

**Cardiff University, School of Psychology**

**Emotion functioning in a young offender sample**

Katharine Louise Bowen

Submitted in partial fulfilment  
of the requirements for the degree of  
Doctor of Philosophy

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This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

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## Summary of Thesis

This thesis examined the role of emotion functioning in adolescent antisocial behaviour, and considered whether more serious forms of antisocial behaviour (ASB) coincided with serious emotion dysfunctions. Emotional functioning in a community sample of 90 young offenders was assessed in three ways. First of all by examining facial affect recognition, secondly by assessing emotion regulation during an economic decision-making task, and thirdly by looking at trust judgments towards emotional faces. An additional aspect of the thesis was to establish whether an emotion intervention task could improve offenders' recognition of negative emotions.

It was expected that antisocial teenagers would demonstrate poor recognition of negative emotional states, poor emotion regulation ability and diminished trust of others compared with age, IQ, socio-economic status, and sex-matched controls. It was also expected that severity of ASB would adversely affect performance on these emotion tasks. It was also expected that a targeted emotion intervention could be a useful tool in improving recognition of negative emotional states.

We found that young offenders differed from matched controls in terms of emotion recognition, trust and emotion regulation. However, an unexpected finding was that offenders were better, not worse than controls at regulating their emotions. As predicted, it was found that seriousness of ASB did influence emotion performance on these tasks: the level of conduct disorder explained emotion dysregulation, whereas offence severity seemed to explain, at least in part, performance on all emotion tasks. The targeted emotion intervention also improved recognition of negative emotions.

Taken together, the results suggest that young offenders show specific, rather than general problems in several domains of emotion functioning. Moreover, the finding that

more severe ASB seems to explain variation in emotion functioning problems highlights the need to take a dimensional approach when examining ASB. The future directions of this research and implications for policy and practitioners working with young offenders were discussed.

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# 1. Chapter 1 – General Introduction

## *1.1. What are antisocial behaviour problems?*

Chronic conduct problems during adolescence are a major problem for the individual as well as society, making it an important area for research (Dodge & Pettit, 2003).

Childhood conduct problems are associated with negative outcomes in adulthood, in terms of future antisocial behaviour (ASB; Fombonne et al., 2001), as well as substance abuse and dependence in adulthood (Kazdin, 1995). Financially, the total costs of public services used through to adulthood by individuals with antisocial behaviour problems are 10 times higher than those without these problems (Scott et al., 2001).

The term ASB covers a broad spectrum of behaviours that can be defined based on clinical diagnoses, the judicial field (Morgan & Lilienfeld, 2000) and aggressive behaviour. The clinical definition of ASB is informed by clinically diagnosed conditions such as psychopathy (see Hare et al., 1999), antisocial personality disorder (ASPD), conduct disorder (CD), and oppositional defiant disorder (ODD), as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). These DSM-IV TR diagnoses are closely linked in terms of their definitions and of their development. Diagnoses are based on an individual displaying repetitive, persistent or pervasive patterns of aggressive behaviour, as well as the disregard and violation of social norms and the rights of others (DSM-IV TR). There is some evidence for a hierarchical structure in terms of their development; Loeber and colleagues (2002) indicated that 82-90% of ASPD cases met criteria for CD during adolescence, and of the individuals with ODD who progressed to an ASPD diagnosis nearly all showed intermediate CD.

Judicial definitions examining delinquency and criminality (Seguin et al., 2007) that are based on self-report measures and criminal behaviour provide a second perspective on

ASB. Categorising ASB individuals based on judicial figures indicates that criminality during childhood is associated with persistence into adulthood, with 80% of crime in the UK being committed by people exhibiting behavioural problems as children and teenagers (Sainsbury Centre for Mental Health, 2009). In addition, it is a relatively small number of adolescents who commit the most offences: 4% of young offenders are responsible for the majority of offences, with over 15 convictions each (Ministry of Justice, 2011).

Important to both clinical and judicial perspectives, and the categorization of ASB, are aggressive behaviours (Rhee & Waldman, 2002). These form part of clinical diagnoses and judicial definitions, such as violent crimes. Indeed, childhood aggression predicts adult health outcomes, psychosocial functioning and criminality (Huesman et al., 1984; Loeber & Le Blanc, 1990; Pulkkinen & Pitkanen, 1993). Moreover, aggression seems to show strong continuity throughout childhood and adulthood (Farrington, 1989), with continuity highest for individuals whose early problem behaviour was highly frequent, or variable in terms of environmental setting (Loeber, 1982; Cote et al., 2007; Viemer, 1996).

### **1.1.1. ASB subtypes**

Antisocial youths form a heterogeneous group and, as such, research has focused on delineating specific subgroups of these young people. Distinguishing between different antisocial groups is thought to be useful for many reasons: for research purposes, for considering the differential causes of the varied behaviour, and for finding appropriate interventions for different groups (Moffitt, 2003). Based upon the clinical, judicial and aggression perspectives outlined above, variation in ASB can be identified and assessed using specific subtypes. Different risk factors can be attributed to the onset of ASB across subtypes, as well as within diagnoses such as CD (e.g. Blair, 2001). For the purpose of this thesis these

subtypes will be limited specifically to the clinical perspectives of psychopathy and conduct disorder, and aggressive behaviour based on judicial severity of offences.

In recent years the issue of child and adolescent psychopathy has become an important research topic, driven in part by the notion that psychopathic traits may help to explain the heterogeneity associated with antisocial behaviour in young people (Frick & White, 2008). Researchers have borrowed the concept of psychopathy from the adult literature and downwardly extended the construct to youths as a way to identify a more homogeneous group of people who may become serious and persistent offenders. Psychopathy is conceptualised as a disorder where the individual displays affective and interpersonal traits such as impulsiveness, manipulateness, shallow affect, and lack of empathy, guilt or remorse (Hare, 1993). The DSM-IV TR currently states that a diagnosis of ASPD is also known as psychopathy, although proposed revisions for the DSM-V recommend that this should be altered so that there is a subtype of ASPD specifically termed 'psychopathic'.

Cornell and colleagues (1996) describe psychopathic populations as a relatively homogeneous population, with a propensity for goal-directed, instrumental aggression; however despite this claim there are different traits associated with a psychopathic personality. Psychopathy and psychopathic traits are defined using standardised inventories including the revised psychopathy checklist (PCL-R; Hare, 2003) in adults, and the antisocial process screening device (APSD; Frick & Hare, 2001) and youth psychopathic traits inventory (YPI; Andershed et al., 2002) in children (Frick et al., 1994). Factor analyses of items from the inventories have indicated distinct factors: an emotion dysfunction factor comprising of emotional shallowness, and an antisocial behaviour factor that is defined by instrumental aggression and a variety of offence types. The YPI also provides an interpersonal factor, which includes grandiosity and manipulative traits; the PCL-R, however,

combines this with the emotional factor. A high score on the antisocial behaviour factor is associated with CD and ASPD diagnoses (Frick et al., 1994). In contrast, a high score on the emotion dysfunction factor of both psychopathy tools is less closely associated with DSM diagnoses. However, there is evidence to suggest that the emotion dysfunction factor closely reflects the neurocognitive impairments that lead to the development of psychopathy (Blair, 2001).

A principal trait that makes up the emotion dysfunction factor is callousness/unemotionality (CU). This trait forms a prominent part of adult psychopathy definitions (Hare, 1993), and has been labelled as ‘deficient affective experience’ (Cooke et al., 2006) or the ‘affective factor’ (Hare, 1993). Frick and Marsee (2006) note the importance of finding subtypes that show independence from general measures of ASB so that predictions within the antisocial sample can be made. They argue that the interpersonal and affective factor of psychopathy contains unique information that is not contained in CD symptoms, and that this feature has additional prognostic value. CU traits in adults seem to be more specific to individuals high in psychopathic traits compared with other antisocial individuals (Cooke & Michie, 1997). However it could be argued that this is unsurprising since CU traits are specifically part of the diagnosis criteria for psychopathy and not part of an antisocial behaviour diagnosis. There is some evidence for this being true in adolescent samples. ASB adolescents’ CU traits, but not other interpersonal and antisocial dimensions of psychopathy, are associated with slower reaction times to negative words in an emotional word recognition task (Caputo et al., 1999). This indicates that this element of psychopathy might be particularly important for distinguishing between psychopathic individuals.

Distinguishing between ASB individuals using clinical definitions is not limited to psychopathy. CD is a psychiatric diagnosis associated with increased levels of persistent aggression and antisocial behaviour in adolescents (American Psychiatric Association APA,

1994), and represents the most common childhood psychiatric disorder found in community and mental health clinics (Loeber et al., 2000). Central to CD are feelings of anger, irritability, and a hostile attribution bias - when an individual interprets ambiguous social situations as threatening and therefore responds with aggressive behaviour (Carr, 2006). The DSM-IV (APA, 1994) indicates that CD can be further categorized into childhood onset (prior to 10 years), or adolescent onset, with evidence suggesting that the former is particularly associated with a more persistent and severe course of CD (Lahey et al., 1998; Moffitt, 1993). According to Loeber et al. (2009) there is little doubt that early CD symptoms are one of the most robust predictors of serious ASB.

More generally, conduct disorder is considered a discrete condition of a group of externalising behaviours. A wealth of studies (e.g. Haltigan et al., 2011; Kobak et al., 2009; Roisman et al., 2010; Snoek et al., 2004) describe antisocial populations based on externalising behaviours, including outward directed aggression and delinquency (e.g. Achenbach & Edelbrock, 1978). The presence of externalising behaviours is seen as being the single best predictor of risk for future antisocial behaviour and conduct disorder (e.g. Moffitt, 1993; Patterson, 1993). Robins (1979) notes that when an individual externalises problems, the behaviour becomes more entrenched, consequently resulting in a worse prognosis and often becoming more resistant to most forms of intervention than is the case when behaviours are internalised, such as withdrawal and anxiety. Moreover, evidence suggests that the presence of these behaviours during childhood leads to an increased risk for life-long psychosocial problems (Moffitt, 1993).

Children with externalising problems, including CD, show poor emotion regulation and an inability to inhibit violent impulses (Blair et al., 2001), leading to reactive aggression elicited during frustration and/or threat (Beauchaine, 2001). Moreover, they display deficits in recognising emotional expressions in comparison with children with internalizing

problems and age-matched controls (Blair et al., 2001; Eisenberg et al., 2001). These affective problems result in problems in feeling emotions that would normally inhibit ASB, e.g. fear, empathy and guilt. It is suggested that due to these emotion functioning problems, children with high externalising problems carry out aggressive and antisocial behaviours (Davidson et al., 2000a).

## ***1.2. Adolescence: an interesting time for development***

According to Blakemore (2008), adolescence is characterised by psychological changes, which affect perceptions about the self as well as interactions with others. There is an increased need to regulate affect, often at a distance from the adults who had provided them with support during childhood (Steinberg, 2005). Adolescents show advances in their social cognition through increased interactions with others; they are more sociable, form more complex peer relationships and are more sensitive to acceptance and rejection by peers compared with children (Brown, 2004). These interactions are integral for effective communication and essentially consist of an exchange of signals; for example, inferring another's mental state through recognising facial expressions, and making judgements such as approachability and trust.

### **1.2.1. Why is adolescence a vulnerable period?**

Adolescence is a vital period for maturation of brain processes that underlie social and emotional behaviour, and higher cognitive functions (Spear, 2000). During this period, emotional responses have not yet consolidated, and adolescents explore a variety of ways of affective expression (Yurgelun-Todd, 2007). The body goes through hormonal and physical

changes (Coleman & Hendry, 1990; Feldman & Elliott, 1990), and with this transition come alterations in identity, self-consciousness and cognitive flexibility (Rutter, 1993). Blakemore and Choudhury (2006) note that there is a shift in cognitive processes; adolescents are more self-aware and self-reflective than prepubescent children. Adolescents develop a capacity to consider more multifaceted concepts and can think in a more strategic way.

Despite developing more strategic, mature ways of thinking, studies comparing adult and adolescent cortical function suggest that adolescents process information differently, often using different brain regions than adults (Baird et al., 1999; Meyer-Lindenberg, 1996). Difficulties with executive cognitive functioning and behavioural self-regulation have been found in adolescents (Yurgelun-Todd, 2007), which can be explained by the relatively late development of the brain region responsible for these functions; the prefrontal cortex (PFC). Steinberg (2005) suggests that the discrepancy between brain maturation and cognition development leads to vulnerabilities. He further states that normative development can be understood as a coordination of intellectual, emotional and behavioural capabilities, and that psychopathology – for example, ASB - could be reflective of difficulties in this coordination.

### **1.2.2. An increase in ASB: normative and persistent problems**

Adolescents engage in more risky behaviour than adults (Steinberg, 2008). It is well established that antisocial and criminal activity increases during adolescence, peaking around age 17 and declines as individuals enter adulthood (Monahan et al., 2009). Evidence for this age–crime curve has been found across samples that vary in their ethnicity, nationality, and historical era (Farrington, 1986; Piquero, 2007; Piquero et al., 2001). Adolescents are more likely than adults over 25 to binge drink, have casual sex, engage in violent and other criminal behaviour, and have fatal or serious driving accidents generally caused by drinking

alcohol or risk-taking (Steinberg, 2008). Farrington (1983) and Wolfgang et al. (1987) showed that this peak in offending behaviour reflects a temporary increase in the number of individuals who engage in ASB rather than a brief acceleration in offences committed by a small group of adolescents; approximately four-fifths of males have had police contact for a minor violation, most of which occurred during adolescence (Farrington et al., 1986), making ASB during adolescence a relatively normative process. However, for the majority of adolescents, this pattern of behaviour stops as they approach adulthood.

Although ASB can be considered as a relatively normative process, there is large amount of heterogeneity amongst adolescents who engage in delinquency. Much research has therefore attempted to differentiate between adolescents in terms of presence, onset, severity, and aetiology of ASB. One highly influential account of how ASB adolescents vary with respect to onset, aetiology and course comes from Moffitt (1993), which focuses on two life-course patterns problem behaviour. She suggests that one begins in childhood and persists into adulthood, whilst the other begins and ends in adolescence. Her emphasis is that age of onset determines persistence. Whereas adolescent limited ASB is theorised to reflect a developmentally normative, short-term digression involving mimicry of delinquent peers, early onset ASB is thought to be due to individual risks, including difficult temperament, poor health, cognition problems. These interact with chronic social problems such as neglect, poverty, absence of caregiver. Empirical evidence has shown some robust support for this theory. Longitudinal studies of ASB consistently identify a small group of deviant adolescents that display chronic ASB emerging during childhood and persisting into adolescence, as well youths who have shown no notably raised levels of delinquency during childhood, but start to develop significant ASB in adolescence (Aguilar et al., 2000; Farrington, 1986; Moffitt et al., 1996). In addition, some evidence suggests that it is possible

to discriminate between these two groups based on measures of individual risk and social problems (see Aguilar et al., 2000).

However, empirical evidence suggests Moffitt's (1993) account does not provide a full picture of antisocial behaviour in young people (Roisman et al., 2010). Firstly, not all antisocial trajectories had been accounted for. A small group of individuals who show elevated ASB during childhood but who do not continue with ASB into adolescence has been consistently identified across studies (Aguilar et al., 2000; Moffitt et al., 1996). Secondly, adolescents displaying no signs of ASB during childhood or adolescence were originally suggested to be social misfits (Moffitt et al., 1996). However, follow-up of these individuals has indicated evidence for their superior adaptation (Moffitt et al., 2002). In addition, there is evidence that the adolescence onset pathway is different from what was originally thought. Aguilar and colleagues (2000) have shown that these individuals report higher levels of life stress and internalising problems in comparison with non-aggressive peers. Furthermore, studies have suggested that when ASB first appears during adolescence it is not always limited to adolescence (Moffitt et al., 2002; Odgers et al., 2008; Roisman et al., 2004). Although they are less likely than early onset individuals to continue with ASB, they are more likely to have ASB problems than non-aggressive peers. In fact, Roisman and colleagues (2010) have indicated that all adolescents who show elevated ASB, regardless of whether it was during childhood, adolescence or both, display individual and social disadvantage in early childhood, childhood and adolescence, relative to youth with consistently low levels of ASB.

Recent work by Fairchild and colleagues has suggested that seriousness of ASB, rather than age of onset proposed by Moffitt (1993), might determine dysfunctional neurobiological systems (e.g. Fairchild et al., 2009a; Fairchild et al., 2009b; Fairchild et al., 2008; Passamonti et al., 2010). The authors noted when early onset CD and adolescent onset

CD young offenders performed affective and risk-related decision-making tasks, that in serious ASB, no matter what the time of onset, emotional and neuropsychological deficits were present. This thesis aims to investigate this suggestion that seriousness of ASB might be associated with dysfunction in certain neurobiological systems, specifically emotional deficits, in a broader defined group: community young offenders.

### ***1.3. The importance of emotion and trust functioning for understanding ASB in adolescence***

#### **1.3.1. What is the link between emotion functioning and ASB?**

Emotions are considered important to social survival because the emotions we experience and express help us to form and maintain social relationships (Fischer & Manstead, 2008). Unsurprisingly, emotional impairments can have detrimental consequences to the individual and those around them, and play an important role in explanations of antisocial behaviour (Baumeister & Lobbestael, 2011). ASB adolescents not only exhibit fearlessness towards risky situations (Barker et al., 2011), but they also have problems understanding the consequences of their actions, for example detection of distress in others (Fairchild et al., 2009a), and producing appropriate empathic responses towards others (de Wied et al., 2012). Abnormal emotion processing is reported in different antisocial populations, such as adolescents with psychopathic tendencies (Blair et al., 2001), and adolescents with early-onset or adolescence-onset CD (Fairchild et al., 2010; Fairchild et al., 2009a; Fairchild et al., 2008; Passamonti et al., 2010).

Emotions are complex constructs, relying on subcortical as well as cortical brain structures, and affecting cognition, neurobiology and physiology (see Fox, 2008). For these reasons emotions have been investigated using different methodologies, for example

questionnaires, physiology, and behaviour. This is particularly important when assessing problems in emotion functioning, in order not to be reliant on one source of information only. In this thesis different methods have been used to assess emotion functioning in a group of adolescents. Specifically, three aspects of emotion functioning and trust will be examined: emotion recognition, which is the ability to successfully attribute the correct emotional state to a facial expression; emotion regulation, which encompasses processes that increase, reduce or maintain the experience of an emotion (Davidson et al., 2000a); and trust towards emotional male and female faces.

### **1.3.2. What are the emotion functioning and trust deficits within ASB populations?**

#### **1.3.2.1. Emotion recognition**

Facial expressions are an important means of social communication, carrying information about others' emotional states. Aggression and other problematic behaviours have been suggested as being a result of the failure to be appropriately guided by the social cues of others, such as understanding facial expressions (Blair, 2003). Blair (2001, 2005a) suggests that distress related-cues, i.e. fear and sadness cues in others, play an integral role inhibiting ASB, and it is this inability to detect these cues that is intrinsically linked with antisociality. In fact, many studies have found impairments in recognising these cues among antisocial individuals, including clinical and community samples, such as psychopathic adults (Blair et al., 2001; Kosson et al., 2002), children high in psychopathic traits (Blair et al., 2004), CD adolescents (Fairchild et al., 2010; Fairchild et al., 2009a), adolescents with mental health problems (Leist & Dadds, 2009), and adolescents from mainstream schools (Blair & Coles, 2000; Dadds et al., 2006).

Previous literature supports the notion that ASB individuals have deficits in the processing and experience of negative affect, however it is unclear if this deficit is a general one (e.g., Fairchild et al., 2010; Fairchild et al., 2009a; Glass & Newman, 2006; Herpertz et al., 2001; 2005; Marsh & Blair, 2008), or one specifically related to fear (e.g., Dadds et al., 2006; Jones et al., 2009; Marsh et al., 2008) or sadness (e.g., Blair, 1999; Dolan & Fullam, 2006; Fairchild et al., 2010). This could be due to the differences in paradigm, or the variation in samples used (for an in depth discussion see Chapter 3).

An additional issue is what ASB subtype best describes emotion function variation. Researchers such as Blair suggest that psychopathy is a key factor in ASB persistence and emotion deficits (see Frick & White, 2008; Marsh & Blair, 2008), whereas Fairchild and colleagues would argue that it is the severity of externalising problems, that underpins ASB and emotion recognition problems (Fairchild et al., 2009a). These authors' studies have used different participant samples to examine these issues, with some studies focusing on community samples of children who arguably lack problematic ASB (e.g. Blair & Coles, 2000; Dadds et al., 2006), whereas others (Fairchild et al., 2009a; Fairchild et al., 2010) used samples of adolescents with diagnosed mental health issues (conduct disorder).

### **1.3.2.2. Trust judgments**

Trust, as defined by Rousseau and colleagues (1998), involves having positive expectations about the behaviour of another person, and willingly allowing oneself to be vulnerable as a result. Understandably, effective evaluations of trust are essential for successful social systems (Bazerman, 1994). Among the most important inferences that must be made on meeting an unknown person is whether they are trustworthy or possibly dangerous (Porter et al., 2008).

During the first years of infancy, trust and attachment towards the primary caregiver is formed (Erikson, 1964). Erikson suggests that a strong sense of predictability and dependability from the caregiver is required in order for a child to form feelings of trust. Moreover, this resultant trust is essential for the progression of subsequent trust formations towards other people. Antisocial individuals may have come from more erratic or hostile environments where parents were unable to provide for their needs (Moffitt, 1993). Theoretically children and adolescents who have experienced insecurity and lack of dependability on parents/ significant adults during their early years may make abnormal trust judgments.

Antisocial adolescents' peer environment may also reinforce this dysfunction. Childhood peer relationship experiences are recognised as correlates and predictors of adolescent and adult antisocial behaviour (Dodge et al., 2006; Kupersmidt et al., 1995; Laird et al., 2001). Indeed, rejection by one's peer group in middle childhood is associated with later externalising behaviour problems (Kupersmidt et al., 1990), and subsequent involvement with antisocial peers during adolescence (e.g. Cole et al., 1995), which is a precursor and correlate of antisocial outcomes (Laird et al., 2001). ASB is a predominantly male problem (e.g. Boylan et al., 2007; Moffitt et al., 2001), thus socialization will primarily be with antisocial, and arguably, untrustworthy adolescent males. This could ultimately result in a bias towards interpreting male faces as being untrustworthy.

Little research has been conducted into the possibility of the presence of trust dysfunction in ASB populations with social risk factors. As far as we know, only one study has examined facial trustworthiness judgments in an antisocial population. Ritchell and colleagues (2005) have looked at trustworthiness judgments towards male faces within a sample of psychopathic and non-psychopathic adult offenders. They found that judgments did not differ between the two antisocial groups, suggesting that psychopathy in adult

offenders does not distinguish between trust judgments. A non-ASB control was not used in this study however, so it is unknown whether differences in trust judgments exist between ASB and non-ASB populations. Furthermore, because only male faces were examined, differential trust judgments across gender could not be made.

### **1.3.2.3. Emotion regulation**

Emotion regulation involves the initiating, inhibiting or modulating of emotional states, cognitions, physiological processes and behaviour (Siegler, 2006). Regulatory systems develop through adolescence due to the structural and functional changes of the PFC; however this is a lengthy process and is not fully coordinated until relatively late in adolescence (Keating, 2004). During childhood, children are able to regulate their emotions with the support of parents; however, as they move towards independence, adolescents begin to regulate their own emotional states. The intensity of emotional reactivity is thought to follow an inverted-U shape from childhood to adulthood, with peak occurring in adolescence (Brenhouse & Andersen, 2011). The implications of this are that adults and children are better able to regulate their emotions than adolescents.

Not only is adolescence a critical period for the development of emotion regulation, but because there is also an increased vulnerability for psychopathology during this period, there is also a risk of regulation problems (e.g. Bandura et al., 2003). Impulsive aggression and violence are thought to arise as a consequence of faulty emotion regulation (Davidson et al., 2000b). Davidson and colleagues (2000b) suggest that the predisposition for impulsive aggression is associated with a low threshold for activating negative affect, and a failure to respond appropriately to the expected negative consequences of behaving aggressively. Moreover, individuals predisposed to impulsive aggression have deficits in the brain regions

responsible for emotion regulation strategies (e.g. Raine, 2002).

There is some support for the notion that specific subtypes of ASB differ in emotion regulation ability. Frick and Morris (2004) argue that emotion dysregulation is associated with reactive, emotionally driven conduct problems, but less likely to be involved in proactive or covert externalising problems, including CU traits. Reactively aggressive children are prone to negative emotion and to have problems in regulating such emotions and inhibiting their behaviour when emotionally aroused. These difficulties can impair information processing (Frick & Morris, 2004) and undermine the quality of interactions with parents and peers (Eisenberg et al., 2010). In contrast, children with CU traits are low in fearful inhibition and show no consistent problems with self-regulation. Coherent with this suggestion, reactive but not proactive aggression is associated with poorly regulated emotion and anger to perceived provocation (Marsee & Frick, 2007).

