, while the fixed use of one antisocial strategy may be characteristic of the primary psychopath, the secondary psychopath may display cooperative and non-cooperative strategies dependent upon environmental circumstances. One such evolutionarily important environmental circumstance may be the in-/out-group status of the person with whom a social interaction occurs.

From an evolutionary perspective, the presence of a strong and faithful in-group may be of particular importance for those who are at a competitive disadvantage. As such, the secondary psychopath could show a heightened intergroup bias in the way that they allocate resources to the in-group and the out-group. These interactions may be characterised either by in-group liking or out-group derogation, both of which either directly or indirectly serve to promote the needs of the in-group and aid survival of its members (Brewer, 1999; Choi & Bowles, 2007). Acts of in-group liking, for example allocating generous amounts of resources

to the in-group, would serve to strengthen one's own group. Furthermore, a selfish allocation of resources to the out-group would serve to undermine the power of the out-group, protecting the needs of and strengthening the position of the in-group (Choi & Bowles, 2007). Secondary psychopaths cheating behaviours may therefore be characterised by parochial altruism, with parochial acts of aggression and selfishness directed toward the out-group, and altruistic acts of generosity and pro-sociality characterizing in-group social interactions.

Although such selfish strategies may be most prevalent among those who present with high levels of antisocial deviance, they may nonetheless be detected sub-clinically under immediate environmental circumstances where pro-social strategies are less profitable. While psychopathy in a forensic context is most commonly assessed using the Psychopathy Checklist – Revised (Hare, 1991; Hare, 2003), psychopathic personality traits may nonetheless be observed in sub-clinical populations through the use of self-report psychopathy scales. One such scale, the Levenson Self Report Psychopathy Scale (LSRP; Levenson et al., 1995), was designed to parallel the two-factor structure of the PCL-R. Thus, while the primary subscale of the LSRP includes items relating to selfishness and a lack of care for others, the secondary subscale includes items that tap a proclivity to boredom, recklessness, and a lack of responsibility for one's own actions. The factor structure and construct validity of the LSRP has been examined in a sample of 549 male inmates from Wisconsin state prisons (Brinkley, Schmitt, Smith, & Newman, 2001). Results showed modest support for the original two factor structure and medium sized correlations of the primary and secondary subscales with the corresponding factors of the PCL-R (Brinkley et al., 2001). It has been suggested however that criteria which load on to Factor 2 of the PCL-R are highly

overlapping with symptoms of ASPD. For example, significant correlations have been noted of total ASPD symptoms and of ASPD diagnoses with PCL-R Factor 2 scores in a sample of 313 male inmates of the Federal Correctional Institution in Tallahassee, Florida (Verona et al., 2001). As such, the secondary subscale of the LSRP may tap psychopathic personality traits which are closely related to those of ASPD.

Similar to those with a diagnosis of ASPD, psychopathic individuals and those with psychopathic tendencies are generally assumed to behave in an antisocial and selfish manner. As well as the PDG, social cooperation has been investigated in psychopaths using experimental games including the dictator game and the ultimatum game. These laboratory based games typically involve participants deciding how to carve up imaginary rewards between themselves and a competitor. The distribution of rewards is governed by different reinforcement contingencies that enable participants to display varying levels of generosity and altruism, as well as selfishness and spite (Andreoni & Miller, 2002).

In the dictator game, a player determines how a reward should be split between themselves and a second, passive player. In contrast, players in the ultimatum game must take on the role of either the proposer or the responder. The proposer is required to split a monetary amount between themselves and the responder, who may either accept or reject this offer. If the responder accepts this single offer, the money is split as proposed. If the responder rejects the offer, neither player receives anything.

The dictator game and ultimatum game have been used to probe social cooperativeness in primary and secondary convicted psychopaths (Koenigs, Kruepke, & Newman, 2010). Primary psychopaths showed significantly lower acceptance rates of unfair ultimatum offers and proposed lower amounts in the dictator game. A similar pattern of responding was seen

in a separate group of participants composed of patients with lesions of the ventro-medial prefrontal cortex, but not in secondary psychopaths (Koenigs et al., 2010). This reinforces the view that those with secondary psychopathy do not show a fixed pattern of non-cooperative responding, but rather may employ differing strategies dependent on the requirements of the social interaction at hand.

In the current study we worked with non-offenders to explore the effects of primary and secondary psychopathic traits on social cooperativeness when interacting with in-groups and out-groups in the dictator game and the ultimatum game. We hypothesised that high primary psychopathic traits would be associated with selfishness and reduced cooperation, independent of the in-/out-group status of the other player. In contrast, we hypothesised that those with high secondary traits would show higher levels of generosity when interacting with other in-group members, while out-group interactions would be characterised by selfish non-cooperation.

3.2. Methods

3.2.1. Ethics statement

The current research was approved by the University of Birmingham Committee for Ethical Review. All participants were asked to sign their written informed consent prior to participation.

3.2.2. Participants

A total of 60 participants (50 female), with a mean age of 19 (range = 18-23, standard deviation = 1.0) were recruited from the University of Birmingham. Participants received course credit in return for their participation.

3.2.3. Measures

The Levenson Self-Report Psychopathy Scale (LSRP) (Levenson et al., 1995) was completed by all participants as part of a battery of questionnaire based measures. The LSRP, designed for the measurement of psychopathic personality traits in non-institutionalised populations, consists of a 16 item primary subscale and a 10 item secondary subscale. While the primary subscale taps the selfish and uncaring characteristics associated with Factor 1 of the PCL-R, the secondary subscale measures behavioural and lifestyle factors associated with Factor 2, including boredom and impulsivity. Adequate internal validity of the LPSP has been demonstrated in a sample of 487 undergraduate psychology students, with a Cronbach's alpha of .82 for the primary subscale and .63 for the secondary subscale, which was considered adequate for a 10-item scale (Levenson et al., 1995).

3.2.4. Procedure

Two separate tasks were employed to assess the intergroup bias in relation to primary and secondary psychopathic traits: a computerised dictator game and a computerised ultimatum game. All tasks were prepared using E-Prime 2.0 stimulus presentation software. Participants always completed the dictator game prior to the ultimatum game. This order was enforced as proposed amounts during dictator game trials are typically dictated by generosity. However, ultimatum game trials require more careful thought as offers may either be accepted or rejected. Thus, we wished to avoid a scenario in which participants continued to make carefully judged proposals on the dictator game as a result of having first completed the ultimatum game.

3.2.4.1. The Dictator Game and Ultimatum Game

Prior to the first dictator game trial, participants received on-screen instructions that they were to split an amount of £10 between themselves and an on-screen player. The

minimum amount a participant could allocate was £1, with a maximum allocation of £9. In order to maximise personal gains, participants may be expected to propose only a minimal amount to the on-screen player. However, higher proposals may represent attempts to appear generous. Following completion of all dictator game trials, participants were presented with additional instructions for ultimatum game proposals. Participants were again instructed to split an amount of £10 between themselves and the on-screen player. However, participants were informed that their offers could subsequently be accepted or rejected by the respective on-screen players. If an offer was rejected, participants were instructed that both they and the on-screen player would receive nothing.

A total of 38 Caucasian faces (10 female) were selected from the PUT face database (Kasinski, Florek, & Schmidt, 2008) for use in the dictator game and ultimatum game. Each face was paired with a forename and allocated to either the in-group or the out-group using a same or other university manipulation. This was achieved through presentation of either same (University of Birmingham) or other (University of Manchester) university logos, including corporately formatted names and crests, alongside each face and forename (see Figure 5).

Participants were informed that the current research was a collaborative investigation with the University of Manchester, assessing the impact of differing personality factors on economical decision-making. Both the information sheet and consent forms included the name and official crests of both the University of Birmingham and the University of Manchester. Each task consisted of 38 trials. For each trial, participants were presented with a central fixation cross for 500ms. The fixation period was followed by a 500ms presentation of a university logo indicating same (University of Birmingham) or other (University of

Manchester) university affiliation, alongside a false forename. University affiliation primes were subsequently joined by the image of a face to whom participants were to make a proposed split while acting as the proposer in the dictator and ultimatum games. The trial was terminated when participants indicated the proposed amount to be allocated to the on-screen player.

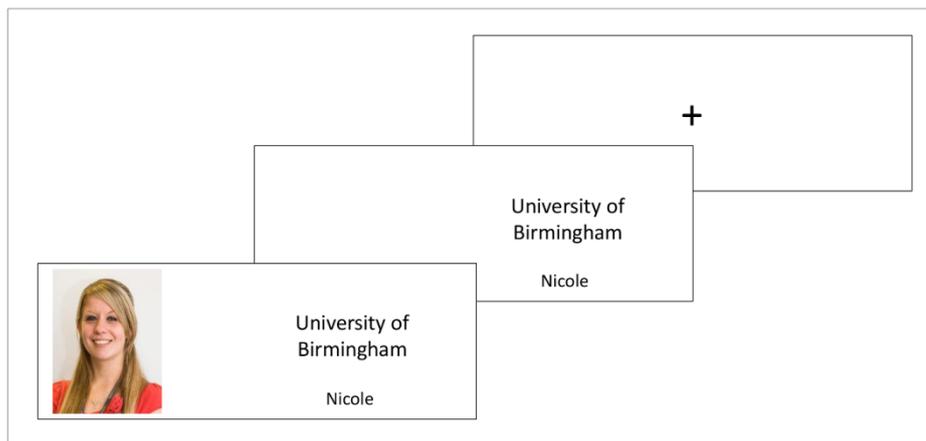


Figure 5. Schematic diagram of the display of dictator game and ultimatum game trials. Note: experimental trials included corporately formatted logos and text, not displayed above.

3.3. Results

3.3.1. Levels of primary and secondary psychopathic traits

The LSRP was used to measure psychopathic personality traits in the current sample. Participants demonstrated a mean score on the primary subscale of 28.6 (SD = 6.39), ranging from 16 to 44. The mean score for the secondary subscale was 20.2 (SD = 4.48), with a range of 12 to 36. We noted that the mean primary and secondary psychopathy scores for the present study fall toward the lower end of the range of mean scores reported in previous studies using the LSRP with non-offending samples (Levenson et al., 1995; Campbell, Doucette, & French, 2009; Gummelt, Anestis, & Carbonell, 2012). Furthermore, we

compared LSRP scores for the current sample of non-offenders with those obtained from a sample of 549 male inmates from Wisconsin state prisons (Brinkley et al., 2001), for primary psychopathy, $M = 32.99$ ($SD = 8.19$), and secondary psychopathy, $M = 21.68$ ($SD = 5.05$). These comparisons revealed that scores recorded on both subscales were higher among the offending sample, with a medium Cohen's d effect size of 0.55 for the primary subscale, and a small effect size of 0.3 for the secondary subscale. In contrast to previous findings with the LSRP, the primary and secondary sub-scales were not found to be significantly positively correlated ($r = .18, p > .05$). The primary subscale yielded good internal reliability, with a Cronbach's alpha estimate of .86. The secondary subscale also showed adequate internal reliability, with a Cronbach's alpha estimate of .71.

3.3.2. Dictator game proposals

Dictator game proposals toward the in- and the out-group were calculated for all participants. A paired samples t-test proved to be non-significant ($t = 1.59, p > .05$) with no differences in responses for the in-group, $M = £3.95$ (out of a possible maximum of £9) ($SD = 1.43$) compared to the out-group, $M = £3.77$ ($SD = 1.34$), Cohen's d effect size = 0.13. A Pearson correlation co-efficient showed that participants responses to the in- and out-group were positively correlated ($r = .81, p < .001$).

3.3.3. Ultimatum game offers

Average offers to the in- and out-group were calculated for each participant. A paired samples t-test indicated a significant effect of in-/out-group ($t = 3.17, p < .01$) with participants offering on average a fairer split for the in-group, $M = £4.73$ ($SD = .82$), compared to the out-group, $M = £4.55$ ($SD = .86$). A Cohen's d effect size calculation of 0.22 suggests a small effect of in-/out-group status on ultimatum offers. Pearson's correlation co-

efficient showed that participants responses to the in-group and the out-group were positively correlated ($r = .87, p < .001$).

3.3.4. Method for analysis

To investigate the effects of level of primary psychopathic traits on dictator and ultimatum game proposals a mean split was used to divide participants in to a low scoring group ($n = 28$; mean primary psychopathy score = 23) and a high scoring group ($n = 32$; mean primary psychopathy score = 34). Two separate mixed model ANCOVAs with the factors affiliation (in-group, out-group) and level of primary psychopathy (low, high) were used with secondary psychopathy scores as covariates. Analyses were repeated for secondary psychopathic traits, with participants divided about the mean in to low ($n = 38$; mean secondary psychopathy score = 18) and high scorers ($n = 22$; mean secondary psychopathy score = 25), with primary psychopathy included as a covariate. Where the analysis revealed a significant interaction between level of psychopathic traits and affiliation, paired samples t-tests were used to examine differences in offers to members of the in-group and the out-group among the low scoring and high scoring groups. Effect sizes are reported as partial-eta squared with the following suggested norms for interpretation: small = .01; medium = .06; large = .14.

3.3.5. Effects of primary psychopathy

3.3.5.1. Dictator game proposals

Analyses revealed no differences in giving behaviour to members of the in- and the out-group $F(1, 57) = .21, p > .05, \eta^2 = .004$. There was also no effect of level of primary psychopathic traits on giving behaviour $F(1, 57) = 2.54, p > .05, \eta^2 = .04$ or interaction of level of primary psychopathic traits with giving behaviour to the in- and the out-group $F(1, 57) = .84, p > .05, \eta^2 = .02$ (see Figure 6).

3.3.5.2. Ultimatum game offers

In contrast to dictator proposals, ultimatum game offers may be accepted or rejected, with rejection resulting in both parties receiving no money. Similar to results for dictator game trials, there were no significant effects of in-/out-group status $F(1, 57) = .15, p > .05, \eta^2 = .003$ or main effect of level of primary psychopathic traits $F(1, 57) = .93, p > .05, \eta^2 = .00$. No differences were observed in giving behaviour to the in- and the out-group for low and high scoring primary psychopathic traits participants $F(1, 57) = .08, p > .05, \eta^2 = .001$ (see Figure 6).

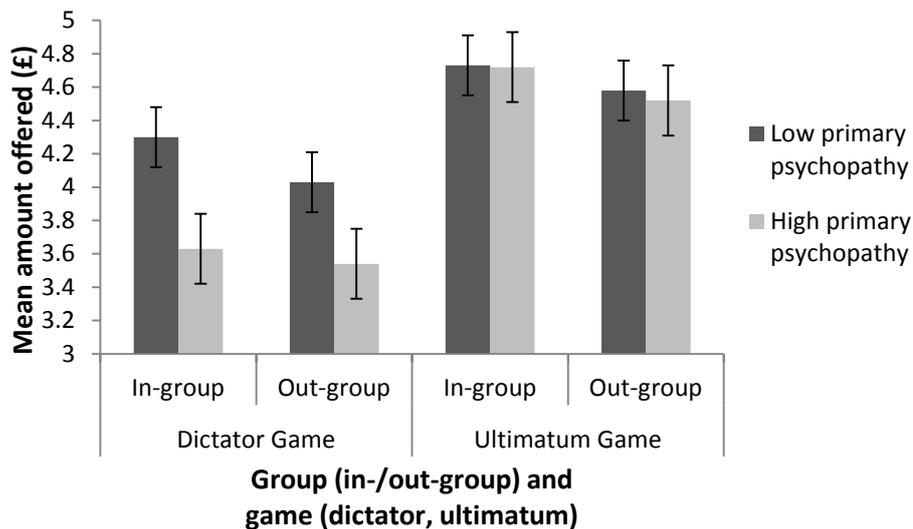


Figure 6. Effects of group (in, out) and level of primary psychopathic traits (low, high) on dictator game and ultimatum game offers.

3.3.6. Effects of secondary psychopathy

3.3.6.1. Dictator game proposals

There were no differences in giving behaviour to members of the in- and the out-group $F(1, 57) = 2.24, p > .05, \eta^2 = .04$, or between those with low and high levels of secondary psychopathic traits $F(1, 57) = .84, p > .05, \eta^2 = .02$. The analysis revealed an interaction of

in-/out-group with level of secondary psychopathic traits $F(1, 57) = 4.19, p < .05, \eta^2 = .07$, whereby those in the high scoring group proposed lower amounts for members of the out-group relative to the in-group (see Figure 7). However, both low and high scoring secondary psychopathic traits participants made similarly fair offers for members of the in-group. These results therefore are suggestive of a pattern of out-group derogation, rather than in-group liking, among those with high secondary psychopathic traits.

Follow up tests were completed using repeated measures t-tests to compare proposed amounts for the in-group and the out-group in low and high scoring secondary psychopathic participants. These results revealed no significant differences in amounts offered to the in- and the out-group for either low-scoring $t(37) = .25, p > .05$ or high-scoring secondary psychopathic traits participants $t(21) = 1.67, p > .05$. Although these tests indicate no significant differences in giving behaviour to the in- and the out-group, the results are limited by a failure to control for the effects of primary psychopathic traits. As such, the results of follow up tests may not reflect a true test of the unique influences of secondary psychopathic traits on giving behaviour.

3.3.6.2. Ultimatum game offers

The analysis showed that there were no differences in giving behaviour to members of the in- and the out-group $F(1, 57) = .001, p > .05, \eta^2 = .000$ or between low and high scoring secondary psychopathic traits participants $F(1, 57) = 1.12, p > .05, \eta^2 = .02$.

However, an interaction was found of in-/out-group with level of secondary psychopathic traits $F(1, 57) = 5.02, p < .05, \eta^2 = .08$. Again, both low and high scoring secondary psychopathic traits participants offered similarly fair amounts to members of the in-group. However, participants in the high secondary psychopathy group proposed lower amounts to

those in the out-group relative to the in-group, indicating a pattern of out-group derogation (see Figure 7).

Again, follow up repeated measures t-tests were used to examine differences in giving behaviour to the in- and the out-group among participants in the low and high scoring secondary psychopathic traits groups. While there were no significant differences in giving behaviour among participants with low levels of secondary psychopathic traits $t(37) = 1.99, p > .05$, those in the high scoring group offered significantly lower amounts to members of the out-group compared to the in-group $t(21) = 2.67, p < .05$.

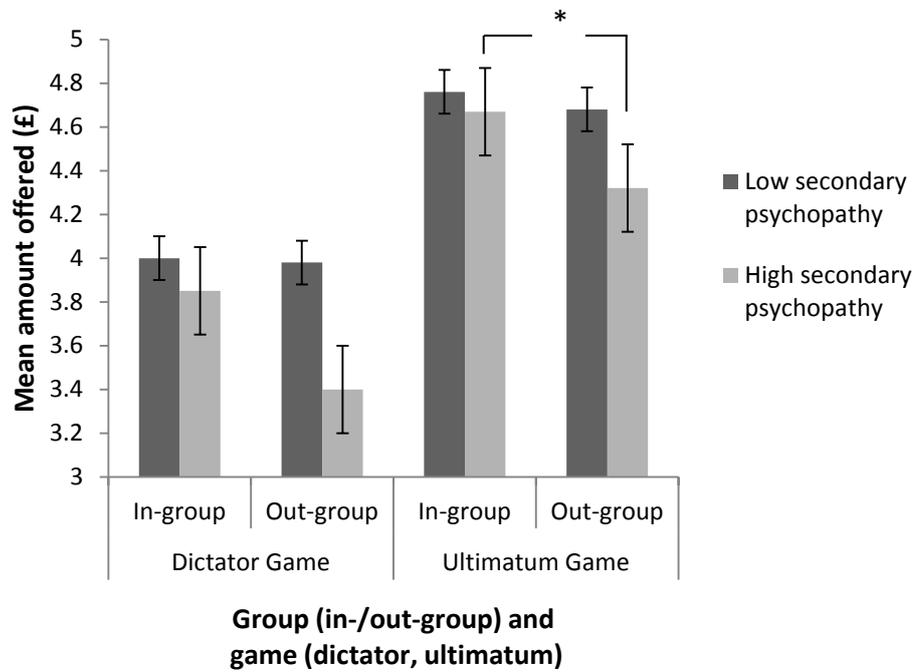


Figure 7. Effects of group (in, out) and level of secondary psychopathic traits (low, high) on dictator game and ultimatum game offers.

3.3.7. Additional analyses

Additional analyses were carried out to examine potential effects of the sex of the on-screen player on dictator and ultimatum game proposals. Due to a low number of male

participants, additional analyses were only performed for data from female participants. As such, this data analytic strategy may be flawed by a failure to include the whole sample. Using a mean split on primary psychopathy scores, female participants were divided into a low scoring group ($n = 24$; mean primary psychopathy score = 23) and a high scoring group ($n = 26$; mean primary psychopathy score = 33). Two separate mixed model ANCOVAs with the factors affiliation (in-group, out-group), sex of on-screen player (female, male) and level of primary psychopathic traits (low, high) were performed with secondary psychopathy scores as covariates. Analyses were repeated for secondary psychopathic traits, with participants divided about the mean in to low ($n = 25$; mean secondary psychopathy score = 26) and high scorers ($n = 25$; mean secondary psychopathy score = 30), with primary psychopathy scores included as a covariate.