The Ultimatum Game (UG) is an economic decision-making game designed to examine emotion regulation (Crockett et al., 2008; Guth et al., 1982; Koenigs & Tranel, 2007; Koenigs et al., 2010). Individuals who are poor at regulating emotions tend to make more irrational decisions (i.e. rejection of unfair monetary offers) in the UG (Koenigs & Tranel, 2007). Although emotion dysregulation can affect economic and social decision-making, other factors can influence decision-making, for example reward sensitivity. It is possible that antisocial adolescents are particularly reward sensitive and more driven to accept offers, even in the face of unfairness. However, to date we are not aware of a study that has examined economic decision-making using the Ultimatum Game in adolescent offenders.

### **1.3.3. What could cause these deficits?**

There are clear brain abnormalities associated with ASB and emotion and trust dysfunction that could explain these observed and, in the case of trust judgments, suggested deficits (for reviews see Crowe & Blair, 2008; Davidson et al., 2000b; Raine & Yang, 2006). Brain regions such as the PFC, OFC, ventral striatum and amygdala are responsible for emotion and trust functioning. PFC activation is associated with the integration of emotional experiences and cognition (Gray et al., 2002), including emotion regulation (Davidson et al., 2000b). Similarly, the OFC is integral for emotion regulation (Davidson et al., 2000b), and shows increased activation during presentation of increasing intensity angry facial expressions (Blair et al., 1999), and when anger is induced in healthy adults (Dougherty et al., 1999; Kimbrell et al., 1999). Dopamine and the ventral striatum seem to be important for effective anger recognition (Calder et al., 2004; Lawrence et al., 2002). Finally, the amygdala is an important region for emotion recognition of fear (Blair et al., 1999; Morris et al., 1996, Whalen et al., 1998), emotion regulation (Davidson et al., 2000b; Schaefer et al., 2002), and trust judgments (Winston et al., 2002), with amygdala dysfunction affecting the recognition of fear and sadness (e.g. Adolphs et al., 1995; Calder, 1996), and trust judgments (e.g. Adolphs et al., 1998; Baron-Cohen et al., 1999; Bauman & Kemper, 1985).

ASB adult and child populations, in comparison with controls, show abnormalities to these brain regions. Adult criminal psychopaths (de Oliveira-Souza et al., 2008; Muller et al., 2008; Yang et al., 2005) and adults with ASPD (Raine et al., 2000) have significant PFC grey matter reductions in comparison with controls, which are not accounted for by environmental risk factors for antisocial behaviour (e.g. head injury, child abuse) or by drug or alcohol abuse (Raine et al., 2006). Kruesi et al. (2004) report similar findings: there is a 16% reduction in CD children's PFC grey matter volume. Early-onset CD adolescents have lower OFC and

left amygdala volumes (Fairchild et al., 2011; Huebner et al., 2008; Sterzer et al., 2007). Also, psychopathic individuals have abnormal ventral striatum volumes (Glenn et al., 2010; Glenn & Yang, in press).

Structural impairments are paralleled by functional impairments in a range of antisocial populations. Decreased or abnormal activity has been shown in the PFC of adult violent offenders (Raine et al., 1997). Several studies have shown abnormal OFC activation in impulsive individuals during response inhibition (Horn et al., 2003), in ASPD patients during fear conditioning tasks (Birbaumer et al., 2005), and CD adolescents during a facial emotion processing task (Passamonti et al., 2010). Further functional deficits have been noted in the amygdala. Amygdala hypoactivity has been found in CD adolescents when viewing aversive images (Sterzer et al., 2005), as well as CD adolescents high in CU traits when viewing images of fearful faces (Jones et al., 2009; Marsh et al., 2008).

#### ***1.4. Goals of the thesis: what areas of emotion functioning and trust need to be examined further?***

##### **1.4.1. Emotion recognition**

Currently research suggests that there is a general negative emotion recognition deficit for ASB populations; however it is uncertain whether this is specific to fear and sadness. Moreover, because of issues with sampling, it is unclear whether psychopathic traits, conduct disorder and general externalising problems have an added role in explaining emotion recognition deficits within ASB populations. Chapter 2 will examine whether a general or specific recognition exists in a community sample of juvenile offenders, and what, if any, the added role of ASB subtypes such as psychopathic traits, conduct disorder and offence severity is in distinguishing emotion recognition deficits.

### **1.4.2. Trust judgments**

There is a considerable lack of empirical research that has examined facial trust judgments in ASB populations. As noted earlier, to our knowledge only one study (Ritchell et al., 2005) has examined this, comparing psychopathic versus non-psychopathic adult offenders. However, the authors did not include an adequate control group, therefore it is unclear whether trust differences exist between ASB and non-ASB groups. Moreover, because only male faces were examined in that study, it is unknown whether gender of faces plays a factor in ASB populations' trust judgments. In Chapter 3 trust judgments within a community sample of juvenile offenders are assessed. A comparison with an age-matched control group is made, and the role of ASB subtypes in explaining trust towards others is explored.

### **1.4.3. Emotion regulation**

We are not aware of a study that has examined emotion regulation in the Ultimatum game within a community sample of adolescent offenders. Community based services typically see a large number of youngsters whose combined offending produces the majority of harm, compared to juveniles identified as being in need of specialist treatment. Chapter 4 aims to examine emotion regulation, and more specifically the role of psychopathic traits, conduct disorders and offence severity in predicting regulation ability.

#### **1.4.4. Emotion intervention**

ASB problems have a large cost to society, to the individual themselves and their own environment. There are high costs because of the crimes committed, the extra educational provision required, the foster/residential care needed, other state benefits during adolescence (van Goozen & Fairchild, 2008), and the associated mental and physical health problems of CD continuing in adulthood (Odgers et al., 2007). For this reason an intervention to help address problem behaviours is desirable. One of the most replicated findings suggests that ASB individuals have problems in emotion face recognition. As part of this thesis, an emotion recognition training protocol was administered to adolescents who have ASB with the aim to find out whether emotion recognition abilities could be enhanced. If emotion recognition plays a role in ASB, and can be improved in ASB individuals, then this could have possible ameliorating effects on future ASB.

#### **1.4.5. The sample**

Community based services typically see a large number of youngsters whose combined offending produces the majority of harm, compared to juveniles identified as in need of specialist treatment. There has to date been little systematic research on theory-guided interventions. If emotion impairments are systematically related to seriousness of antisocial behaviour in community-based juvenile offenders, this would not only have important implications for the development and design of interventions targeting prolific offender groups, but would also provide further evidence that insights developed with clinically significant groups generalize to a much larger group of youngsters who come into

contact with the offending services for a wide range of different types of antisocial behaviour (van Goozen & Fairchild, 2008).

The participants in this current study were recruited from the Youth Offending Service and provided us with an opportunity to assess the role of community-based problematic ASB without the issue of mental illness adding further variability to the data. Within this sample the added role of psychopathic traits, externalising problems and mental health issues such as CD was also examined. In doing this, we aimed to distinguish between the more normative and the more serious ASB individuals, by focusing on their emotion functioning. Moreover, the comparison sample was age-, gender-, IQ- and socioeconomic status matched to the ASB group, since all these factors are known to affect emotion performance (Adolphs et al., 1996; Nolen-Hoeksema & Aldao, 2011; Taylor et al., 2004).

Table 1-1 illustrates the distribution of participants who were invited to take part in the study, those who agreed to take part in the study, and those who subsequently completed the emotion recognition, trust, and emotion regulation tasks. Control adolescents were recruited from local comprehensive schools in the Cardiff Council area. Eighteen schools were contacted, of which four allowed recruitment and testing to take place on the school premises. The school contact, i.e. the Head of GCSE Years for Fitzalan, Cardiff and Whitchurch High Schools and Careers Officer for Cantonian High School, approached all the available males on our behalf therefore exact numbers of adolescents asked to take part are unknown. Similarly, the Case Workers within the Youth Offending Service were asked to approach all of their designated caseload; however we are unaware of the exact number they actually asked. In each case an estimate of eligible adolescents has been given, i.e. the number of male offenders within the Youth Offending Service between January 2010 and May 2012 and the number of male students in the requested year group (this varied as a function of the age of YOs we had seen).

Table 1-1

*Number of participants included in analyses contained in Chapter 2, 3 and 4.*

<b>Variable</b>	<b>NC</b>	<b>YO</b>
<b>Estimate of participants eligible for the study</b>	410	290
<b>N participants who agreed to take part in study</b>	93	117
<b>N participants included in emotion functioning analyses</b>	66	80
<b>N participants included in C2, C3, &amp; C4 analyses</b>	27	36
<b>N participants included in C2 &amp; C3 only</b>	2	14
<b>N participants included in C2 &amp; C4 only</b>	0	6
<b>N participants included in C3 &amp; C4 only</b>	0	0
<b>N participants included in C2 only</b>	8	7
<b>N participants included in C3 only</b>	8	10
<b>N participants included in C4 only</b>	21	7

*Notes: C2 = Chapter 2; C3 = Chapter 3; C4 = Chapter 4; N = number; NC = normal control group; YO = young offender group. All data show number of participants.*

All the experimental chapters are currently submitted or in preparation to be submitted as journal papers. They have therefore been presented in paper format.

## **2. Chapter 2 – Emotion Recognition**

Antisocial populations have problems recognising negative emotions (e.g. Marsh & Blair, 2009); however, due to issues with sampling and the methods used, previous findings have been varied. Sixty-three male young offenders and thirty-seven age-, IQ- and socio-economic status-matched male controls completed a facial emotion recognition (FER) task, which measures recognition of neutral expressions, and happiness, sadness, fear, anger, disgust, and surprise across 4 emotional intensities. Conduct disorder (YSR) and psychopathic traits (YPI) were measured, and offenders' offence data were taken from the Youth Offending Service's case files. Relative to controls, offenders were significantly worse at identifying sadness. A significant interaction for anger was also observed, with offenders showing reduced low- but increased high-intensity anger recognition in comparison with controls. Within the young offender group offence severity played a role in explaining variations in anger recognition performance. Results suggest that antisocial youths show specific problems in recognising negative emotions, and that offence severity - rather than conduct disorder or psychopathy - explains variation within this antisocial group.

## ***2.1. Introduction***

Accurately processing emotional facial expressions is critical in everyday functioning, as the ability to recognise facial emotions is fundamental to appropriate interpersonal communication (Marsh & Blair, 2008). The usual communicatory function of emotion is to transmit information about the valence of situations to conspecifics, and a failure to respond to the emotional expressions of others could lead to atypical responding in social interactions (Blair, 2003). Blair (2001, 2005a) suggests that correctly processing others' distress-related cues (i.e., fear and sadness) can inhibit ASB and that the inability to detect these cues contributes to antisocial behaviour. Accordingly, facial affect recognition has been examined in populations that exhibit inappropriate interpersonal behaviours such as antisocial behaviour (ASB) and studies have found negative emotion recognition impairments, particularly for fear and sadness, among clinical and community samples of antisocial individuals, including psychopathic adults (Blair et al., 2004; Glass & Newman, 2006; Kosson et al., 2002), children high in psychopathic traits (Blair et al., 2001), conduct disorder (CD) adolescents (Fairchild et al., 2009a), adolescents with mental health problems (Leist & Dadds, 2009), and antisocial adolescents recruited from mainstream schools (Blair & Coles, 2000; Dadds et al., 2006). While there is evidence for a deficit in processing negative affect in ASB groups it is unclear whether this deficit is a general one (e.g., Fairchild et al., 2008; 2009; Herpertz et al., 2001; 2005), or one specifically related to fear (e.g., Dadds et al., 2006; Jones et al., 2009; Marsh & Blair, 2008) or sadness (e.g., Blair, 1999; Dolan & Fullam, 2006; Fairchild et al., 2010).

### **2.1.1. Integrated Emotions Systems theory and the neuroscience of emotion processing**

A theory accounting for the relationship between problem behaviour and impairments in facial affect recognition is provided by Blair's (2005) Integrated Emotions Systems (IES) theory. IES suggests that distress cues, such as fear and sadness, serve to inhibit ASB. It has been proposed that this process occurs by an individual learning to avoid hostile acts that can cause fear and sadness, as both of these emotions elicit empathy in those who see them (Marsh & Blair, 2008). This theory is consistent with data from ethological studies, which find that primates avoid aggression behaviours in the presence of distress cues (Preuschoft, 2000). From an evolutionary perspective, the message being conveyed by facial affect and the meaning attached to these might have developed in such a way that human and non-human primates respond in a similar way when they see distress cues in others.

IES theory also proposes that different brain areas are implicated in different forms of ASB. Specifically, the amygdala is mainly associated with dysfunction in psychopaths, who present with high levels of goal-directed instrumental aggression (Birbaumer et al., 2005; Blair, 2003; Kiehl et al., 2001). Orbitofrontal cortex (OFC) dysfunction, observed in individuals with acquired sociopathy, is associated with impulsive aggression (Dolan & Fullam, 2006). Each of these brain areas is associated with the expression of different emotions: fear and sadness recognition rely on the amygdala (Adolphs & Spezio, 2006; Adolphs & Tranel, 2004; Adolphs et al., 1999; Calder, 1996; Murphy et al., 2003; Papps et al., 2003), whereas OFC damage results in impairments in recognition of anger and disgust (Blair & Cipolotti, 2000; Hornak et al., 1996; 2003). Early OFC damage may also lead to a pattern of childhood-onset impulsive behaviour and aggression (Anderson et al., 1999). The behavioural parallels between individuals with CD and those with early OFC damage suggest

that subtle OFC dysfunction might be present in those with CD, and might be reflected in anger and disgust recognition.

### **2.1.2. Emotional processing deficits in antisocial populations**

Consistent with IES theory and Lykken's (1995) suggestion that psychopathy reflects an innate deficiency in fearfulness that can result in a dangerous syndrome when combined with an aggressive temperament, empirical research has confirmed the role of psychopathy in emotion processing deficits in antisocial samples. Psychopathic offenders display poor fear conditioning (Flor et al., 2002; Lykken, 1957), and adults and children who are high in psychopathic traits display deficits in fear and sometimes sadness (Blair & Coles, 2000; Blair et al., 2001; Blair et al., 2004; Dadds et al., 2006). A meta-analysis of 20 studies conducted in antisocial samples, defined by different criteria and characterized as psychopathic, conduct disordered, aggressive, unsocialised, abusive or criminal, identified a specific impairment in fearful expression recognition (Marsh & Blair, 2008). Empirical data also supports the suggestion that impulsive ASB is associated with anger recognition dysfunction. Deficits in recognising anger have been reported in individuals with acquired sociopathy (Blair & Cipolotti, 2000), adults with high levels of impulsive aggression (Best et al., 2002), ASB adolescents (Leist & Dadds, 2009) and adolescents with early-onset CD (Fairchild et al., 2009a; 2010; Rubia et al., 2009).

Whereas some researchers suggest that psychopathy is fundamental to the variation in emotion dysfunction associated with ASB (see Frick & White, 2008; Marsh & Blair, 2008), others argue that it is the severity of the behavioural problems that underpins ASB and emotion recognition problems (Fairchild et al., 2009a). Several studies examining juvenile delinquency have shown a dose response relationship between severity of offending and risk

factors, indicating that the more serious the offending, the higher the number of risk factors (e.g. Stouthamer-Loeber et al., 2004). However, to our knowledge no study has directly examined whether severity of offending explains emotion recognition in an antisocial sample.

Different ASB participant samples have been used to examine emotion recognition in ASB samples, with some studies focusing on community samples of children who arguably lack problematic ASB (e.g. Blair & Coles, 2000; Dadds et al., 2006), while others (Fairchild et al., 2009a; 2010) used samples of adolescents with diagnosed mental health issues (i.e. CD). In some studies the comparison samples displayed ASB themselves (e.g. Blair et al., 2004; Blair et al., 2001; Glass & Newman, 2006; Kosson et al., 2002) or were not adequately age- (e.g. Dolan & Fullam, 2006), IQ- (e.g. Blair et al., 2004) or socio-economic status-matched (e.g. Blair, 1999; Fairchild et al., 2009a). Examining the role of these ASB subtypes in a sample with clear behavioural problems, without the added complication of mental health issues, and comparing them against a matched control group could help address these potential confounds.

### **2.1.3. Methodological issues**

Although sampling issues can explain some of the variation in findings across ASB studies, methodological differences may also contribute. Studies with incarcerated psychopathic male offenders, for example, have shown fear (Blair et al., 2004), disgust (Kosson et al., 2002), or sadness and happiness deficits (Hastings et al., 2008); whereas Glass and Newman (2006) found no differences between psychopathic offenders and comparison offenders in identifying facial affect.

One frequently used methodology involves participants identifying the emotional content of unambiguous and high intensity facial expressions (e.g. Dadds et al., 2006; Glass & Newman, 2006; Kosson et al., 2002; Leist & Dadds, 2009). Although this reveals

difficulties in the identification of unambiguous emotion, this approach does not provide any insight into any underlying difficulties associated with the identification of less emotionally intense facial expressions. It is possible that they are characteristic of expressions that are frequently experienced outside of the laboratory. Furthermore, presenting only high intensity and unambiguous facial expressions could even disguise more subtle deficits (e.g. Glass & Newman, 2006). The use of low intensity and more ambiguous facial expressions, in addition to high intensity expressions, would therefore provide greater sensitivity and reveal more subtle differences between participants (Adolphs & Tranel, 2004).

Other studies have used blends of different emotions to assess deficits (e.g. Blair & Coles, 2000; Fairchild et al., 2009a). Although this method presents less intense emotional expressions, because different expressions are blended together, low-intensity unambiguous affect performance is not assessed.

Finally, several studies have used a range of emotional expression intensities (e.g. Adolphs & Tranel, 2004; Blair et al., 2001; 2004; Dolan & Fullam, 2006) through morphing an emotional face with its matching neutral expression on a continuum of images that range from 0% (neutral) to 100% (full expression). Although this provides an opportunity for a sensitive assessment of low intensity affect recognition, there has been variation in the selection of emotion intensities presented (e.g. Blair et al., 2001; 2004; Hastings et al., 2008).

An additional methodological issue involves the number of emotions presented: some studies present images representative of the six basic emotions: happiness, sadness, fear, anger, disgust, and surprise (see Blair & Coles, 2000; Blair et al., 2001; 2004; Dolan & Fullam, 2006; Fairchild et al., 2009; Matheson & Jahoda, 2005); while other studies have used two (Adolphs & Tranel, 2004), three (Leist & Dadds, 2009), four (Glass & Newman, 2006; Stevens et al., 2001) and five emotions (Dadds et al., 2005; 2006; Hastings et al.,

2008). Using fewer emotions means a thorough assessment of facial affect recognition problems cannot be achieved.

#### **2.1.4. The current study**

Even though research has identified both general face affect recognition deficits in antisocial individuals, and particular impairments in different antisocial samples in terms of different emotions, existing literature has mainly focused on incarcerated offenders and psychopaths, and to our knowledge a study on facial affect recognition in community-based adolescent young offenders has not been carried out.

The current study aims to assess facial affect recognition in a group of young male offenders who exhibit varying degrees of ASB severity, conduct disorder and psychopathic traits. Community based services typically see a large number of juveniles whose combined offending produces the majority of harm in their communities. However, research findings concerning the psychological factors that contribute to ASB and related outcomes have yet to be systematically translated to inform practice and steer the development of theoretically guided interventions. At present, research indicates that ASB populations have problems recognising negative facial emotions but it is not clear whether a community sample of adolescents would display general negative affect deficits, or those specific to fear and/or sadness, and whether these apply to the whole intensity spectrum. Our primary hypothesis was that, based on findings from Marsh and Blair (2008), ASB individuals would display deficits in recognising fear and sadness in comparison with control adolescents, but would show no problems recognising positive emotions.

Young offenders are typically a heterogeneous sample whose behaviour, in the majority of cases, does not reach clinical significance, yet emotion recognition deficits could provide one potentially important explanation for their behaviour. However, it is unclear

whether it is ASB per se, levels of psychopathic traits or CD severity that best explain the variation in emotion recognition performance in this group. Based on IES theory and findings from previous studies in clinical and incarcerated samples, it was expected that CD might explain anger and disgust recognition variation (e.g. Fairchild et al., 2009a), and psychopathic traits would explain fear and sadness recognition scores (e.g. Blair et al., 2001; 2004; Marsh & Blair, 2008). Because offence severity has been associated with ASB risk factors, but has not yet been examined in explaining emotion recognition, we also assessed its role. The current study examined, first, recognition of facial affect across all emotions and intensities in a relatively large community sample of juvenile offenders and their matched controls, and second, the role of psychopathic traits, conduct disorder and offence severity in explaining variation within the young offenders in emotion recognition performance.

## ***2.2.Method***

### **2.2.1. Participants**

All aspects of the research reported here were scrutinized and approved by the Cardiff University School of Psychology Research Ethics Committee. All participants and their parents/guardians provided written informed consent. Male young offenders (YO), aged 13-17 years (mean age= 15.79 years) took part in the study (N = 63). They were recruited from the Cardiff Youth Offending Services. All offenders completed the emotion recognition task and the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999); 60 YOs completed the Youth Psychopathic Traits Inventory (YPI; Andershed et al., 2002), and 57 completed the Youth Self-Report (YSR; Achenbach, 1991). Postcode data were available for all YOs, from which levels of neighbourhood deprivation could be determined, and offence data were available for 60 YOs. Age-matched male control participants (NC), aged 14-18

(mean age= 15.41 years) also took part (N = 37). They were recruited from local comprehensive schools and youth centres from relatively deprived areas in Cardiff. All control participants completed the emotion task, WASI and the questionnaires. For a detailed breakdown of the distribution of participants who completed the emotion recognition task in addition to the trust judgment task (see Chapter 3) and Ultimatum Game (see Chapter 4) please see Table 1.1.

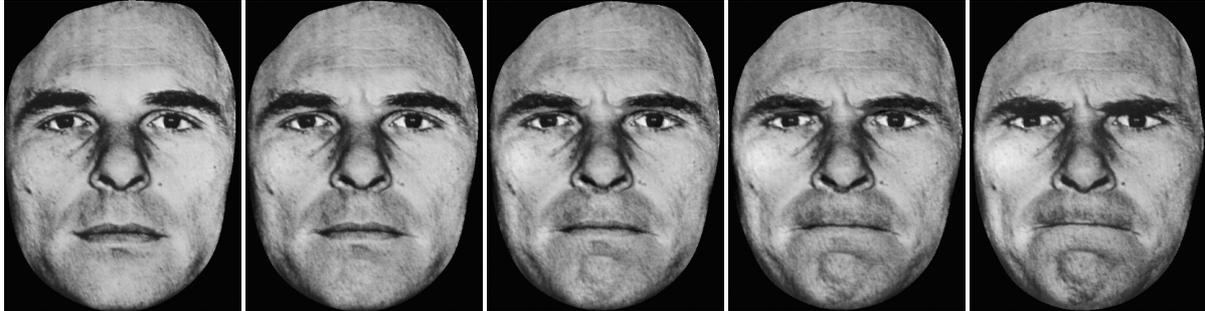
## **2.2.2. Materials**

### **2.2.2.1. Facial Emotion Recognition Task**

The Facial Emotion Recognition (FER) task was made using the application Medialab (Empirisoft Corporation, New York) and consisted of a series of 150 slides displaying facial expressions drawn from Ekman and Friesen's (1975) facial affect battery (see Figure 2.1). Six target faces – three male and three female – were used. Each of these targets displayed a neutral expression or one of six emotions: happiness, sadness, fear, anger, disgust, or surprise. Additionally, the six emotional expressions were morphed with their matching neutral expression (0% emotion) to display faces at 25%, 50%, 75% and 100% emotional intensity. The hair and background of the image had been blacked out so that only the facial features remained.

The question “What emotion is this person showing?” accompanied the target image, along with numbered options from 1 to 7. The options were (from 1 to 7) “happiness”, “sadness”, “fear”, “anger”, “disgust”, “surprise”, and “neutral”. Percentage correct recognition scores for each emotion at each intensity level were produced.

Data from the FER task and the Trust in Others task (see Chapter 2) were collected at the same time. These two tasks were interleaved in order to alleviate boredom and fatigue effects in a sample that might otherwise have found it difficult to sustain attention.



*Figure 2.1.* 0% (neutral), 25%, 50%, 75% and 100% angry expression examples (actor PE) of the Ekman and Friesen facial affect battery (1975).

#### **2.2.2.2. Youth Self Report**

The Youth Self Report (YSR; Achenbach, 1991) assesses a range of behavioural problems following DSM-IV (American Psychiatric Association, 1994) criteria and is widely used in community-based and clinical research on problem behaviour in adolescents between the age of 11 and 18 years. Each item is rated on a scale of 0-2, with 0 corresponding to “not true”, 1 corresponding to ‘sometimes true’ and 2 corresponding to “very or often true”. The conduct disorder (CD) symptoms subscale of the YSR was used to classify young offenders in terms of the borderline/clinical or normal range of CD symptoms based on their individual standardized t-scores (Achenbach, 1991).

#### **2.2.2.3. Youth Psychopathy Inventory**

The Youth Psychopathy Inventory (YPI; Andershed et al., 2002) is a 50-item validated youth self-report questionnaire that assesses psychopathic tendencies. The YPI is

scored on a 1-4 Likert scale, giving a sum score of 50-200. Respondents are classified into high or low psychopathy groups by dividing the total YPI score by 50; a mean YPI score of between 1 and 4 is then obtained (Skeem & Cauffman, 2003). Participants scoring above the 2.5 threshold are classified as high in psychopathic traits, whereas those below are classified as low in psychopathic traits.

#### **2.2.2.4. Offence data**

The type of previous crimes for which the offender had been convicted was taken from their YOS case files. Each offence had been assigned an offence severity score ranging from 1 (e.g. minor public order offences) to 8 (e.g. murder; see Appendix 1). For the convicted offences, the highest severity score (i.e. the most serious crime the offender had committed) was recorded. Inspection of the distribution of severity scores showed a bimodal pattern. Based on this information two subgroups were identified for subsequent analysis; offenders with a severity score ranging from 1 to 5, and offenders with a severity score between 6 and 8.

#### **2.2.2.5. Wechsler Abbreviated Scale of Intelligence**

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) is a standardized measure of intelligence. The two-subtest form was used, which includes Vocabulary and Matrix Reasoning tasks. The Vocabulary subtest measures word knowledge, verbal concept formation, and fund of knowledge, and the Matrix Reasoning subtest measures visual information processing and abstract reasoning skills. The two-subtest form provides an estimated Full Scale IQ score.

### **2.2.2.6. Socio-Economic Status (SES)**

SES was estimated using the Office of National Statistics estimates of average household total weekly income based on each participant's postcode (Low = £0-£520; Middle = £521-£670; High = £671+).

### **2.2.3. Statistical methods**

The outcome variables were the mean correct scores for neutral faces and each of the six emotions at each of the four intensities. For comparisons between YOs and NCs, mixed-design MANOVAs were used to examine the effects of emotion intensity (within-subjects) and group (between-subjects) for each emotional expression. Independent samples t-tests were used to compare age, IQ, SES, mean YPI scores, mean CD scores, and neutral recognition scores between the groups. When examining within the offender sample, mixed design MANOVAs were used to determine the effects of emotion intensity (within-subjects), psychopathy (between-subjects), conduct disorder (between-subjects), and offence severity (between-subjects). An independent samples t-test was used to compare the neutral recognition scores of the YO high and low psychopathy groups, conduct disorder groups, and offence severity groups. Where simple comparisons tests were carried out, Tukey's HSD effects test was used.

## ***2.3. Results***

### **2.3.1. Demographic characteristics**

Table 2-1 shows the demographic characteristics of the sample. Independent samples t-tests indicated that the groups differed in CD scores (YSR;  $t(92)=3.7, p<0.01$ ), but did not

differ in psychopathic traits ( $t(95)=0.6, p=0.54$ ). The two groups were matched for age ( $t(98)=1.8, p=0.07$ ), IQ ( $t(98)=-1.2, p=0.24$ ) and socio-economic status ( $t(98)=0.8, p=0.43$ ).

Table 2-1  
Demographic characteristics of adolescents

Variable	NC	YO
Age (years)	15.4 (1.1)	15.8 (0.8)
IQ	92.2 (12.3)	88.4 (11.2)
YPI (total score)	113.4 (25.8)	116.7 (21.0)
CD (YSR t-score)	57.2 (6.4)	65.8 (9.9)**
SES (mean)	1.4	1.5
Low (1)	73.0%	60.0%
Middle (2)	13.5%	27.3%
High (3)	13.5%	12.7%

Notes: \*\* =  $p < 0.01$ ; CD = conduct disorder; IQ = intelligence quotient; NC = normal control group; SES = socio-economic status; YO = young offender group; YPI = youth psychopathic traits inventory; YSR = youth self-report. All data show mean values (SD), number, or % of group.

### 2.3.2. YO and NC group comparisons

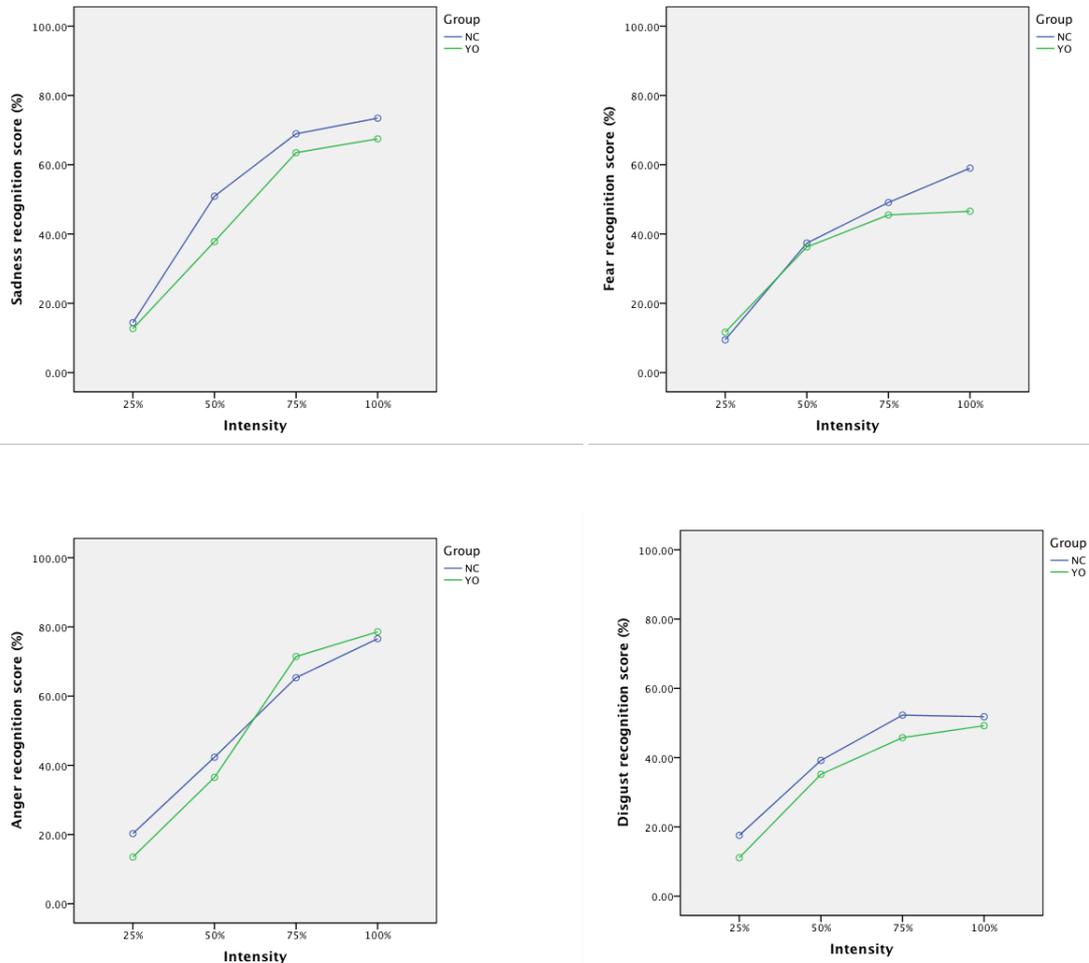


Figure 2.2. Young offenders and controls' mean sadness, fear, anger, and disgust recognition scores at 25%, 50%, 75% and 100% emotional intensities.

Figure 2.2 illustrates sadness, fear, anger and disgust recognition scores across 25%, 50%, 75% and 100% intensities for the YO and NC groups. For sadness, there was a significant main effect of intensity ( $F(2.6, 260.8)=203.3, p<0.01$ ), a significant main effect of group ( $F(1, 98)=5.5, p<0.05$ ), but no significant interaction ( $F(2.6, 260.8)=1.7, p=0.18$ ). Simple comparisons tests revealed that YOs recognition of 50% sad faces (mean recognition

score=37.8%) in particular was significantly worse than the NC group's recognition (mean=50.9%;  $p<0.01$ ).

For fear, YO and NC recognition scores were clearly similar for 25%, 50%, and 75% intensities. A more marked difference was apparent for 100% fearful expression (YO mean=46.8, NC mean=59.0). There was a significant main effect of intensity ( $F(2.66, 260.9)=85.5, p<0.01$ ), no main effect of group ( $F(1, 98)=1.1, p=0.29$ ), and a marginally significant interaction between intensity and group ( $F(2.6, 260.9)=2.3, p=0.08$ ). Tukey's HSD effects tests revealed that YOs were significantly worse at 100% fear recognition in comparison with NCs ( $F(1, 98)=4.8, p<0.05$ ). These results clearly indicate that no group differences exist for fear recognition; however the data provide some indication that deficits seem to be solely evident for 100% expressions.

For anger, there was a significant main effect of emotion intensity ( $F(2.8, 270.0)=222.4, p<0.01$ ), no main effect of group ( $F(1, 98)=0.1, p=0.74$ ) and a significant interaction between intensity and group ( $F(2.8, 270.0)=2.8, p<0.05$ ). Tukey's HSD simple effects tests revealed that there was in particular a difference between YO and NC groups' anger recognition scores at 25% ( $p=0.05$ ).

For disgust, there was a significant main effect of intensity ( $F(3,294)=75.2, p<0.01$ ), no main effect of group ( $F(1,98)=1.4, p=0.24$ ), and no interaction between intensity and group ( $F(3,294)=0.3, p=0.86$ ).

Table 2-2 shows happiness, surprise and neutral recognition scores for young offenders and controls. There were significant main effects of intensity for happiness ( $F(2.3,226.2) = 244.3, p<0.01$ ), and surprise ( $F(3,294)=302.9, p<0.01$ ). There were no main effects of group (happiness  $F(1,98)=0.0, p=0.84$ ; surprise  $F(1,98)=0.0, p=0.92$ ), and no interactions between intensity and group (happiness  $F(2.31, 226.2)=0.4, p=0.67$ ; surprise

$F(3,294)=0.8, p=0.52$ ). YOs and NCs neutral recognition scores were not statistically different ( $t(98)=0.0, p=0.97$ ).

Table 2-2

*Young offenders' and controls' happiness, surprise and neutral recognition scores.*

Facial Expression	NC	YO	
<b>Happiness:</b>	<b>25%</b>	48.6 (19.0)	51.6 (24.1)
	<b>50%</b>	86.0 (18.2)	86.5 (14.9)
	<b>75%</b>	93.2 (10.7)	92.1 (12.6)
	<b>100%</b>	95.9 (7.3)	95.5 (7.5)
<b>Surprise:</b>	<b>25%</b>	18.9 (15.8)	20.9 (15.0)
	<b>50%</b>	74.3 (23.1)	69.8 (21.6)
	<b>75%</b>	78.8 (22.4)	80.7 (19.0)
	<b>100%</b>	85.6 (20.5)	85.2 (17.2)
<b>Neutral</b>	71.6 (26.3)	71.4 (27.0)	

Notes: NC = normal control group; YO = young offender group. All data show mean values (SD), number, or % emotion intensity.

### 2.3.3. Within YO group analyses

YSR data were collected for 57 YOs, of whom 33 YOs displayed borderline or clinical levels of CD ( $YO_{CD+}$ ) and 24 YOs scored in the normal range ( $YO_{CD-}$ ). YPI data were collected for 60 YOs. Of these, 20 were classified as high in psychopathic traits ( $YO_{YPI+}$ ) and 40 were classified as low in psychopathic traits ( $YO_{YPI-}$ ) based on their mean YPI total score. Offence data were available for 63 YOs. Of these, 35 were classified as 'high severity' offenders ( $YO_{HS}$ ) and 28 were classified as 'low severity' offenders ( $YO_{LS}$ ).

#### 2.3.3.1. Young offenders with and without Conduct Disorder

Sadness recognition for the  $YO_{CD+}$  and  $YO_{CD-}$  groups are shown in Figure 2.3. There was a main effect of intensity ( $F(3,165)=111.2, p<0.01$ ), no main effect of CD group ( $F(1,55)=0.1$ ,

$p=0.75$ ), and a marginally significant interaction between intensity and group ( $F(3,165)=2.3$ ,  $p=0.08$ ). Simple post-hoc effects tests revealed no differences between the two groups' mean recognition scores at any intensity.

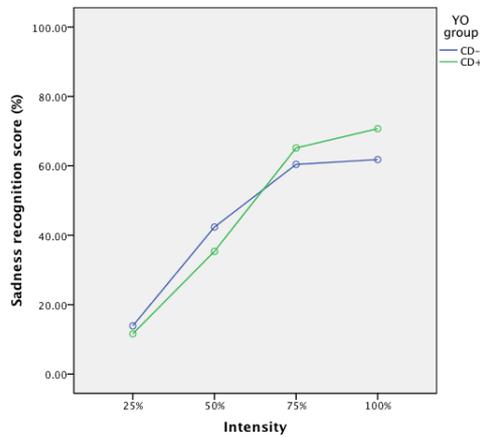


Figure 2.3. Mean recognition scores of sadness at 25%, 50%, 75% and 100% intensity for offenders with and without conduct disorder.

For fear, there was a significant main effect of intensity ( $F(2.4, 132.5)=32.1$ ,  $p<0.01$ ), no main effect of group ( $F(1, 58)=0.1$ ,  $p=0.79$ ), and no interaction between intensity and group ( $F(2.4,132.5)=0.0$ ,  $p=0.98$ ). For anger, there was a significant main effect of intensity ( $F(3,165)=153.5$ ,  $p<0.01$ ), no main effect of group ( $F(1,55)=1.5$ ,  $p=0.22$ ) and no interaction between intensity and group ( $F(3,165)=0.1$ ,  $p=0.97$ ). Finally, for disgust, there was a significant main effect of intensity ( $F(3,165)=43.8$ ,  $p<0.01$ ), no effect of group ( $F(1,55)=0.1$ ,  $p=0.80$ ), and no interaction ( $F(3,165)=0.7$ ,  $p=0.57$ ).

### 2.3.3.2. Young offenders with and without psychopathic traits

For sadness recognition scores, there was a main effect of intensity ( $F(3,174)=112.1$ ,  $p<0.01$ ), a marginal effect of group ( $F(1,58)=3.5$ ,  $p=0.07$ ), but no interaction between

intensity and group ( $F(3,174)=0.2, p=0.92$ ). Simple comparisons revealed no statistical differences between the two groups' mean scores at any intensity.

For fear, there was a significant main effect of intensity ( $F(2.5,147.3)=34.4, p<0.01$ ), neither a main effect of group ( $F(1, 58)=0.1, p=0.79$ ), nor an interaction between intensity and group ( $F(2.5, 147.3)=0.1, p=0.98$ ). Likewise for anger, there was a significant main effect of intensity ( $F(3,174)=173.2, p<0.01$ ), no main effect of group ( $F(1,58)=0.0, p=0.91$ ), and no interaction between intensity and group ( $F(3,174)=2.0, p=0.11$ ).

Finally, for disgust there was a significant main effect of intensity ( $F(3,174)=40.1, p<0.01$ ), no main effect of group ( $F(1,58)=1.4, p=0.24$ ), and a marginally significant interaction between group and intensity  $F(3,174)=2.2, p=0.09$ ). Simple effects tests revealed that there were no statistical differences between the groups' mean scores at any intensity.

Figure 2.4 shows sadness and disgust recognition scores for the two psychopathic trait offender groups.

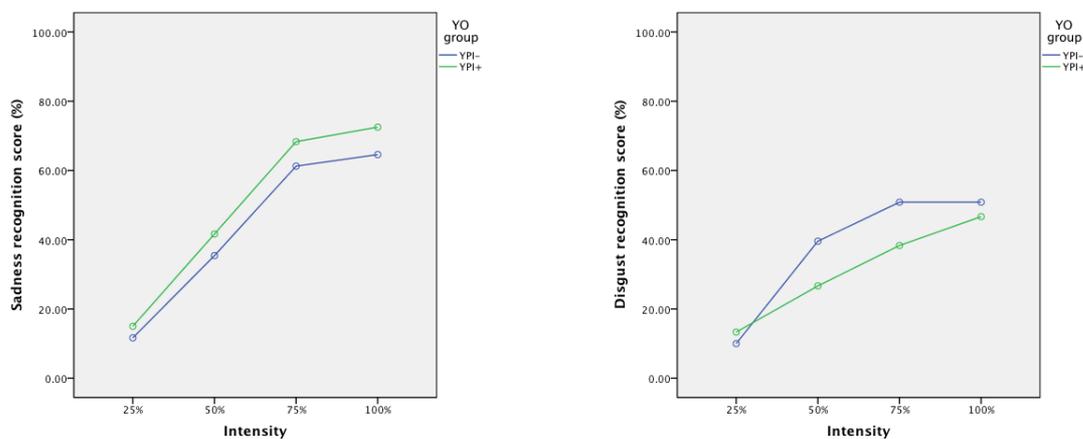


Figure 2.4. Mean recognition scores of sadness and disgust at 25%, 50%, 75% and 100% intensity for offenders high and low in psychopathic trait scores.

### 2.3.3.3. Emotion recognition in high and low severity offenders

For sadness, there was a main effect of intensity ( $F(3.0, 183.0)=129.9, p<0.01$ ), no main effect of group ( $F(1.0, 61.0)=2.0, p=0.16$ ), nor an interaction between intensity and group ( $F(3.0, 183.0)=1.2, p=0.33$ ). Similarly, for fear, there was a significant main effect of intensity ( $F(2.5, 150.2)=37.7, p<0.01$ ), no main effect of group ( $F(1.0, 61.0)=0.2, p=0.65$ ) and no interaction between intensity and group ( $F(2.5, 150.2)=0.5, p=0.62$ ).

Figure 2.5 illustrates anger recognition in high and low severity offenders. There was a significant main effect of intensity ( $F(3.0, 183)=175.3, p<0.01$ ), no main effect of group ( $F(1.0, 61.0)=0.7, p=0.42$ ), and a significant interaction between intensity and group ( $F(3.0, 183.0)=4.4, p<0.01$ ). Tukey's HSD effects tests indicated that, in comparison with the low severity group, the high severity YOs were significantly worse at identifying 25% anger ( $p<0.05$ ), but significantly better at identifying 100% anger ( $p<0.05$ ).

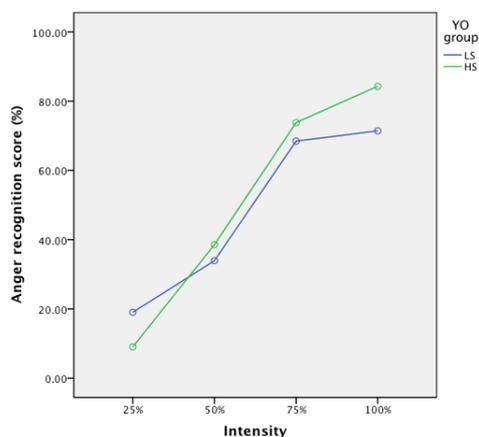


Figure 2.5. Mean recognition scores of anger at 25%, 50%, 75% and 100% intensity for high and low severe offenders

For disgust, there was a main effect of intensity ( $F(3.0, 183.0)=50.6, p<0.01$ ). There was no main effect of group ( $F(1.0, 61.0)=0.1, p=0.70$ ), and no interaction between intensity and group ( $F(3.0, 183.0)=0.5, p=0.72$ ).

## ***2.4. Discussion***

The present study had two key goals. Firstly, it sought to examine whether there is a general or a specific emotion recognition deficit in a community sample of antisocial adolescent boys, and whether any deficit is present across the whole range of emotion intensities. Secondly, the study would assess the influence of variations in severity of antisocial behaviour on emotion recognition by examining the role of psychopathic traits, CD symptoms, and offending severity on emotion recognition performance.

The current findings provide partial support for the primary hypothesis; our community-based sample of adolescent offenders showed a general deficit recognising sadness in facial expressions, but not a general deficit for fear. Young offenders' fear recognition deficits seemed to be limited to 100% intensity expressions. Also, compared to age, IQ and SES matched controls, young offenders performed less well in recognising low intensity anger. Our results also indicate that even though young offenders presented with emotion recognition difficulties in terms of selective negative emotions, they were equally able as normal controls in identifying positive emotions: happiness and surprise. Given previous studies and theory on facial emotion recognition in antisocial groups, these findings confirm that young offenders did not present with difficulties in recognising positive emotions.

Data from the young offender group were examined to determine how CD, psychopathy, and severity of offending were related to differences in facial emotion processing. Analyses revealed that adolescents' offence history, specifically the severity of their offending behaviour, played a role in explaining anger recognition variation. YOs who had committed the most severe offences showed a poorer recognition of 25% angry, but a

better recognition of 100% angry faces. Surprisingly, neither CD nor psychopathy explained any variation within YOs' emotion recognition scores.

Generally, antisociality has been linked more to deficits in fear recognition than sadness recognition (see Marsh & Blair, 2008), although conflicting findings have been reported (Fairchild et al., 2010; Glass & Newman, 2006; Kosson et al., 2002). Our findings demonstrated a group difference in sadness across intensities, as well as a difference at 100% fear. Past research has focused largely on examining emotion recognition in psychopathic antisocial populations (see Marsh & Blair, 2008), and so it might be that fear recognition deficits are more pronounced than sadness deficits within psychopathic populations. Our sample did not display heightened levels of psychopathic traits in comparison with control adolescents, nor did we find variation in recognition scores within our offender group when examining the role of psychopathy.

These results are consistent with previous research showing dysfunctional anger in patients with impulsive aggression disorders and CD adolescents (Best et al., 2002; Fairchild et al., 2009a). We demonstrated an anger recognition interaction across intensities, which supports the claim that antisocial or aggressive individuals are less sensitive to weak (social) signals of punishment (Best et al., 2002; Fairchild et al., 2009a). Understanding the warning signs of anger might allow an individual to learn the association between their actions and its consequences before a situation has been aggravated.

Our finding that individuals who have committed more severe offences are better at identifying high intensity anger might be explained by offenders having greater exposure to anger in their environment and therefore they recognise this emotion more readily. Rejection by peers (Coie & Dodge, 1998) and harsh parenting (Weiss et al., 1992) are known risk factors for development of aggressive behaviour that can also affect processing of situations, predisposing them to attribute hostile intent to situations (Dishion et al., 1995; Dodge, 1993,

2003). It may also be the case that exposure to angry situations facilitates the learning of obviously angry faces.

These results extend previous findings showing that there is variation in emotion recognition deficits across emotional intensities in antisocial youths. This variation could explain the differential results across previous studies. For instance, while there appears to be a generalized sadness deficit across emotional intensities our data also indicate that young offenders' fear recognition deficit is restricted to high intensity facial expressions, whereas the anger deficit only seems to exist in the low intensity range. Methodologies relying on high intensity expressions only would reveal a different pattern of results compared to studies that included ambiguous and less intense facial expressions. Our results indicate that examining recognition deficits *across* emotion intensities provides additional detailed insights into emotion processing factors that may contribute towards antisocial and criminal behaviour.

One limitation of the study is the lack of control boys from a middle and higher SES. Although matching YOs and NCs on the basis of IQ and SES allows for an assessment of the effect of ASB on emotion recognition without the complication of differing intelligence or social depravity, it does mean that differences between the groups are less likely to be detected and more subject to type II errors. The results reported here are therefore conservative but raise important questions relating to the methodology used in emotion research for future studies.

An additional issue is that our NC and YO samples did not differ in terms of their psychopathy scores. Adolescent offenders are a heterogeneous sample, and can be comprised of individuals who have committed one crime as well as persistent offenders who may have syndromes such as CD or psychopathy, which would explain why only a third of our offender sample were classified as being high in psychopathic traits. Although this is a similar

distribution to that observed in other studies of antisocial populations (e.g. Brandt et al., 1997; Catchpole & Gretton, 2003; Murrie & Cornell, 2002), the low numbers of high psychopathy trait-scoring offenders might explain why our NCs and YOs do not differ significantly in terms of psychopathic traits. It is widely reported that psychopathy is related to deficits in the recognition of fear and sometimes sadness (see Marsh & Blair, 2008), therefore it might be that our sample of offenders, who did not significantly differ from controls in terms of psychopathic traits, are perhaps not best suited to examine the role of psychopathy in young offenders. In order to further assess psychopathy in a population of offenders, prior screening for psychopathy could be performed.

This study has demonstrated that, compared to a matched (by gender, age, IQ and SES) control group that did not exhibit ASB, adolescents who engage in community-based offending exhibit specific emotion recognition dysfunctions. This could potentially have important implications for the development and design of interventions targeted at tackling ASB. Offenders were able to recognise clear social signs of anger, a finding that we interpret as one suggesting that their routine exposure to anger but impoverished experience of other emotions accounts for the differential recognition rates observed here. Targeted emotion recognition interventions may rebalance these biases and improve their ability to detect other emotional expressions. Such an approach might ultimately contribute towards improving their problematic behaviour.