3.3.7.1. Effects of primary psychopathy scores

3.3.7.1.1. Dictator game proposals

There was no effect of the sex of the on-screen player on dictator game proposals $F(1, 47) = .11, p > .05, \eta^2 = .00$. There was also no difference in giving behaviour to members of the in- and the out-group $F(1, 47) = .47, p > .05, \eta^2 = .01$, or between those with low and high levels of primary psychopathic traits $F(1, 47) = 2.28, p > .05, \eta^2 = .05$. The analysis failed to reveal an interaction of in-/out-group with level of primary psychopathic traits $F(1, 47) = .80, p > .05, \eta^2 = .02$. The interaction of sex with in-/out-group and level of primary psychopathic traits was also non-significant $F(1, 47) = .36, p > .05, \eta^2 = .01$.

3.3.7.1.2. Ultimatum game offers

There was no effect of the sex of the on-screen player on ultimatum game offers $F(1, 47) = .36, p > .05, \eta^2 = .01$. There was also no difference in giving behaviour to members of the in- and the out-group $F(1, 47) = .20, p > .05, \eta^2 = .00$, or between those with low and high

levels of primary psychopathic traits $F(1, 47) = .06, p > .05, \eta^2 = .00$. The analysis failed to reveal an interaction of in-/out-group with level of primary psychopathic traits $F(1, 47) = .06, p > .05, \eta^2 = .00$. The interaction of sex with in-/out-group and level of primary psychopathic traits was also non-significant $F(1, 47) = 2.83, p > .05, \eta^2 = .06$.

3.3.7.2. Effects of secondary psychopathy scores

3.3.7.2.1. Dictator game proposals

There was no effect of the sex of the on-screen player on dictator game proposals $F(1, 47) = 2.88, p > .05, \eta^2 = .06$. There was also no difference in giving behaviour to members of the in- and the out-group $F(1, 47) = 1.78, p > .05, \eta^2 = .04$, or between those with low and high levels of secondary psychopathic traits $F(1, 47) = .01, p > .05, \eta^2 = .00$. The analysis failed to reveal an interaction of in-/out-group with level of secondary psychopathic traits $F(1, 47) = 2.47, p > .05, \eta^2 = .05$. The interaction of sex with in-/out-group and level of secondary psychopathic traits was also non-significant $F(1, 47) = .04, p > .05, \eta^2 = .00$.

3.3.7.2.2. Ultimatum game offers

There was no effect of the sex of the on-screen player on ultimatum game offers $F(1, 47) = .06, p > .05, \eta^2 = .00$. There was also no difference in giving behaviour to members of the in- and the out-group $F(1, 47) = .00, p > .05, \eta^2 = .00$, or between those with low and high levels of secondary psychopathic traits $F(1, 47) = .34, p > .05, \eta^2 = .01$. The analysis failed to reveal an interaction of in-/out-group with level of secondary psychopathic traits $F(1, 47) = .92, p > .05, \eta^2 = .02$. The interaction of sex with in-/out-group and level of secondary psychopathic traits was also non-significant $F(1, 47) = 2.56, p > .05, \eta^2 = .05$.

3.4. Discussion

The current study aimed to investigate the effects of primary and secondary psychopathic personality traits on economical decision-making to members of the in- and

the out-group. It was predicted that primary psychopathic traits, which reflect selfishness and a lack care for others, would be associated with a pattern of selfish responding in the dictator game and the ultimatum game, with both tasks necessitating similar decisions. It was also predicted that secondary psychopathic traits would be linked with differential response patterns for members of the in- and the out-group. More specifically, that offers to out-group members would be characterised by a more selfish response pattern.

Results showed no differences in dictator or ultimatum game offers, irrespective of in-/out-group status, between participants who scored high and low on primary psychopathic traits. However, these findings may reflect low levels of primary psychopathic traits among sub-clinical samples. For example, low levels of psychopathic personality traits have been reported among the general household population of Great Britain (Coid, Yang, Ullrich, Roberts, & Hare, 2009) and across world regions (Neumann, Schmitt, Carter, Embley, & Hare, 2012). Furthermore, rates have been shown to be lower among females relative to males (Coid et al., 2009; Neumann et al., 2012). Nonetheless, primary psychopathic trait scores in the current sample were found to be within the range of scores reported elsewhere for non-offenders on the primary subscale of the LSRP (Levenson et al., 1995; Campbell et al., 2009; Gummelt et al., 2012) and differed from the scores obtained in an offending male sample (Brinkley et al., 2001) by a medium effect size. As such, it can be suggested that the current sample is a representative sample for research on psychopathic personality traits among non-offenders.

Although counter to the predicted pattern of results, the absence of an effect of primary psychopathic traits on generosity in the ultimatum game is consistent with earlier work showing that convicted primary psychopaths offered similar amounts as healthy controls

(Koenigs et al., 2010). However, in contrast to responses in the ultimatum game, these convicted primary psychopaths did demonstrate a pattern of selfish responding on dictator game trials (Koenigs et al., 2010). The results of the current study, as well as those outlined above, are contrary to early hypothesising on the nature of responding in game theoretic models of psychopathy (Mealey, 1995b). Such models suggest that primary psychopathic traits should be linked with a fixed and selfish pattern of responding, which is independent of the specific circumstances of the interaction.

The finding that convicted primary psychopaths show a selfish pattern of responding under dictator game but not ultimatum game conditions (Koenigs et al., 2010) may be explained by the need for a fairer pattern of responding in the ultimatum game. While selfish ultimatum game offers are often rejected resulting in both players receiving nothing, selfish responses on the dictator game go unpunished. Thus, a selfish response pattern still allows for a monetary gain during the dictator game, but not the ultimatum game.

In the current experiment it was also expected that the self-centeredness associated with primary psychopathic traits would manifest itself independent of the in-/out-group membership of the on-screen player. The results of this study indicate that there was no interaction between level of primary psychopathic traits and generosity of proposals to members of the in-group and the out-group. These findings are therefore supportive of the hypothesis that the pattern of responding in those with high primary psychopathic traits would not be dependent up on the specific environmental or situational demands of the interaction. These findings may be consistent with traditional conceptualizations of psychopathy which refer to emotional-interpersonal deficits, including pathologic egocentricity, incapacity for love, and unresponsiveness in general interpersonal relations

(Cleckley, 1941). As such, those with high primary psychopathic traits may be less likely to form a close in-group to whom they would feel any great sense of loyalty.

In contrast to primary psychopathic traits which refer to affective and interpersonal features, secondary traits tap behavioural instability and social deviance. In accordance with Mealey's game theoretic model of psychopathy (Mealey, 1995a, 1995b), it was expected that individuals characterised by secondary psychopathic traits would exhibit increased generosity for the in-group, and/or selfish, non-cooperative behaviour when dealing with members of the out-group. Although results showed that there were no differences in giving behaviour between high and low scoring participants on either the dictator or the ultimatum game, there was a significant interaction of level of secondary psychopathic traits with giving behaviour to members of the in-group and the out-group, in both the dictatory game and ultimatum game. Although the finding of an inter-group bias in high secondary psychopathic traits participants in the dictator and ultimatum game were not replicated in additional analyses, these were limited by the low number of male participants in the current experiment. As such these analyses could only be performed on data from female participants. While this strategy is suboptimal, it is nonetheless inevitable given the data collected.

Dictator game results indicated that participants with the highest levels of secondary psychopathic traits showed decreased generosity toward out-group relative to in-group members. In contrast, low scoring participants showed similar levels of generosity toward both in- and out-group members. This pattern of results is indicative of a link between secondary psychopathic personality traits and out-group derogation. Since proposals in the dictator game can neither be accepted nor rejected, giving behaviour is presumed to reflect

altruism or guilt. The implication is that those with elevated levels of secondary psychopathic traits may feel less guilt and show lower levels of generosity to members of the out-group. Participants in the high scoring secondary psychopathic traits group also showed reduced generosity for members of the out-group relative to the in-group while making ultimatum game offers.

Results suggest that individuals with elevated levels of secondary psychopathic traits may adopt a strategy whereby reasonable amounts are offered while interacting with members of the in-group. Such a strategy would aid the development of a reputation for cooperation among those with whom future interactions are most likely (Mealey, 1995b). Such a reputation may aid the development of a close in-group, which might allow those with high secondary psychopathic traits to compete more effectively for resources in the future (Brewer, 1999; Choi & Bowles, 2007). In contrast, interactions with members of the out-group are more likely to be infrequent and far between. Thus, a selfish pattern of responding toward members of the out-group may lead to financial gain without reducing the opportunity for future, potentially profitable interactions.

It is possible that these findings in relation to generosity will equally well apply to other interpersonal and social emotions, including empathy, sympathy and guilt, when dealing with members of the in-group and the out-group. Consistent with a callous and unemotional affective style, it may be hypothesised that high primary psychopathic traits would be associated with reduced feelings of empathy, guilt and remorse for members of both the in- and the out-group. Conversely, secondary psychopathic traits may be linked with normal or enhanced levels of such interpersonal emotions for members of the in-group, while presenting with severely reduced levels for members of the out-group.

These findings may relate to recent findings in the neuroscience literature. For example, it has been indicated that the neuropeptide oxytocin may be implicated in the expression of interpersonal emotions including trust (Baumgartner et al., 2008), generosity (Zak, Stanton, & Ahmadi, 2007) and envy and gloating (Shamay-Tsoory, Fischer, Dvash, Harrari, Perach-Bloom, & Levkovitz, 2009), as well as intergroup conflict (De Dreu et al., 2010) and in-group liking (De Dreu et al., 2011). Consistent with a link between secondary psychopathy and reduced generosity to the out-group, it has been found that oxytocin levels are severely elevated among psychopathic patients (Mitchell et al., 2013). More specifically, a positive correlation of levels of oxytocin with Factor 2 scores on the PCL-R has been noted (Mitchell et al., 2013). Thus, an elevated intergroup bias among those with high Factor 2 scores may be associated with heightened levels of oxytocin.

Although it remains unclear how the results of the current study may relate to clinically relevant forms of psychopathy, it has been noted that psychopathic personality most likely refers to a continuum and not a discrete category of individuals (Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012; Guay, Ruscio, Knight, & Hare, 2007; Edens, Marcus, Lilienfeld, & Poythress, 2006). Thus, the dimensional nature of the psychopathy construct might suggest that the results of the present study may be particularly exaggerated for those at the extreme high end of the psychopathy continuum. As such it may be hypothesised that the intergroup bias may be particularly elevated among those scoring highly for the lifestyle and antisocial features of psychopathy, with such traits paralleled in the secondary subscale of the LSRP. However, we would urge caution in making extrapolations to clinically relevant forms of psychopathy on the basis of psychopathic personality trait information. This may be particularly problematic where results are derived from female participants, with findings

from Coid et al. (2009) indicating a 0% prevalence of psychopathy in the general household population of Great Britain.

It has also been highlighted that the use of self-report scales for the measurement of psychopathic traits may be problematic given the high levels of dishonesty, malingering and deceitfulness inherent in psychopathic personality (Lilienfeld & Fowler, 2006). However, evidence suggests that psychopaths show lower levels of socially desirable responding and positive impression management tendencies (Hare, 1982; Lilienfeld & Andrews, 1996). Furthermore, psychopathic personality has been shown to be unrelated to malingering success (Edens, Buffington, & Tomicic, 2000; Poythress, Edens, & Watkins, 2002). As such, although caution may be necessary when interpreting results based on self-reported psychopathy, evidence suggests that such tools are a valid means of assessing psychopathic personality.

To summarise, although there were no overall differences in giving behaviour between those with low and high levels of primary psychopathic traits, high secondary psychopathic traits were consistently associated with reduced generosity for the out-group relative to the in-group. This pattern was largely absent in association with primary psychopathic traits across the two tasks. These results are aligned with the hypothesised distinction between members of the in- and out-group in relation to secondary psychopathic traits. The results of the current investigation also suggest a need to investigate the role of secondary psychopathic traits in relation to offending behaviours which are driven by loyalty to an in-group and/or hatred of the out-group. Such crimes would include those committed as part of a gang or other social group and so called 'race hate' crimes.

Although the results of this chapter suggest that secondary psychopathic traits may be linked with a lack of guilt or empathy for members of the out-group, there was no effect of secondary psychopathy on in-group interactions. However, Chapter 2 indicated lower levels of emotional empathy in relation to both primary and secondary psychopathic traits. These results raise questions as to the nature of empathy deficits in relation to primary and secondary psychopathy. It is therefore necessary to objectively measure and better classify the type of empathy deficits experienced in relation to primary and secondary psychopathic traits.

As noted by Blair (2008), the recognition of others emotions represents an important prerequisite for affective empathy. Emotional states may be best signalled through facial expressions of emotion. Although psychopathic offenders display deficits in recognising facial displays of emotion, the precise mechanism underlying this deficit remains poorly understood. Therefore, the following chapter describes the use of eye tracking techniques to examine eye scan paths for emotionally expressive faces. More specifically, this chapter examines the relationship of primary and secondary psychopathic traits with abnormalities in eye scan paths during an expression recognition task. The results of this experiment add to current understanding on the nature of empathy deficits in relation to psychopathic traits and suggest a potential mechanism for associated deficits in expression recognition.

CHAPTER 4: EFFECTS OF PRIMARY AND SECONDARY PSYCHOPATHIC TRAITS ON EYE SCAN PATHS FOR EMOTIONALLY EXPRESSIVE FACES

4.1. Introduction

Emotional empathy has been linked with the successful recognition of others emotional states which are often conveyed via facial expressions of emotion (Blair, 1995, 2001, 2003a). Tests of emotional face recognition have previously been used to investigate deficits in affective empathy among incarcerated psychopathic offenders. The findings of such experiments suggest that psychopathic offenders are impaired in the recognition of fearful, and to a lesser extent, sad expressions of emotion (Blair et al., 2001, 2004). However despite these findings, the psychological mechanisms underlying such deficits remain unclear. Investigating differences in the precise cognitive and attentional processing of facial expressions in relation to primary and secondary psychopathic traits may add to our understanding of impaired emotion recognition in offending populations. Neuropsychological techniques which can be used to investigate the processing of emotional expressions include the analysis of eye scan paths during the viewing of facial emotional expressions.

As noted in section 1.3., psychopathic personality was first described by psychiatrist Hervey Cleckley (1941) as *'The Mask of Sanity'*. With this description, Cleckley refers to an underlying pattern of destructive behaviour among a subgroup of hospitalised patients. However, Cleckley notes these patients appeared as otherwise overtly 'normal' and free from insanity or delusion. These psychopathic patients presented as 'fearless' and were

characterised by severe emotional detachment, callous-unemotionality, a lack of remorse or guilt, and high levels of superficial charm.

Blair (2007) employs a cognitive neuroscience perspective to account for the calculated, goal directed acts of aggression which accompany the emotional detachment and callous unemotional traits central to Cleckley's early description. Blair argues that a lack of empathy among such individuals is accounted for by dysfunction of a Violence Inhibition Mechanism (VIM) (Blair, 1995, 2001). The VIM refers to the inhibition of acts of aggression in response to submissive signals exhibited by another individual. This model predicts that a decreased sensitivity to others submissive facial expressions of emotion, particularly expressions of fear and sadness, would lead to an inability to recognise the suffering of others (Blair, 1995). Subsequently, the individual no longer recognises a victim's distress signals as aversive, and there follows a failure to inhibit acts of aggression in response to a victim's suffering. In support of this model, psychopathic individuals (Blair et al., 2004), adults with psychopathic personality traits (Montagne et al., 2005), and children with psychopathic tendencies (Blair, Colledge, Murray, & Mitchell, 2001) demonstrate impaired recognition of fearful facial affect.

Information from the eye region is argued to be particularly important for recognizing fearful expressions (Smith, Cottrell, Gosselin, & Schyns, 2005). Accordingly, impaired recognition of fearful facial expressions in a patient presenting with bilateral amygdala damage is associated with reduced fixation on the eye region of expressive faces (Adolphs, Gosselin, Buchanan, Tranel, Schyns, & Damasio, 2005). Similarly, an association between the ability to recognise fearful expressions and fixation on the eye region has also been observed in participants with autism (Pelphrey, Sasson, Reznick, Paul, Goldman, & Piven, 2002).

It is hypothesised that deficits in fearful face recognition in psychopathy may stem from a breakdown in the directing of attention toward the eye region of expressive faces. This conjecture has been supported by the findings of Dadds and colleagues (Dadds, El Masry, Wimalaweera, & Guastella, 2008), who found that callous-unemotional psychopathic traits among 100 boys ranging in age from 8 to 15 years (mean age = 12.4 years) were associated with fewer and shorter fixations of the eye region during an expression recognition task. This finding was observed independent of the displayed expression. In addition, it was found that accuracy of fearful face recognition was positively correlated with both the number, and length, of fixations on the eye region in callous-unemotional adolescents.

The work of Dadds et al. (2008) offers some insight into the potential mechanism underlying deficits in expression recognition in psychopathy. However, this work specifically focuses on the association with callous-unemotional traits in an adolescent sample. However, it is important to note (as we discuss below) that callous-unemotional traits represent only one aspect of psychopathy. Thus, it remains unknown whether similar deficits can be observed in an adult sample and in association with other aspects of psychopathic personality.

Based on early descriptions of psychopathy, a set of clinical criteria for the assessment of psychopathy was formalised by Hare (1991, 2003). These criteria, presented in the Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003), are underpinned by two correlated factors, known as Factors 1 and 2. Factor 1 of the PCL-R taps the interpersonal/affective component of psychopathy, inclusive of callous-unemotional traits, superficial charm, and a lack of remorse or guilt. On the other hand, Factor 2 measures the behavioural/lifestyle aspects of psychopathy, including anti-social behaviour, irresponsibility, and poor

behavioural controls. Levenson, Kiehl, and Fitzpatrick (1995) devised a self-report measure of psychopathic personality, based upon Factors 1 and 2 of the PCL-R. These subscales, termed primary and secondary, measure the selfish and uncaring traits of Factor 1 and the irresponsibility and recklessness which underpins Factor 2, respectively. Evidence of medium sized correlation of the primary and secondary subscales with Factor 1 and 2 of the PCL-R, respectively, are presented by Brinkley et al. (2001). Furthermore, these scales have been validated using a student sample (Levenson et al., 1995).

Although there is clinical and empirical support for the existence of primary and secondary psychopathy variants (Kosson & Newman, 1995; Arnett, Smith, & Newman, 1997; Newman & Schmitt, 1998), the unique contribution of primary and secondary psychopathic traits remains largely overlooked in psychopathy research. However, these variants may have implications for emotional functioning in psychopaths. For example, secondary psychopaths have been found to present with heightened levels of trait anxiety relative to primaries (Skeem, Johansson, Andershed, Kerr, & Louden, 2007).

This experiment aimed to investigate the influence of primary and secondary psychopathic traits on accuracy of expression recognition and eye scan paths for emotionally expressive faces in an adult male sample. It was hypothesised that higher levels of primary psychopathic traits would be linked with a deficit in fearful face recognition. This result would be consistent with findings of fearful face recognition deficits in psychopathic offenders (Blair et al., 2004) and children with callous-unemotional traits (Blair et al., 2001). As well as examining the relationship between primary psychopathy and accuracy, an analysis of misclassification errors was also conducted. It has previously been shown that antisocial features are associated with a hostile attribution bias, whereby neutral faces are

misinterpreted as angry (Dadds et al., 2006; Dodge, Price, Bachorowski, & Newman, 1990). Also, Dadds et al. (2006) showed that callous-unemotional traits are linked with a tendency to misinterpret fearful expressions as expressions of disgust or as neutral expressions. It was therefore hypothesised that while primary psychopathic traits would be associated with a tendency toward classifying fearful expressions as either neutral or as disgust, secondary psychopathic traits would be associated with a higher number of angry misclassifications for calm (low intensity faces).

Based on the results of Dadds et al. (2006) it was also hypothesised that primary psychopathy would be associated with reduced dwell time on the eye region. On the other hand, it was hypothesised that secondary psychopathy would be linked with increased dwell time on negative expressions. This hypothesis is consistent with findings that anxious participants show increases in eye gaze and orienting of attention toward negative emotional expressions (Mogg, Garner, & Bradley, 2007; Mogg, Millar, & Bradley, 2000).