In summary, the current findings provide further evidence that insights developed in clinically significant groups generalize to a much larger group of youths who come into contact with the offending services for a wide range of different types of antisocial behavioural problems (van Goozen & Fairchild, 2008). Compared to age-, IQ- and SES-matched controls, juvenile offenders exhibited specific negative facial expression recognition

impairments. Variation in anger recognition within offenders was partly explained by the severity of their offending behaviour rather than by levels of CD or psychopathic traits.

### **3. Chapter 3 – Trust in Others**

Trusting others is fundamental to human social interaction, and is determined by the facial emotion of the other person. It is hypothesized that mistrust underlies social problems exhibited by antisocial youths, yet this is an under-researched area. In this study, sixty male juvenile offenders and thirty-seven IQ-, age, and socio-economic status-matched male controls completed a facial trust task that measures participants' judgments of trust toward images of happy, angry and neutral male and female faces. Levels of psychopathic traits and conduct disorder were measured, and the seriousness of offenders' criminality was assessed using case files. Male adolescents trusted neutral expressions more than angry expressions. Young offenders judged male faces generally, and happy faces specifically, as less trustworthy compared to the control group. Within the young offender group, offence severity explained variations in trust of male neutral faces. Results are discussed in terms of possible social factors responsible for mistrust of emotional male faces.

### ***3.1. Introduction***

Trust is fundamental to human social interaction and shares many of the characteristics of approach and bonding behaviours (Bazerman, 1994). It is independently and robustly related to life satisfaction and happiness, both directly and through its impact on health (Helliwell & Putnam, 2004). Demonstrating trust involves having positive expectations about the behaviour of others and in so doing making oneself vulnerable (Rousseau et al., 1998). Accurately judging the level of trust that can be invested in an unknown person or persons is therefore critical (Porter et al., 2008). However, there is considerable variation in the extent that people show trust in strangers. These variations are explained through reference to the social and biological processes that underpin the development of trust.

A child's early social environment is critical in the formation and generalisation of trust in others. Trust and attachment towards primary caregivers are formed during infancy and Erikson (1964) suggests that predictability and dependability from caregivers are formative in promoting these feelings. These trust bonds are in turn influential to the development of trust beyond the child's caregivers, such as with peers (Rotenberg et al., 2004). Thus the social environment of the child has a clear role in the development of trust.

There is also an important role for the brain in determining the extent that people trust one another. Showing trust towards facial stimuli is associated with activation in the amygdala, a brain region implicated in emotional and social behaviour (Adolphs et al., 1998; Engell et al., 2007; Todorov, 2008; Winston et al., 2003). Functional magnetic resonance imaging studies show that even when participants do not explicitly evaluate faces, increased activation in the amygdala corresponds with reduced levels of trust towards facial stimuli (Engell et al., 2007; Todorov, 2008; Winston et al., 2003). Furthermore, the capacity to judge

levels of trust for facial stimuli is compromised following amygdala lesions (Adolphs et al., 1998).

Amygdala function is implicated in multiple processes relating to emotion, including the learnt fear response (Fairchild et al., 2008; LeDoux, 2000) and recognising emotional states (Adolphs et al., 1999). There are also emotional components implicated in trusting others (e.g. Oosterhof & Todorov, 2009; Willis et al., 2011). Todorov (2008) proposed that trusting facial stimuli is based on those facial features that correspond with emotional expressions. Facial stimuli that depict happiness are more trusted than facial stimuli that depict negative emotion. Furthermore, trust is strongly associated with the level of reported happiness facial stimuli depict, even when those facial stimuli are emotionally neutral faces (Todorov & Duchaine, 2008; Winston et al., 2003), suggesting that trust is based on subtle approach (happiness; Oosterhof & Todorov, 2009) and avoidance cues (anger; Adams et al., 2005; Marsh et al., 2005).

### **3.1.1. Trust and ASB**

Adolescence is a time of increased risk for the onset of a wide range of emotional and behavioural problems, including delinquency (Steinberg, 2005). In particular, adolescents who engage in antisocial behaviour (ASB) demonstrate problems relating to both biological and social factors that contribute to trust (Barkley et al., 1991; Fairchild et al., 2011; Warr, 2002). The presence of ASB is associated with a weakened attachment to and increased conflict with parents (Barkley et al., 1991; Danforth et al., 1991). Pollak and colleagues (Pollak et al., 2000) demonstrated that aversive parenting, involving physical abuse and neglect, affects emotion recognition, particularly anger. Moreover, insecure attachment corresponds with anger and reduced trust in caregivers (Cummings & Davies, 1994),

providing a pathway suggesting that adolescents who display ASB are less likely to have trust in others.

Impairments in amygdala structure and function have not only been observed in adult offenders (Tiihonen et al., 2000; Wong et al., 1997), individuals with intermittent explosive disorder (Coccaro et al., 2007), and psychopaths (Kiehl et al., 2001; Veit et al., 2002; Yang et al., 2009), but also in children and adolescents with antisocial behaviour (Fairchild et al., 2011; Vloet et al., 2008; Passamonti et al., 2010). As a result of these impairments, ASB individuals demonstrate reduced ability on tasks in which amygdala function is implicated (Blair et al., 2001; Blair et al., 2004; Fairchild et al., 2010; Fairchild et al., 2009a; Fairchild et al., 2008). Because amygdala function is implicated in trust towards faces it is feasible that ASB youngsters also have difficulties trusting stimuli when emotional facial components are included (Winston et al., 2003).

Few studies have examined levels of trust in facial stimuli in antisocial populations, or more specifically adolescents. Only one study (Ritchell et al., 2005) assessed trust in male faces for psychopathic and non-psychopathic adult offenders. They found that trust was significantly positively correlated with ratings of how happy the faces were, and significantly negatively correlated with ratings of facial anger, fear and sadness. A multiple regression indicated that trust was uniquely related to anger ratings. However, rather unexpectedly, trust did not differ between the two offender groups, suggesting no role for psychopathy. This study did not include a normal control group, so it remains unclear whether trust varies between ASB and non-ASB populations. Furthermore, only male faces were used and it therefore remains unclear whether trust differs between male and female faces.

### **3.1.2. The current study**

Trusting others is evidently important for social behaviour and health outcomes; it has been found to foster close relationships during adolescence (Armsden & Greenberg, 1987; Collins & Repinski, 1994), and is directly and indirectly related to reduced experience of sadness, loneliness, low self-esteem and problems with eating and sleeping (Helliwell & Putnam, 2004). Despite this, little research has been conducted on trust in a group of adolescents with clear social problems. Based on previous studies examining antisocial and healthy individuals (Richell et al., 2005; Willis et al., 2011), a significant effect of facial emotion on trust was anticipated. Relative to neutral expressions, participants were expected to trust happy faces more and trust angry faces less. Second, and based on the assumption that juveniles who engage in serious ASB have neurobiological dysfunction and come from a problematic social background (Barkley et al., 1991; Pollak et al., 2000), it was also expected that juvenile offenders would be less trusting overall, compared to control youths. Finally, and because young offenders are a heterogeneous group, the roles of offence severity, level of psychopathic traits and conduct disorder were explored to assess whether more serious patterns of ASB and offending were associated with lower levels of trust. Although, based on Ritchell and colleagues' (2005) data, psychopathy was not expected to play a significant role.

## ***3.2. Method***

### **3.2.1. Participants**

All aspects of the research reported here were scrutinized and approved by the Cardiff University School of Psychology Research Ethics Committee. All participants and their parents/guardians provided written informed consent. Male young offenders (YO), aged 13-

18 years (mean age = 15.8 years, SD = 1.0) took part in the study (N = 60). They were recruited from the Cardiff Youth Offending Services. All offenders completed the trust judgment task and the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999); 59 YOs completed the Youth Psychopathic Traits Inventory (YPI; Andershed et al., 2002), and 56 YOs completed the Youth Self-Report (YSR; Achenbach, 1991). Postcode data were available for all YOs, from which levels of neighbourhood deprivation could be determined. Offence data were available for 50 YOs. Male control participants (NCs), aged 13-18 (mean age = 15.4 years, SD = 1.1) also took part (N = 37). They were recruited from local comprehensive schools and youth centres from relatively deprived areas in Cardiff. All control participants completed the trust task, WASI and YSR; 29 NCs completed the YPI. For a detailed breakdown of the distribution of participants who completed the trust judgment task in addition to the emotion recognition task (see Chapter 2) and Ultimatum Game (see Chapter 4) please see Table 1.1.

### **3.2.2. Materials**

#### **3.2.2.1. Trust of Others Measure**

The facial trust task was made using the application Medialab (Empirisoft Corporation, New York) and consisted of a series of 18 choice set slides displaying facial stimuli from Ekman and Friesen's (1975) pictures of facial affect. Six target faces – three male and three female – were used. Each of these targets displayed a neutral, angry or happy expression. The two emotional expressions had been morphed with their matching neutral expression (0% emotion) to display faces at 25% emotional intensity. The hair and background of the image had been blacked out so that only the facial features were remaining. This measure was interleaved with the FER task (see Chapter 2).

The question “How trustworthy is this person?” accompanied the target image, along with numbered options from 1 to 7. The options were (from 1 to 7) “very untrustworthy”, “moderately untrustworthy”, “a little untrustworthy”, “neither”, “a little trustworthy”, “moderately trustworthy”, and “very trustworthy”. Mean trust judgment scores of male and female faces for anger, neutral and happiness were produced.

### **3.2.2.2. Youth Self Report**

The Youth Self Report (YSR; Achenbach, 1991) assesses a range of behavioural problems following DSM-IV (American Psychiatric Association, 1994) criteria and is widely used in community-based and clinical research on problem behaviour in adolescents between the age of 11 and 18 years. The conduct disorder (CD) symptoms subscale of the YSR was used to classify young offenders in terms of the borderline/clinical or normal range of CD symptoms based on their individual standardized t-scores (Achenbach, 1991).

### **3.2.2.3. Youth Psychopathy Inventory**

The Youth Psychopathy Inventory (YPI; Andershed et al., 2002) is a 50-item validated youth self-report questionnaire that assesses psychopathic tendencies. The YPI is scored on a 1-4 Likert scale, giving a sum score of 50-200. Respondents are classified into high or low psychopathy groups by dividing the total YPI score by 50; a mean YPI score of between 1 and 4 is then obtained (Skeem & Cauffman, 2003). Participants scoring above the 2.5 threshold are classified as high in psychopathic traits, whereas those below are classified as low in psychopathic traits.

#### **3.2.2.4. Offence data**

The type of previous crimes for which the offender had been convicted was taken from their YOS case files. Each offence had been assigned an offence severity score ranging from 1 (e.g. minor public order offences) to 8 (e.g. murder; see Appendix 1). For the convicted offences, the highest severity score (i.e. the most serious crime the offender had committed) was recorded. Inspection of the distribution of severity scores showed a bimodal pattern. Based on this information two subgroups were identified for subsequent analysis; offenders with a severity score ranging from 1 to 5, and offenders with a severity score between 6 and 8.

#### **3.2.2.5. Wechsler Abbreviated Scale of Intelligence**

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) is a standardized measure of intelligence. The two-subtest form was used, which includes Vocabulary and Matrix Reasoning tasks. The Vocabulary subtest measures word knowledge, verbal concept formation, and fund of knowledge, and the Matrix Reasoning subtest measures visual information processing and abstract reasoning skills. The two-subtest form provides an estimated Full Scale IQ score.

#### **3.2.2.6. Socio-Economic Status**

Socio-economic status (SES) was estimated using the Office of National Statistics estimates of average household total weekly income based on each participant's postcode (Low = £0 - £520; Middle = £521 - £670; High = £671+).

### **3.2.3. Statistical methods**

The outcome variables were the mean trust judgment scores for male and female faces with happiness, neutral and anger expressions. For comparisons between YOs and NCs, mixed-design MANOVAs were used to examine the effects of emotion (within-subjects), gender of face (within-subjects), and group (between-subjects) for each emotional expression. Independent samples t-tests were used to compare age, IQ, SES, and mean YPI scores between the groups. Due to the results of the initial 3-way MANOVA comparing YOs and NCs, only male faces were examined for subsequent YO within group analyses. Mixed design MANOVAs were used to determine the effects of emotion (within-subjects), conduct disorder (between-subjects), psychopathy (between-subjects), and offence severity (between-subjects). Tukey's HSD effects test was used to test simple comparisons.

## **3.3. Results**

### **3.3.1. Demographic characteristics**

Table 3-1 shows the demographic characteristics of the sample. Independent samples t-tests indicated that the groups differed in YSR CD scores ( $t(91)=2.6, p<0.01$ ), but not in age ( $t(95)=1.8, p=0.07$ ), psychopathic traits ( $t(86)=1.8, p=0.07$ ), IQ ( $t(84)=-1.1, p=0.29$ ) or socio-economic status ( $t(81)=0.7, p=0.46$ ).

Table 3-1  
*Demographic characteristics of adolescents*

<b>Variable</b>	<b>NC</b>	<b>YO</b>
<b>Age (years)</b>	15.4 (1.1)	15.8 (1.0)
<b>IQ</b>	90.9 (12.6)	87.3 (11.8)
<b>YPI (total score)</b>	109.4 (15.2)	118.8 (21.6)
<b>CD (YSR t-score)</b>	56.0 (6.4)	65.7 (9.9)**
<b>SES (mean)</b>	1.4	1.5
<b>Low (1)</b>	73.0%	60.0%
<b>Middle (2)</b>	13.5%	27.3%
<b>High (3)</b>	13.5%	12.7%

*Notes:* \*\* =  $p < 0.01$ ; CD = conduct disorder; IQ = intelligence quotient; NC = normal control group; SES = socio-economic status; YO = young offender group; YPI = youth psychopathic traits inventory; YSR = youth self-report. All data show mean values (*SD*), number, or % of group.

### 3.3.2. YO and NC group comparisons

Figure 3.1 illustrates happiness, neutral and anger mean trust scores for male and female faces for the YO and NC groups. Young offenders' and school controls' mean trustworthiness judgments were similar for male (YO mean=3.7, NC mean=3.8) and female angry faces (YO mean=3.6, NC mean=3.8). Young offenders' judgments of male (mean=4.0) and female neutral faces (mean=3.9) were similar to school controls' judgments of female neutral faces (mean=4.1). School controls seemed to judge male neutral faces as more trustworthy (mean=4.4) than female neutral faces. Differences between young offenders and controls were most apparent for male happy faces. In comparison with school controls, young offenders judged happy male faces as being less trustworthy (YO mean=3.6, NC

mean=4.2), whereas trust judgments made by the two groups were similar for female happy faces (YO mean=3.9, NC mean=3.8).

Mixed model MANOVAs revealed there was a significant main effect of emotion ( $F(1.8, 170.5)=7.2, p<0.01$ ), with simple comparisons showing that angry faces were judged as more untrustworthy than neutral faces ( $p<0.05$ ), happy faces were judged as marginally significantly less trustworthy than neutral faces ( $p=0.07$ ), while trust judgments of angry and happy faces did not differ significantly ( $p=0.57$ ).

There was no main effect of face gender ( $F(1, 97)=0.6, p=0.40$ ), or group ( $F(1,97)=0.4, p=0.60$ ), but a significant interaction between face gender and group ( $F(1,97)=4.5, p<0.05$ ), with simple effects tests indicating that YOs judged male faces as generally less trustworthy relative to NCs ( $p<0.05$ ). There was no interaction between emotion and group ( $F(1.8,170.5)=0.7, p=0.50$ ), nor between emotion and face gender ( $F(2,194)=0.5, p=0.60$ ).

The influence of group and face gender was most evident within the happy face condition. This was confirmed by a significant three-way interaction of emotion, face gender and group ( $F(2,194)=3.0, p=0.05$ ). A 2-way ANOVA follow-up analysis on the happy face data revealed no significant main effect of face gender ( $F(1,97)=0.01, p=0.97$ ) or group ( $F(1,97)=0.8, p=0.38$ ), but a significant interaction between face gender and group ( $F(1,97)=11.9, p<0.01$ ). Simple effects tests showed a significant main effect of group within the male target face condition only ( $p<0.01$ ); YOs rated male happy faces (mean = 3.6) as significantly less trustworthy than NCs (mean = 4.2).

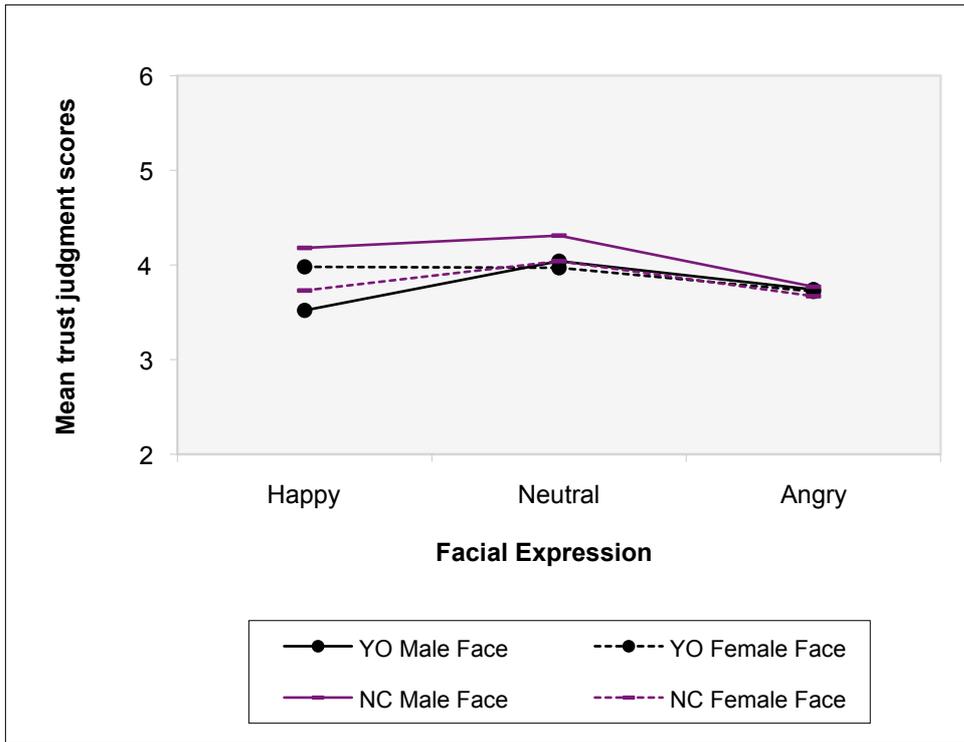


Figure 3.1. Mean trust judgment scores (2-6) of happy, neutral and anger expressions of male and female faces for young offenders and controls.

### 3.3.3. Within YO group analyses

YSR data were available for 56 YOs, of whom 31 YOs displayed borderline or clinical levels of CD ( $YO_{CD+}$ ) and 25 YOs scored in the normal range ( $YO_{CD-}$ ). YPI data were collected for 59 YOs. Of these, 22 were classified as high in psychopathic traits ( $YO_{YPI+}$ ) and 37 were classified as low in psychopathic traits ( $YO_{YPI-}$ ) based on their mean YPI total score. Offence data were available for 50 YOs. Of these, 29 were classified as ‘high severity’ offenders ( $YO_{HS}$ ) and 21 were classified as ‘low severity’ offenders ( $YO_{LS}$ ). Based on the results comparing YO and NC groups, only male face data were examined in subsequent within group analyses.

### **3.3.3.1. Young offenders with and without Conduct Disorder**

There was a significant main effect of emotion ( $F(2,108)=4.0, p<0.05$ ), no main effect of group ( $F(1,54)=0.6, p=0.45$ ), and no interaction between group and emotion ( $F(2,108)=0.1, p=0.89$ ). Simple comparisons tests revealed that trust judgments for happy male faces were significantly lower than for neutral male faces ( $p<0.05$ ). Happy and angry ( $p=0.50$ ) and neutral and angry faces ( $p=0.24$ ) did not significantly differ in terms of trust judgments.

### **3.3.3.2. Young offenders with and without psychopathic traits**

There was a significant main effect of emotion ( $F(2,114)=3.3, p<0.05$ ), no main effect of group ( $F(1,57)=0.3, p=0.60$ ), and no interaction between emotion and group ( $F(2,114)=0.1, p=0.92$ ). Simple comparisons tests revealed that trust judgments for happy faces were marginally significantly lower than for neutral faces ( $p=0.07$ ). Happy and angry ( $p=0.67$ ) and neutral and angry faces ( $p=0.24$ ) did not significantly differ in terms of trust judgments.

### **3.3.3.3. Trust judgments in high and low severity offenders**

Figure 3.2 illustrates trust judgment scores of male happy, neutral and angry faces in high and low severity offenders. There was a significant main effect of emotion ( $F(2,96)=4.1, p < 0.05$ ), no main effect of group ( $F(1,48)=0.6, p=0.56$ ), and a significant interaction between emotion and group ( $F(2,96)=3.6, p<0.05$ ). There was no effect of

emotion on trust in the high severity group, but the low severity group rated neutral male faces as the most trustworthy ones. This was confirmed by simple effects tests; less severe offenders rated neutral male faces as significantly more trustworthy than more severe offenders ( $p < 0.05$ ).

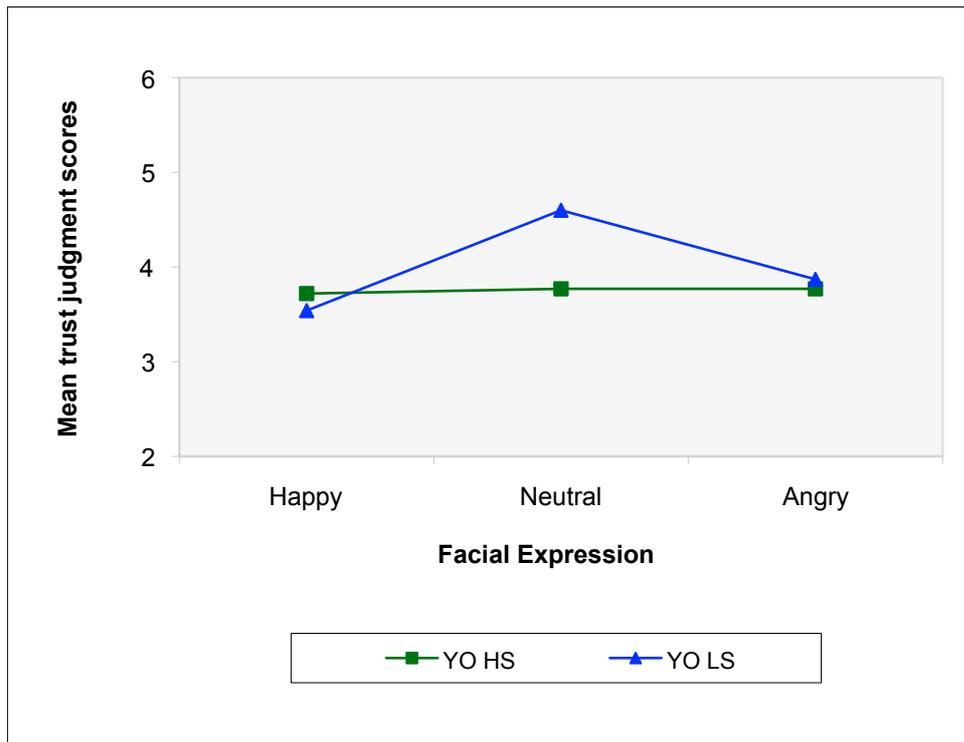


Figure 3.2. Mean trust judgment scores (2-6) of happy, neutral and anger expressions of male faces for young offenders with high and low previous offence severity scores.

### 3.4. Discussion

This study investigated trust for emotional facial stimuli. The sample was drawn from a large, community-based sample of adolescents with social behaviour problems and assessed the role of psychopathic traits, conduct disorder and severity of offending in explaining variation of trust in facial stimuli.

The current findings provided partial support for the first hypothesis; male adolescents generally trust angry faces less than neutral faces, however happy faces were not considered to be more trustworthy than neutral faces. We also noted that although YOs were not less trusting than NCs overall, there was also an influence of participant group and target gender; young offenders did not trust male faces as much as the NCs, an effect that was most apparent for happy faces.

Analyses also indicated that trust in male faces varied within the YO group; trust did not vary by emotional expression for more severe offenders, but less severe offenders trusted neutral faces more than happy and angry faces. There was no discernible relationship between trust and psychopathy or trust and conduct disorder for young offenders.

The results of the current study confirm and generalize to YOs Ritchell and colleagues' (2005) observation involving adult offenders, that trust is based on emotional content. Relative to neutral expressions, low intensity angry expressions were generally less trusted by both YOs and NCs. Todorov (2008) argues that trustworthiness judgments are an attempt to understand behavioural intentions and are derived from facial features that resemble emotional expressions signalling approach/avoidance. Since expressions of anger communicate that the person should be avoided (Todorov, 2008), and trigger automatic avoidance responses (Adams et al., 2006; Marsh et al., 2005), trustworthiness judgments for angry expressions are lower than those for neutral expressions.

However, although previous studies in healthy adults indicate trust in emotionally neutral faces is associated with judgments of happiness for those faces (Todorov & Duchaine, 2008; Winston et al., 2003), we did not find that male adolescents trusted happy faces more than neutral or angry faces. This rather discrepant finding might be due to our sample consisting of adolescents who came from relatively low SES communities and were asked to rate adult faces. Studies using experimental trust games suggest that, compared to adults,

adolescents trust others less (Sutter & Kocher, 2007). The lower levels of trust towards positive adult strangers observed here might be related to their relatively poor social background as low SES families may experience less positive and more uncontrollable and sometimes threatening life events (Bradley & Corwyn, 2002; Bradley & Whiteside-Mansell, 1997). Living in neighbourhoods characterized by relative poverty and disorder significantly and detrimentally affects levels of fear and mistrust (Ross & Jang, 2000; Ross et al., 2001). Additionally, adolescence is a period characterised by the drive for psychological and emotional independence from adults, which often coincides with conflict and changes in the parent-child relationship (Steinberg, 1990 & 2001; Youniss & Smollar, 1985). In our sample of teenage antisocial and control boys, a general lack of positive experiences with adults might explain why they did not trust happy faces significantly more than neutral or angry ones.

Another interesting finding was that juvenile offenders, relative to normal controls, rated male happy faces as less trustworthy. We suggest that the most likely explanation for this finding is a social environmental one: youngsters who display aggressive and delinquent behaviour may be exposed less often to happy faces. This might be because they are more likely to have had harsh and inconsistent parenting, they may have been expelled from schools, and in contact with adults who have not been able to help them despite good intentions (Farrington, 2004; Leventhal & Brooks-Gunn, 2004; Loeber & Farrington, 1998). As a result of their own ASB these youths get involved in a negative cycle of unpleasant and negative interaction, which lessens their trust in adults generally, and those who have good intentions specifically.

We also observed that antisocial adolescents trusted male faces less than female faces. ASB is reflective of problematic male social environments. It is evident that poor parental relationships, including neglect and hostility, are associated with ASB problems (see Hoeve

et al., 2009). Paternal support specifically seems to be lacking in ASB adolescents (U.S. Bureau of the Census, 1998). Aversive or minimal support from fathers seems to be related to a tendency toward hostile attribution bias in children (Nelson & Coyne, 2009), and predicts externalising and attention problems in children with ADHD (Chang & Gau, 2010). Dysfunctional paternal support associated with delinquency could thus explain the general distrust of other males.

Antisocial adolescents are also exposed to negative male peer influence. Features of an individual's peer group contribute towards the likelihood of engaging in ASB during adolescence (Erickson & Jensen, 1977; Warr, 2002; Zimring, 1998). Peer relationship problems (Miller-Johnson et al., 1999; Nagin & Tremblay, 1999), peer rejection (Bierman et al., 1993; Coie et al., 1992; Dodge et al., 2003; Rabiner et al., 2005) and negative peer influence (Boivin & Vitaro, 1995; Coie & Dodge, 1998; Elliott et al., 1985; Espelage et al., 2003; Mrug et al., 2004) are all associated with ASB. Positive peer relationships serve as an important function in teaching children adaptive social behaviour (Ladd et al., 1999). Children deprived of positive peer relationships due to peer rejection or negative peer influence may be deprived of the opportunity to learn important social skills and instead sustain negative social interactions that may also be characterized by aggression (Dodge et al., 2003; Ladd et al., 1999). Since prosocial peer relationships during childhood are related to trust (Rotenberg et al., 2004) delinquent adolescents who have problematic peer relationships are less likely to trust others. Peer relationships with other antisocial males might also underlie the observation of general mistrust of other males.

Variations in trust within the young offender sample may be due, in part, to the severity of offending. Relative to adolescents who engaged in more serious crimes and for whom trust was not affected by the emotional content of the faces, less severe offenders trusted male neutral faces to a significantly greater extent than more severe offenders did.

This is an encouraging sign indicating that positive trust towards males is possible in a subgroup of antisocial youths.

In line with Ritchell and colleagues' study of incarcerated adult offenders (2005), our results from male adolescents suggest that psychopathic traits did not explain variations in trust within an antisocial sample. Moreover, our results also demonstrated that CD did not explain variation in trust. We have suggested that environmental rather than biological factors better explain why ASB adolescents trust male faces less than controls. It would seem that environmental factors play a bigger role in severity of ASB than they do in psychopathy or CD.

The study had some limitations. There was a lack of NCs from middle or high SES. Although matching YOs and NCs on SES allowed differences in trust by ASB to be assessed without the complication of differing social depravity, differences between the groups are less likely to be detected. Living in neighbourhoods characterized by relative poverty and disorder significantly and detrimentally affects levels of fear and mistrust (Ross & Jang, 2000; Ross et al., 2001). One might expect that adolescents from socially affluent areas would judge faces as being more trustworthy than individuals from deprived areas. The results reported here are therefore conservative but do raise important questions relating to the methodology used in trust research for future studies.

The facial stimuli may also have contributed some potential task problems. The gender of the stimuli presented appeared to be confounded with age, which as a result could mean that rather making lower trust judgments in relation to male faces, young offenders might have trusted older faces significantly less than did school control adolescents. Although we regard this possibility as unlikely, in the absence of direct evidence to support it, this issue could be addressed by using other facial stimuli in which sex/gender confounds are not present.

We did not assess the role of paternal support and/or peers, and advise that future research on trust in antisocial youths incorporates these factors. One robust finding is that individuals with deviant peers are more likely to engage in antisocial behaviour than individuals without deviant peers (Farrington, 2004; Patterson, 1992). The combination of a lack of positive male peer influence, coupled with a home environment in which there is a problematic relationship with the father or other male relatives, may influence the development of mistrust generally, and the mistrust of male happy faces in particular.

This study has demonstrated that adolescents who engage in community-based offending exhibit general and specific trust judgment differences compared to matched controls, who do not exhibit ASB. Potentially, this could have important implications for the development and design of interventions targeting and tackling ASB. Targeted interventions that focus on the mistrust of other males and involve the presence of unambiguously positive males could rebalance these biases and improve trust. Such an approach might ultimately contribute towards improving problematic relations and behaviour, and also improve health-related benefits associated with trusting others.

Although we are unable to claim that a lack of trust will cause antisocial behaviour, there is some evidence that trust is critical in human learning (Rotter, 1967) and cooperation (Gregory & Ripski, 2008). If these antisocial adolescents have problems with trusting males, who predominantly make up the justice system either as police officers or as offenders (Home Office, 2012; Home Office, 2011), then engagement, cooperation, and ultimately reform could be detrimentally affected.

In summary, we have demonstrated that relative to a comparison group of similar sex, IQ and SES, who do not display ASB, those adolescents who engage in community-based offending judge male faces generally, and happy faces specifically, as less trustworthy.

These findings underline the importance of engaging male juvenile offenders in developing positive social relationships with male role models through restorative justice.

## **4. Chapter 4 – Emotion Regulation**

Emotion regulation strategies develop during adolescence, making adolescence a particularly interesting period to study emotion regulation function. Difficulties with emotion regulation underlie many disorders, including conduct disorder and antisocial behaviour (ASB; Cole et al., 1994; Davidson et al., 2000b), and can affect the outcome of decision-making tasks, including the Ultimatum Game. Additionally, both adolescents and antisocial individuals show reward sensitivity, which could also affect decision-making behaviour. The focus of this study was to examine economic decision-making in adolescent males, including a sample of juvenile offenders. Forty-nine male juvenile offenders and forty-eight IQ-, age-, and socioeconomic status-matched male controls completed the Ultimatum Game, in which participants can accept or reject a range of ‘fair’ and ‘unfair’ offers. Relative to controls, young offenders accepted significantly more unfair offers. Within the young offender group those with high levels of conduct disorder rejected more unfair offers, whereas those who committed more severe offences accepted more unfair offers. Results suggest that antisocial youths per se do not necessarily have emotion regulation problems during an economic decision-making task. Rather, it seems that young offenders, and in particular those who commit the most severe offences, are more reward driven than control adolescents; whereas offenders high in conduct disorder have problems regulating emotions during unfair offers.

## ***4.1. Introduction***

Throughout life, emotions influence attention (Vuilleumier, 2005), memory (Phelps, 2006), decision-making (Bechara et al., 1999), physiological responses (Cacioppo et al., 2000; Levenson, 2003) and social interactions (Keltner & Kring, 1998). In addition to shaping a wide range of processes, emotions themselves are modified and regulated. Emotion regulation refers to the processes through which individuals modulate their emotions consciously or unconsciously (Bargh & Williams, 2007; Rottenberg & Gross, 2003) to respond to and deal with environmental demands (Cole et al., 2004). The ability to successfully regulate emotion is related to a number of important psychological, social and physical health outcomes (Abelson et al., 2005; Gross, 2002). Conversely, difficulties with emotion regulation have been said to underlie a range of disorders, including conduct disorder and antisocial personality disorder (Cole et al., 1994; Davidson et al., 2000b).

### **4.1.1. Emotion regulation development**

Emotion regulation gradually develops during adolescence due to the structural and functional changes of the prefrontal cortex (PFC), particularly also the lateral orbitofrontal (OFC) and ventromedial frontal regions (VMPFC), which include the anterior cingulate (ACC), amygdala, and insula (Davidson et al., 2000a; Davidson et al., 2000b; Goldsmith et al., 2008). The VMPFC inhibits amygdala activation during purposeful regulation of negative emotions (Goldsmith et al., 2008).

In childhood, children usually regulate their emotions with the help and support of their parents; however, adolescence marks a transition towards independence and an increased focus on peer relationships (Steinberg & Morris, 2001), making the ability to regulate one's own emotions even more essential. It has been suggested that intensity of

emotional reactivity and reward processing follow an inverted U-shape from childhood to adulthood in terms of onset and remission, with the peak occurring in adolescence (Brenhouse & Andersen, 2011). This supports the idea that adolescence is a particularly crucial time to study emotion regulation.

#### **4.1.2. Emotion regulation and ASB**

Empirical evidence highlights the relation between aggression and emotion, indicating that negative affect can make aggressive boys more prone to attribute hostile intentions to other children, thus causing (even) more aggression (Dodge, 1985; Orobio de Castro et al., 2003; Orobio de Castro et al., 2002). Brain-imaging research has emphasized the specific neurological mechanisms underlying the emotion regulatory problems in individuals who engage in antisocial behaviour (e.g. Davidson et al., 2000b; Raine, 2002). Antisocial and violent offenders (Henry & Moffitt, 1997; Raine, 1993; Raine & Buchsbaum, 1996), aggressive personality-disordered patients (Goyer et al., 1994), psychiatric patients with a history of aggression (Volkow et al., 1995), and impulsive violent offenders (Soderstrom et al., 2000) have functional impairments to the prefrontal regions of the brain that are implicated in regulation, specifically the ACC and OFC (Davidson et al., 2000b).

Although it has been proposed that emotion regulation problems during adolescence could explain why adolescents engage in risk-taking behaviour (Steinberg, 2008), including antisocial behaviour (ASB; Davidson et al., 2000b), there have been few fMRI studies that have investigated emotion regulation in adolescents. Relative to controls, reduced PFC/amygdala connectivity has been observed in children with early onset conduct disorder (CD; Decety et al., 2009). Similarly, reduced amygdala responsivity has also been reported in male adolescents with CD (Sterzer et al., 2005), suggesting diminished regulation of emotion processing networks in conduct disorder boys. The ventral prefrontal region also

seems to play a key role in effective regulation; in a sample of 8-12 year old children with behavioural problems, undergoing parent training and cognitive behavioural therapy, treatment success corresponded with reduced ventral prefrontal activation, indicating greater ability to regulate emotional impulses (Lewis et al., 2008).

Despite this support, it seems that not all children who engage in ASB will display emotion regulation problems. In a review of the relevant literature, Frick and Morris (2004) argued that deficits in regulation are associated with reactive, emotionally driven conduct problems (e.g. reactive aggression), but are less likely to be involved in covert externalising problems (e.g. stealing) and proactive externalising problems (e.g. unprovoked, unemotional aggression that is used for personal gain or to coerce others). Reactively aggressive children are prone to negative emotion and problems in regulating such emotions, as well as inhibiting their behaviour when aroused. Conversely, children prone to proactive aggression, including those with psychopathic traits are low in fear, which undermines the development of their conscience. They also show no consistent emotion regulatory problems (Frick & Morris, 2004). Consistent with this argument, reactive aggression is associated with higher cortisol reactivity than proactive aggression (Lopez-Duran et al., 2009), and reactive but not proactive aggression is associated with anger (Marsee & Frick, 2007).

### **4.1.3. The Ultimatum Game**

The Ultimatum Game (UG) is an economic decision-making game that has been used as a measure emotion regulation (Crockett et al., 2008; Guth et al., 1982; Koenigs & Tranel, 2007; Koenigs et al., 2010). In this paradigm two players are given the opportunity to split a sum of money. One player (the proposer) proposes a way to split an amount of money with another player (the responder). These offers vary in fairness and the participant must simply accept or reject the offers made to them. If the responder accepts the offer, both players are

paid accordingly. If the offer is rejected, neither player is paid. Traditional economic models regard decision-making as a rational, cognitive process (e.g. utility theory; Fishburn, 1970) and state that all offers, irrespective of their fairness, should be accepted. However, this is not what is observed; studies find that comparatively small - and therefore unfair offers (20% of the total) - have a 50% chance of being rejected (Bolton & Zwick, 1995; Guth et al., 1982).

Traditional economic models have been challenged by behavioural economists, who identified additional factors that influence decision-making (Gospic et al., 2011; Loewenstein & Lerner, 2003; Sanfey et al., 2003). It has been suggested that the rejection of unfair offers is best explained by negative emotions, such as anger and frustration, that drive participants to penalise rather than making an utilitarian choice (Fehr & Gächter, 2002; Pillutla & Murnighan, 1996). Rejection of unfair offers has been associated with an increase in amygdala activity (Gospic et al., 2011) and anterior insula activity (Sanfey et al., 2003) - traditionally correlated with feelings of anger and disgust (Calder et al., 2001; Phillips et al., 1997) - and autonomic activation (skin conductance; van't Wout et al., 2006). These results suggest that the (irrational) rejection of unfair offers is driven by emotional responses to unfair treatment and that the ability to regulate negative emotions may be essential for the rational acceptance of unfair offers.

Results from studies examining children and adults converge to suggest that age is an important factor in emotion regulation in the ultimatum game. A consistent finding is that there is a U-shaped developmental trajectory: adolescents reject more unfair offers than younger children and adults (Harbaugh et al., 2003; Hoffman & Tse, 2006; Murnighan & Saxon, 1998), which is consistent with the conceptualization of a peak in emotional reactivity during adolescence (Brenhouse & Andersen, 2011).

Moreover, individuals who are poor at regulating emotions tend to make more irrational decisions (i.e., reject more unfair offers) in the UG (Koenigs & Tranel, 2007). Men with higher manipulated levels of testosterone (Zak et al., 2009) and patients with VMPFC damage reject more offers (Koenigs & Tranel, 2007). Interestingly, although children high in psychopathic CU traits do not show consistent regulatory problems (Frick & Morris, 2004), Koenigs et al. (2010) observed poorer regulation during the UG in low-anxious psychopathic offenders in comparison with high-anxious psychopathic and non-psychopathic offenders. This might indicate that there is variation in UG performance within ASB groups, specifically in relation to psychopathic traits; however, due to the small sample sizes (n=6) and lack of a non-ASB control sample, further research is needed to clarify this issue.

Although emotion dysregulation can affect economic and social decision-making, there are other factors that can influence decision-making behaviour. Doya (2008) emphasized the role of the individual's economic needs and perception of gains and losses, with these factors influencing the satiety to the reward. Neuroeconomic methods, which include paradigms such as the UG, highlight that reward-processing brain regions are active during decision-making (Sharp et al., 2012). Both adolescents and antisocial samples seem to be highly sensitive to rewards. Van Leijenhorst and colleagues (2010) found an adolescent-specific peak in activation of the VMPFC and ventral striatum during risky choices and the processing of reward in a decision-making paradigm, suggesting increased sensitivity to rewards during adolescence. Moreover, numerous studies using decision-making tasks have demonstrated a relationship between reward dominance – that is decision-making in favour of rewards, irrespective of punishment – and externalising problems in samples of adolescents with psychopathic tendencies, and children and adolescents with oppositional defiant disorder and conduct disorder (Fisher & Blair, 1998; Fonseca & Yule, 1995; Matthys et al., 1998; Newman & Kosson, 1986; Newman et al., 1990; O'Brien & Frick, 1996; van Goozen et al.,

2004). Based on this evidence, it is possible that adolescents in general, and ASB adolescents in particular, might accept more unfair offers compared with those in other age groups, or those who do not engage in ASB.

While ASB individuals in general seem highly driven by reward (Fisher & Blair, 1998; Fonseca & Yule, 1995; Matthys et al., 1998; Newman & Kosson, 1986; Newman et al., 1990; O'Brien & Frick, 1996; van Goozen et al., 2004), there is variation in reward sensitivity within ASB individuals. Violent adult offenders preferred smaller immediate rewards over larger delayed rewards compared to their non-violent counterparts (Cherek et al., 1997). This evidence suggests that more serious (i.e., violent) offenders might accept more 'unfair' offers in the UG in comparison with less severe offenders. If reward seeking drives decision-making, offence severity could help to explain variation in offenders' responses to the UG, predicting greater acceptance of unfair offers.

Lack of affective empathy, which has been theorised to be implicated in ASB, particularly psychopathic forms (Jolliffe & Farrington, 2004), may also have influenced the decision-making. Individuals, who lack empathy and care less about others, are likely to be less driven by anger and the motivation to punish the other individuals. Based on the finding that psychopathy is associated with a specific deficit in affective empathy (Blair, 2005b; Dadds et al., 2009), as well as results from a meta-analysis of 35 studies that violent offenders have less empathy than non-violent offenders (Jolliffe & Farrington, 2004), one might expect psychopathic and violent adolescent offenders to empathise less with others and to be less motivated to reject 'unfair' offers.

#### **4.1.4. The current study**

Few studies have examined emotion regulation using the UG in adolescents; and we are not aware of a study that has done so in a group of juvenile offenders who exhibit ASB.

Although antisocial samples are reward driven and might therefore be expected to accept more offers (e.g. O'Brien & Frick, 1996), it was expected that juvenile offenders would reject more unfair offers relative to control youths, based on the evidence that adolescents who engage in serious ASB have neurobiological dysfunctions and have problems regulating their emotions (e.g. Decety et al., 2009).

Additionally, because ASB adolescents are a heterogeneous sample, it was also expected that there might be variation within the young offender group. Based on the findings that children with CD show diminished regulation of emotion processing brain networks (Decety et al., 2009; Sterzer et al., 2005), it was anticipated that offenders high in CD would display emotion regulation problems and reject more unfair offers in comparison with offenders without CD. Conversely, children prone to proactive aggressive, including those with callous-unemotional traits (CU), do not show consistent emotion regulatory problems (Frick & Morris, 2004), and lack affective empathy (Blair, 2005b; Dadds et al., 2009) making them unlikely to care about others and the offers made to them; therefore, we expected that offenders high in psychopathic traits would not display regulatory problems and would accept more unfair offers than offenders low in psychopathic traits. Finally, based on the evidence that violent offenders more readily accept small rewards (Cherek et al., 1997) and also lack affective empathy (Joliffe & Farrington, 2004), we predicted that more severe offenders would accept more unfair offers than less severe offenders would. The current study examined economic decision-making performance during the UG in a community sample of juvenile offenders and their matched controls.

## ***4.2. Method***

### **4.2.1. Participants**

All aspects of the research reported here were scrutinized and approved by the Cardiff University School of Psychology Research Ethics Committee. All participants and their parents/guardians provided written informed consent. Male young offenders (YOs), aged 13-18 years (mean age= 16.10 years) took part in the study (N=49). They were recruited from Cardiff's Youth Offending Services. All offenders completed the ultimatum game and Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999); 44 YOs completed the Youth Psychopathic Traits Inventory (YPI; Andershed et al., 2002), and 36 YOs completed the Youth Self-Report (YSR; Achenbach, 1991). Postcode data were available for all YOs, from which levels of neighbourhood deprivation could be determined, and offence data were available for 44 YOs. Male control participants (NCs), aged 13-18 (mean age= 15.14 years) also took part (N=48). They were recruited from local comprehensive schools and youth centres from relatively deprived areas in Cardiff. All NCs completed the WASI and the ultimatum game. Thirty NCs completed the YPI, and 27 NCs completed the YSR. Postcode data were available for all NCs. For a detailed breakdown of the distribution of participants who completed the trust judgment task in addition to the emotion recognition task (see Chapter 2) and trust judgment task (see Chapter 3) please see Table 1.1.

### **4.2.2. Materials**

#### **4.2.2.1. Ultimatum Game**

The Ultimatum Game, as described by Koenigs and Tranel (2007), is a social economic decision making paradigm. Participants were responders in a series of 22 trials, and the proposer of one trial of the Ultimatum Game. At the start of the task participants were asked to propose one take-it-or-leave-it offer of 5/5, 6/4 (keep 6, give 4 points), 7/3

(keep 7, give 3 points), 8/2 (keep 8, give 2 points), and 9/1 distributions (keep 9, give 1 points). A 5/5 offer was categorised with a score of 1, a 6/4 offer was categorised with a score of 2, a 7/3 offer was categorised with a score of 3, an 8/2 offer was categorised with a score of 4, and a 9/1 offer was categorised with a score of 5. Next they were the responders, and the participant saw a picture of a person making an offer. If 'Accept' was selected then the participant and the other player received the points that were offered. If 'Reject' was selected then the participant and the other player received nothing. The participants were instructed that the offers were real, but made before their arrival. In fact, the experimenter predetermined the offers, and photographs of the responders were taken from the Amsterdam Dynamic Facial Expression Set (Van der Schalk et al., 2011). In accordance with Koenigs and Tranel's (2007) paper, offers were generated in the following frequencies: two offers of 5/5 distribution, two offers of 6/4 distribution (proposer keeps 6 points), six offers of 7/3 distribution (proposer keeps 7 points), six offers of 8/2 distribution (proposer keeps 8 points), and six offers of 9/1 distribution (proposer keeps 9 points). Fair offers (n=4) were considered to be 5/5 and 6/4 distributions of points; where as unfair offers (n=18) were 7/3, 8/2 and 9/1. Total number of offers accepted was calculated for fair and unfair offers.

#### **4.2.2.2. Youth Self Report**

The Youth Self Report (YSR; Achenbach, 1991) assesses a range of behavioural problems following DSM-IV (American Psychiatric Association, 1994) criteria and is widely used in community-based and clinical research on problem behaviour in adolescents between the age of 11 and 18 years. Each item is rated on a scale of 0-2, with 0 corresponding to "not true", 1 corresponding to 'sometimes true' and 2 corresponding to "very or often true". The conduct disorder (CD) symptoms subscale of the YSR was used to classify young offenders

in terms of the borderline/clinical or normal range of CD symptoms based on their individual standardized t-scores (Achenbach, 1991).

#### **4.2.2.3. Youth Psychopathy Inventory**

The Youth Psychopathy Inventory (YPI; Andershed et al., 2002) is a 50-item validated youth self-report questionnaire that assesses psychopathic tendencies. The YPI is scored on a 1-4 Likert scale, giving a sum score of 50-200. Respondents are classified into high or low psychopathy groups by dividing the total YPI score by 50; a mean YPI score of between 1 and 4 is then obtained (Skeem & Cauffman, 2003). Participants scoring above the 2.5 threshold are classified as high in psychopathic traits, whereas those below are classified as low in psychopathic traits.

#### **4.2.2.4. Offence data**

The type of previous crimes for which the offender had been convicted was taken from their YOS case files. Each offence had been assigned an offence severity score ranging from 1 (e.g. minor public order offences) to 8 (e.g. murder; see Appendix 1). For the convicted offences, the highest severity score (i.e. the most serious crime the offender had committed) was recorded. Inspection of the distribution of severity scores showed a bimodal pattern. Based on this information two subgroups were identified for subsequent analysis; offenders with a severity score ranging from 1 to 5, and offenders with a severity score between 6 and 8.

#### **4.2.2.5. Wechsler Abbreviated Scale of Intelligence**

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) is a standardized measure of intelligence. The two-subtest form was used, which includes Vocabulary and Matrix Reasoning tasks. The Vocabulary subtest measures word knowledge, verbal concept formation, and fund of knowledge, and the Matrix Reasoning subtest measures visual information processing and abstract reasoning skills. The two-subtest form provides an estimated Full Scale IQ score.

#### **4.2.2.6. Socio-Economic Status**

Socio-economic status (SES) was estimated using the Office of National Statistics estimates of average household total weekly income based on each participant's postcode (Low = 0-£520; Middle = £521-£670; High = £671+).