The intensity of the expressions was also manipulated for the current experiment for two reasons: firstly, ambivalent expressions are more representative of facial expressions outside of the laboratory and hence have higher ecological validity; secondly, this has been shown to make the task more sensitive to subtle differences in the processing of facial expressions (Adolphs & Tranel, 2004; Calder, Young, Perrett, Etcoff, & Rowland, 1996). Therefore it was predicted that psychopathic traits would have a more pronounced effect upon the processing of more ambivalent expressions. Finally, eye scan paths have been found to vary for expressive faces as a function of the sex of the model conveying the expression. For example, Wieser, Pauli, Weyers, Alpers, and Mühlberger (2009) observed a preference for

happy female faces among participants who show high fear of negative evaluation.

Therefore the model's sex was included as a factor in the analysis.

4.2. Method

This study investigated the effects of primary and secondary psychopathy on eye gaze and dwell time for emotionally expressive faces of varying expression, intensity, and sex. Of specific interest was dwell time on the eyes and the mouth, the most expressive features of the face, and how dwell time on these regions was affected by participants' psychopathic personality traits.

4.2.1. Participants

A total of 21 participants were recruited from the staff and student population of the University of Birmingham. All participants were male, with a mean age of 24.9, ranging from 19-39 years (SD = 5.95). All participants had normal or corrected to normal vision. Ethical approval for this study was granted by the University of Birmingham Committee for Ethical Review. Due to computer error the behavioural responses in the recognition task were recorded for only 12 participants.

4.2.2. Materials

4.2.2.1. Facial expression stimuli

Ten different Caucasian models (5 females) were selected from the NimStim Face Stimulus Set (<http://www.macbrain.org/resources.htm>). Each model conveyed a neutral expression, and each of the six basic emotions; anger, disgust, afraid, happy, sad, and surprise. The models were selected based on the NimStim validity data for expression recognition (Tottenham et al., 2009). These data indicate good validity for the selected expressions (standard deviations in brackets); neutral = .84 (.13), angry = .85 (.83), disgust = .85 (.13), fear = .84 (.13), happy = .85 (.13), sad = .85 (.13), surprised = .85 (.13). In order to

manipulate the intensity of the emotional expressions, each expression was morphed from neutral to 100% expressive in ten successive frames using the STOIK Morph Man software (<http://www.stoik.com/products/video/STOIK-MorphMan/>). This resulted in ten morphed continua for each of the six expressions for the 10 selected models. For task purposes, three frames of varying intensity were selected for each expression; mild intensity (10% expressive); moderate intensity (55% expressive); high intensity (100% expressive). See Figure 8 for stimuli examples. Thus we had 18 faces across all expressions for each model, 180 faces in total.

4.2.2.2. Levenson Primary and Secondary Psychopathy Scales

The Levenson Primary and Secondary Psychopathy Scales (LPSP; Levenson, Kiehl, & Fitzpatrick, 1995) were developed for the assessment of psychopathic traits in non-institutionalised populations. The LPSP contains 26 items measured on a four-point Likert scale; 16 items measure the primary (P-psych) characteristics associated with psychopathic personality, including selfishness, and a lack of care for others; the remaining items tap traits that are typical of secondary (S-Psych) psychopathy, including proneness to boredom and impulsivity. Levenson et al. have demonstrated adequate internal validity of the LPSP in a student sample, with a Cronbach's alpha of .82 for the primary subscale and .63 for the secondary subscale. Levenson et al. (1995) considered this to be a reliable estimate for a ten-item scale. Finally we also used the State and Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) to assess participants' anxiety levels and the relationship of anxiety to psychopathy.



Figure 8. Example stimuli: A female face displaying a fearful expression at (left to right) 10%, 55%, and 100% intensity.

4.2.3. Eye Tracking

We used an EyeLink 1000 eye tracking system (SR Research Ltd.) to record eye gaze and dwell time. Although viewing was binocular, only movements of the right eye were recorded. Gaze location was sampled once every millisecond.

4.2.4. Procedure

Participants were seated at a computer with a chin-rest and a head-rest in order to minimise head movements. Facial expression stimuli were presented on a computer monitor at random and participants were asked to categorise faces as one of the seven core emotions: neutral, angry, disgusted, afraid, happy, sad or surprise, using the keys 0-6 respectively, on a computer keyboard. The expression labels were listed on the left hand side of the screen with the relevant number response keys. We first calibrated the eyes using nine dots. Each trial started by insuring that the eye was calibrated with respect to the fixation point. Following calibration, faces were presented in a random order and remained on screen till the participant responded. There were 180 trials, each presenting a different

stimulus varying in the model, expression and intensity. The experiment was developed using EyeLink experiment builder.

4.2.5. Data Analysis

4.2.5.1. Behavioural data

Accuracy data was collected and analysed using mixed ANCOVA with the following repeated factors: six expressions, three intensities, two sex of model. We used primary (P-psych) and secondary (S-psych) psychopathy scores as between subject covariates. A further mixed model ANCOVA was used to investigate misclassification errors for calm (low intensity) emotional expressions. This analysis included the misclassification type (angry, disgust, fear, happy, sad, surprise) and the covariates P-psych and S-psych. A mixed model ANCOVA with the factors level of intensity (moderate, high) and misclassification type (neutral, angry, disgust, happy, sad, surprise) was also used to examine misclassification errors for fearful expressions of moderate and high intensity. Again, the analysis included P-psych and S-psych as covariates. Note that by including P- and S-psych in the same ANCOVA model, it is insured that any effects observed for one sub-scale are controlled for and hence beyond the effect of the other sub-scale. In addition, based on a-priori hypotheses correlations for recognition accuracy of the moderate negative expressions and scores on the primary and secondary psychopathy scales were computed.

4.2.5.2. Eye tracking data

The analysis focused on pre-determined areas of interest (AOI), specifically the eye and mouth regions. The eye region was defined using a rectangle of 289x100 pixels including both eyes and eyebrows; the mouth region was defined using a rectangle of 208x139 pixels. Images subtended a visual angle of 10°. Results of absolute dwell times within these pre-determined areas of interest are reported. It was believed that the absolute dwell time

reflects a combination of participants' interest in, and attraction to, the information within the AOI and how relevant they found this information for categorising the expressions.

Recall that no time limits were imposed on participants responses for each trial. Mixed ANCOVAs, as described above, were used to analyse absolute dwell time, focusing on effects that interacted with psychopathic traits. As in the behavioural analysis, by including P- and S-psych in the same ANCOVA model, it was insured that any effects observed for one sub-scale are controlled for and therefore beyond any effect of the other sub-scale. For example, an effect of P-psych on dwell times on the eyes cannot be explained by, or driven by, the effect S-psych alone. For completeness all the main effects and interactions observed are reported in Table 2 and Figure 9.

4.3. Results

4.3.1. Psychopathy

The Levenson Primary and Secondary Psychopathy (P-Psych, S-Psych, respectively) Scales were used to assess levels of psychopathic traits in the current sample. The average score for the primary sub-scale was 27.6, ranging from 20-41 (SD = 5.57, with a maximum possible score of 64). For the secondary subscale participants had an average score of 20.4, ranging from 16-23 (SD = 2.09), with a maximum possible score of 40. As reported by others, scores for primary and secondary psychopathy were significantly positively correlated ($r_p = .46, p < .05$). Neither the primary nor the secondary scales were correlated with the state or trait anxiety scales (all correlations $p > .1$).

4.3.2. Expression recognition

4.3.2.1. Accuracy

Expression recognition accuracy data are shown in Figure 9, which depicts the percentage of mild, moderate, and high intensity faces that were correctly classified as

anger, disgust, afraid, happy, sad, and surprise. A mixed ANCOVA was used with the following factors: 3 (intensity levels) x 6 (expressions) x 2 (model's sex) as repeated factors and scores on the P- and S-psych scales as between participant covariates. Not surprisingly, the analysis revealed a significant main effect of intensity $F(2, 18) = 13.76, p < .05, \eta^2 = .61$, whereby mild intensity faces (level 1) were least likely to be correctly classified. These faces, containing 10% of the expressive information, were mostly (73.6%) classified as neutral. Furthermore, neither P- or S-psych affected accuracy or interacted with any of the factors ($p > .05$). However, it was hypothesised a-priori that psychopathy would specifically affect the recognition of threat/submissive expressions in ambiguous, moderate expressions. Therefore, the effects of psychopathic traits on the recognition of sad, fearful, disgusted, and angry expressions at moderate intensities (55% of the expressive information) were analysed. It was found that both primary and secondary psychopathic traits were associated with reduced recognition of moderate intensity expressions of disgust (primary, $r = -.59, p < .05$; secondary, $r = -.64, p < .05$). There were no further correlations of P- or S-psych with recognition accuracy for any other expression ($p > .05$).

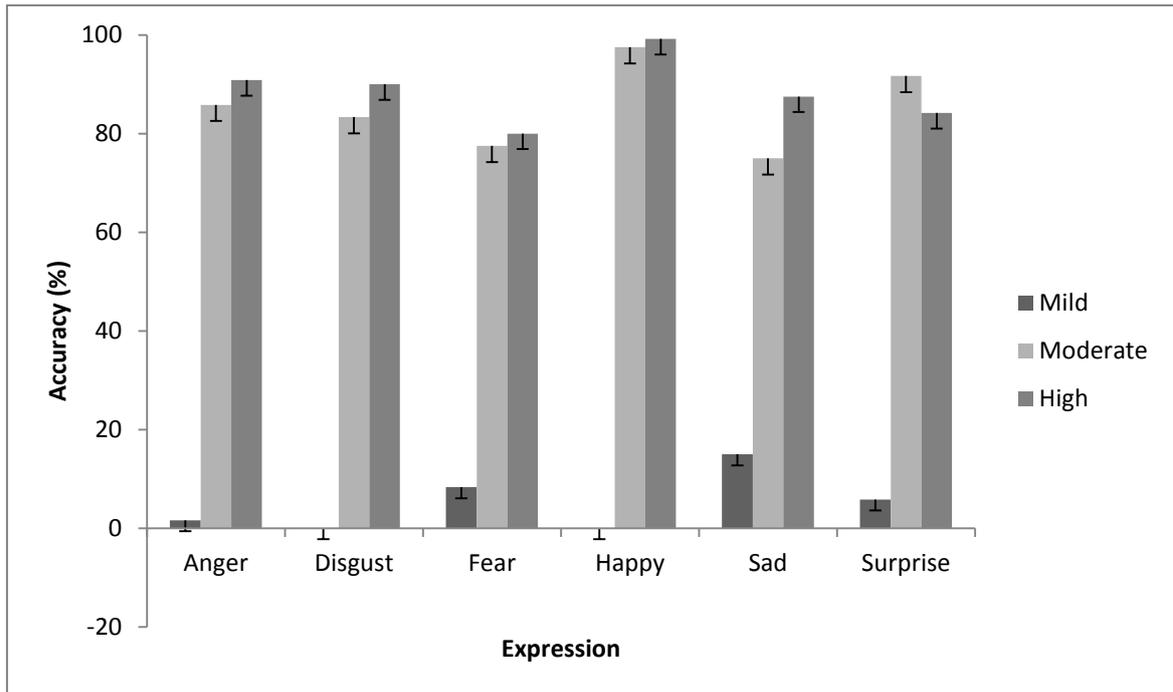


Figure 9. Accuracy data for mild, moderate and high intensity emotional expressions. Error bars indicate standard error of the mean.

4.3.2.2. Misclassification errors

A mixed ANCOVA with the with-in subjects factor error type (angry, disgust, fear, happy, sad, surprise) and the co-variates P-psych and S-psych was used to examine misclassification errors for calm (low intensity) faces. The analysis failed to reveal a significant effect of error type $F(5, 45) = .65, p = .66, \eta^2 = .07$, or an interaction of error type with P-psych $F(5, 45) = .16, p = .98, \eta^2 = .02$ or S-psych $F(5, 45) = .44, p = .82, \eta^2 = .05$.

A further mixed model ANCOVA was used to examine misclassification errors for fearful faces. The analysis contained the with-in subject factors level of intensity (moderate, high) and misclassification type (neutral, angry, disgust, happy, sad, surprise) and P-psych and S-psych were included as covariates. The analysis revealed a significant interaction of error type with P-psych $F(5, 40) = 3.66, p = .008, \eta^2 = .314$. To further investigate the relationship

of P-psych with error type for fearful faces a partial correlation of P-psych with the number of each misclassification type, controlling for S-psych, was computed. Partial correlation revealed a trend toward a negative relationship between the number of surprise classifications and levels of P-psych ($r = -.55, p = .1$).

4.3.3. Dwell times on eyes vs. mouth

A mixed ANCOVA was used to analyse dwell time data with the following factors: six (expressions) x three (intensities) x two (model's sex) x2 (AOIs) as with-in subject factors and the between subject covariates of primary and secondary psychopathy. Table 10 shows all significant main effects and interactions that were independent of psychopathy, while Figure 10 presents the averaged data for dwell time on the eyes and the mouth of female and male expressive faces. As the primary aim of this paper was the effects of psychopathic traits on the viewing of facial expressions of emotion, only those effects that interacted with the two psychopathy subscales are report and discussed in detail.

Table 10.

Significant main effects and interactions for analysis of absolute dwell time that do not include an interaction with primary or secondary psychopathic traits. F-statistic and degrees of freedom in brackets (df).

Effect	F (df)	p
AOI: eyes > mouth	4.75(1,18)	.043
Expression*Level*AOI	2.15(10, 180)	.023
Expression*AOI	2.88(2.96, 90)	.045

4.3.3.1. Effects of primary psychopathy

P-psych modulated the differences in dwell time spent on the eyes and mouth independent of expression and expression intensity ($F(1, 18) = 3.78, p = .068, \eta^2 = .741$). To better understand this effect the difference between dwell times on eyes minus mouth was calculated (collapsed across expressions and intensities). This data was used to compute the correlation of the difference in dwell time on the eyes and mouth with the primary psychopathy scores (Figure 11). This showed a negative correlation ($r = -.44, p < .05$) indicating that higher levels of P-psych were associated with decreased dwell time on the eyes relative to the mouth across all trials. Example dwell time on the eyes and the mouth for a low scoring and a high scoring participant on P-psych are depicted in Figure 12.

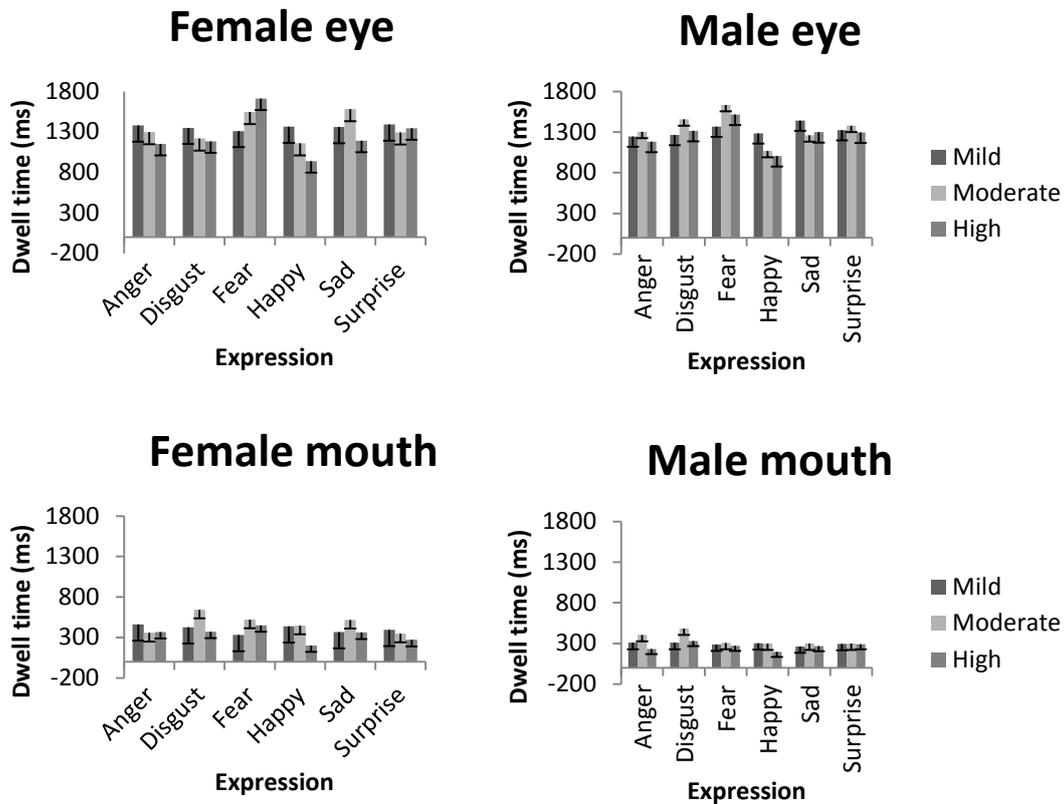


Figure 10. Dwell time on female eyes, female mouth, male eyes, and male mouth, at mild, moderate, and high intensity. Error bars indicate standard error of the mean.

An interaction between intensity, sex and area of interest (AOI) was observed which was modulated by P-psych ($F(1.54, 27.79) = 7.92, p < .005, \eta^2 = .306$). In order to further understand this interaction, separate analyses were conducted for female and male models. For male faces only, an interaction was observed between level and AOI which was modulated by P-psych ($F(1.97, 35.38) = 6.2, p = .005, \eta^2 = .256$). When this interaction was further broken down by level, an interaction of AOI and P-psych was revealed for expressions of moderate intensity (level 2) ($F(1, 18) = 4.89, p < .05, \eta^2 = .214$). This interaction indicated that increasing levels of P-psych were associated with decreased

absolute dwell time on the eyes (relative to mouth) for male expressions with moderate intensity. Thus, the overall reduced dwell time on eyes compared with mouth in high P- psych individuals was most pronounced when observing other male faces that depicted ambiguous expressions.

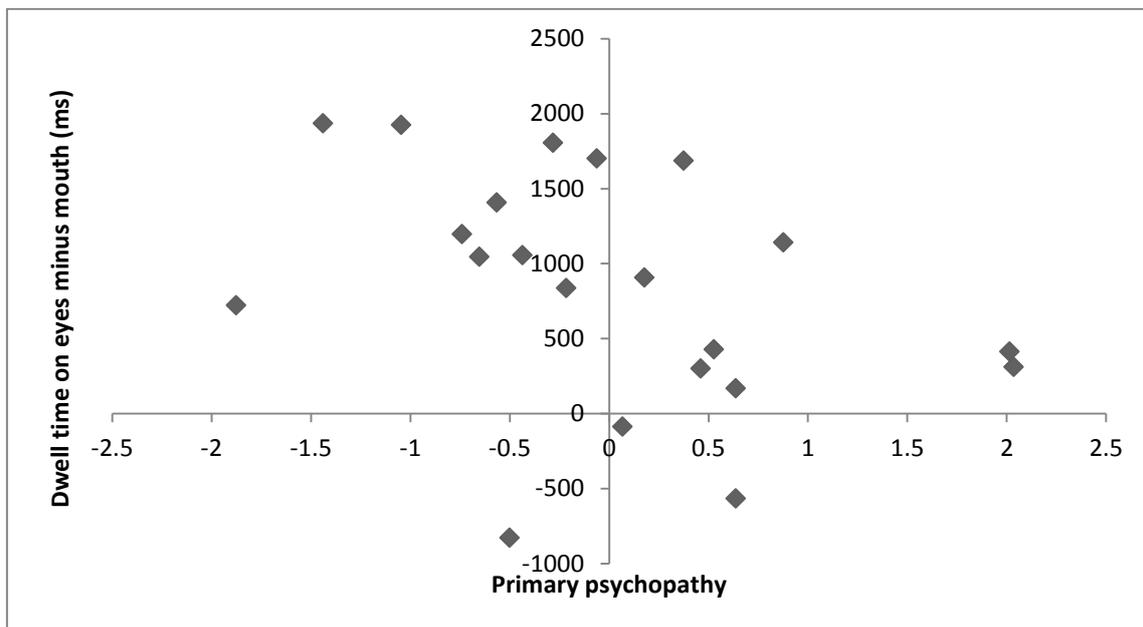


Figure 11. Scatter plot showing partial correlation ($r = -.44, p < .05$) of standardised residuals for primary psychopathic traits controlling for secondary psychopathic traits (x) with dwell time difference for eyes and mouth of emotionally expressive faces (y).



Figure 12. Illustrations of dwell time during expression recognition task for a low scoring (left) and a high scoring (right) participant on the primary psychopathy scale of LPSP.

4.3.3.2. Effects of secondary psychopathy

An interaction was observed between expression and sex which was modulated by secondary psychopathy (S-psych, $F(1, 18) = 4.89$, $p < .05$, $\eta^2 = .214$). In order to further investigate this interaction, separate ANCOVAs were computed for each expression with the factors intensity, sex and AOI, with P-Psych and S-Psych as covariates. For sad expressions, an effect of sex which was modulated by secondary psychopathy revealed that high levels of secondary psychopathy were associated with increased dwell time on the eyes and mouth of sad female relative to sad male faces $F(1, 18) = 10.04$, $p < .01$, $\eta^2 = .358$. This effect was confirmed by the finding of a positive partial correlation of secondary psychopathic traits with dwell time on sad female relative to sad male faces ($r = .46$, $p < .05$) (see Figure 13).

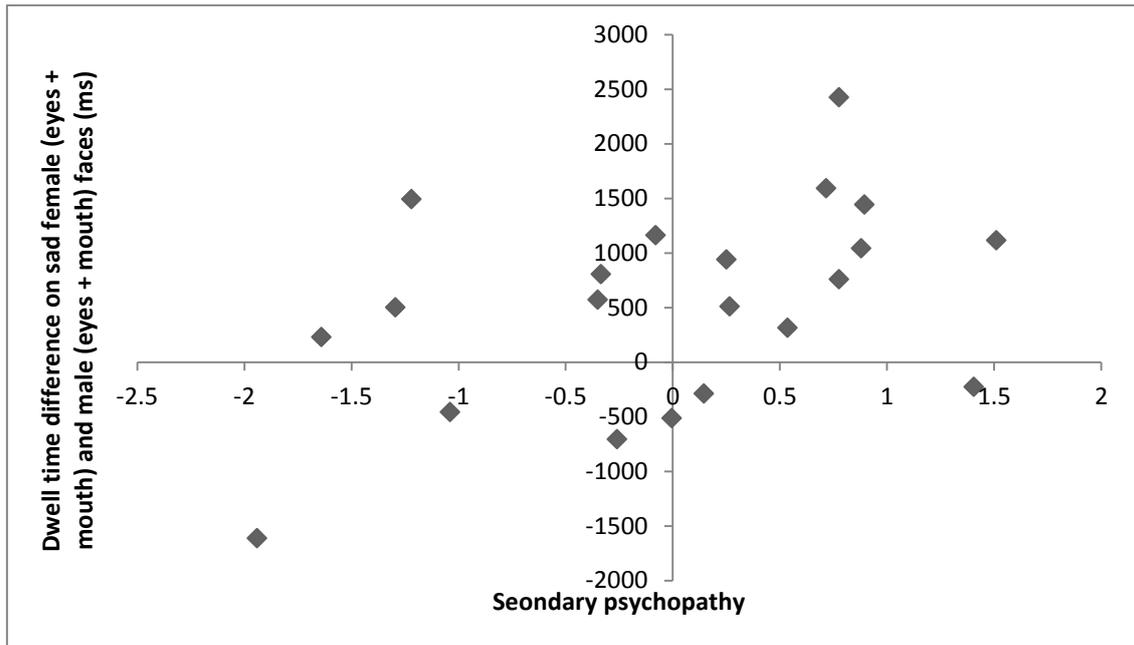


Figure 13. Scatter plot showing partial correlation ($r = .46, p < .05$) of standardised residuals for secondary psychopathic traits controlling for primary psychopathic traits (x) with dwell time difference for sad female (eyes + mouth) relative to sad male (eyes + mouth) emotional faces (y).

4.3.4. Correlation between Accuracy scores and dwell time

Finally, tests were conducted to examine whether these data adhere to previously reported results on the relation between eye scan paths for expressive faces and recognition accuracy. To that aim, it was investigated whether a deficit for negative expression recognition was linked with dwell time on the eyes relative to the mouth (eye – mouth). It was found that increased recognition of moderate intensity expressions of disgust was associated with increased dwell time on the eyes relative to the mouth (eyes – mouth) ($r = .73, p < .01$). On the other hand however, increased accuracy for moderate intensity angry faces was found to be associated with reduced dwell time on the eyes relative to the mouth ($r = -.69, p < .05$). Figure 14 shows correlations of recognition accuracy for angry and disgusted moderate intensity faces with dwell time on the eyes relative to the mouth. No

other significant correlations of dwell time on the eyes with recognition accuracy for negative expression were observed ($p > .05$).

4.4. Discussion

The current study investigated the effects of primary and secondary psychopathic traits on recognition and eye scan paths of adult males while categorizing emotionally expressive faces of varying levels of intensity. Results showed that both primary and secondary psychopathy were associated with impaired disgust recognition, especially at moderate levels of intensity. Furthermore increasing levels of primary psychopathy were associated with reduced dwell time on the eyes relative to the mouth across all expressions of emotion. This effect was found to be particularly strong for male expressions of moderate intensity. On the other hand, increasing levels of secondary psychopathy were linked with increased dwell times on the eye and the mouth region of sad female relative to sad male expressions.

The association of primary psychopathic traits with reduced dwell time on the eyes is consistent with earlier research. For example, Dadds et al. (2008) demonstrated a reduced number of first fixations and reduced fixation duration on the eye region of expressive faces among children with callous-unemotional traits. It was also found that the relationship of primary psychopathy with reduced dwell time on the eyes (relative to the mouth) was particularly marked for images of male faces of moderate intensity. It is argued by Adolphs and Tranel (2004) that the relatively ambivalent nature of lower intensity expressions is better representative of real life expressions. Thus, it can be argued that dwell time on the eyes and mouth of moderate intensity expressions may be most reflective of eye scan patterns of expressive faces in the real world.

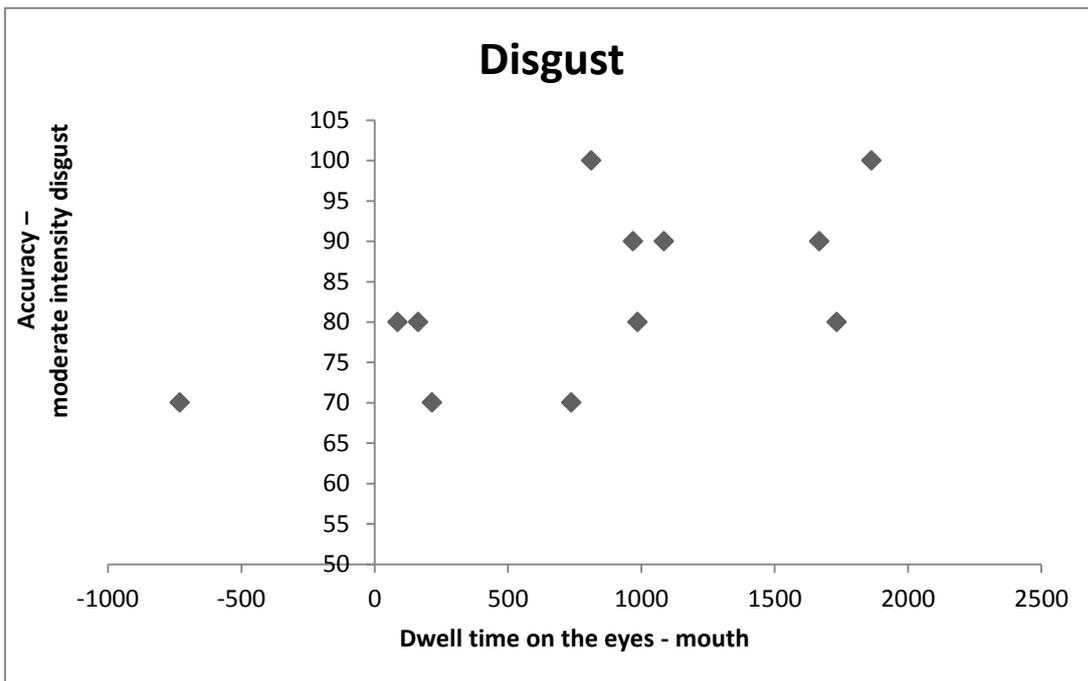
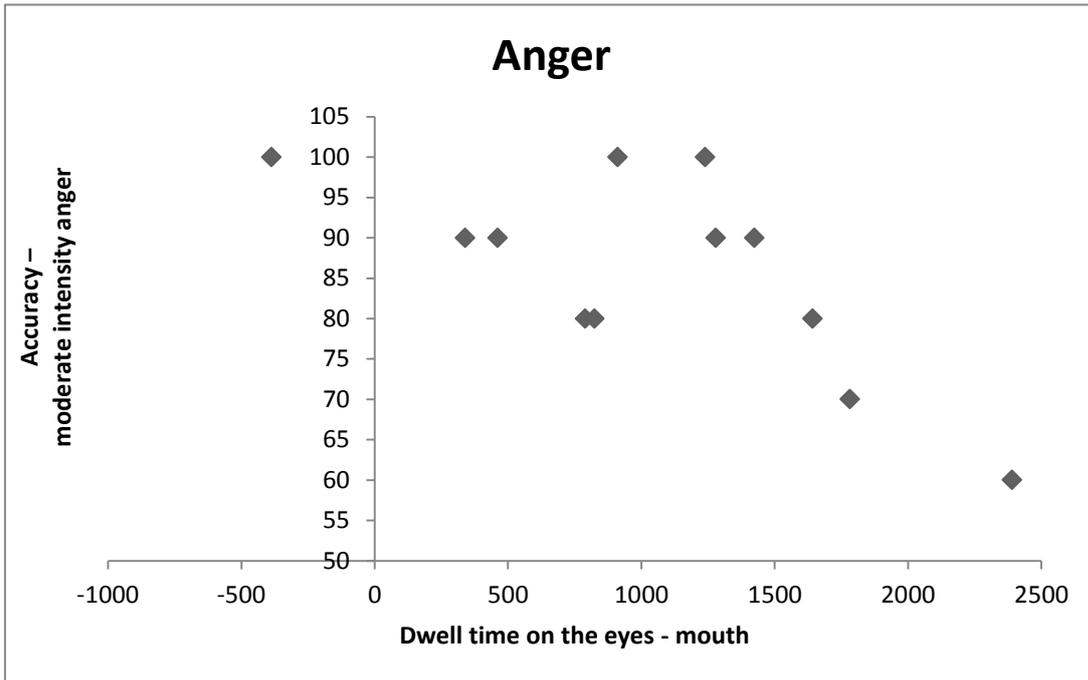


Figure 14. **Above:** Scatter plot showing correlation ($r = -.69, p < .05$) of dwell time on the eyes relative to the mouth with accuracy for angry expressions of moderate intensity. **Below:** scatter plot showing correlation ($r = .73, p < .01$) of dwell time on the eyes relative to the mouth with accuracy for disgusted expressions.

Research with various populations, including children with autism and callous-unemotional traits, suggests that reduced dwell time on the eyes may be linked with deficits in the recognition of facial displays of affect. Although initial analyses of the current data failed to indicate an interaction of either primary or secondary psychopathy with accuracy of expression recognition, subsequent correlational analyses revealed associations of both primary and secondary psychopathy with the classification of disgust expressions.

Negative correlations of both primary and secondary psychopathic traits were noted with moderate intensity expressions of disgust. Furthermore, in an analysis independent of level of psychopathic traits, we observed an association of decreased dwell time on the eyes with a reduction in the ability to correctly classify disgust facial expressions. Again, this was only true for expressions of moderate intensity. Thus, dwell time on the eye region may represent a critical component for the recognition of disgust expressions. Such a view is consistent with the results of Smith, Cottrell, Gosselin, and Schyns (2005), who found that visual information from the region surrounding the nose and mouth for disgust expressions is reflective of human bias (not optimally used in expression classification), while information from the eye region was found to represent more optimal information use. Thus, a failure to scan the eye region of expressive faces in individuals with psychopathic personality traits may explain poor disgust expression classification.

The finding of an association between psychopathic traits and a disgust deficit is consistent with a number of earlier findings. Most notably, Kosson, Suchy, Mayer and Libby (2002) identified a specific deficit in the classification of disgust expressions among criminal psychopaths relative to non-psychopaths. However, this deficit was only evident when participants were instructed to respond with the left, rather than the right hand. Disgust

deficits in psychopathy have also been noted outside of the classification of facial expressions of affect. For example, psychopaths relative to non-psychopaths showed startle-inhibition in response to disgust inducing images of mutilation (equivalent to Haidt, McCauley & Rozin's (1994) bodily envelope violation domain of disgust), and victimization (Levenston, Patrick, Bradley, & Lang, 2000). Evidence from the current experiment would indicate that previously observed disgust deficits in psychopathy may also be evident in a subclinical sample of non-offenders with psychopathic personality traits.

Secondary psychopathy was associated with an increase in dwell time on the eye and mouth region for sad female relative to sad male faces. Schwartz, Brown, and Ahern (1980) identified a greater degree of association between feelings of sadness and increased activity of the corrugator region of the face (the muscles of the face which sit above the brow), in females relative to males. Thus, in comparison to male expressions of sadness, female sad expressions may appear to be more expressive. Furthermore, anxiety and neuroticism, two of the defining features of secondary psychopathy, have been linked with abnormal eye scan paths for negative expressions including expressions of sadness. For example, individuals with generalised anxiety disorder (DSM-IV-TR, 2000) demonstrated a greater tendency to orient toward negative expressions (Mogg, Millar, & Bradley, 2007), while levels of neuroticism have been found to correlate positively with dwell time on the eyes of sad faces (Perlman, Morris, Vander Wyk, Green, Doyle, & Pelphrey, 2007). Thus, although results failed to show a positive correlation of either state or trait anxiety with levels of secondary psychopathy, it might be speculated that heightened levels of neuroticism in secondary psychopathy, coupled with increased intensity of female expressions, may account for an

increase in dwell time on the eye and mouth region of female relative to male expressions of sadness.

The finding that secondary psychopathy was associated with increased dwell time on the eyes and mouth of sad female expressions might alternatively reflect increased difficulty in judging opposite sex facial expressions of sadness. Psychopaths have been found to present with generalised problems in responding to sad emotional stimuli. Skin conductance hyposponsivity has been noted among psychopathic men (Blair, Jones, Clark, & Smith, 1997) and children with psychopathic tendencies (Blair, 1999), in response to distress cues (images depicting sadness). Similarly, children with psychopathic tendencies (Blair, Colledge, Murray, & Mitchell, 2001) and imprisoned psychopaths (Hastings, Tangney, and Stuewig, 2008) show difficulty in the classification of facial expression of sadness. Thus, research findings indicate that psychopaths may be deficient in responding to and recognising sadness based cues. In addition, difficulties in the decoding of female relative to male emotional facial expressions, particularly those of negative valence, have been demonstrated by Thayer and Johnsen (2000). Therefore, increased dwell time on the eye and mouth region of sad female faces may reflect increased difficulty in classifying sad female expressions among male participants with secondary psychopathic traits. However, firm conclusions cannot be drawn from the current data.

The results of the current research highlight how abnormal eye scan paths for emotional faces are associated with primary and secondary psychopathic traits. While primary psychopathy was specifically associated with a reduced tendency to dwell on the eye region of moderate intensity male faces, secondary psychopathy was associated with an increase in dwell time on the critical features of sad female faces. However, care should be taken when

applying these findings to clinical forms of psychopathy. For example, low base rates of psychopathic traits have been noted in the general household population of Great Britain (Coid, Yang, Ullrich, Roberts, & Hare, 2009). As such, levels of psychopathic traits in the current sample are likely to be low compared with those observed among offending participants. This likely difference in levels of psychopathic traits may affect the relationship between psychopathic traits and cognitive-affective processes, including eye scan paths for expressive faces. Although psychopathy has been shown to be based on a continuum (Guay, Ruscio, Knight, & Hare, 2007; Edens, Marcus, Lilienfeld, & Poythress, 2006), extrapolating to clinical forms of psychopathy on the basis of experimental findings from a non-clinical, non-offending sample should therefore be cautioned against.

An additional limitation arises when considering the small sample size used in the current experiment, with particular respect to behavioural data, which was collected from only a subsample of the original sample. There is therefore a need to replicate these results with a larger sample which includes offenders with clinical levels of PCL-R assessed psychopathy. It would be hypothesised that those with elevated Factor 1 scores would show the lowest level of attention to the eye region. Despite these limitations, the finding of reduced attention to the eye region in relationship to primary psychopathic traits is nonetheless consistent with findings from developmental samples (Dadds et al., 2006, 2008).

Although deficits in facial expression recognition in psychopathy have been widely reported, there has been a failure to investigate the relative influence of primary and secondary psychopathic traits. While the findings of the current research point toward a general deficit in disgust recognition in relation to primary and secondary traits of psychopathy among non-offenders, there may be important differences in facial expressions

recognition in serious offenders. Thus, there is a need to investigate facial expression recognition among serious offenders relative to healthy controls, and understand the relative influence of both primary and secondary psychopathic traits.

The following chapter aims to investigate the links between expressions recognition and psychopathic traits in two groups of serious offenders, those who have committed sexual offences and those who have committed violent offences including murder and grievous bodily harm. These results will further our understanding of facial expression recognition in these types of offender, as well as the relative influence of both primary and secondary traits of psychopathy. Furthermore, given that facial affect recognition represents a prerequisite for emotional empathy, the results of this experiment will offer a more objective test of the relationship primary and secondary psychopathic traits with affective empathy. As such, these results will expand up on the results obtained through self-report measures in Chapter 2.

CHAPTER 5: REDUCED ACCURACY FOR FEARFUL FACE RECOGNITION AMONG SEXUAL OFFENDERS: EVIDENCE FOR AN AFFECTIVE EMPATHY DEFICIT

5.1. Introduction

One of the most common treatment targets for interventions with sexual offenders is global and victim empathy (McGrath, Cumming, Burchard, Zeoli & Ellerby, 2010). However, as commented by a number of authors (Barnett & Mann, 2013; Polascheck, 2003), the role of empathy in sexual offending remains somewhat controversial, with empathy research with sexual offenders yielding varied and at times conflicting results. For example, while some authors have noted deficits in empathy among sexual offenders relative to other non-sex offender (Rice, Chaplin, Harris, & Coutts, 1994; Marshall & Moulden, 2001) and non-offender groups (Burke, 2001), others have noted no reduction in empathic functioning (Hanson & Scott, 1995). In a systematic review and meta-analysis of the literature on empathy and offending, Jolliffe and Farrington (2004) found that while there is a relatively strong link between empathy and offending among violent offenders, the relationship is relatively weak for sexual offenders.

It is noted by Polascheck (2003) that mixed findings on the relationship between empathy and sexual offending may in part reflect a reliance on various self-report questionnaires. Difficulties with the self-report measurement of empathy include the questionable ability to accurately appraise one's own level of empathic functioning and the inclusion of items in affective subscales which tap perspective taking abilities or theory of mind. Such measures are also open to impression management strategies which have been found to be particularly common among sexual offenders (Gudjonsson & Sigurdsson, 2000). These results may therefore be of questionable external validity.

One of the most commonly used self-report measures of empathic functioning among sexual offenders, the Interpersonal Reactivity Index (IRI; Davis, 1983), allows for the differentiation between '*cognitive*' and '*affective*' empathy. While cognitive empathy refers to perspective taking abilities, akin to theory of mind, affective empathy is concerned with the ability to recognise and translate others communications of emotion (Blair, 2008). A distinction between affective and cognitive components of empathy is presented by Blair (2005, 2006, 2008), who argues that these '*fine cuts*' of empathy (cognitive versus affective) may be partially separated at both the cognitive and the neural level. For example, deficits in cognitive empathy or perspective taking have been linked with lesions localised to right ventro-medial pre-frontal cortex, while lesions of the inferior frontal gyrus have been linked with extremely impaired affective empathy and emotion recognition (Shamay-Tsoory, Aharon-Peretz, & Perry, 2009). In addition, the neural systems underlying cognitive and affective empathy have been further dissociated in psychiatric samples, including adults with Asperger Syndrome (Dziobek et al., 2008) and Borderline Personality Disorder (Harari, Shamay-Tsoory, Ravid, & Levkovitz, 2010).

A distinction between affective and cognitive perspective taking components of empathy has also been noted in various models of the empathy process in sexual offenders, including the multicomponent model of empathy proposed by Marshall, Hudson, Jones, and Fernandez (1995) and more recently in Barnett and Mann's (2013) model of the empathic process. In their multicomponent model of empathy in sexual offenders, Marshall et al. (1995) propose a multistep model which distinguishes between the processes of: (1) emotion recognition; (2) perspective taking; (3) emotion replication; and (4) response

decision. It is suggested by Marshall et al. (1995) that deficits at the emotion recognition stage of this model would prevent the unfolding of the empathetic response.

Similar to Marshall et al. (1995), Blair (2005, 2008) argues that a crucial prerequisite for affective empathy is the ability to recognise others expressions of emotion. Human facial emotional expressions therefore serve a critical role in human emotional and social behaviour, allowing for the rapid communication of specific valence information to the observer (Blair, 2003a). It is believed that of particular relevance to antisocial and aggressive behaviour are those expressions which communicate an individual's distress (Blair, 1995, 2001), most notably the expressions of fear and sadness. Furthermore, it is argued that along with happy expressions, fearful and sad expressions may act as reinforcers, or unconditioned stimuli, modulating the probability that a particular behaviour will be performed again in the future (Blair, 1995; Mineka & Cook, 1993).