#### **4.2.3. Statistical methods**

The outcome variables were the total number of fair and unfair offers accepted. Independent samples t-tests were used to compare age, IQ, SES, mean YPI scores, conduct disorder YSR scores, initial proposed offer, and total acceptance rate of all offers between the groups. For comparisons of offer acceptance rates between YOs and NCs and between YO subgroups, Chi Square analyses were conducted for fair and unfair offers.

## 4.3. Results

### 4.3.1. Demographic characteristics

Table 4-1 shows the demographic characteristics of the sample. Independent samples t-tests indicated that the groups differed in YSR CD scores ( $t(61)=2.6, p<0.01$ ), but not in psychopathic traits ( $t(72)=0.1, p=0.94$ ). The two groups were matched for age ( $t(95)=1.9, p=0.11$ ), IQ ( $t(95)=-1.7, p=0.14$ ) and socio-economic status ( $t(95)=0.2, p=0.83$ ).

Table 4-1.  
*Demographic characteristics of adolescents*

Variables	NC	YO
Age (years)	15.6 (1.2)	15.9 (0.8)
IQ	87.4 (9.4)	84.0 (7.9)
YPI (psychopathic traits)	116.6 (34.7)	116.0 (22.0)
CD (YSR)	59.0 (8.8)	64.8 (10.2)*
SES:	1.4	1.4
Low 1	73.0%	60.0%
Middle 2	13.5%	27.3%
High 3	13.5%	12.7%
Offence severity:		
Low 3	N/A	14.4%
Low 4	N/A	31.0%
Low 5	N/A	5.3%
High 6	N/A	41.5%
High 7	N/A	7.8%

*Notes:* \*\* =  $p<0.01$ ; CD = conduct disorder; IQ = intelligence quotient; N/A = not applicable; NC = normal control group; SES = socio-economic status; YO = young offender group; YPI = youth psychopathic traits inventory; YSR = youth self-report. All data show mean values (SD), number, or % of group.

### 4.3.2. YO and NC group comparisons

Mean initial proposer offers by NCs and YOs were fair, at 1.7 and 1.9 respectively (NC and YO mode = 1 [i.e., a 5/5 offer]). An independent-sample t-test confirmed that YOs and NCs did not make statistically different initial offers ( $t(95)=-0.7, p=0.48$ ).

Figure 4.3 illustrates the distribution of accepted offers across the different offer levels, while Table 4-2 shows the number of accepted fair and unfair offers. Young offenders and school controls seemed to accept a similar percentage of fair offers (YO mean=84%, NC mean = 85%), whereas offenders seemed to accept more unfair offers than controls (YO mean=29%, NC mean=17%). Chi square analyses indicated that there was no significant difference between adolescent group and acceptance of fair offers ( $\chi^2(1)=0.1, p=0.92$ ). However, there was a significant effect of group in terms of the number of accepted unfair offers ( $\chi^2(1)=6.1, p<0.01$ ) with a higher proportion of unfair offers being accepted by the offenders. The odds of YOs accepting unfair offers were 1.34 times higher than for NCs.

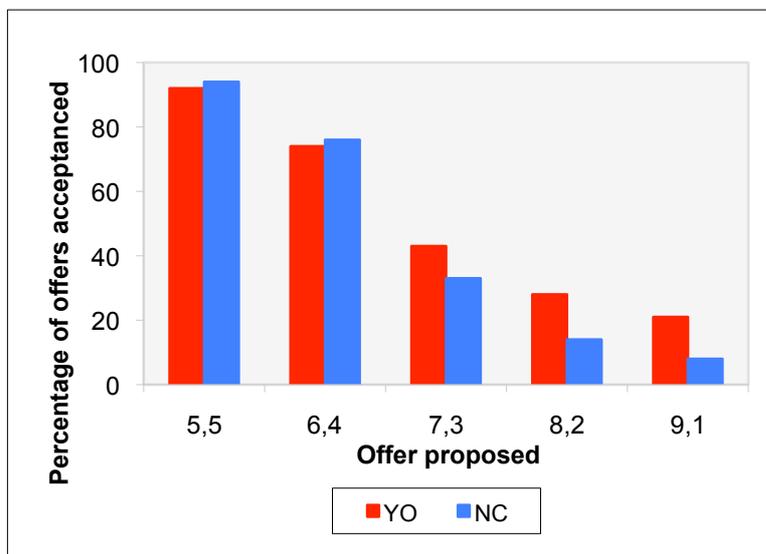


Figure 4.1. Percentage of Ultimatum Game 5-5, 6-4, 7-3, 8-2, and 9-1 offers accepted by the young offender (YO) and school control (NC) adolescents.

Table 4-2.

*Fair and unfair offer acceptance scores and percentages for young offenders and controls*

<b>Offers</b>	<b>NC (n=48)</b>	<b>YO (n=49)</b>
<b>Fair (n=4)</b>	3.40 (85%)	3.36 (84%)
<b>Unfair (n=18)</b>	3.06 (17%)	5.22 (29%)

*Notes:* NC = normal control group; YO = young offender group. All data show mean values, or percentage accepted score. Fair offers are 5/5 and 6/4; unfair offers are 7/3, 8/2 and 9/1

### **4.3.3. Within YO group analyses**

YSR data were collected for 36 YOs, of whom 19 YOs displayed borderline or clinical levels of CD (YO<sub>CD+</sub>) and 17 YOs scored in the normal range (YO<sub>CD-</sub>). YPI data were collected for 44 YOs. Of these, 15 were classified as high in psychopathic traits (YO<sub>YPI+</sub>) and 29 were classified as low in psychopathic traits (YO<sub>YPI-</sub>) based on the YPI cutoff. Offence data were available for 44 YOs. Of these, 24 were classified as ‘high severity’ offenders (YO<sub>HS</sub>) and 20 were classified as ‘low severity’ offenders (YO<sub>LS</sub>).

#### **4.3.3.1. Young offenders with and without Conduct Disorder**

Chi square analyses indicated that there was no significant difference between conduct disorder group and acceptance of fair offers (mean fairYO<sub>CD+</sub>=0.81; mean fairYO<sub>CD-</sub>=0.83;  $\chi^2(1)=0.2, p=0.82$ ). There was a significant difference between conduct disorder group and acceptance of unfair offers (mean unfairYO<sub>CD+</sub>=0.21; mean unfairYO<sub>CD-</sub>=0.30;

$x^2(1)=4.4, p=0.04$ ). Based on the odds ratio, the odds of the YO<sub>CD+</sub> rejecting unfair offers were 1.51 times higher than for the YO<sub>CD-</sub>.

#### **4.3.3.2. Young offenders with and without psychopathic traits**

Chi square analyses indicated that there was no significant difference between psychopathy group and acceptance of fair (mean fairYO<sub>YPI+</sub>=0.84; mean fairYO<sub>YPI-</sub>=0.83;  $x^2(1)=0.2, p=0.80$ ) or unfair offers (mean unfairYO<sub>YPI+</sub>=0.32; mean unfairYO<sub>YPI-</sub>=0.30;  $x^2(1)=0.2, p=0.88$ ).

#### **4.3.3.3. High and low severity offenders**

Chi square analyses indicated that there was no significant difference between the severity groups in terms of their acceptance of fair offers (mean fairYO<sub>HS</sub>=0.84; mean fairYO<sub>LS</sub>=0.83;  $x^2(1)=0.2, p=0.82$ ), but there was a significant difference in terms of the mean number of accepted unfair offers (mean unfairYO<sub>HS</sub>=0.32; mean unfairYO<sub>LS</sub>=0.22;  $x^2(1)=24.0, p=0.01$ ). Based on the odds ratio, the odds of the YO<sub>HS</sub> group accepting unfair offers was 2.33 times higher than for the YO<sub>LS</sub> group.

#### **4.3.3.4. Conduct Disorder and offence severity**

As a result of the findings that level of CD predicted *rejection* of unfair offers, and offence severity predicted *acceptance* of unfair offers, the acceptance of offers for young offenders with and without CD, who had engaged in high or low severity crimes was examined. Table 4-3 shows the mean acceptance rates of the CD and offence severity YO

subgroups. For fair offers, numbers of offers accepted were relatively similar varying between 3.16 (CD+/LS group) and 3.55 (CD+/HS). In contrast, acceptance of unfair offers seemed to show more variation between the groups; CD+/LS accept the lowest number (mean=2.77), where as CD-/HS accept the highest number of offers (mean=5.85). Because of the low number of participants in the cells, we were unable to complete statistical analyses.

Table 4-3.

*Fair and unfair offer acceptance scores and percentages for young offenders with and without conduct disorder who have engaged in high or low severity crimes.*

<b>Offers</b>	<b>CD-/LS (n=8)</b>	<b>CD-/HS (n=9)</b>	<b>CD+/LS (n=9)</b>	<b>CD+/HS (n=9)</b>
<b>Fair (n=4)</b>	3.30 (83%)	3.18 (79%)	3.16 (79%)	3.55 (89%)
<b>Unfair (n=18)</b>	4.65 (26%)	5.85 (33%)	2.77 (15%)	5.25 (29%)

*Notes:* CD-/LS = low severity offending young offender group without conduct disorder; CD-/HS = high severity offending young offender group without conduct disorder; CD+/LS = low severity offending young offender group with conduct disorder; CD+/HS = high severity offending young offender group with conduct disorder; n = number of participants. All data show mean values, or percentage accepted score. Fair offers are 5/5 and 6/4; unfair offers are 7/3, 8/2 and 9/1

#### **4.4. Discussion**

This study had several goals. Firstly, it sought to examine whether adolescents in general have a problem with emotion regulation, or whether it is a specific problem to antisocial populations. We investigated economic decision-making in a group of adolescents, including a community-based sample of youths with antisocial behaviour. We are not aware of a previous study that has examined economic decision-making using the UG with a similar cohort of individuals.

The results show, unsurprisingly, that the vast majority of the adolescents accept the fair offers and reject the unfair offers. Moreover, they generally show lower acceptance rates of unfair offers than those made by normal, healthy adults (Koenigs & Tranel, 2007; Sanfey et al., 2003), adding further support to the conceptualization of a peak in emotional reactivity during adolescence (Brenhouse & Andersen, 2011). More surprisingly, the results also

indicate that juvenile offenders accept more unfair offers than their matched control adolescents. Finally, analyses within the delinquent group suggest that more severe offenders accept more unfair offers than less severe offenders, and offenders with higher levels of CD reject more unfair offers. Level of psychopathic traits did not play a role in acceptance rates of unfair offers within juvenile offenders.

Although we predicted that antisocial youths would reject more unfair offers as a result of their suspected emotion regulation problem, we found the opposite pattern: juvenile offenders accepted significantly more unfair offers. There are several explanations for this rather unexpected result. One explanation might be related to the type of ASB that the ASB sample predominantly shows. Forty-one percent (41%) of our ASB sample was made up of individuals who engaged in serious offending such as robbery or domestic burglary, whereas 31% consisted of individuals who engaged in less serious offending such as vehicle theft or non-domestic burglary (see Appendix for list of crimes and severity score). Petty crime might be more impulsive, less planned and more driven by emotional factors than more serious crimes, and as such be more related to emotion regulation problems and poor UG performance. In support of this, we found that less severe offenders rejected significantly more unfair offers than high severe offenders.

There are at least two other lines of research that might explain this finding. Based on Doya's (2008) suggestion that the economic needs of the individual and their perception of gain and loss affect decision-making, reward sensitivity might be a driving factor in our offenders, especially those who engage in high severity crimes. In line with findings that antisocial individuals are highly driven by reward (Fisher & Blair, 1998; Fonseca & Yule, 1995; Matthys et al., 1998; Newman & Kosson, 1986; Newman et al., 1990; O'Brien & Frick, 1996; van Goozen et al., 2004), we found not only that young offenders in general accepted more unfair offers, but also that more serious offenders accepted significantly more

unfair offers than less severe offenders, supporting the idea that reward sensitivity can distinguish between ASB individuals.

An additional possibility is related to the fact that more violent offenders seem to have less empathy than non-violent offenders (Joliffe & Farrington, 2004) and that a lack of concern for others is an index of low empathy (Jones et al., 2010). Our more serious offenders might also have cared less about the actions and mental states of the proposers and were therefore less motivated to reject unfair offers. In sum, the less emotional and more reward driven nature of the violent offender seems to give a possible explanation for acceptance of unfair offers.

Interestingly, CD also seemed to explain variation in decision-making: young offenders with CD rejected more unfair offers than those without CD. Although this finding supports research by Decety and colleagues (2009) and Crowe and Blair (2008) of poorer emotion regulation in individuals with CD, it seemingly contradicts our finding that ASB severity is related to acceptance of unfair offers. One might expect that adolescents with CD would also engage in the highest severity offences. However, CD is associated with emotional regulation processing problems and anger (Decety et al., 2009; Sterzer et al., 2005), which would intuitively lead to a greater rejection of unfair offers. Conversely, high severity offenders seem to be driven by reward, irrespective of size, and perhaps less motivated to reject unfair offers. Taken together, these findings would suggest that offenders who have CD and engage in the lowest severity offences would reject more of the unfair offers, and that offenders without CD but who engage in the most severe offences would have the highest unfair offer acceptance rate. Examination of the data confirmed this hypothesis. These findings emphasise the interplay between these ASB groups, and could potentially inform targeted intervention programs within the judicial system, by focusing on emotion regulation management in offenders with CD who are involved in petty crimes, whilst

working with incentive based goals in individuals without CD who have engaged in high severity offences.

Unlike CD and severity of offending, level of psychopathic traits in the offenders did not influence acceptance rates of the unfair offers. Although this could result from methodological issues including low power due to the sample size of psychopathic individuals, there are some inconsistencies in the literature regarding emotion regulation problems in individuals with psychopathy. Frick and Morris (2004) suggest that children prone to proactive aggression, including those with psychopathic and/or callous-unemotional traits (CU), are low in fear and show no emotion regulatory problems. Conversely, Koenigs and colleagues (2010) suggest that primary psychopaths, i.e. low-anxious psychopathic offenders, reject more unfair offers than secondary (high-anxious) psychopaths and non-psychopathic offenders. It may be the case that the anxiety component of psychopathy drives regulation problems, and that in our sample of adolescents, where anxiety was not distinguished, emotion dysregulation was not a characteristic problem.

The study also had some limitations. It can be argued that the group sizes for subgroup and within YO analyses were relatively small, and we were unable to look at statistical differences within CD/severity groups. Although the sample sizes in our study exceed the sample sizes of vmPFC lesion patients and psychopaths in previously published studies using the same behavioural tasks (Koenigs & Tranel, 2007; Koenigs et al., 2010), a larger sample size would be a priority for future work.

Of further note, and as discussed by Koenigs and Tranel (2007), the current study did not obtain a direct measure of participants' emotional responses, such as psychophysiological recording or subjective ratings, during performance of the UG task. As a consequence, conclusions about the role of emotion in the UG responding are based on our samples' behavioural characteristics and associated psychological and neuropsychological data

regarding the UG. In order to address this issue, collection of concurrent direct measurements of emotional arousal and neural activity could provide valuable data that further differentiate subgroups of ASB.

Our findings suggest that ASB adolescents do not necessarily have emotion regulation problems during an economic-decision making task. This study has demonstrated that, compared to a matched by gender, age, IQ, and SES control group that did not exhibit ASB, adolescents who engage in community-based offending accept more unfair UG offers. We have also provided evidence that offence severity and conduct disorder ASB subgroups result in different response outcomes during the UG, which could have implications for behaviour management within the judicial system. Assessing CD and offence severity within community ASB groups, therefore, would be beneficial in order to target interventions and support for YOs more effectively.

## **5. Chapter 5 – Emotion Intervention**

The inability to recognise distress in others is thought to contribute to antisocial behaviour. It is well established that antisocial individuals, including antisocial youngsters, have neurobiological dysfunctions that result in problems recognising negative emotional expressions. We administered a targeted emotion recognition training intervention with the aim of improving emotion recognition abilities in adolescent antisocial males. Thirty male young offenders completed a facial emotion recognition (FER) test twice within a 2-week interval. Fifteen offenders completed an emotion recognition intervention consisting of six 30-minute sessions in the intervening period. Results show that young offenders who had completed the intervention significantly improved their recognition of fear, sadness and anger, while there was no improvement in emotion recognition in the non-intervention group. These results suggest that a focused intervention can improve emotion recognition in antisocial adolescents. If emotion recognition plays a key role in antisocial behaviour, then a next step is to examine whether improved emotion recognition has a beneficial effect on future antisocial behaviour.

## ***5.1. Introduction***

Conduct problems in childhood and adolescence are associated with a range of negative outcomes in adulthood. They are predictive of future antisocial behaviour (Fombonne et al., 2001), substance abuse and dependence in adulthood (Kazdin, 1995), early pregnancy in antisocial girls (Bardone et al., 1998), persistent health problems (Bardone et al., 1998), and other forms of psychiatric illness such as depression. Clearly, antisocial behaviour (ASB) problems are costly to society, as well as to the individual themselves and their environment (Scott et al., 2001). There are high costs not only because of the crimes committed, the extra educational provision required, the foster/residential care needed, and other state benefits during adolescence (van Goozen & Fairchild, 2008), but also because of the associated mental and physical health problem of conduct disorder (CD) in adulthood (Odgers et al., 2007). For this reason intervention strategies and support for young people with ASB are desirable.

Although the short-term effectiveness of intervention strategies (e.g. parent management training, cognitive behavioural therapy) has been demonstrated (Kazdin, 2001), the long-term effectiveness of treatment of conduct disorders appears to be limited (Offord & Bennett, 1994). The high persistence and poor prognosis associated with oppositional defiant disorder (ODD) and CD, coupled with the limited effectiveness of current treatments for childhood antisocial behaviour, are the main reasons why neuropsychological and neurobiological correlates of antisocial behaviour in childhood should be given more attention, particularly in terms of designing targeted interventions (van Goozen & Fairchild, 2008).

One of the best-replicated findings is that ASB individuals have problems in facial emotion recognition, including fear and sadness, and anger and disgust. Blair's (2005a) Integrated Emotions Systems (IES) theory suggests that correctly processing others' distress

related-cues (i.e., fear and sadness) can inhibit ASB and that the inability to detect these cues contributes to antisocial behaviour. According to IES theory, different brain areas are implicated in different forms of ASB. The amygdala, implicated in the detection of fear and sadness, is mainly associated with dysfunction in psychopaths (Birbaumer et al., 2005; Blair, 2003; Blair et al., 2001; Blair et al., 2004; Kiehl et al., 2001; Pinel, 2000). In contrast, orbitofrontal cortex dysfunction, observed in impulsively aggressive individuals, is associated with anger and disgust recognition problems (Best et al., 2002; Blair & Cipolotti, 2000; Dolan & Fullam, 2006; Hornak et al., 1996; 2003).

Accordingly, facial affect recognition has been examined in populations that exhibit inappropriate interpersonal behaviours such as antisocial behaviour (ASB). Empirical studies have found fear and sadness recognition impairments among clinical and community samples of antisocial individuals, including psychopathic adults (Blair et al., 2004; Glass & Newman, 2006; Kosson et al., 2002), children high in psychopathic traits (Blair et al., 2001), conduct disorder (CD) adolescents (Fairchild et al., 2009a), adolescents with mental health problems (Leist & Dadds, 2009), and antisocial adolescents recruited from mainstream schools (Blair & Coles, 2000; Dadds et al., 2006). Moreover, anger recognition dysfunction has been reported in ASB adolescents (Leist & Dadds, 2009), adolescents with early-onset CD (Fairchild et al., 2009), and juvenile offenders (see Chapter 2).

Although these dysfunctions in the recognition of anger, sadness and fearful expressions have been observed in antisocial individuals, a recent study indicates that the nature and extent of the emotion recognition deficits depends on the type and intensity of emotion displayed (Bowen et al., under review; see Chapter 2 for results). Juveniles displayed a general dysfunction in the recognition of sadness, and a specific one for high intensity fear and low intensity anger, whilst also showing good recognition of high intensity anger. It was hypothesized that their rather frequent exposure to anger, but impoverished

experience of other emotions, might account for these differential recognition rates. Targeted emotion recognition interventions could rebalance these biases and improve the ability to detect other, including more subtle emotional expressions. If proven to be true, this approach might contribute towards reducing problematic behaviour.

Cognitive training has been demonstrated to impact on brain functioning (Olesen et al., 2004), improving working memory (Olesen et al., 2004; Rainer & Miller, 2000), and modifying emotion recognition (Baron-Cohen et al., 2009; Golan et al., 2010; Radice-Neumann et al., 2009), emotional cognitive biases (Penton-Voak et al., 2012) and affective empathy (Dadds et al., in press). If young offenders can be trained to better recognise fear and sadness, and if emotion recognition plays a key role in ASB, then the intervention could ultimately have a positive effect on amygdala functioning as well as future ASB.

### **5.1.1. The current study**

The current study aims to assess facial affect recognition in a new group of male offenders prior to, and after completion of an emotion recognition training intervention, whilst also controlling for retest effects. An emotion recognition training protocol (Radice-Neumann et al., 2009) was administered to young offenders with the aim to improve emotion recognition. Firstly, it was expected that this new sample of young offenders would show similar initial recognition abilities as those observed in the sample of offenders described in Chapter 2. Secondly, it was expected that young offenders who had completed the intervention would show a significant improvement in the detection of fear, sadness, and anger compared to young offenders who had not undergone the training. Because happy expressions are generally recognised with very high accuracy (Busso et al., 2004), a ceiling effect was anticipated and improvement was not expected here.

## **5.2. Method**

### **5.2.1. Participants**

All aspects of the research reported here were scrutinized and approved by the Cardiff University School of Psychology Research Ethics Committee. All participants and their parents/guardians provided written informed consent. Male young offenders (YO), aged 13-17 years (mean age = 15.79 years) took part in the study (N = 30). They were recruited from the Cardiff Youth Offending Services. All participants completed the emotion recognition test twice (time between tests = 2.5 weeks), whilst a randomly selected group of 15 offenders (YO I+) completed the emotion recognition-training program in the 2-week time interval.

### **5.2.2. Materials**

#### **5.2.2.1. Facial Emotion Recognition Task**

The Facial Emotion Recognition (FER) task was made using the application Medialab (Empirisoft Corporation, New York) and consisted of a series of 150 slides displaying facial expressions drawn from Ekman and Friesen's (1975) facial affect battery. Six target faces – three male and three female – were used. Each of these targets displayed a neutral expression or one of six emotions: happiness, sadness, fear, anger, disgust, or surprise. Additionally, the six emotional expressions were morphed with their matching neutral expression (0% emotion) to display faces at 25%, 50%, 75% and 100% emotional intensity. The hair and background of the image had been blacked out so that only the facial features remained.

The question “What emotion is this person showing?” accompanied the target image, along with numbered options from 1 to 7. The options were (from 1 to 7) “happiness”,

“sadness”, “fear”, “anger”, “disgust”, “surprise”, and “neutral”. Percentage correct recognition scores for each emotion at each intensity level were produced.

#### **5.2.2.2. Emotion training task**

The emotion-training task (‘facial affect recognition’ [FAR] task; Radice-Neumann et al., 2009) was a protocol-based intervention designed to train participants to identify four emotional expressions: happiness, sadness, fear and anger. All emotional faces presented were 100% intensity. FAR consisted of seven levels of emotion tasks. Within each level there were three types of emotion recognition tasks to complete. For task-type one, participants were required to identify the emotional expression of each face. If an incorrect response was given, a description of the features of the face was outlined to prompt the participant. After correctly identifying the emotional expression they were also required to describe an event that has made them feel that emotion, and mimic the emotion using a mirror. The second task-type required participants to focus on a specified feature of an emotional face and select the correct description of that feature from three options. The third task-type required participants to select one specified emotional expression (e.g. sadness) from a group of four emotional faces. Participants completed the series of tasks in 6 sessions over 2 weeks. Each session lasted approximately 30 minutes.

#### **5.2.3. Statistical methods**

The outcome variables were the mean correct recognition scores of happy, sad, fearful and angry expressions at 25%, 50%, 75% and 100% for the initial and retest FER task. In order to assess whether these YOs (YO I) were statistically similar to the YOs assessed in Chapter 2 (YO C2), mixed-design MANOVAs were used to examine the effects of emotion

intensity (within-subjects) and group (between-subjects) for each emotional expression at time 1 (pretest). To assess emotion recognition scores for YO I+ and retest-only YOs (YO I-) at time 2, mixed-design MANOVAs were used to examine the effects of emotion intensity (within-subjects), retest (within-subjects) and young offender group (between-subjects) for each emotional expression. Independent samples t-tests were used to compare age, IQ, and SES between YO I+ and YO I-. Where simple comparisons tests were carried out, Tukey's HSD effects test was used.

### 5.3. Results

#### 5.3.1. Demographic characteristics

Table 5-1 shows the demographic characteristics of the sample. One-way ANOVAs indicated that the groups did not differ in age ( $F(1,28)=0.9, p=0.43$ ), IQ ( $F(1,28)=0.6, p=0.58$ ), or socio-economic status ( $F(1,28)=1.0, p=0.39$ ).