It has been suggested that a failure to recognise others' distress cues may be associated with a greater propensity for antisocial behaviour, including acts of aggression and violence (Blair, 2003b; Montagne et al., 2005). Furthermore, Blair (1995, 2001) posits a mechanism whereby the display of non-verbal distress cues, either before or during an aggressive attack, will lead to attack withdrawal upon recognising the victim's distress. This mechanism, termed the empathy dysfunction, Violence Inhibition Mechanism (VIM), may account for the apparent lack of empathy among some individuals (Blair, 1995; 2001). A similar mechanism therefore may be invoked to account for acts of sexual coercion against women (Knight & Guay, 2006) and sexual violence toward children.

Although numerous studies have been conducted with the aim of assessing facial expression recognition in psychopathic and generally anti-social populations (see Marsh &

Blair (2008) and Wilson, Juodis, & porter (2011) for meta-analyses), there has been a relative failure to utilise expression recognition tasks for the objective measurement of affective empathy among sexual offenders. In addition, those that have used tasks of expression recognition present conflicting results. For example, Oliver, Watson, Gannon, and Beech (2009) failed to observe an effect of group on accuracy of expression recognition following word primes. On the other hand, those who do observe a deficit in expression recognition fail to contrast the accuracy of sexual offenders with relevant offending control groups (Gery, Miljkovitch, Berthoz, & Soussignan, 2009; Hudson, Marshall, Wales, McDonald, Bakker, & McLean, 1993).

In one recent study of expression recognition, Gery et al. (2009) observed a deficit in the recognition of anger, disgust, surprise and fear among sexual offenders relative to non-sex offenders and non-offending controls. However, although these authors controlled for the effects of a number of variables known to influence expression recognition, including depression and anxiety, there was a failure to control for the effects of psychopathic personality. Findings of meta-analytic reviews by Marsh and Blair (2008) and Wilson et al. (2011) demonstrate severely impaired fearful face recognition among instrumentally violent and psychopathic individuals. Thus, the extent to which the fear deficit observed among sexual offenders by Gery et al. (2009) is reflective of elevated levels of psychopathy among sexual offenders relative to control participants is unknown. Further problems arise when considering the choice of control group employed by Gery et al. (2009). It is argued by Blair (1995, 2001) that deficits in recognising others distress cues may account for failures in violence inhibition. Therefore it may be argued that the control group employed by Gery et al. (2009), who were convicted of theft or fraud, may not be expected to show a fear deficit

as pronounced as those whose offences are characterised by severe violence. Furthermore, sexual offenders, particularly those with child victims, have been found to present with elevated levels of social phobia (Hoyer et al., 2001) which may affect the processing of facial expressions of emotion (see Amir et al., 2005, 2010).

The present study aimed to use a facial expression recognition task to objectively measure deficits in affective empathy among sexual offenders. The recognition of others emotional expressions is argued to represent a crucial prerequisite for affective empathy, allowing the communication of another's emotional state. The experience of cognitive empathy on the other hand is thought to more heavily rely on perspective taking and theory of mind abilities (Blair, 2008). To control for confounding factors, levels of psychopathic personality traits and social phobia were also measured. Both have been linked with abnormalities in the processing of emotional expressions (Blair et al., 2004; Blair, Colledge, Murray, & Mitchell, 2001; Montagne et al., 2005; Montagne, Schutters, Westenberg, van-Honk, Kessels, & de-Haan, 2006; Amir, Klumpp, Elias, Bedwell, Yansak, & Miller, 2005; Amir, Najmi, Bomyea, & Burns, 2010) and have been identified to a heightened degree among sexual offenders (Brown & Forth, 1997; Rosenberg, Abell, & Mackie, 2005; Baxter, Marshall, Barbaree, Davidson, & Malcolm, 1984; Raymond, Coleman, Ohlerking, Christenson, & Miner, 1999).

Stimuli for use in this task were varied both in terms of the intensity of the expressions displayed and the sex of the model displaying each expression. Varying the expression intensity allows for more life-like representations of each expression (Adolphs & Tranel, 2004) and makes the task more sensitive to subtle differences in the processing of emotional expressions (Calder, Young, Perrett, Etcoff, & Rowland, 1996). Potential difficulties in the

self-report measurement of empathic functioning were circumvented through the use of an emotion recognition task as an objective measure of affective empathy. These difficulties include: (i) the questionable ability to appraise accurately one's level of empathic functioning; (ii) a tendency toward impression management among sexual offenders; (iii) the presence of questionnaire items which do not necessarily tap affective empathy, but rather cognitive empathy or perspective taking abilities. The chosen task was therefore considered to be of greater internal validity compared with the self-report measurement of empathic functioning.

It was hypothesised that both sexual and violent offenders would show deficits in the recognition of fearful and sad expressions relative to non-offenders. Furthermore, it was expected that these effects would be most pronounced for the expressions of manipulated intensity due to their more life-like appearance. It was also hypothesised that high levels of the callous-unemotional traits which characterise primary psychopathy would be linked with reduced accuracy in the recognition of fearful and sad expressions. Consistent with the findings of Dadds et al. (2006) of an increased tendency of those with high antisocial traits to show a hostile attribution bias (Dodge et al., 1990), it was hypothesised that secondary psychopathic traits would be associated with an increased number of angry classifications for calm faces. Dadds et al. (2006) also showed that children with CU traits show a tendency to misclassify fear as either a neutral expression or one of disgust. Thus it was hypothesised that primary psychopathic traits would be associated with a greater number of disgust and neutral misclassifications for fearful faces.

5.2. Method

This experiment was designed to investigate differences in the recognition of emotional faces of varying expression, intensity and sex in sexual offenders, violent offenders, and non-offending controls. A further aim was to test for the modulatory effects of primary and secondary psychopathic traits and social phobia on emotion recognition.

5.2.1. Participants

Participants were 13 sex offenders, 16 violent non-sex offenders, and 12 non-offending controls. All offenders were recruited from the Therapeutic Community for adult male prisoners at HM Prison Grendon. Offence types for the sex offender group included rape or attempted rape of a child victim (n=5), possession of indecent photographs of children (n=1), and rape or attempted rape of an adult victim (n=7). The average age of the sex offender sample was 50.5 years (SD=5.9) with a range of 40-62 years. The average age of child victims was 10.8 years with a victim age range of 5-15 years, while the average age of adult victims was 34.6, with a range of 18-23 years. The sample had a mixed history of treatment, however, the majority had completed the Sex Offender Treatment Program (n=11) and/or Enhanced Thinking Skills (ETS) (n=10). Out of the 13 sex offenders tested, seven reported a history of early physical and/or emotional abuse.

Offense types for violent offenders included murder (n=9), wounding with intent to do grievous bodily harm (n=6), and aggravated burglary (n=1). Violent offenders had an average age of 37.8 years (SD=10.4), with a range of 24-58 years. The average victim age for violent offenders was 39 with a range of 22-74 years. Treatment history for violent offenders included Enhanced Thinking Skills (ETS) (n=9), Counselling, Assessment, Referral Advice, Throughcare (CARAT) (n=4), and the Prisoners – Addressing Substance Related Offending (P-

ASRO) program (n=3). A total of nine violent offenders reported a history of early physical and/or emotional abuse.

A non-offending control group of 12 males was collected from the staff and student population of the University of Birmingham, UK. Participants had a mean age of 24.5 years, (SD=6.5) with a range of 19-39 years. Control participants were awarded £10 compensation for their time. Ethical approval for this study was granted by the University of Birmingham Committee for Ethical Review and the National Offender Management Service for the United Kingdom of England and Wales.

5.2.2. Materials

5.2.2.1. Facial expression stimuli

Ten different Caucasian models (5 females) were selected from the NimStim Face Stimulus Set (<http://www.macbrain.org/resources.htm>). This stimulus set included each model showing each of seven different expressions; neutral, angry, disgusted, afraid, happy, sad, and surprise. The models were selected based on the NimStim validity data for expression recognition (Tottenham et al., 2009). These data indicate good validity for the selected expressions (standard deviations in brackets); angry = .85 (.83), disgust = .85 (.13), fear = .84 (.13), happy = .85 (.13), sad = .85 (.13), surprised = .85 (.13), neutral = .84 (.13). In order to manipulate the intensity of the emotional expressions, each expression was morphed from neutral to 100% expressive in ten successive frames using the STOIK Morph Man software (<http://www.stoik.com/products/video/STOIK-MorphMan/>). This resulted in ten morphed continua for each of the six expressions for the ten selected models. For task purposes, we selected three frames of varying intensity for each expression; mild intensity (10% expressive), moderate intensity (55% expressive), and high intensity (100% expressive)

(see Figure 8 for stimuli examples). Thus we had 18 faces across all expressions for each model, 180 faces in total.

5.2.2.2. Levenson Primary and Secondary Psychopathy Scales

The Levenson Primary and Secondary Psychopathy Scales (LPSP; Levenson, Kiehl, & Fitzpatrick, 1995) were developed for the assessment of psychopathic traits in non-institutionalised populations. The LPSP was designed to parallel the 2 Factor structure of the Hare PCL-R (Hare, 1991, 2003). Based on a sample of 549 male inmates from Wisconsin state prisons, Brinkley et al. (2001) present moderate correlations for the primary and secondary subscales of the LPSP with the corresponding factors of the PCL-R, Factors 1 and 2 respectively. The LPSP contains 26 items measured on a four-point Likert scale; 16 items measure the primary characteristics associated with psychopathic personality, including selfishness, and a lack of care for others. The remaining items tap traits which are typical of secondary psychopathy, including proneness to boredom and impulsivity. Participants rate the degree to which they disagree or agree with each item on a scale of 1-4 (*1 = Disagree Strongly; 4 = Agree Strongly*). Levenson et al. have demonstrated adequate internal validity of the LPSP, with a Cronbach's alpha of .82 for the primary subscale and .63 for the secondary subscale.

5.2.2.3. Liebowitz Social Anxiety Scale

Social phobia was assessed using The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). The LSAS consists of 24 items rated on a 4-point Likert scale (*0 = no fear; 3 = severe fear*) designed to measure fear and avoidance across a variety of social interactions and performance situations. The LSAS has demonstrated acceptable internal validity, with a Cronbach's alpha estimate of .95 for the whole scale, while the fear and avoidance subscales

also demonstrate acceptable internal validity, with Cronbach's alphas of .91 and .92 respectively (Baker, Heinrichs, Kim, & Hofmann, 2002).

5.2.2.4. Marlowe-Crowne Form C

Socially desirable responding was assessed using the Marlowe-Crowne Form C (MC-C; Reynolds, 1982). This short form scale includes 13 *true* or *false* items for the assessment of social desirability bias. Reynolds (1982) demonstrated acceptable internal validity and concurrent validity estimates for the MC-C.

5.2.3. Procedure

Stimuli were presented using E-Prime stimulus presentation software on a Samsung Electronics laptop computer. Faces were presented in a random order and remained on screen till the participant responded. Participants were asked to categorise faces as one of the seven core emotions: neutral, angry, disgusted, afraid, happy, sad or surprise, using the numeric keys 0-6 respectively. The expression labels were listed on the left hand side of the screen with the relevant number key to respond with for that expression. There were 180 trials, each presenting different stimulus varying in the model, expression and intensity.

5.2.4. Method for analysis

Levels of primary and secondary psychopathic traits between sexual offenders, violent offenders and non-offending controls were compared with those obtained from an offending sample by Brinkley et al. (2001) using Cohen's *d* effect size estimates. Furthermore, differences in primary and secondary psychopathic traits and social phobia between the three groups of participants in the current experiment were examined using a multivariate analysis of variance.

To investigate differences in accuracy of expression recognition between sexual offenders, violent offenders and control participants, a mixed model ANCOVA was

conducted with the factors group, sex of model, level of intensity (moderate, high) and expression type (angry, disgust, fear, happy, sad, surprise), including primary and secondary psychopathic traits and social phobia as covariates. Interactions between offence type and expression were broken down using further ANCOVA analyses for each expression between the three participant groups. Follow up tests were conducted using an independent samples t-test to compare the accuracy of expression recognition between sexual and violent offenders. A further independent samples t-test was used to investigate differences in fear recognition among offenders, collapsed across offence type, relative to controls.

Classification errors were analysed using a mixed model ANCOVA with the with-in subjects factor misclassification type (anger, disgust, fear, happy, sad, surprise) and the between subjects factor offence type (sexual, violent) to examine bias toward certain expressions when labelling calm faces (those of low intensity) between the two offender groups. Primary and secondary psychopathic traits were included as covariates in the analysis. To investigate errors when classifying fearful expressions, a mixed model ANCOVA was used with the factors level (moderate intensity, high intensity) and misclassification type (neutral, anger, disgust, happy, sad, surprise), with primary and secondary psychopathic traits as covariates.

5.3. Results

5.3.1. Psychopathy and social phobia

All participants completed the Levenson Primary and Secondary Psychopathy Scales (Levenson et al., 1995) and the Liebowitz Social Anxiety Scale (1987) to assess levels of psychopathic traits and social phobia (see Table 11). Cohens *d* effect size calculations were

used to compare levels of psychopathic personality traits among sexual, violent and non-offenders with those obtained by Brinkley et al. (2001) from a sample of 549 male inmates from Wisconsin state prisons for primary psychopathy, $M = 32.99$, $SD = 8.19$, and secondary psychopathy, $M = 21.68$, $SD = 5.05$. Calculations revealed higher levels of primary psychopathy among the Brinkley et al. (2001) sample, with a large effect size of 0.8 for sexual offenders, a small effect size of 0.38 for violent offenders and a moderate effect size of 0.58 for non-offenders. The Brinkley et al. (2001) sample also showed more elevated levels of secondary psychopathic traits, with small effect sizes of 0.49, 0.28 and 0.26 compared with sex offenders, violent offenders and non-offenders respectively. A analysis of variance (ANOVA) revealed no difference in scores on self-report measures, including levels of primary and secondary psychopathic traits and social phobia, between the three groups $F(4, 76) = 2.0$, $p > .05$, $\eta^2 = .10$.

In addition all offending participants completed the Marlowe-Crowne Form C (Reynolds, 1982) social desirability scale (Table 11). Due to constraints of time, 1 sex offender and 3 violent offenders failed to complete this scale. Crucially, both sexual and violent offenders in the current study showed similar levels of responding on the Marlowe-Crowne Form C to scores obtained by Reynolds et al. (1982) from a sample of non-offenders ($n = 608$). This similarity suggests normal levels of socially desirable responding among both sexual and violent offenders in the present study.

Table 11.

Mean scores (standard deviations in brackets) for non-offenders, sex offenders, and violent offenders on the Liebowitz Social Anxiety Scale, Levenson Primary and Secondary Psychopathy Scales, and Marlowe-Crowne Form C social desirability scale.

Measure	Non-offenders	Sexual offenders	Violent offenders
Psychopathy			
Primary	28.3 (6.6)	26.5 (7.2)	29.9 (8.6)
Secondary	20.4 (2.6)	19.2 (5.9)	23.1 (4.9)
Total	48.7 (8.2)	45.8 (11.0)	53.1 (11.8)
Social phobia	35.9 (15.4)	54.6 (34.1)	48.9 (21.9)
Social desirability	5.6 (3.2) †	5.8 (3.4)	5.4 (2.4)

Note: † denotes values obtained from Reynolds et al. (1982) sample of non-offending adults ($n = 608$).

5.3.2. Accuracy of expression recognition

Statistical analyses were carried out using SPSS 17 for Microsoft Windows. A mixed model analysis of covariance (ANCOVA) was used to explore the effects of offence type and levels of primary and secondary psychopathic traits and social phobia on accuracy of facial expression recognition. Due to low levels of recognition for 10% intensity, only the higher intensity faces (55%, 100%) were included in the following analysis. The analysis contained the with-in subject factors intensity (moderate, high), sex of model (female, male), and emotion expressed (anger, disgust, fear, happy, sad, surprise), with group (non-offender, sex offender, violent offender) as a between subjects variable. Scores on the primary and secondary psychopathy scales and Liebowitz Social Anxiety Scale were also included as between subject covariates. As the primary interest of this paper was between group differences in facial expression recognition, and the moderating effects of psychopathic

traits and social phobia, the discussion and results will focus on those findings which show an interaction with group, psychopathic traits, or social phobia.

5.3.2.1. Expression recognition

A significant interaction of expression type with group was observed ($F(10, 175) = 2.02$, $p < .05$, $\eta^2 = .10$). In order to further understand this interaction, separate ANCOVAs were performed for each expression type with the within subject factors intensity and sex and the between subject factor of group (sex, violent, control). Primary and secondary psychopathic traits and social phobia were included as covariates. The analysis revealed a significant main effect of group for fearful facial expressions of emotion $F(2, 35) = 3.39$, $p < .05$, $\eta^2 = .16$. An independent samples t-test was used to compare fear recognition abilities between sexual offenders and violent offenders. This test showed no significant difference in fear recognition for sexual and violent offenders ($t = -.15$, $df = 28$, $p > .05$). A further independent samples t-test was used to test for differences in fear recognition in offenders, collapsed across offence type, and non-offender controls. Fear recognition abilities were found to be significantly reduced among sexual and violent offenders relative to controls ($t = -2.78$, $df = 40$, $p < .01$). Figure 15 shows recognition accuracy for all expressions collapsed across intensities and sex of model, for non-offender controls, sexual offenders, and violent offenders.

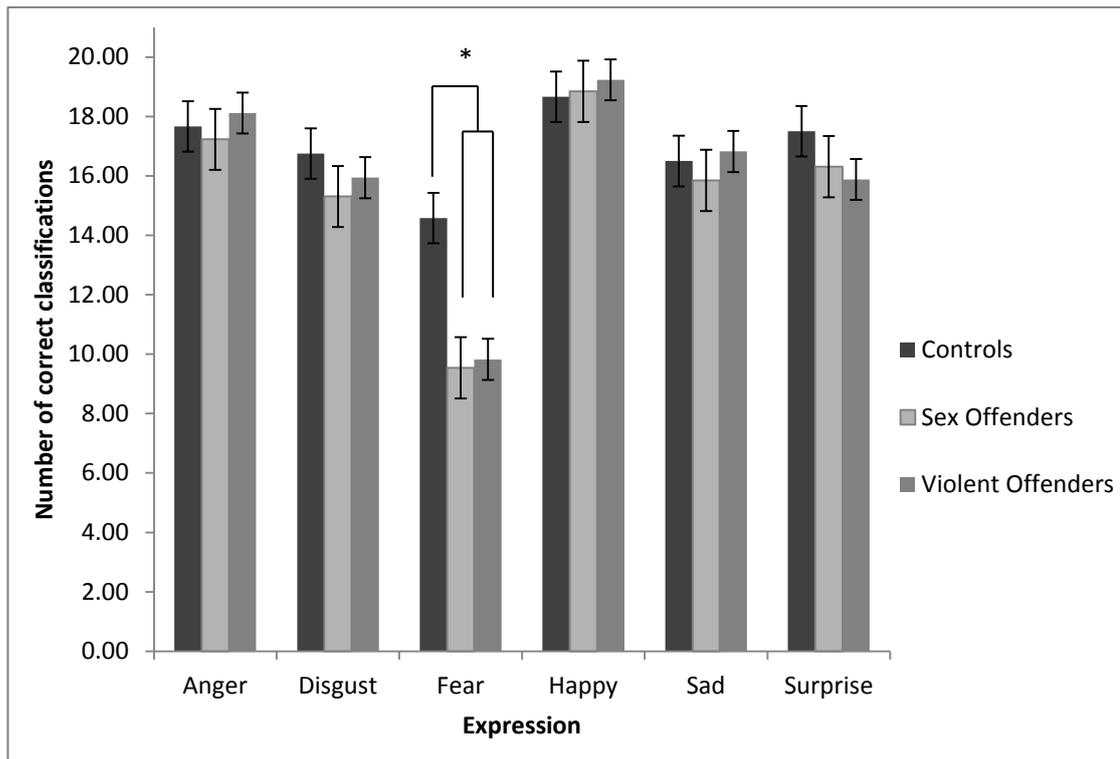


Figure 15. Mean accuracy ratings for classifying facial expressions of emotion of moderate (55%) and high (100%) intensity, for non-offending controls, sex offenders, and violent offenders. Error bars indicate standard error of the mean.

5.3.2.2. Effects of Primary Psychopathy

The analysis also revealed an effect of expression which was modulated by primary psychopathic traits ($F(5, 175) = 2.78, p < .05, \eta^2 = .07$). In order to further understand the effects of primary psychopathic traits on recognition, partial correlations were computed for primary psychopathy with accuracy for each expression, collapsed across intensity and sex, controlling for the effects of social phobia and secondary psychopathy. This analysis revealed a significant inverse correlation of primary psychopathic traits with fearful expression recognition ($r = -.33, p < .05$) indicating that higher levels of primary psychopathic traits were

associated with a deficit in fearful face recognition (see Figure 16). Correlations for all other expressions were non-significant ($p > .05$).

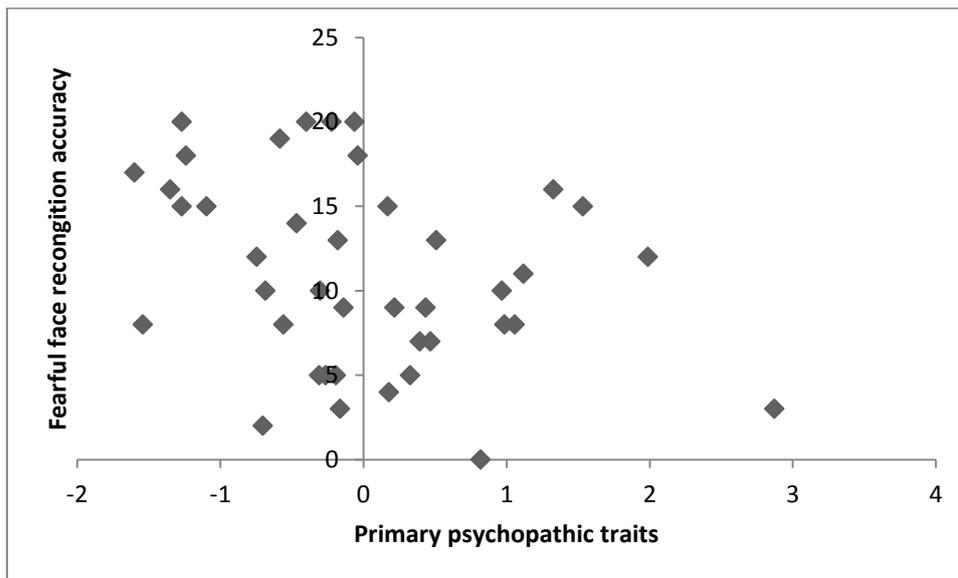


Figure 16. Scatter plot showing partial correlation ($r = -.33, p < .05$) of standardised residuals for primary psychopathic traits controlling for secondary psychopathic traits and social phobia (x) with accuracy of fearful facial expression recognition (y).

5.3.2.3. Effects of Secondary Psychopathy

A significant interaction of sex and expression was identified, which was modulated by secondary psychopathic traits ($F(5, 175) = 2.45, p < .05, \eta^2 = .07$). In order to further understand this interaction, separate ANCOVAs were performed for each expression with the within subject factor sex, controlling for the effects of primary and secondary psychopathic traits and social phobia. The analysis showed an effect of sex which was modulated by secondary psychopathic traits for surprised expressions ($F(1, 35) = 9.73, p <$

.01, $\eta^2 = .22$). To further examine this effect, secondary psychopathic traits were correlated with the accuracy for surprised female faces relative to surprised male faces (female-male), collapsed across intensities. Using a partial correlation to control for levels of primary psychopathic traits and social phobia, a significant inverse correlation was observed of secondary psychopathic traits with recognition accuracy for surprised female relative to male faces ($r = -.45, p < .01$). This result indicates that participants scoring higher for secondary psychopathy showed poorer surprise recognition for female relative to male faces (see Figure 17).

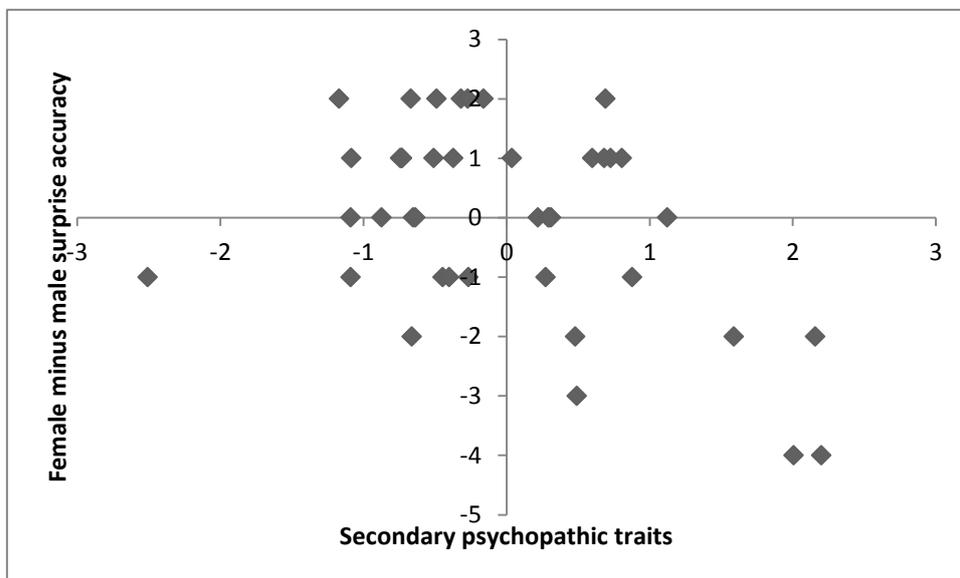


Figure 17. Scatter plot showing partial correlation ($r = -.45, p < .01$) of standardised residuals for secondary psychopathic traits controlling for primary psychopathic traits and social phobia (x) with accuracy for female relative to male surprised facial expression recognition (y).

5.3.2.4. Effects of Social Phobia

An interaction of social phobia with sex of model was observed which was independent of expression and intensity ($F(1, 35) = 4.97, p < .05, \eta^2 = .12$). To better understand this effect the difference in accuracy for female relative to male faces (female-male) was

calculated collapsed across all expressions and intensities. A correlation of social phobia with accuracy for female relative to male expression recognition was computed, controlling for the effects of primary and secondary psychopathic traits. A significant inverse correlation was observed of social phobia with recognition of female relative to male facial expressions ($r = -.35, p < .05$). This result may indicate that increasing levels of social phobia are linked with a reduction in accuracy for the classification of opposite sex relative to same sex faces (see Figure 18).

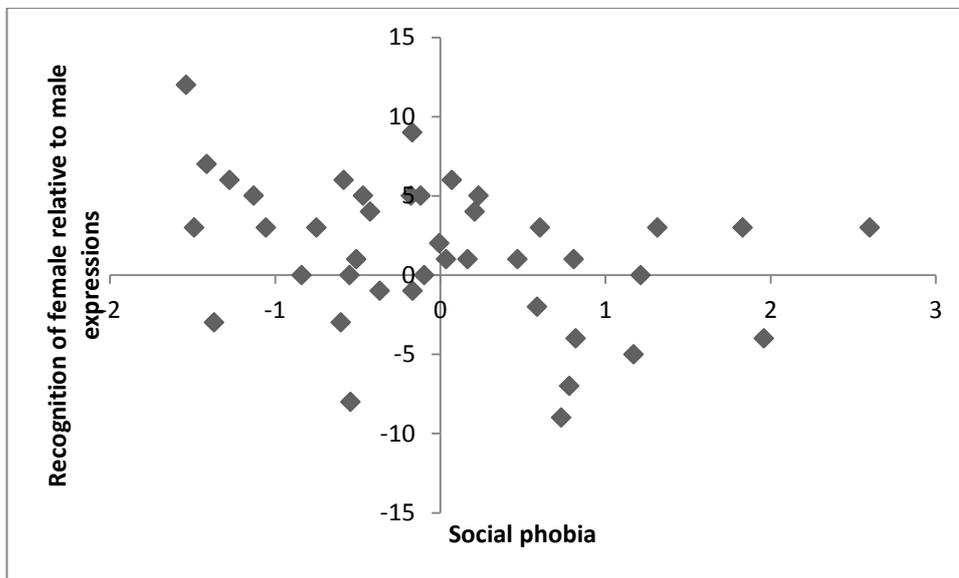


Figure 18. Scatter plot showing partial correlation ($r = -.35, p < .05$) of standardised residuals for social phobia controlling for primary and secondary psychopathic traits (x) with accuracy for female relative to male facial expression recognition (y).

5.3.2.5. Age effects on expression recognition

Given the large age discrepancies between the three groups of participants, a one way ANOVA was conducted to examine whether or not age was likely to be a statistically relevant factor in the analyses of expression recognition. The ANOVA revealed significant age

differences between the three groups $F(2, 41) = 36.71, p < .001, \eta^2 = .65$. Post-hoc tests using a Bonferroni correction procedure showed significant differences in age between sex offenders and violent offenders ($p < .001$) and between both sexual and violent offenders and normal controls ($p < .001$). To investigate the potential influence of age on emotional expression recognition, age was correlated with accuracy for each expression type collapsed across sex and level of intensity. All correlations revealed no relationship between age and accuracy of expression recognition (all $p > .05$). However, it should be noted that this analysis is confounded by clear age differences between groups, with the higher age strata only occurring in the offender subgroups. Nonetheless, the lack of an association between age and expression may be indicative that age is unlikely to represent a confounding factor in the finding of differences in expression recognition.

5.3.2.6. Misclassification errors

5.3.2.6.1. Misclassification errors for calm faces

A mixed model ANCOVA revealed a significant interaction of misclassification type with primary psychopathic traits $F(5, 120) = 2.63, p < .05, \eta^2 = .01$. To better understand this interaction, partial correlations of primary psychopathy with the number of each type of misclassification were computed, controlling for the effects of secondary psychopathy and social phobia. Correlation analysis revealed increasing levels of primary psychopathic traits were associated with a lower number of angry ($r = -.43, p < .05$) (see Figure 19) and fear ($r = -.40, p < .05$) (see Figure 20) classifications for calm faces. These findings indicate that at higher levels of primary psychopathic traits there was a reduced tendency toward the misclassification of calm expressions as either fearful or angry expressions. All other correlations were non-significant ($p > .05$).

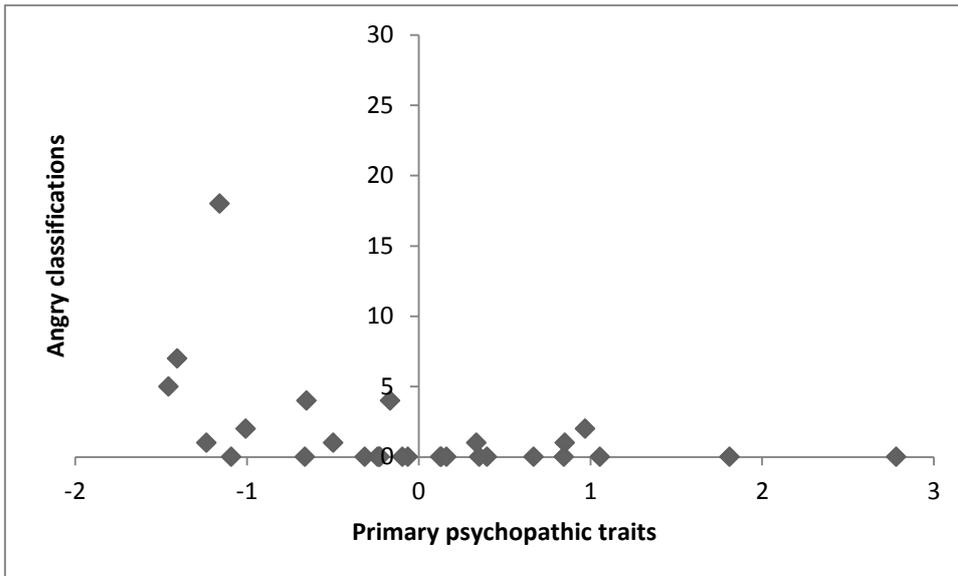


Figure 19. Scatter plot showing partial correlation ($r = -.43$, $p < .05$) of standardised residuals for primary psychopathic traits controlling for secondary psychopathic traits and social phobia (x) with angry misclassification errors for calm faces (y).

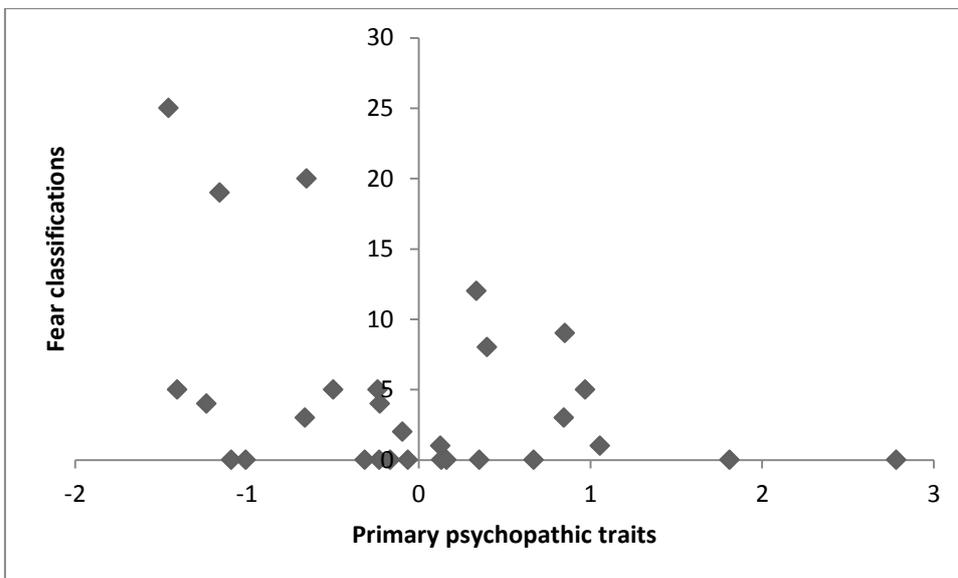


Figure 20. Scatter plot showing partial correlation ($r = -.40$, $p < .05$) of standardised residuals for primary psychopathic traits controlling for secondary psychopathic traits and social phobia (x) with fearful misclassification errors for calm faces (y).

5.3.2.6.2. Misclassification errors for fearful faces

A mixed model ANCOVA revealed a significant three-way interaction of expression and level of intensity with secondary psychopathic traits $F(5, 120) = 2.44, p < .05, \eta^2 = .09$. To better understand this interaction, separate ANCOVAs were conducted for each level of intensity across all participants, with the factor misclassification type and primary and secondary psychopathic traits and social phobia as covariates. An analysis of moderate intensity expressions revealed an interaction of misclassification type with secondary psychopathic traits $F(5, 120) = 4.79, p < .05, \eta^2 = .17$. A partial correlation of secondary psychopathic traits with the number of each misclassification type controlling for primary psychopathic traits and social phobia showed a positive correlation of disgust classifications with secondary psychopathic traits ($r = .46, p < .05$) (see Figure 21), suggesting that those with elevated levels of secondary psychopathic traits show a bias toward classifying fearful faces as disgust. Partial correlation analysis also showed a negative correlation between number of surprise classifications and secondary psychopathic traits ($r = -.43, p < .05$) (see Figure 22). The ANCOVA for high intensity faces revealed no significant interaction of misclassification type with secondary psychopathic traits $F(5, 120) = .62, p > .05, \eta^2 = .03$.

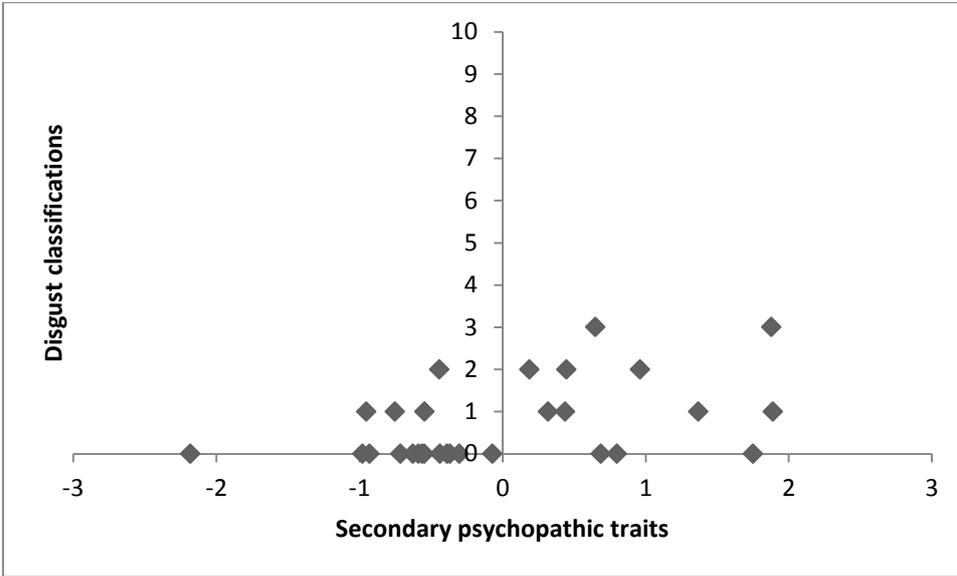


Figure 21. Scatter plot showing partial correlation ($r = .46, p < .05$) of standardised residuals for secondary psychopathic traits controlling for primary psychopathic traits and social phobia (x) with disgust misclassification errors for fearful faces (y).

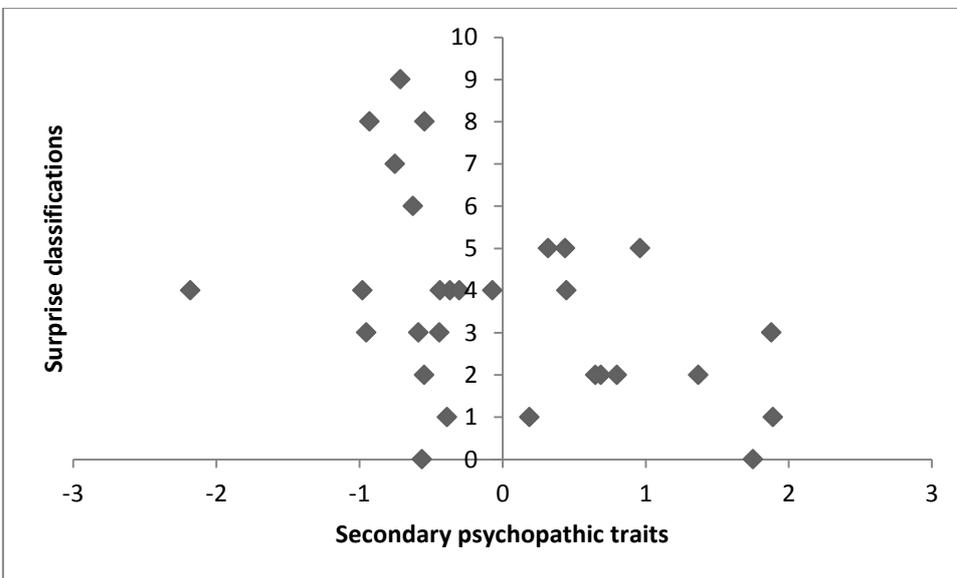


Figure 22. Scatter plot showing partial correlation ($r = -.43, p < .05$) of standardised residuals for secondary psychopathic traits controlling for primary psychopathic traits and social phobia (x) with surprise misclassification errors for fearful faces.

5.4. Discussion

The aim of the present study was to measure expression recognition, an important prerequisite for affective empathy, among sexual and violent offenders and non-offenders. According to a *'fine cuts'* approach to empathic functioning, advocated by Blair (2008), recognising others outward expressions of emotion represents an important component of affective empathy, while cognitive empathy is more heavily reliant upon theory of mind and perspective taking abilities. It was hypothesised that both sexual and violent offenders would show a deficit for fearful and sad expressions relative to other emotions. Such a pattern of performance may be associated with a breakdown in affective empathy among sexual offenders which is similar to that previously observed among violent and more generally anti-social populations (Marsh & Blair, 2008). A further aim was to investigate the extent to which deficits in expression recognition were independent of levels of primary and secondary psychopathic traits and social phobia.

The results revealed a deficit in the recognition of fearful relative to other facial expressions among sexual and violent offenders. Furthermore, this deficit was independent of primary and secondary psychopathic traits and social phobia. However, contrary to hypotheses, analyses failed to reveal a deficit in the recognition of sad emotional expressions among either type of offender. These results may be indicative of deficient levels of affective empathy among sexual offenders, including rapists and child sexual abusers, and violent offenders. Although some researchers have successfully demonstrated lower levels of global empathy in sexual offenders (Polashek, 2003), findings have been conflicting and fail to reliably distinguish between cognitive and affective empathy.