Table 5-1  
*Demographic characteristics of adolescents*

<b>Variable</b>	<b>YO I+</b>	<b>YO I-</b>
<b>Age (years)</b>	15.9 (1.1)	16.3 (1.0)
<b>IQ</b>	92.2 (8.1)	86.3 (7.5)
<b>SES (mean)</b>	1.4	1.5
<b>Low (1)</b>	86.6%	86.6%
<b>Middle (2)</b>	6.7%	6.7%
<b>High (3)</b>	6.7%	6.7%

*Notes:* IQ = intelligence quotient; SES = socio-economic status; YO I+ = young offender group who completed the intervention task; YO I- = young offender group who did not complete the intervention task; All data show mean values (SD), number, or % of group.

### 5.3.2. YO I and YO C2 group comparisons at Time 1

Fear analyses indicated that there was a significant main effect of intensity ( $F(2.5,229.0)=47.7, p=0.01$ ), but no main effect of group ( $F(1, 91)=0.5, p=0.46$ ), nor a significant interaction between intensity and group ( $F(2.5,229.0)= 0.2, p=0.85$ ). For sadness, there was a significant main effect of emotion intensity ( $F(2.7, 247.9)=151.4, p=0.01$ ), no main effect of group ( $F(1, 91)=0.6, p=0.43$ ), nor a significant interaction between intensity and group ( $F(2.7, 247.9)=0.4, p=0.75$ ). For anger, there was a significant main effect of intensity ( $F(3,273)=258.1, p=0.01$ ), no significant main effect of group ( $F(1, 91)=0.4, p=0.53$ ), nor a significant interaction ( $F(3,273)=0.8, p=0.52$ ). Happiness analyses indicated that there was a significant main effect of intensity ( $F(2.2,199.0)=206.2, p=0.01$ ), no main effect of group ( $F(1,91)=0.1, p=0.74$ ), and no interaction between intensity and group ( $F(2.2,199.0)=0.1, p=0.94$ ).

### 5.3.3. YO I+ and YO I- group comparisons

#### 5.3.3.1. Fear recognition

Figure 5.1 illustrates fear facial recognition pretest and retest scores for YO I+ and YO I-. There was a significant main effect of retest ( $F(1,28)=17.7, p=0.01$ ). Fear recognition scores were significantly higher at retest (mean=41.1%) than at pretest (mean=32.2%). There was also a marginally significant main effect of intervention group ( $F(1,28)=4.0, p=0.06$ ), with YO I+ recognising marginally more fearful faces than YO I- (YO I+ mean=43.9, YO I- mean=32.2), and there was a significant interaction between retest and intervention group ( $F(1,28)=7.3, p=0.01$ ). Simple effect tests of the retest indicated that YO I+ showed a significant improvement in the recognition of fearful expressions ( $F(1,28)=23.9, p=0.01$ ) whereas YO I- did not ( $F(1,28)=1.1, p=0.27$ ). Simple effect tests of intervention group

indicated that YO I+ recognised significantly more fearful expressions at retest than YO I- ( $F(1,28)=10.3, p=0.01$ ), whilst no differences between the groups were observed during the pretest ( $F(1,28)=0.3, p=0.58$ ).

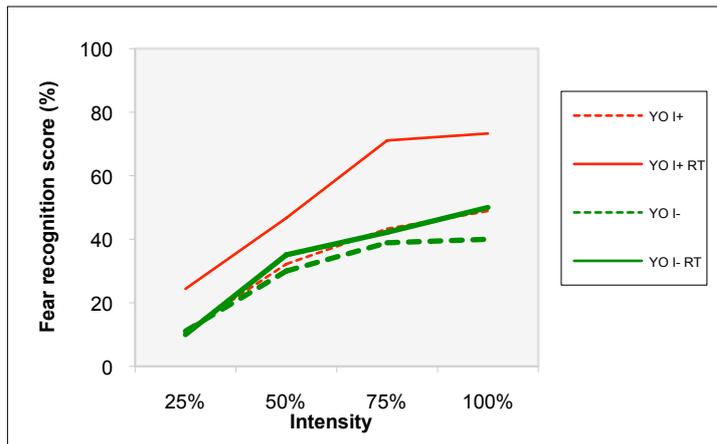


Figure 5.1. Young offenders and controls' mean fear recognition scores at 25%, 50%, 75% and 100% emotional intensities for initial FER task and retest.

### 5.3.3.2. Sadness recognition

Sadness facial recognition pretest and retest scores for YO I+ and YO I- are illustrated in figure 5.2. There was no significant main effect of retest ( $F(1,28)=0.2, p=0.63$ ), nor a significant main effect of intervention group ( $F(1,28)=0.5, p=0.49$ ); however, there was a significant interaction between retest and intervention group ( $F(1,28)=8.1, p=0.01$ ). Simple effects of retest indicated that YO I+ showed a significant improvement in sadness recognition scores in comparison with the pretest scores ( $F(1,28)=5.6, p=0.03$ ). In contrast, YO I- did not show a statistically significant difference in recognition of sadness ( $F(1,28)=2.8, p=0.11$ ). Simple effects of intervention group indicated that YO I+ recognised marginally significantly more sad expressions during the retest than YO I- ( $F(1,28)=3.2, p=0.08$ ). There were no differences between the two groups during the pretest ( $F(1,28)=0.8, p=0.38$ ).

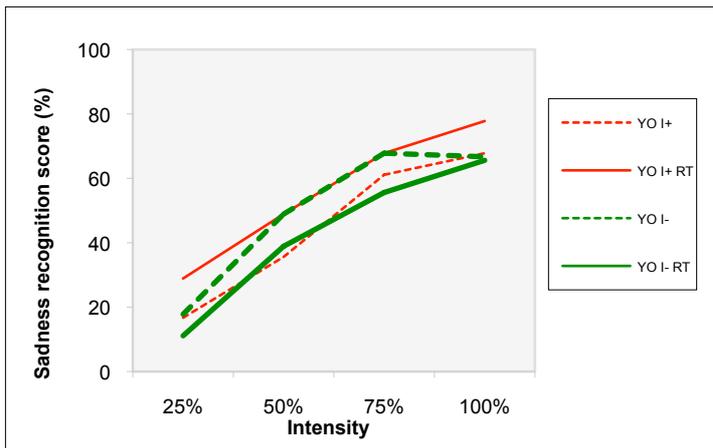


Figure 5.2. Young offenders and controls' mean sadness recognition scores at 25%, 50%, 75% and 100% emotional intensities for initial FER task and retest.

### 5.3.3.3. Anger recognition

Figure 5.3 shows anger facial recognition pretest and retest scores for YO I+ and YO I-. There was no significant main effect of retest ( $F(1,28)=2.3, p=0.14$ ), a significant main effect of intervention group ( $F(1,28)=7.3, p=0.01$ ), with YO I+ recognising significantly more angry faces than YO I- (YO I+ mean=56.3, YO I- mean=43.3), and a marginally significant interaction between retest and intervention group ( $F(1,28)=3.6, p=0.07$ ). Simple effects of retest indicated that, compared to pretest anger scores, YO I+ showed a significant improvement in the recognition of angry expressions after completing the intervention ( $F(1,28)=5.9, p=0.02$ ); YO I- did not show a statistically significant difference in anger recognition scores across pretest and retest ( $F(1,28)=0.1, p=0.78$ ). Simple effects of intervention group indicated that YO I+ recognised significantly more angry expressions than YO I- during the retest condition ( $F(1,28)=11.9, p=0.01$ ), but not during the pretest ( $F(1,28)=1.6, p=0.21$ ).

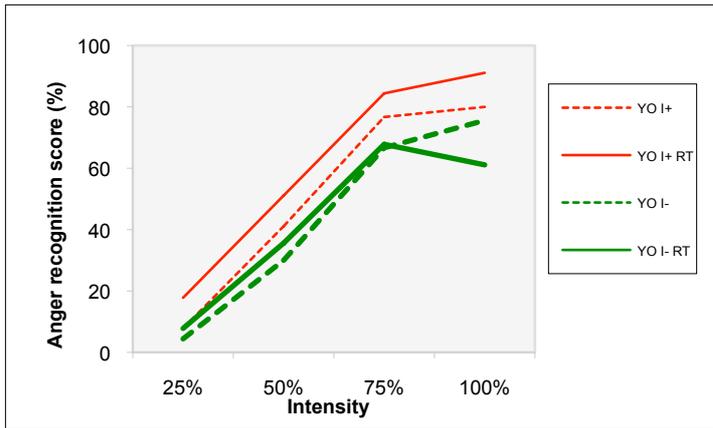


Figure 5.3. Young offenders and controls' mean anger recognition scores at 25%, 50%, 75% and 100% emotional intensities for initial FER task and retest.

#### 5.3.3.4. Happiness recognition

Happiness facial recognition pretest and retest scores for YO I+ and YO I- can be seen in figure 5.4. The 3-way mixed factor MANOVA indicated that there was no significant main effect of retest ( $F(1,28)=0.3, p=0.59$ ), no significant main effect of intervention group ( $F(1,28)=2.7, p=0.11$ ), but there was a significant interaction between retest and intervention group ( $F(1,28)=8.0, p=0.01$ ). Simple effects of retest indicated that YO I- was significantly worse at identifying happy expressions during the retest, in comparison with their initial recognition scores ( $F(1,28)=5.7, p=0.02$ ). YO I+ did not show a statistical significant difference in recognition between pre- and posttest ( $F(1,28)=2.6, p=0.12$ ). Simple effects of intervention group indicated that YO I+ recognised significantly more happy expressions during the retest than YO I- ( $F(1,28)=5.7, p=0.02$ ). No differences between the groups were observed during the pretest ( $F(1,28)=0.1, p=0.74$ ).

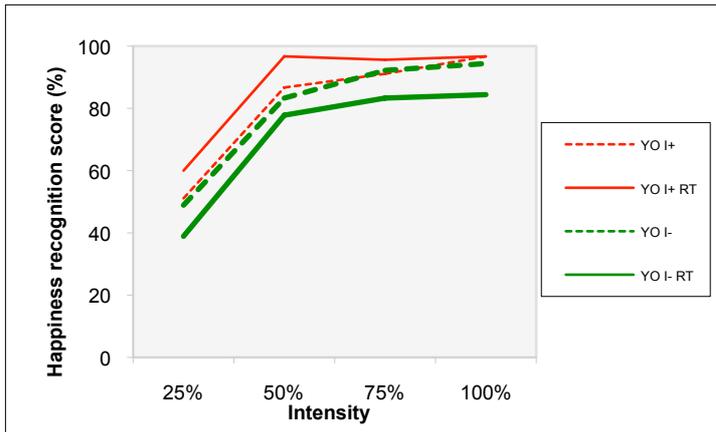


Figure 5.4. Young offenders and controls' mean happiness recognition scores at 25%, 50%, 75% and 100% emotional intensities for initial FER task and retest.

### 5.4. Discussion

The present study sought to establish whether emotion recognition abilities could be improved in a sample of young offenders. A protocol based intervention task that has been shown to improve emotion recognition in individuals with acquired brain injury (Radice-Neumann et al., 2009) was used with our group of YOs. The aim was to examine whether young offenders with emotion recognition deficits, can improve their ability to recognise different emotions, whilst controlling for repeated testing effects.

The current findings firstly established that this sample of young offenders showed statistically similar emotion recognition abilities to those of the young offenders described in Chapter 2. Likewise, the YO I+ and YO I- groups displayed statistically analogous recognition abilities during the pretest. This suggests that these samples have comparable emotion recognition deficits and are likely to share similar neurobiological profiles. Previous research that has examined emotion recognition in antisocial samples has demonstrated impaired recognition of fear, sadness and anger (e.g. Best et al., 2002; Blair & Cipolotti, 2000; Blair et al., 2001, 2004; Dadds et al., 2006; Fairchild et al., 2009). Impairments in the recognition of fear and sadness in particular have been interpreted as evidence for amygdala

dysfunction, particularly in psychopathy (e.g. Marsh et al., 2008), whereas anger recognition impairments have been associated with orbitofrontal cortex dysfunction (Blair et al., 1999).

We demonstrated that the intervention had a positive effect on emotion recognition scores. There was a general improvement in the recognition of fear, which was specific to the YO I+ group. Compared to pretest fear scores, YO I+, but not YO I-, showed significant improvement in recognising fear at retest. Moreover, during retest the YO I+ group recognised significantly more fearful expressions than the YO I- group.

Similarly, analyses of sadness and anger recognition indicated that, compared to pretest recognition scores, the YO I+ group, but not YO I-, showed a significant improvement in recognition of sadness and anger during retest. In particular, at retest YO I+ recognised significantly more angry and marginally more sad faces than the YO I- group.

Interestingly, although differences in happiness recognition abilities were not expected, differential scores across the YO I groups were noted. During the retest, YO I+ recognised significantly more happy faces compared to YO I-. Whilst the two groups showed statistically similar recognition rates during pretest, the YO I- group's recognition of happiness was significantly worse during retest whilst the YO I+ group's happiness scores remained unchanged. It seems unlikely that this is due to an actual deterioration over a two-week period in the ability to recognise happiness, but rather a result of the ceiling effect. Participants had very high scores to begin with, and when conducting a re-test without doing anything in the interval scores might drop.

We have demonstrated that emotion recognition can be improved in a sample of adolescent offenders who have known emotion detection impairments, and one might speculate that in the end this could affect the neural processes involved in emotion recognition. Cognitive training has not only been demonstrated to positively affect empathy (Dadds et al., in press) and reduce emotion recognition biases (Penton-Voak et al., 2012), but

also to impact on brain functioning by affecting the underlying neural and anatomical networks (e.g. Olesen et al., 2004). If this intervention can alter young offenders' neural activity and produce long-term improvement in recognition, then it would provide a cost-effective and relatively quick way of managing a population of individuals whose combined offending produces the majority of harm in their communities. Moreover, because of their age, young offenders have greater brain plasticity than adults (van Goozen & Fairchild, 2008), we suggest there is a greater chance of enduring success than the current approaches to treatment.

One limitation of the study is the absence of a control group of adolescent boys who also completed the pretest and retest of the FER test. By including an group of control adolescents it would have been possible to confirm once more that adolescents who engage in ASB display recognition deficits compared to a group of age-, SES- and IQ- matched control youths, whilst also controlling for repeated testing effects. Consequently, testing of control adolescents is currently being carried out.

An additional consideration is that although we suggest that young offenders' brain functioning may ultimately alter as a result of improved emotion recognition, future studies are needed to confirm this. Neuroimaging research could establish whether amygdala functioning can be altered in young offenders through administering this intervention. Similarly, in order to assess the long-term impact of this intervention on ASB, subsequent follow-up assessments of this sample's ASB will need to be conducted.

In summary, the current findings provide evidence that emotion recognition can be improved through administering a targeted intervention to a group of youths who come into contact with the offending services for a wide range of different types of antisocial behaviour problems (van Goozen & Fairchild, 2008). Compared to age-, IQ-, and SES-matched controls and offenders, juvenile offenders who completed an intervention exhibited

improvements in the recognition of fear, sadness, and anger. As emotion recognition plays a key role in ASB (Blair, 2001), we propose that such an intervention should have a positive effect on future ASB and therefore have a beneficial impact on the lives of young people and their communities.

## **6. Chapter 6 – General Discussion**

Central to this PhD thesis was the examination of emotion functioning in youngsters with antisocial behaviour (ASB). Antisocial and criminal activity peak during adolescence and pose a significant problem for the individuals themselves and society (Monahan et al., 2009). Emotional impairments, particularly those related to learning and processing, play an important role in explanations of antisocial behaviour. Although the affective characteristics of clinically defined antisocial youngsters and adults have been investigated considerably, there are few studies that have focused upon community samples of young offenders, whose combined offending produces the majority of harm compared to youths identified as in need of specialist treatment.

One influential age of onset theory (Moffitt, 1993) proposed that adolescent onset ASB can be explained in terms of social rather than neuropsychological or biological factors. However, growing empirical evidence has found problems with this account (Roisman et al., 2010), and shows that seriousness of the ASB – irrespective of onset – might be associated with dysfunctional neurobiological systems (Fairchild et al., 2009a; Fairchild et al., 2009b; Fairchild et al., 2008; Passamonti et al., 2010). In light of these recent findings, the role of seriousness of ASB on emotion functioning was also explored.

### ***6.1. Overview and aims***

The aims of this thesis were to examine the extent to which emotion dysfunction was implicated in ASB, and to explore different aspects of emotion functioning including recognition and regulation in male adolescents. Differences in the emotion functioning of adolescent offenders compared with non-offending adolescents, matched for age, IQ and socio-economic status, were examined. The extent to which different operationalisations of

ASB influenced emotion functioning within the sample of young offenders was also assessed. The current chapter will present an overview and integration of the main findings, discuss the possible implications, and identify areas for future research.

To achieve these aims, data were collected at the Cardiff Youth Offending Services and local comprehensive schools. Young offenders completed a battery of tests including assessments of IQ, questionnaire measures assessing personality characteristics relating to psychopathic traits and behavioural problems, and computer-based tests measuring facial affect recognition, trust, and emotion regulation through economic decision-making. In addition, pre-existing information on offence severity was used from official records. Finally, a protocol-based emotion intervention was carried out in a subgroup of young offenders to find out whether targeted emotion training could improve emotion recognition.

Chapter 2 examined the relationship between emotion recognition deficits and ASB in male adolescents. Both general face affect and specific recognition deficits for fear and sadness (see Marsh & Blair, 2008) have been identified in antisocial individuals; however, the existing literature has mainly focused on clinical populations including incarcerated offenders and psychopaths (Marsh & Blair, 2008). To our knowledge, no study on facial affect recognition in community-based adolescent young offenders had been carried out. The goal of Chapter 2 was to identify whether young offenders have a general or a specific emotion recognition deficit, and whether conduct disorder (CD), psychopathy, and severity of offending help to explain variation in emotion recognition performance.

Chapter 3 examined the effect of ASB on trust judgments in male adolescents. Adolescents who engage in ASB demonstrate problems relating to both biological and social factors that contribute to trust. These include a weakened attachment to and increased conflict with parents (Barkley et al., 1991; Danforth et al., 1991), and impairments in amygdala function and structure (Fairchild et al., 2011; Vloet et al., 2008; Passmonti et al.,

2010). Despite the evidence that levels of trust in facial stimuli could be impaired in antisocial populations, few studies have examined this issue. The goal of Chapter 3 was to find out whether young offenders have deficits trusting others in comparison with normal controls, and to examine the role of gender and emotion of faces in these trust judgments.

Chapter 4 examined emotion regulation in young offenders and normal controls using an economic decision-making task (Ultimatum Game [UG]). Difficulties with emotion regulation underlie many ASB problems, including CD (Cole et al., 1994; Davidson et al., 2000b), and can affect the outcome of decision-making tasks. Frick and Morris (2004) have proposed that difficulties with emotion regulation underlie reactive, emotionally driven conduct problems but seem to be less likely to be involved in proactive or covert ASB, which would suggest different economic decision-making outcomes in different ASB subgroups. Moreover, because the UG involves decision-making based on economic rewards, reward sensitivity may also play a key role in determining behavioural responses (Cherek et al., 1997; van Goozen et al., 2004). The goal of Chapter 4 was to examine emotion regulation in young offenders and their matched controls to find out whether offenders have more problems with regulation than controls, and more specifically what role CD, psychopathy, and severity of offending play in explaining regulation ability.

Finally, Chapter 5 extended the findings of Chapter 2 and sought to assess whether young offenders' emotion recognition could be improved. Blair (2005a) suggests that distress cues serve as an inhibitor for antisocial behaviour. Based on this theory, if emotion recognition deficits, particularly for fear and sadness, can be ameliorated then this could have a positive effect in preventing future ASB. Although cognitive training has been demonstrated to impact on brain functioning (Olsen et al., 2004), it is unknown whether training can improve emotion recognition in a community sample of adolescent offenders. The goal of Chapter 5 was to assess whether young offenders' emotion recognition abilities

could be improved by administering an emotion intervention, whilst controlling for retest effects.

### **6.1.1. What is the evidence that young offenders have general or specific emotion problems?**

Taking the findings from this thesis together, we have demonstrated that rather than having a general emotion functioning impairment, community sampled young offenders have specific emotion functioning deficits. The analyses in Chapter 2 revealed that they had a general problem in recognising sadness (across all intensities) and a specific problem in recognising low intensity anger and high intensity fear. We demonstrated in Chapter 3 that although young offenders were not less trusting overall, they generally mistrusted male faces more, and male happy faces specifically, compared to control males. Finally, in Chapter 4 we found that, contrary to our expectations, young offenders generally accepted more unfair offers than adolescent controls. Importantly, the young offenders and controls were matched for age, IQ, and SES background, which makes these results more noteworthy and suggests that these emotion functioning deficits are important markers in the understanding of ASB.

Different explanations can clarify these specific emotion functioning deficits. As previously discussed, antisocial behaviour results from a failure to be appropriately guided by the social cues of others (Blair, 2003). Blair (2005a) suggests that distress cues, such as fear and sadness, serve to inhibit ASB. He proposes that this occurs by an individual learning to avoid hostile acts that can cause distress to others, which is underpinned by effective amygdala functioning. Amygdala dysfunctions affect the recognition of fear and sadness (Adolphs & Tranel, 2004; Blair et al., 1999; Calder, 1996), and are widely reported in

antisocial samples (e.g. Fairchild et al., 2011; Jones et al., 2009; Marsh et al., 2008; Sterzer et al., 2005).

Observing fear and sadness in others elicits affective responses, such as empathy and remorse, and reduces the likelihood of continued aggression against the victim (Blair, 1995, 2001; Marsh & Ambady, 2007). Indeed, both empathy and remorse are elicited by the perception and correct interpretation of distress cues such as fear and sadness (Blair, 1995; Hoffman, 1987; Marsh & Ambady, 2007), and are defective in antisocial populations (Blair, 2005b; Frick et al., 1994; Miller & Eisenberg, 1988; Pardini et al., 2003; Raine et al., 2003; Soderstrom, 2003; Sterzer et al., 2007; de Wied et al., 2012). Our sample of offenders had a general problem in detecting sadness in others, as well as clear signs of fear, and so according to Blair's model they would have problems learning the association between committing hostile acts and the distressing impact this has on others, as well as difficulties producing an appropriate empathic response that might inhibit (further) aggression against the victim.

A particularly interesting finding that illustrates not only how young offenders do not seem to have general emotion functioning deficits, but also how a lack of empathic responses does not necessarily result in negative outcomes, is that young offenders were better able to make more rational decisions. Although we expected that young offenders might have more problems regulating their emotions than their non-ASB counterparts, our findings in Chapter 4 indicated that they seemed to be better able to do so. We suggested that low empathy and a lack of concern for the emotional states of others makes the antisocial individual care less about the actions of others and less motivated to reject unfair offers. In this situation, it seems that lack of emotional empathy towards others might be beneficial for the regulation of emotion within the individual.

We found evidence that supports the suggestion that antisocial adolescents have specific neurobiological dysfunctions that predispose them to heightened reward sensitivity

and anger recognition impairments. Not only did young offenders have difficulties in recognising low intensity anger, but evidence in Chapter 4 also suggests that they are more reward driven than non-ASB youths, even in the face of unfair offers. Antisocial samples have been reported to have underlying dopamine and ventral striatum abnormalities (Buckholtz et al., 2010; Glenn et al., 2010; Glenn & Yang, in press), which seem to result in anger recognition deficits (Calder et al., 2004; Lawrence et al., 2002), and problems integrating reward cues to facilitate goal-directed behaviour (Beauchaine, 2001; Beauchaine et al., 2001; Glenn & Yang, in press; Marsden & Obseso, 1994; Tisch et al., 2004).

Picking up the warning signs of anger in others might allow for individuals to learn what the consequences of their actions are and give them the opportunity to desist from those actions or remove themselves from the situation before it escalates into more hostility. Our sample of juvenile offenders had problems in identifying these (early) warning signals of anger and could therefore lack the emotional information needed to desist from behaving in a way that might cause more anger in others. Moreover, the implication of being particularly sensitive to reward is that an individual is likely to have an enhanced motivation to obtain reward, which – in conjunction with a reduced ability to recognise emotions in others and to learn from aversive outcomes – could lead to an instrumental style of aggression (Buckholtz et al., 2010).

The environment also plays a role in emotion functioning, specifically when making trust inferences about emotional faces. We have suggested that youngsters who engage in delinquent behaviours are less likely to be exposed to happy male faces. ASB adolescents are more likely to have experienced harsh parenting and poor paternal relationships (Farrington, 2004; Hoeve et al., 2009; Leventhal & Brooks-Gunn, 2004; Loeber & Farrington, 1998). Aversive or minimal support from fathers also seems to affect hostility attributions (Nelson & Coyne, 2009), and might explain their general distrust of other males.