Based on these results, sex offenders may present with a breakdown in the Violence Inhibition Mechanism (VIM), postulated by Blair (1995, 2001) to account for failures in aggression withdrawal in response to others cues of distress. These results therefore provide support for earlier conceptual models of sexual violence which cite deficiencies in violence inhibition in the aetiology of sexual offending (Marshall & Barbaree, 1990). Furthermore, Barbaree and Marshall (1991) argued that a deficiency in violence inhibition may explain increased sexual arousal in response to rape stimuli among adult male rapists. However, while Blair (1995, 2001) emphasises the role of psychopathy in the breakdown of the violence inhibition mechanism, fear recognition deficits in the current sex offender sample, similar to results for violent offenders, were found to be significant after controlling for levels of primary and secondary psychopathic traits. Thus, the results of the current research might preclude psychopathy based accounts of this problem.

Despite this finding, the current results nonetheless support a link between the selfish, uncaring traits of primary psychopathy and reduced accuracy in fearful face recognition. Results revealed a significant inverse correlation between primary psychopathic traits and the classification accuracy for fearful facial expressions. Furthermore, this correlation was observed across all participants (including offenders and non-offenders) and may therefore support of a continuum based account of psychopathy. Consistent with these findings, Seara-Cardoso, Neumann, Roiser, McCrory, and Viding (2012) note that taxometric studies support the notion of psychopathy as a dimensional construct, rather than a qualitatively distinct category of behaviour (also see Hare & Neumann, 2008). Thus, establishing linear relationships of psychopathic traits with behavioural and other variables may add to our understanding of psychopathy beyond the study of extreme groups with a formal PCL-R

diagnosis of psychopathy. Despite the strong evidence for continuum based accounts of psychopathy, caution should nonetheless be urged in making generalisation to clinically relevant forms of psychopathy on the basis of psychopathic trait information.

Findings also showed a relationship between secondary psychopathic traits and recognition of female relative to male faces expressing surprise. This finding indicated that increasing levels of secondary psychopathic traits were associated with a reduced ability to correctly classify female relative surprised expressions. Difficulty in decoding female emotional expressions has been noted among healthy male participants, with errors typically due to the misclassification of one emotion as another (Thayer & Johnsen, 2000). This effect may be exacerbated by increasing levels of secondary psychopathic traits. In addition, the selective nature of this result may reflect the relative ambiguity of surprised expressions. For example, Smith, Cottrell, Gosselin, and Schyns (2005) noted that fearful and surprised expressions are transmitted with a high degree of overlap in terms of location (eye region, mouth region) of diagnostic information for expression classification. A potential explanation is that secondary psychopathic traits may impair the fine grained abilities to disentangle the available information for these two expressions.

It was also found that recognition accuracy for female relative to male faces was inversely correlated with scores on the Liebowitz Social Anxiety Scale. As noted above, it has been found that male participants show increased difficulty in correctly classifying female emotional expressions (Thayer & Johnsen, 2000). These results would suggest that this difficulty is most evident in those with heightened levels of social phobia. Sex offenders have been shown to present with heightened levels of social phobia (Baxter et al., 1984) intimacy deficits and exaggerated fears of intimacy (Marshall, 1989). These traits may be

compounded by a deficit in the recognition of female emotional states making appropriate emotional responding problematic. The finding of a negative association between social phobia and female emotional expression recognition suggests a reduced ability to process female socio-emotional cues. Thus, high levels of social phobia may contribute to the offence process for those with adult female victims, whereby emotional facial expressions may be either misinterpreted or misperceived. Furthermore, a failure to correctly categorise females' emotional states may contribute to intimacy deficits and conflicts in intimate relationships. Such factors have been identified as areas of problematic psychological functioning linked with sex offense recidivism (Hanson & Morton-Bourgon, 2005).

Results from analyses of misclassification errors failed to support the notion of a hostile attribution bias among those with high secondary psychopathic traits. However, those with high secondary psychopathic traits did show an increased tendency to attribute disgust to fearful faces. This contrasts with the findings of Dadds et al. (2006) who showed a similar pattern of performance among children with high CU traits, thus indicative of a relationship with primary rather than secondary psychopathic traits. Secondary psychopathic traits were also linked with fewer surprise errors for fearful faces. Those with high primary psychopathic traits showed an inverse hostile attribution bias, misclassifying calm faces as angry less often than those with lower primary psychopathic traits. Thus, those with high primary psychopathic traits may show a reduced tendency to perceive hostility in others neutral expressions. Primary psychopathic traits were also associated with a reduced tendency to attribute fear to calm faces.

Although the findings presented in this chapter suggest deficits in fearful face recognition among sexual offenders, it remains unclear how this deficit relates to specific

types of sexual offender. For example, it is highlighted by Mitchell and Beech (2011) that individuals who perpetrate offences of a paedophilic nature typically show heightened levels of social phobia. Thus, although social phobia has been linked with abnormalities in the processing of facial emotional stimuli, these abnormalities typically reflect heightened levels of amygdala activation (Stein et al., 2002). The pattern of fearful face recognition observed among paedophilic offenders may therefore be distinguishable from that observed among adult rapists and violent offenders. However, such hypotheses could not be tested in the current experiment due to mixed nature of the sex offender sample recruited. This sampling issue therefore limits the extent to which these findings can be applied to understanding differences between different types of sexual offender and violent offenders compared with healthy controls. Hypotheses outlined by Mitchell and Beech (2011) could however be tested using a similar expression recognition task alongside personality inventories used to measure social phobia and psychopathy.

To summarise, these results show that both sexual and violent offenders present with deficits in the recognition of fearful facial displays of affect. These results are consistent with those of Gery et al. (2009) who showed deficits in fear recognition among sexual offenders after controlling for depression and anxiety. The effect observed in the present study was found to be independent of both levels of primary and secondary psychopathic traits and social phobia. This fear recognition deficit among sexual and violent offenders is indicative of a reduced ability to process others distress cues. Furthermore, results showed a global deficit in the recognition of female emotional expressions in relation to elevated levels of social phobia. High levels of social phobia may therefore lead to problems in making appropriate emotional responses during interactions with adult females. A failure to

appropriately process female emotional expressions may also be associated with problems in affective empathy when responding to female distress cues.

Although these results suggest deficits in affective empathy among sexual and violent offenders, with facial affect recognition judged to represent a prerequisite for affective empathy, models of empathy in sex offenders promote a distinction between cognitive and affective empathy (Mann & Barnett, 2013, Barnett & Mann, 2013, Marshall et al., 1995). Thus, it is important that future research should utilise objective tests, including advanced theory of mind and perspective taking tasks alongside tasks of affective empathy, to reveal a more precise understanding of these '*fine cuts*' of empathy in sexual and violent offending.

Ultimately the results of the current research suggest the need to develop intervention strategies with a focus on affective empathy in sexual and violent offenders. One of the aims of such interventions may be to aid offenders in adapting strategies which are associated with improved facial affect recognition. For example, it has been shown that reduced accuracy in fearful face recognition among children with callous-unemotional traits is linked with a reduced number of fixations on the eye region of emotionally expressive faces (Dadds, El Masry, Wimalaweera, & Guastella, 2008). Furthermore, an instruction to fixate the eye region of these faces was associated with improvements in classification accuracy (Dadds et al., 2008). The use of eye tracking methodologies may therefore help to elucidate the underlying mechanisms for fearful face recognition while helping to inform future programs for intervention with sexual and violent offenders.

Chapter 6: General Discussion

6.1. Restatement of aims

Since the early description of psychopathy as the '*Mask of Sanity*' (Cleckley, 1941) and the advent of the PCL-R for the assessment of psychopathic personality, large gains in knowledge and research on the topic have furthered our understating of this syndrome. Furthermore, the construct of psychopathy is clearly a useful one, with the inclusion of psychopathic personality in assessments of risk adding to predictive accuracy for violent and sexual recidivism (Hemphill et al, 1998). However, there remain important and unanswered questions around the construct of psychopathic personality. On-going issues in the understanding and measurement of psychopathic personality include the use of psychopathy as a taxonomic construct rather than a dimensional one (Edens et al., 2006; Seara-Cardoso et al., 2012), and the issue of psychopathic subtypes, particularly those of primary and secondary psychopathy (Skeem et al., 2003, 2007). Further complications involve the presence or absence of criminality as central component of psychopathic personality (Skeem & Cooke, 2010).

This thesis aimed to use objective experimental tests to examine the relationship of primary and secondary psychopathic traits with cognitive, affective and social psychological correlates of psychopathy among offenders and non-offenders. The results reported in this thesis: (i) provide support for the dimensionality of psychopathic personality; (ii) suggest differential effects of primary and secondary psychopathic personality traits; (iii) demonstrate markers of psychopathic personality among non-offending participants.

Some theorists, including for example Levenson et al. (1995) and Mealey (1995b) characterise primary psychopathy according to affective descriptors. Such descriptors include a callous disregard for others and a severe lack of remorse or guilt. Secondary psychopaths on the other hand are described more in terms of their behavioural characteristics, including high levels of impulsivity and antisocial deviance. However, as highlighted by Skeem et al. (2003) other models of psychopathy propose that primary and secondary variants may not be distinguishable on the basis of the psychopathic traits which characterise them (Karpman, 1941). Consistent with this position, Skeem et al. (2007) provide support for earlier descriptions of secondary psychopathy which emphasise the presence of heightened levels of neuroticism and anxiety relative to primary psychopaths (Karpman, 1941). The results presented in this thesis both challenge and support aspects of these contrasting models.

6.2. Implications and theoretical issues

Chapter 2 aimed to assess the differential relationships of primary and secondary psychopathic traits with social phobia, attachment insecurity and empathic functioning. The emotional detachment from others and lack of fear or anxiety commonly linked with primary psychopathic traits has led some theorists to propose a negative relationship between psychopathy and social phobia (Mitchell and Beech, 2011). This theoretical observation receives support from the findings of Hofmann et al. (2009) of an inverse relationship of self-reported psychopathic traits with social phobia among non-offenders. However, these results were not replicated in the findings of Chapter 2.

Although Hofmann et al. (2009) used a large, mixed sex sample ($n = 349$), the results obtained were very weak, ranging from $r = -.12$ for the full sample to $r = -.25$ in a male only

sample controlling for variables of affect and social desirability. Despite results being in the hypothesised direction, the use of the Social Psychopathy Scale (SPS; Edelman & Vivian, 1988) fails to distinguish between primary and secondary features of psychopathy. Furthermore, this scale predates the advent of two factor conceptualisations of psychopathy. Thus, the SPS may measure a psychopathy construct which is not consistent with current conceptualisations of psychopathy, and may be only loosely based on those core components outlined by Cleckley (1941) and Hare (1991). The failure to support a relationship between psychopathic traits and social phobia asks important questions about the extent to which psychopathic traits are linked with a reduction in levels of anxiety in a non-offending sample. However, it should be noted that opinion is divided as to whether social anxiety represents a discrete entity or whether it forms a continuum with trait anxiety (McWilliams & Cox, 2001). Results from Chapter 2 did however support the hypothesis that there would be positive associations between attachment anxiety, social phobia and emotional congruence with children, and between social phobia disgust sensitivity and fear of contamination. It is suggested that these constructs may be identified to a heightened degree among specialist, paedophilic sexual offenders.

Findings of Chapter 2 also showed that while both primary and secondary psychopathic traits are associated with elevated scores for attachment anxiety, only secondary psychopathic traits were associated with elevated levels of attachment avoidance. However, it was shown that when controlling for secondary psychopathic traits, there were no significant relationships between primary psychopathic traits and attachment anxiety or avoidance. Furthermore, when relationships were examined separately for male and female participants, male participants showed a unique relationship of primary psychopathy with

attachment anxiety, while female participants showed a unique relationship of secondary psychopathic traits with attachment avoidance. Thus, there may be gender differences in the relationship of attachment style to psychopathic traits.

Despite these methodological limitations, the results of this chapter may have implications for studies of attachment behaviour in psychopathy which fail to distinguish between the influence of emotional detachment features (Factor 1 of the PCL-R) and behavioural and antisocial features of psychopathy (Factor 2). The absence of a relationship between primary psychopathy and features of a dismissive style of attachment presents problems for theorists who emphasise emotional detachment as a central component of primary but not secondary psychopathy (Levenson et al., 1995, Mealey, 1995b). Rather, these findings suggest that attachment insecurity in general may be linked with the construct of psychopathy.

The results of Chapter 2 also have implications for the understanding of primary and secondary psychopathic personality traits in relation to empathic functioning. Results showed that while primary psychopathy was linked only with lower levels of emotional reactivity, suggestive of reduced levels of affective empathy in relation to the selfish and uncaring characteristics of primary psychopathy, secondary psychopathic traits were linked with a reduction in all three empathy subscales; emotional reactivity, social skills empathy, and cognitive empathy. Thus, secondary psychopathy may be linked with a general reduction in empathic functioning that is not specific to emotional reactivity. Taken together these results provide support for hypothesised characteristics of a generalist pattern of offending. Mitchell and Beech (2011) suggest that generalist offenders who show a mixed pattern of

offending and generally antisocial behaviour may show high levels of attachment insecurity, high levels of psychopathic personality, and poor empathic functioning.

The finding of an inverse relationship in Chapter 2 of primary and secondary psychopathic traits with affective empathy is consistent with the findings of Seara-Cardoso et al. (2012) who showed reduced empathic responses to fearful faces in relation to affective-interpersonal and lifestyle-antisocial features of psychopathy. However, the result was no longer present after controlling for the affective-interpersonal features of psychopathy, with the authors concluding that shared variance between affective-interpersonal and lifestyle-antisocial features may account for reduced responsiveness to fearful expressions. Seara-Cardoso et al. also showed that when controlling for affective-interpersonal features, lifestyle-antisocial features correlated positively with the empathic concern subscale of the Interpersonal Reactivity Index. Thus, these two sets of results clearly diverge in the direction of association between secondary psychopathic traits and empathic functioning.

These contrasting findings may reflect differences in the underlying constructs being measured by the secondary subscale of the Levenson Primary and Secondary Psychopathy Scale and the lifestyle-interpersonal dimension of the Self-Report Psychopathy Scale 4 Short Form. Alternatively, the empathic concern subscale of the Interpersonal Reactivity Index does not measure affective or cognitive empathy, as measured using the Empathy Quotient. Thus, investigating associations of psychopathic traits with empathy requires careful consideration of both the pattern of psychopathic traits being assessed and also a careful distinction between different forms of empathy. For example, Blair (2008) advocates a “*fine cuts*” approach to understanding empathy, distinguishing between affective and cognitive

empathy and their relationship to psychopathy and autism. However, such findings are nonetheless consistent with unique variance of primary and secondary psychopathic traits providing support for further support for theories of psychopathic variants, and are also consistent with the reported dimensionality of the psychopathy construct (Edens et al., 2006).

Chapter 3 aimed to examine the effects of primary and secondary personality traits on giving behaviour to members of the in- and the out-group using economical decision making games. The results of these experiments also demonstrated important differences in the behavioural responses associated with primary and secondary psychopathic traits. Earlier experiments investigating game theory in convicted psychopathic offenders has shown, as predicted, a pattern of selfish non-cooperation in relation to psychopathic traits (Mokros et al., 2008). These results also showed that non-cooperative responses were associated with the *'rebellious nonconformity'* and *'machiavellian egocentricity'* subscales on the PPI. Although it remains unclear to what extent these responses are associated with primary relative to secondary psychopathic traits, factor analytic studies of the PPI suggest that both the *'rebellious nonconformity'* and *'machiavellian egocentricity'* subscales load on to an Impulsive Antisociality factor (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005). The implication is that the non-cooperative responses among psychopathic offenders in Mokros et al. (2008) may be more closely linked with the secondary rather than the primary psychopathic variant.

Chapter 3 aimed to further the findings of Mokros et al. (2008) by examining the responses of non-offending participants on two economical decision making tasks. However, the group status of alleged partners in these computerised game situations was manipulated

such that participants believed that they were making offers to either members of the in-group (University of Birmingham) or the out-group (University of Manchester). Mealey (1995 a, b) suggests that social and situational factors may be important determinants of antisocial and selfish interactions in secondary psychopathy. Consistent with Mealey's theoretical model, the findings of experiment 2 showed that participants scoring high in secondary psychopathic traits made more selfish offers to members of the out-group relative to the in-group across both dictator game and ultimatum game trials. While these findings are consistent with the suggestion that non-cooperative responses may be associated with secondary psychopathic traits, they have the implication that responses may be guided by social factors and not reflective of a general pattern of antisocial responding.

Although in Chapter 3 participants with high secondary psychopathic traits demonstrated a pattern of out-group derogation, behaving less generously toward members of the out-group relative to the in-group, in-group social interactions were more similar to those with low levels of secondary psychopathic traits. In-group social interactions may therefore be better characterised by social emotions such as generosity or altruism among high secondary psychopathic traits individuals. These findings in relation to the in-group are in contrast to the findings of Chapter 2 which suggested a negative association of secondary psychopathic traits across three aspects of empathic functioning: emotional reactivity, social skills empathy and cognitive empathy. It has been theorised that both primary and secondary psychopaths may be characterised by features of emotional detachment (Karpman, 1941; Mealey 1995a, b). However, in relation to secondary psychopathic traits, such tendencies may only be evident during interactions with out-group members.

Additional analyses were also performed in Chapter 3 to examine the effects of gender of the on-screen player on the giving behaviour of female participants. The results of these analyses failed to show any differences in giving behaviour to the in- and the out-group among high secondary psychopathic participants. Although this analysis strategy was suboptimal, given that male participants were excluded from the analysis due to low numbers, these results may suggest that the initial findings could have been influenced by the gender of the on-screen player.

It is hypothesised that the effects observed in Chapter 3 may also generalise to other social emotions, including empathy, envy and gloating. However, the success of self-report and behavioural measures in detecting such effects may be dependent upon the ability of such measures to distinguish between responses to the in- and the out-group. Thus, the finding in Chapter 2 of a global empathy deficit in relation to secondary psychopathy may reflect a failure of the empathy quotient to differentiate between responses on the basis of social in-/out-group status.

Differential contributions of primary and secondary psychopathic traits were also observed in Chapter 4, where it was found that the unique variance of primary psychopathic traits was associated with abnormal eye scan paths for emotionally expressive faces. Results showed that there was an effect of primary psychopathy on dwell time for the eyes and the mouth, that is, those areas that provide important information for the processing of emotional expressions. More specifically, there was an inverse relationship of primary psychopathy, controlling for secondary psychopathic traits, with dwell time on the eyes relative to the mouth. This finding showed that those who reported the highest levels of

primary psychopathy showed a reduced tendency toward dwelling on the eyes of emotionally expressive faces.

Eye tracking methodologies have also been used by Dadds et al. (2008) to investigate the processing of emotional facial expressions among children and adolescents who present with callous and unemotional traits. The primary psychopathy subscale of the LPSP parallels the selfish and uncaring characteristics measured using Factor 1 of the PCL-R, with similar tendencies evident to a high degree in children who present with callous and unemotional traits. Thus, the findings of Chapter 4 are consistent with those of Dadds et al. (2008) whereby abnormal eye scan paths for emotionally expressive faces are linked with primary psychopathic traits. However, beyond the results of Dadds et al. (2008) and those reported in Chapter 4, eye scan paths have not otherwise been analysed in relation to the processing of emotional faces in psychopathy. The finding of deficits in facial expression recognition in psychopathy make it crucial that researchers gain a finer understanding of the mechanisms driving the recognition of emotional faces, as well as the potentially separable influences of primary and secondary psychopathic traits in adult participants.

Although the results of Chapter 4 suggest that abnormal eye scan paths are linked with the unique variance of primary psychopathic traits, secondary psychopathic traits were shown to be linked with an increase in dwell time on the eye and mouth region of sad female relative to sad male faces. Although this finding may reflect an increase in negative emotionality in relation to lifestyle/antisocial features of psychopathy, results failed to support a relationship between secondary psychopathic traits and trait anxiety. As such, the relationship between these constructs and the ways in which this impacts the processing of negative emotional expressions may be worthy of further investigation.

Chapter 4 also revealed that both primary and secondary psychopathic traits showed similar inverse relationships with recognition accuracy for disgusted expressions. The finding that both sets of traits were linked with a deficit in disgusted facial expression recognition is consistent with the conclusions of Seara-Cardoso et al. (2012). These authors showed that shared variances of affective-interpersonal and lifestyle-antisocial features are linked with reduced responsiveness to facial expressions of fear. Results are also consistent with those found by Kosson, Suchy, Mayer, and Libby (2002) who identified a deficit in disgust recognition among 34 psychopathic offenders. However, this effect was only significant for analyses of left handed responses. The findings of Chapter 4 failed to show a negative correlation of primary or secondary psychopathic traits with fearful expression recognition. Nonetheless, this result is consistent with previous negative findings of a deficit in fearful face recognition in relation to psychopathic traits among other non-offending samples (Del Gaizo & Falkenbach, 2008). The hypothesised effects of primary and secondary psychopathic traits on facial expression recognition may therefore be better investigated among incarcerated individuals showing more extreme levels of psychopathic personality.

Chapter 5 aimed to expand upon the findings of Chapter 4 in relation to facial expression recognition in psychopathy. Results indicated that sexual and violent offenders show a selective deficit in the recognition of fearful facial expressions relative to non-offenders. These results may offer potentially important insights in to neuropsychological functioning in sexual and violent offenders. The results of Chapter 5 also revealed that across all participants (sexual offenders, violent offenders, and non-sexual, non-violent offenders) there was an inverse relationship of primary psychopathic traits with fearful face recognition. Although earlier findings have shown a reduced ability to correctly classify

fearful facial expressions among incarcerated offenders with psychopathy (Blair et al., 2004) and adults with psychopathic characteristics (Montagne et al., 2005), these studies failed to investigate the separable influences of primary relative to secondary psychopathic traits. Furthermore, others have attempted and failed to establish the unique contributions of affective/interpersonal and lifestyle/antisocial features of psychopathy in an offending sample, concluding instead that total psychopathy scores are related to a general deficit in the classification of facial affect (Hastings, Tangney, & Stuewig, 2008). However, the absence of an effect in these studies may reflect a failure to test participants at two extreme ends of the distribution. Thus, an interaction of primary psychopathic traits with fearful face recognition in a mixed offender/non-offender sample represents a noteworthy finding and is consistent with the operationalisation of psychopathy as a dimensional construct (Edens et al., 2006; Guay et al., 2007).

A unique relationship of primary psychopathic traits with reduced accuracy for fearful face recognition is consistent with the finding of a unique relationship of primary psychopathic traits with reduced dwell time on the eye region of emotional facial expressions. Thus, the findings of Chapters 4 and 5 with adult male participants are consistent with those of Dadds et al. (2008) who examined eye scan paths and facial affect recognition in children and adolescents with callous and unemotional traits. On the basis of these studies it may be hypothesised that deficits in fearful face recognition in offending participants may be linked with a failure to fixate the eye region of emotionally expressive faces. More specifically, poor fearful face recognition in psychopathy may reflect decreased orienting of attention to increases in the eye white area observed in fearful facial expressions (Hardee, Thompson, & Puce, 2008).

Blair (1995, 2001) argues that a failure to recognise others expressions of emotion in psychopathy has implications for affective empathic functioning and violence inhibition. Mechanisms for violence inhibition refer to a failure to inhibit violent attacks as a result of a reduced ability to recognise and associate another's fear and submissive signals with aggressive behaviours. A relationship of primary psychopathic traits and affective empathy is supported by the results in Chapter 2 of this thesis. This experiment showed that primary psychopathic traits among non-offenders were associated with lower levels of emotional reactivity, or affective empathy, measured using the Empathy Quotient. Therefore, the finding of a decreased tendency to fixate the eye region of emotionally expressive faces, coupled with an associated deficit in fearful face recognition may have important implications for treating those with high primary psychopathic traits.

Improving eye gaze to the eye region and expected improvements in the recognition of fearful affect (see Dadds et al., 2006) may lead to increased desistance from violence among those with high primary psychopathic traits. Although Dadds et al. (2006) showed that an instruction to fixate the eye region in callous and unemotional traits children was associated with improved fear recognition, changes resulting from these instructions are unlikely to be long lasting and durable (Dadds et al., 2008). However, other interventions may lead to more desirable and long-term effects.

It should be noted that a failure to fixate the eye region is not specific to individuals with psychopathic traits. Indeed similar findings have been reported in the clinical literature, perhaps most notably in relation to autism (Pelphrey et al., 2002). Both individuals with autism and those with high levels of psychopathic traits show a similar underlying neuro-cognitive profile, characterised by abnormalities in amygdala activity in response to

emotional expressions (Deeley et al., 2006; Ashwin, Baron-Cohen, Wheelwright, O`Riordan, & Bullmore, 2007). Thus, it is important to note that although a failure to fixate the eye region of emotionally expressive faces and associated deficits in expression classification have been linked with reductions in affective empathy, these deficits are observed in autism as well as psychopathy. Thus, models of affective empathy based on such mechanisms do not offer a complete account for elevated levels of aggressive and instrumental violence among psychopaths, relative to healthy controls or individuals with autism (Kennett, 2002)

The distinction between affective and cognitive empathic functioning in psychopathy and in autism has been taken up by Blair (2008) in what he terms a *'fine cuts'* approach to empathy in these two disorders. Blair (2008) notes that although many popular models of autism historically refer to deficits in the recognition of affect, other accounts do not view such deficits as a principal component in the development of the disorder (see Baron-Cohen, 2006; U. Frith & Happe', 2005). Although some studies do present evidence for a deficit in the processing of emotional expressions in both autism and psychopathy, Blair (2008) argues that many of those studies with autistic samples are poorly controlled. However, as highlighted by Blair (2008) other methodologically sound studies have found evidence for such a deficit in autism.

Studies of facial expression recognition in autism present a confused picture with conflicting results. It is suggested by Blair (2008) that studies finding a deficit in expression recognition in autism may reflect impaired processing of faces more generally or impairments in other related processes, including attention and intelligence. Evidence for expression recognition impairments in these two disorders, albeit confusing in the case of autism, have led to amygdala based models of psychopathy and autism. Although these two

disorders have been linked with amygdala dysfunction, Blair (2008) argues that evidence for amygdala impairments in autism may reflect deficits in surrounding areas, notably the fusiform gyrus, an essential structure for the cognitive representation of facial stimuli. On the other hand however, amygdala based models of psychopathy focus up on the role of the amygdala in the learning of stimulus-reinforcement associations.

Blair (1995, 2001) describes how deficits in facial expression recognition and the formation of aversive stimulus-reinforcement associations may lead to a failure in the 'Violence Inhibition Mechanism.' While aversive stimulus-reinforcement learning has been shown to be compromised in psychopathy, research suggests that this process remains intact in autism. This difference may ultimately explain heightened levels of instrumental aggression in psychopathic, yet not autistic individuals.

Given the finding of expression recognition deficits in both psychopathy and autism, it may be possible to draw upon findings from the autism literature for designing interventions aimed at improving eye gaze and facial affect recognition in psychopathy. However, caution should also be urged in developing such interventions for use in psychopathy given the differential neurocognitive profiles associated with these two disorders, as discussed by Blair (2008). Interventions for facial affect recognition in autism which may be of use include the work of Bolte et al. (2002), who developed and evaluated a computer based program which aimed to improve accuracy in the correct classification of emotional expressions.

In a sample of adolescents and adults with high-functioning autism or Asperger's syndrome, Bolte et al. (2002) showed that a computer based program, over the course of a five-week intervention, led to significant improvements in the recognition of basic emotional expressions. This finding was true for expressions recognised from both the whole face and

the eyes. However, these changes were found to be linked to changes in neural activity in the superior parietal lobe and the medial occipital gyrus (Bolte et al., 2006). Such findings might suggest that improvements in facial expression recognition in autism are dependent upon improved processing of facial stimuli, rather than an improved ability to recognise emotional expressions *per se*. Thus, although training programmes may lead to improvements in facial emotional expression recognition, the mechanism of change may affect structures which are not central to the deficit observed in psychopathy. Furthermore, it is unlikely that such interventions would lead to improvements in the process of aversive conditioning, which is at the heart of many amygdala based models of psychopathy.

As well as computer training interventions, pharmacological interventions have also been suggested which may lead to improvements in the recognition of facial affect.

Pharmacological interventions include administration of the neuropeptide oxytocin. The intranasal administration of oxytocin has been shown to lead to improved abilities on the Reading the Mind in the Eyes Test (Domes et al., 2007). Additionally, relative to placebo, oxytocin has also been shown to improve performance on the Reading the Mind in the Eyes Test among participants with autism or Asperger's syndrome (Guastella et al., 2010).

However, as shown by the research of Dadds et al. (2006, 2008), children with callous and unemotional traits show improved performance when asked to specifically focus attention on the eyes. As the eye region represents the only emotional information available in the Reading the Mind in the Eyes Test, the extent to which intranasal oxytocin administration would be of therapeutic utility in the treatment of psychopathic personality is unclear.

Deficits in the recognition of facial affect in psychopathy are particularly evident when there are failures in the mechanisms which serve to focus attention on the eye region in the

spatial context of a face. Therefore it is of note that oxytocin has been shown to facilitate gaze to the eye region of emotionally expressive human faces (Guastella, Mitchell, & Dadds, 2008). Guastella et al. (2008) showed that following intranasal administration of oxytocin, participants showed an increase in the number of fixations, as well as longer gaze time on the eye region. Notwithstanding the findings of Guastella et al., the use of oxytocin in the treatment of psychopathy may be contraindicated by the findings of Mitchell et al. (2013), who found severely elevated levels of oxytocin in serious sexual and violent, mentally disordered in-patients, as well as a positive correlation of oxytocin levels with Factor 2 scores on the PCL-R.

These findings add to earlier reservations of Blair (2011) at the prospect of using oxytocin in the treatment of CU traits children. Specifically, Blair (2011) refers to the work of Dadds, Jambrak, Pasalich, Hawes, and Brennan (2011) who conclude that CU traits may be driven by failures to make eye contact with one's attachment figures early in development. Based on the conclusions of Dadds et al. (2011) oxytocin may have therapeutic benefits in treating CU traits children. However, Blair suggests that CU traits might instead stem from failures in the amygdala circuitry, and these failures drive the lack of eye contact with caregivers. According to this position, oxytocin would not represent a useful pharmacological intervention. Indeed, it is noted by Blair (2011) that oxytocin has been shown to reduce the amygdala response to fear inducing stimuli in healthy adult male participants (Kirsch et al., 2005). However, those who advocate a role of oxytocin in the treatment of CU traits children, via increasing attention to the eye region, would instead seek to increase the amygdala response. As such, research at present would not support the use of oxytocin with CU traits children (Blair, 2011).

Although Chapter 5 supported the hypothesis that primary psychopathic traits would be negatively correlated with accuracy of fearful face recognition, it should be noted that scores on the LPSP among sexual and violent offenders remain unexpectedly similar to those scores recorded for non-offenders. These low scores on the LPSP in offending participants may reflect 'pitfalls' of self-report inventories which are open to deception and socially desirable response biases (Lilienfeld & Fowler, 2006). This may be particularly problematic when used with offending participants who may present with a deceitful and manipulative interpersonal style. Furthermore, Lilienfeld and Fowler (2006) note that social desirability may be of particular concern when using self-report inventories for the measurement of psychopathic personality, with deceitfulness and malingering inherent aspects of the psychopathy construct. Furthermore, "pathological lying" and "conning/manipulative" have been recognised as affective/interpersonal features of psychopathy on Factor 1 of the Hare PCL-R (Hare, 1991). Nonetheless, it should be noted that sexual and violent offenders tested for Chapter 5 scored similar to a large sample of college students on a measure of socially desirable responding.

Although one should proceed with caution in interpreting results based on self-report psychopathy inventories, low levels of positive impression management and malingering have been identified in relation to self-reported psychopathy scores (Lilienfeld & Fowler, 2006). For example, across a series of development and validation studies of the PPI, a measure of self-reported psychopathy for use with non-criminal populations, results showed that PPI total scores were either unrelated or only weakly related to various measures of social desirability and response bias (Ray, Hall, Rivera-Hudson, Poythress, Lilienfeld, & Morano, 2013).

Further studies have investigated the relationship of the PPI with aptitude for malingering, showing similarly reassuring findings for the use of self-report psychopathy scales. In an investigation of malingering success on a self-report psychopathy measure, Edens, Buffington, and Tomicic (2000) examined whether psychopathic personality is (a) linked with a greater self-efficacy for malingering and (b) a greater likelihood of attempting to malingering. A sample of 143 non-offending participants was asked to complete the PPI under two conditions: responding in an honest fashion during the first condition while being instructed to feign psychosis in the second condition. Although results revealed that psychopathic personality was not associated with greater success at malingering when instructed to do so, there were correlations of PPI scores with willingness to malingering. There were also significant, weak positive correlations of PPI scores with perceived ability to fake a mental disorder for some instrumental gain and perceived ability fake a mental disorder without detection. Although these results suggest that those with high psychopathic traits may demonstrate a greater willingness to malingering, there are no differences in success rates for malingering between those with high and low psychopathy scores. These results provide support for the use of self-report psychopathy scales, yet fail to support for the hypothesis that those with higher psychopathy scores are more likely to be successful at faking on self-report measures.

Further difficulties associated with the measurement of psychopathic personality traits include low prevalence rates of psychopathy in the general community and differences in prevalence between male and female participants. For example, Coid et al. (2009) noted a low prevalence of psychopathy in the general household population of Great Britain, with a weighted prevalence for 'possible' psychopathy of 2.3% in a representative sample of 638

participants aged 16-74, living in private households in England, Wales and Scotland. The weighted prevalence for male participants was 3.7% and 0.9% for women (Coid et al., 2009). However, at a more stringent cut-off point for psychopathy, prevalence rates were even lower, with the prevalence of possible psychopathy estimated at 0.6%; 1.3% in men and 0% in females (Coid et al., 2009). As such, there may be a potential floor effect imposed by studies which seek to examine psychopathic traits among non-offending participants. This limitation of studying psychopathic traits in the general community may be of particular significance for Chapters 2, 3 and 4 of this thesis. However, low levels of psychopathic traits were also observed among offending participants in Chapter 5.

The low prevalence of psychopathic traits in the general community may have implications for drawing conclusions about clinical psychopathy on the basis of psychopathic trait information. At low levels of psychopathy, there may be difference in the relationship between psychopathic traits and related constructs relative to those observed among clinical psychopaths. For example, it was noted by Coid et al. (2009) that at low levels of psychopathy, there was an association of psychopathic traits with obsessive-compulsive disorder. However, similar relationships are largely absent at higher levels of psychopathy. As such, although findings from psychopathic traits in the general population may contribute to understanding of the psychopathy construct and highlight the cognitive, affective and behavioural correlates of primary and secondary psychopathic traits, caution should be urged in making generalisations to clinical psychopathy on the basis of these results.

As well as a low prevalence of psychopathy in the general population, the results of Coid et al. (2009) also suggest that there may either be differences in the distribution of psychopathic traits between males and females or that there may be a gender bias in the

identification and manifestation of psychopathic features. It has also been suggested however that certain traits may be more difficult to measure in female samples (Salekin et al., 2001) or that some psychopathic features may manifest differently in females (Hare, 2003). Consistent with sex differences in the prevalence, measurement and identification, or manifestation of psychopathic traits between males and females, differential associations of psychopathic traits with attachment anxiety and avoidance and empathic functioning were observed in Chapter 2. In addition, the findings from Chapter 3 of an intergroup bias in high secondary psychopathic traits individuals were based on a majority sample of female participants. As such, the extent to which these findings may apply to male participants is currently unknown.

6.3. Summary

To summarise, in contrast to findings for primary psychopathic traits, secondary traits were not linked with a general decrease in dwell time on the eye region of emotionally expressive faces. Moreover, secondary psychopathic traits failed to interact with facial expression recognition in Chapter 5. This was in contrast to the finding of an inverse relationship of primary psychopathic traits with fearful face recognition in a mixed sample of offenders and non-offenders. However, secondary psychopathy was nonetheless associated with reductions in empathic functioning as measured using the subscales of the Empathy Quotient in Chapter 2. In contrast to primary psychopathy which only showed a relationship with emotional reactivity, secondary psychopathic traits were found to inversely correlate with emotional reactivity, social skills empathy and cognitive empathy, indicative of a general deficiency in empathic functioning in high secondary psychopathic traits individuals.

The finding of reduced empathic functioning in relation to secondary psychopathy may not be clear cut however. The results of Chapter 3 suggest that secondary psychopathic personality traits may be associated with an exaggerated intergroup bias. It was found that across 2 tasks high secondary psychopathy individuals show a bias toward out-group derogation. For example, while making dictator game responses high secondary psychopathy participants showed apparently normal giving behaviour to the in-group coupled with unfair offers to the out-group. High secondary psychopathy participants again showed an intergroup bias in their ultimatum offers, with increased levels of generosity evident during in-group relative to out-group interactions. Conversely however, there were no differences in giving behaviour on either task between low and high scoring primary psychopathy participants.

From a theoretical point of view, an exaggerated intergroup bias in secondary psychopathy may be related to levels of the neuropeptide oxytocin. Mitchell et al. (2013) have shown elevated levels of the oxytocin peptide among incarcerated sexual and violent offenders with clinical levels of psychopathic personality, as diagnosed using the PCL-R. More specifically, oxytocin levels were positively associated with PCL-R Factor 2 scores, with item specific correlations of oxytocin levels with lifestyle/antisocial features of psychopathy (Mitchell et al., 2013). Of relevance to secondary psychopathic personality traits therefore, it has been shown that the oxytocin peptide has a complex role in social cognition.

Although the results of early studies suggested a role of oxytocin in the experience of pro-social emotions including generosity (Zak et al., 2007) and trust (Baumgartner et al., 2008), other findings fail to support a purely pro-social view of oxytocin in social cognition. For example, it has been shown that intranasal administration of oxytocin leads to increased

levels of envy and gloating (Shamay-Tsoory et al., 2009). Also of note are the more recent findings of De Dreu and colleagues (2010, 2011). These findings emphasise a central role of oxytocin in intergroup conflict and in-group liking (De Dreu et al., 2010, 2011). These results suggest that the experience of social emotions associated with oxytocin may be subject to intergroup processes.

Results from the wider social cognition literature therefore suggest that elevated levels of oxytocin in secondary psychopathy may have implications for the experience of social emotions in response to members of the in-group versus the out-group. For example, those with elevated levels of secondary psychopathy would be expected to show higher levels of empathy and generosity, and lower levels of envy and gloating in response to the in-group relative to the out-group. The findings of experiment 2 provide initial support for this set of hypotheses.

The finding of an increased intergroup bias in secondary psychopathy may have practical implications for understanding behaviours driven by in-group liking or out-group derogation. It may be hypothesised that individuals who show aggressive behaviours directed against members of the out-group would also show heightened levels of secondary psychopathic personality traits. Such behaviours are characteristic of individuals involved in a gang culture who show lifestyle and antisocial features of psychopathy and perpetrate acts of violent aggression against rival gangs. However, variants of psychopath who closely resemble the secondary prototype may be hard to classify. Although secondary psychopathic traits may be tapped using measures such as Factor 2 of the PCL-R, or the secondary subscale of the LPSP, such measures fail to take in to account levels of trait anxiety. It is important to note that original conceptualisations of the secondary variant of psychopath emphasised high levels of

trait anxiety or neuroticism (Karpman, 1941). Furthermore, measures of trait anxiety have been shown to distinguish between primary and secondary variants in offending and non-offending samples (Vassileva et al., 2005; Falekenbach et al., 2008). As such, future research which seeks to explore the correlates and characteristic features of secondary psychopaths should aim to operationalise trait anxiety or include items pertaining to trait anxiety in measures of lifestyle/antisocial features of psychopathy.

6.4. Conclusion

The experiments reported in this thesis present various findings relating to the cognitive, affective and social psychological process associated with primary and secondary psychopathic personality traits. Results reported here are consistent with dimensional theories of psychopathy, with correlations of psychopathic personality traits observed with empathic function, eye scan paths, emotional face recognition and generosity in economical decision making games. This thesis also demonstrates unique relationships of primary and secondary psychopathic traits with cognitive, affective and social psychological correlates. While recent theoretical conceptions of psychopathy acknowledge the construct of psychopathy as multi-faceted (Cooke et al., 2006; Hicks & Patrick, 2006), many investigators fail to separately analyse the separable and unique contributions of interpersonal/affective and lifestyle/antisocial features of psychopathy. This may be to the detriment of progress in the formal understanding of psychopathic personality.

The dimensional and multi-faceted nature of psychopathy is supported by results showing that primary psychopathic traits were linked with emotional detachment features of psychopathy, including lower levels of emotional reactivity, a failure to fixate the eye region of emotionally expressive faces, and impairments in fearful face recognition. These

findings are consistent with theoretical models of psychopathy proposed by Levenson et al. (1995) and Mealey (1995a, b). Mealey's (1995b) theory of psychopathy is further supported by high secondary psychopathic traits participants' differential response pattern for in- and out-group members during economical decision making games. These findings support the theoretical position that secondary psychopaths would not show a general pattern of selfish responding, but would be sensitive to the situational demands of the interaction.

The finding of an enhanced intergroup bias in high secondary psychopathic traits participants may have implications for future theorising on social cognition in psychopathy. When considered in light of the finding of high levels of oxytocin in relation to PCL-R Factor 2 scores in a clinical population, these findings may contribute to neurobiological models of secondary psychopathy. Such models may be formally tested using manipulations of group status coupled with measurement of oxytocin levels in clinical and non-clinical samples. Such experiments should aim to measure interpersonal emotions including empathy, guilt, altruism, trust, and envy and gloating, as well as examining behavioural responses to members of the in-group and the out-group.

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