The bias of males within the criminal justice system might also – to some extent - explain these findings. Not only are 78% of young people under supervision at Youth Offending Teams male (Home Office, 2012), but males make up 74% of police officers (Home Office, 2011). As a result of their own ASB these youths get involved in a negative cycle of negative interaction, which lessens their trust in adult males generally, including those who have good intentions.

We also suggested that antisocial adolescents are exposed to negative peer interactions, including peer relationship problems (Miller-Johnson et al., 1999; Nagin & Tremblay, 1999), peer rejection (Bierman et al., 1993; Coie et al., 1992; Dodge et al., 2003; Rabiner et al., 2005), and negative peer influence (Boivin & Vitaro, 1995; Coie & Dodge, 1998; Elliott et al., 1985; Espelage et al., 2003; Mrug et al., 2004). Positive peer relationships facilitate learning of adaptive social behaviours (Ladd et al., 1999), and are related to trust (Rotenberg et al., 2004). Delinquent adolescents who have difficult peer relationships may therefore be less likely to trust others. Problematic male peer relationships might also contribute to their general mistrust of other males.

Although we are unable to claim that a lack of trust will cause antisocial behaviour, it could be suggested that a lack of trust may have a detrimental impact on rehabilitation. Trust has been demonstrated to be critical in human learning (Rotter, 1967) and cooperation (Gregory & Ripski, 2008). If these antisocial adolescents have difficulties trusting males, and males predominantly make up the justice system, then engagement and cooperation could be affected, making reform more difficult.

Our findings are consistent with the wider literature in showing that emotional impairments play an important role in explanations of antisocial behaviour (Baumeister & Lobbstaël, 2011). However, in our study, emotion functioning was not generally impaired. Young offenders had problems in specific aspects of emotion recognition, yet they showed no

differences in their ability to trust females, and were generally better able to regulate their emotions during a reward-based decision-making task. Our findings therefore emphasise the need to focus on assessing specific domains of emotional functioning that can identify strengths as well as deficiencies in abilities, which could be used to develop targeted interventions.

### **6.1.2. Does variation in seriousness of ASB explain variation in emotion functioning?**

We know that a relatively large proportion of young people engage in ASB, and that there is much heterogeneity in terms of prevalence, type and severity of ASB within these youths. Of the 29% of the more than 4500 youths aged 10 to 25 who had committed at least one act of ASB in the previous year, 14- to 16-year olds were more likely to commit ASB than other age groups, and 68% had committed one type of antisocial act compared to 9% who had committed three or more (Home Office, 2005). In clinical research and practice it is important to discriminate between the antisocial individuals in order to better understand risk factors and outcomes, and to develop targeted interventions.

Categorical and dimensional approaches both enable us to differentiate. To date, there is a large body of work that has taken a categorical approach by comparing clinical groups, for example CD, oppositional defiant disorder (ODD) and/or attention deficit hyperactivity disorder (ADHD) adolescents, against normal controls using clear cut-offs (for examples see Decety et al., 2009; Fairchild et al., 2010; Herpertz et al., 2008; Luman et al., 2010). Although much of current psychopathology research follows this category-based framework of conceptualising psychopathology, there are problems associated with this approach (Krueger et al., 2005). Not only is there extensive comorbidity among disorders, but also

there is extensive heterogeneity within categorical classifications of disorders (Krueger et al., 2005). It is therefore theoretically possible that two individuals with the same diagnosis may share no more than one common feature, but that two individuals with different diagnoses may share multiple traits. Given these issues, outcome measures based on categorical distinctions of psychopathology can sometimes be difficult to interpret (Krueger et al., 2005). Accordingly, there has been an increasing move towards more dimensional ways of studying psychopathology, for example by using correlational and regression analyses, as well as examining between ASB subgroups (see Fairchild et al., 2009a; Fairchild et al., 2009b; Marsee et al., 2005; Passamonti et al., 2010).

The approach of this thesis initially took a categorical approach; categorizing adolescents as either young offenders, who had committed a criminal offence, or control adolescents who had not. Based on the increasing need to look at the heterogeneity of delinquency, we subsequently moved closer towards assessing ASB as a dimension by examining emotion functioning variation within the ASB subgroup. Our analyses have consistently demonstrated in a community population of adolescents with ASB, that seriousness of ASB seems to explain variation in problems with emotional functioning.

Firstly, we observed that severity of offending helps to explain variation in anger recognition, judgments of male neutral faces, and emotion regulation. Interestingly, we also observed an interaction in anger detection: whereas our sample of more severe offenders had problems detecting low intensity anger, they showed superior recognition for high intensity anger expressions in comparison with less severe offenders. While we had previously suggested that deficits in low intensity recognition might be related to biological factors, we hypothesized that enhanced recognition of clear anger might reflect their social environment. Well-known risk factors for the development of aggressive behaviour problems include rejection by peers (Coie & Dodge, 1998) and harsh parenting (Weiss et al., 1992). It has

been suggested that these risk factors may alter children's processing of situations, predisposing them to attribute hostile intent to ambiguous stimuli (Dishion et al., 1995; Dodge, 1993, 2003). It is possible that more severe offenders were better at recognising clear anger than less severe offenders because their repeated exposure to negative social environments has facilitated the learning of obviously angry faces. Speculatively, whilst these individuals might have been exposed to environments with repeated opportunities to learn stronger angry expressions, they might have had limited chances to learn the milder indicators of anger.

It remains unclear whether engaging in ASB leads to an improved ability to detect obvious anger, or whether an 'anger bias' leads to more ASB (Dishion et al., 1995; Dodge, 1993, 2003). It is possible that the heightened awareness of anger results in more aggression; however, it may also be that aggressive behaviour leads to an anger bias (Dodge, 2003). Children who are aggressive become embroiled in negative cycles whereby their aggressive behaviour leads to negative evaluations by others, which then further results in retaliatory aggression. These hostile interactions might serve to heighten awareness of hostile cues, which is an antecedent for aggressive behaviour (Crick & Dodge, 1994). Another interpretation is that biases in the perception of emotional facial expressions play a causal role in the maintenance of negative affect. Modification of these biases could establish a cycle through which alterations in the perception of emotion in others may lead to changes in behaviour that are then reinforced (Penton-Voak et al., 2012). Modification of perception of emotions in others could therefore be a key area of prospective research.

Not only did more severe offenders show heightened ability at detecting obvious signs of anger, they also seemed to be better able to regulate their emotions during a reward-based task; more severe offenders accepted more unfair offers than those who had only engaged in less severe offences. In line with our earlier explanations that young offenders are reward

sensitive and lack empathy, there is evidence that more severe offenders in particular are driven to obtain rewards, sacrificing size for immediacy, in comparison to non-violent offenders (Cherek et al., 1997), and that violent offenders have less empathy than non-violent offenders (Joliffe & Farrington, 2004). Taken together, it is possible that the drive to obtain rewards, combined with a reduced understanding of the emotional state of the proposer, might make more severe offenders less motivated to reject offers, even in the context of unfair offers.

In addition, ASB subtype analyses also provided some evidence that elevated trust towards males is possible. Adolescents who had engaged in less severe crimes judged male neutral faces as more trustworthy in comparison with offenders who had engaged in more severe crimes. It may be that, unlike more severe offenders, individuals who have committed lower severity offences are not as embroiled in negative cycles that can exacerbate problematic relationships with males. Although the reasons for this finding are not clear at present, trust towards other males does exist in an identifiable subgroup of young offenders.

Severity of offending was not the only subgroup of ASB that helped to explain variation in emotion functioning. Performance on the Ultimatum Game varied between offenders with and without CD reflecting differences in emotion regulation problems: CD adolescents rejected more unfair offers than adolescents without CD. Davidson (2000b) suggests that the tendency for impulsive aggression, as seen in individuals with CD, is associated with a low threshold for activating negative affect and with a failure to respond appropriately to the expected negative consequences of behaving aggressively. The difficulties offenders with CD have in regulating their emotions are likely to set them at a disadvantage for successfully restraining themselves during conflict.

Overall the evidence suggests that seriousness of ASB subtypes can help to explain variation in emotion functioning. Our results therefore suggest a need for taking a

dimensional approach to ASB by distinguishing between ASB adolescents based on the seriousness of their delinquency, particularly in terms of severity of offending. This approach would not only allow for better understanding of their emotional and neuropsychological deficits, but it could also help to develop targeted interventions aimed at ameliorating these difficulties.

### **6.1.3. Can young offenders' emotion problems abilities be improved?**

Although we have noted several emotion functioning deficits between young offenders and controls, and within the offender group as a whole, we also obtained some evidence that young offenders' emotion recognition, regulation, and trust abilities can be improved. Based on our findings there was no evidence of a general emotion deficit; severe offenders were very good in clear anger recognition, and, apart from fear, they had no problems in recognising high intensity emotion. We considered, therefore, the possibility of intervening by targeting specific emotion recognition through training or social intervention. Social circumstances clearly affect emotion recognition: for example, children who had been physically abused by their parents have been shown to require less perceptual information to correctly identify angry expressions, but more information to identify sadness (Pollak & Sinha, 2002). Following on from our findings in Chapter 2, we sought to examine whether emotion recognition abilities could be improved in young offenders whilst controlling for repeated testing effects.

We demonstrated that our emotion training intervention had a positive impact on emotion recognition scores. Offenders who completed the intervention showed an improvement in recognition of fear, sadness and anger, whereas there was no improvement for offenders who did not take part in the intervention and only completed the retest task.

The implication of our findings is that individually tailored interventions for young offenders can help them to identify negative expressions and also improve their understanding of possible reasons why someone displays facial affect. This could be of benefit in their interactions with others and ultimately have a positive effect on ASB. It has been suggested that as a result of poor conditioning, antisocial individuals fail to learn to make associations easily between negative emotions and harmful actions (Marsh & Blair, 2008). Making these associations more explicit may provide support to young offenders, enabling them to learn to ameliorate their thinking and behaviour. If Blair's (2005a) suggestion that distress cues, such as fear and sadness, serve to inhibit ASB is correct, then this intervention could be an effective approach to reducing delinquency.

Cognitive training has been shown to affect the behavioural and neural processes involved in emotion recognition, including improving empathy (Dadds et al., in press), reducing recognition biases (Penton-Voak et al., 2012), and altering neural and anatomical networks (Olesen et al., 2004). We suggest that if this intervention has successfully altered young offenders' neural activity and can produce long term improvements, then this could provide a cost-effective way of treating this population of adolescents who produce the majority of harm in communities. Clearly, a next step would be to examine whether improved recognition has indeed resulted in a neural change, whether emotion recognition improvements are enduring, and whether the improved recognition results in a reduction of ASB.

We observed that trust towards males exists in a subgroup of young offenders. It seems that young offenders who have not yet engaged in more severe crimes, trust male neutral faces more, providing hope that trust towards males is not universally deficient in young offenders. Thus trust towards other males does exist in identifiable subgroups of young

offenders and this knowledge can be used in designing psychosocial interventions for youths with more severe problem behaviour (and to prevent severe problem behaviour developing).

In addition to exploring social factors, there are a few promising pharmacological interventions that ultimately could be used in offender populations. Intranasal administration of the neuropeptide oxytocin has been shown to increase ratings of facial trustworthiness in healthy young adults (Theodoridou et al., 2009) and trusting behaviour during economic tasks (Baumgartner et al., 2008). There is also evidence that oxytocin improves young males' ability to infer the affective mental state of others (Domes et al., 2007), making this a potentially useful pharmacological intervention strategy in young offenders who have affective recognition and trust impairments.

Lastly, analyses of emotion regulation revealed two key findings that could inform interventions. In light of the heightened sensitivity towards reward, even in the face of unfair offers, rehabilitation and reform based on the reward of prosocial behaviour could ultimately be more beneficial to the individual and society at large. However, whilst severity of offending explained a drive towards rewards, CD explained variation in emotion regulation. This has clear implications for the treatment of community adolescents with CD in helping them to develop their emotion regulation strategies. Pharmacological or psychosocial interventions that operate on a common final pathway in the emotion regulatory circuitry of the brain would need to be conducted within this specific population of adolescents with ASB, in order to help them better regulate their emotions.

## ***6.2. Limitations and caveats***

There are some limitations in this study that need to be discussed. One limitation involves the number of participants available for testing. Recruitment was an extremely difficult venture and although a substantial proportion of all those young people engaged in

the youth offending team were approached to take part in the study, many refused to take part. A large number of participants had been recruited, but participants frequently failed to attend scheduled sessions or did not want to complete all of the tests in the battery. The number of tests included was reduced in size to prevent boredom; however, there was still a considerable number of tests that took up a substantial amount of time and some participants became fatigued or lost interest. In spite of this, most measures were completed in sufficiently large numbers of participants and provided interesting information on the factors associated with ASB in young people.

It is also worth noting that we recruited a number of female participants, but these were in such low numbers that it was difficult to complete any meaningful comparisons between the genders. Combining all participants into one group did not seem to be appropriate given that female and males differ in terms of their experience and expression of emotions (Fischer et al., 2004).

It is also important to note the use of cut-off based analyses throughout the thesis. This statistical technique reduces statistical power and individual variability by placing individuals into groups and losing meaningful information (Altman & Royston, 2006; Irwin & McClelland, 2003; MacCallum et al., 2002). However, we feel that the use of some cut-off based analyses was legitimate in this research, because some the groupings are already in use by policy makers and practitioners (e.g. the distinction between high and low offence severity groups), whilst others are based on well-established criteria (i.e. subgroups based on borderline/clinical range YSR scores).

A notable issue involves the role of psychopathy in emotion dysfunction in ASB. Muller and colleagues (2003) suggest that this disorder is characterized by abnormal or deficient emotional responsiveness, including emotional detachment, fearlessness, and lack of empathy and remorse. As a function of these deficiencies psychopaths have disturbed social

interaction and diminished ability to learn from punishment (Muller et al., 2003). Because of the emotional dysfunction seen in psychopaths, an affective factor is a key part of psychopathy definitions. Frick and White (2008) highlight that the affective dimension of psychopathy contains unique information not contained in other ASB diagnoses, which has additional prognostic value. In our dimensional analyses, the role of YPI traits was considered; however, we did not find any evidence showing levels of psychopathy or callous/unemotional (CU) traits explained variation in emotion dysfunction in this community sample of adolescent offenders (CU analyses were conducted but not included because of a consistent lack of relationship between CU traits and emotional functioning).

There are several reasons that might explain why we did not find support for a role of psychopathic traits in offenders' emotional responses. Firstly, it may be that our groups were too small to adequately assess any differences between high and low psychopathy offenders. Although we attempted to test a large number of adolescent offenders in order to adequately assess subgroups of ASB, there were difficulties recruiting and testing these individuals, which may have reduced statistical power and increased the chance of making a Type II error.

Other researchers have found limited effects of psychopathy in addition to CD. In a study exploring decision-making and executive functioning in a population of CD adolescents, dividing participants into high and low psychopathy groups using the YPI indicated no clear effect of psychopathic traits on decision-making (Fairchild et al., 2009b). Passamonti and colleagues (2010) examined CD adolescents' neural activations in the regions associated with ASB, including the amygdala, OFC, vmPFC and insula, whilst viewing angry, neutral and sad faces. They found that although individuals with CD scored significantly higher than healthy controls on measures of CU traits or overall psychopathic traits, variations in these dimensions were not significantly related to the neural responses to

the affective faces. Moreover, CD subtypes did not differ in psychopathic or CU traits, and so any differences between the groups were unlikely to reflect differences on psychopathy measures. The control and adolescent offender groups in this thesis did not differ in terms of psychopathy scores, particularly for the emotion recognition and regulation tasks, which indicates that these populations of ASB and control adolescents are not best suited to reveal differences in emotion functioning as a result of variations in psychopathic traits.

Passamonti and colleagues (2010) suggest that issues with the methodology used might offer an alternative explanation why their results indicate that psychopathy does not seem to play a role in explaining outcome. Although our data indicate that psychopathy is unlikely to explain emotion functioning variation, the use of a different clinical psychopathy measure might help identify relationships between psychopathy and regulation/recognition. We selected the YPI, a self-report measure, based on a number of benefits (van Baardewijk et al., 2008). Not only can self-report measures be easily administered to a large group of individuals, but they also provide insight into the core affective traits of psychopathy that are not always easy to observe by third-party raters. Moreover, the internal consistencies of the three YPI dimensions have been described as good to excellent (Andershed et al., 2002; Larsson et al., 2006; Skeem & Cauffman, 2003), whilst the consistencies of the CU dimension of another self-report tool, the Anti Social Process Screening Device (Frick & Hare, 2001), have been consistently poor (Poythress et al., 2006). Despite the benefits associated with the YPI, it may be that a different screening tool relying on multi-domain and multi-source information and clinician ratings, such as the PCL-YV (Forth et al., 2003), might be better able to reveal differences in emotion functioning.

Although different aspects of emotion functioning have been examined in the context of this thesis, other aspects of emotion functioning were not included. The focus was on emotion and trust recognition and emotion regulation; however there are several areas that

could be examined. Psychophysiological research has demonstrated that a range of peripheral processes is critical for the realization of emotions. Physiological arousal (Damasio, 1999) is an important determinant of feelings, and is a marker for psychopathology. According to Raine (1993), fearlessness theory indicates that low levels of arousal are markers for low levels of fear. Furthermore, being unable to learn from punishments during childhood due to low physiological arousal is thought to result in poor fear conditioning and ineffective socialization. Fearlessness can therefore be seen as a requirement for certain antisocial acts to occur (Blair et al., 2005a; Fairchild et al., 2008; Fairchild et al., 2010; Raine, 2002). Although fear conditioning has been studied frequently in adults and increasingly so in adolescents, examining this issue in a population of adolescents who may not have yet reached clinical significance in terms of ASB, but commit the majority of offending within the community, may help determine which ASB subtypes could best explain their psychophysiology impairments.

The possibility of low empathy being an explanation for young offenders' acceptance of unfair offers during the UG is speculative and would need further study. Empathy dysfunction, like dysfunctions in fear conditioning and in fear and sadness recognition, is related to abnormalities in the limbic region, particularly the amygdala (Blair, 2005b; 2007). Despite the considerable amount of research on facial affect recognition in individuals with ASB, there has been little attention given to empathy-related responding within more complex empathy-inducing settings. One recent study that has adopted a multi-measure approach to examine patterns of affective empathy looked at high versus low CU traits in adolescents with disruptive behaviour disorders ([DBD] including CD; de Wied et al., 2012). Empathy inducing film clips depicting negative or positive emotions were played while facial electromyographic activity in the cheek and eyebrow muscle regions and heart rate responses were monitored. Subsequently, self-report empathy was measured. Although several

interesting findings were reported, including high CU trait DBD adolescents showing significantly lower levels of empathic sadness than healthy controls across all response systems, there were some clear limitations. A majority of the DBD group showed comorbid ADHD, and so the results might reflect behaviour of adolescents with pure ADHD, or comorbid DBD/ADHD. Moreover, the sample size was low (CU+ n=14, CU- n=17, NC n=32), thus reducing power and the ability to demonstrate significant differences between subgroups. Further research that combines this multi-method approach to assessing empathy in a larger antisocial sample could help to extend our understanding of their emotion processing.

The inclusion of emotion functioning measures such as those included in the present study, in combination with neuroimaging procedures could be useful in future studies in providing more specific information about the brain areas involved in different components emotion functioning in the context of ASB. For instance, Passamonti and colleagues (2010) demonstrated amygdala hypofunction in CD adolescents viewing sad faces through using fMRI, helping to differentiate between early onset and adolescent CD. By including imaging techniques in the Ultimatum Game paradigm, the neural basis for economic decision-making in antisocial adolescents could be examined further. Although we have speculated that decision-making performance during the UG might have been affected by the reward sensitivity of adolescents, we cannot be certain of these claims. Through using neuroimaging techniques, one might expect that the reward pathways of the brain might show increased activation during this task for offenders generally, and more severe offenders specifically. Moreover, fMRI could be one way of establishing whether neural functional changes have occurred in young offenders who complete the emotion intervention task in the future.

Finally, another issue to consider is the use of controls from a middle and higher SES. By recruiting a non-offending control group from the area in which young offenders live and

by matching for socioeconomic status and IQ we were able to examine factors that were specifically associated with ASB without the added complication of differing intelligence or social deprivation. However, it does mean that between group differences were more difficult to obtain and there was an increased chance of type II errors.

### ***6.3. Implications and conclusions***

Our findings suggest that young offenders have specific emotional problems that could impact their ability to deal with emotional situations (emotion regulation) and inhibit their understanding of the consequences of their actions (emotion recognition). They also have difficulties trusting positive male role models, which could feasibly affect their engagement in reform. Although these findings were observed when comparing young offenders with their matched male controls, we also identified some important differences within the group of young offenders, highlighting the dimensional nature of the underlying emotional impairments in ASB and the need to differentiate between different antisocial subgroups. On the other hand, it is also important to mention that we observed some ‘strengths’: young offenders as a group were better than controls at identifying intense anger and in regulating negative emotions, which suggests a need to focus on identifying individual differences within the ASB group through the use of further standardised assessments.

These results have important implications for policy and practitioners working with young offenders. Some of our findings can inform interventions for young offenders by taking into account offenders’ differences when setting up individual programs to tackle behaviour problems. At present, the criminal justice system is based heavily on the use of deterrence and restorative justice. The UK government’s view is ‘to punish and rehabilitate more offenders’ and ‘to give victims and witnesses more support’

([http://www.cjsonline.gov.uk/the\\_cjs/how\\_it\\_works/](http://www.cjsonline.gov.uk/the_cjs/how_it_works/)). However, the current findings suggest

that young offenders present with problems identifying negative emotions in others (particularly sadness and fear), and are therefore likely to have problems in recognising the distress they have caused to their victims. They also have clear problems trusting males, which may have an impact on engagement in a male-dominated justice system. In these instances, restorative justice might not be as effective as one might hope. Clearly, interventions that aim to improve emotion recognition, such as the one outlined in Chapter 5, and those that help to facilitate trust should be considered in order to increase engagement and improve outcome. This is of critical importance; until relatively recently intervention programs have been designed without an adequate understanding of the individual risk factors involved in antisocial behaviour and consequently resources have been spent inefficiently (Moffitt, 2005).

Although we have demonstrated that young offenders have impaired emotion functioning, including problems in recognising sadness, fear, and low intensity anger, and in trusting positive male faces, the findings can be used constructively as they help to identify areas of concern that can be utilized for the development and implementation of future interventions. Young offenders are better able to regulate their emotions when an incentive is given, and when they recognise obvious signs of anger in others. Importantly, they are able to show an overall improvement in the recognition of negative emotions after completing an emotion intervention task. Arguably, this would be an important prerequisite for an understanding of their victims' mental state and showing empathy for them. It might also help them to modify their behaviour and prevent an escalation of their antisocial actions.

## 7. References

- Abelson, J. J., Liberzon, I., Young, E. A., & Khan, S. (2005). Cognitive modulation of the endocrine stress response to a pharmacological challenge in normal and panic disorder subjects. *Archives of General Psychiatry*, *62*, 668-675.
- Achenbach, T. M. (1991). *Manual for the YSR and 1991 profile*. Burlington: University of Vermont.
- Achenbach, T. M., & Edelbrock, C. S. (1978). The classification of child psychopathology: A review and analysis of empirical efforts. *Psychological Bulletin*, *85*, 1275-1301.
- Adams, R. B., Ambady, N., Macrae, N., & Kleck, R. E. (2006). Emotional expressions forecast approach-avoidance behaviour. *Motivation & Emotion*, *30*, 179-188.
- Adolphs, R., Damasio, H., Tranel, D., & Damasio, A. R. (1996). Cortical systems for the recognition of emotion in facial expressions. *Journal of Neuroscience*, *1*, 7678-7687.
- Adolphs, R., & Spezio, M. (2006). Role of the amygdala in processing visual social stimuli. *Progress in Brain Research*, *156*, 363-378.
- Adolphs, R., & Tranel, D. (2004). Impaired judgments of sadness but not happiness following bilateral amygdala damage. *Journal of Cognitive Neuroscience*, *16*, 453-462.
- Adolphs, R., Tranel, D., & Damasio, A. R. (1998). The human amygdala in social judgment. *Nature*, *393*, 470-474.
- Adolphs, R., Tranel, D., & Damasio, A. R. (1995). Fear and the human amygdala. *Journal of Neuroscience*, *15*, 5879-5891.
- Adolphs, R., Tranel, D., Hamann, S., Young, A. W., Calder, A. J., Phelps, E. A., Anderson, A., Lee, G. P., & Damasio, A. R. (1999). Recognition of facial emotion in nine individuals with bilateral amygdala damage. *Neuropsychologia*, *37*, 1111-1117.

- Aguilar, B., Sroufe, L., Egeland, B., & Carlson, E. (2000). Distinguishing the early-onset/persistent and adolescence-onset antisocial behavior types: From birth to 16 years. *Development and Psychopathology, 12*, 109-132.
- Altman, D. G., & Royston, P. (2006). The cost of dichotomizing continuous variables. *British Medical Journal, 332*, 1080.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders; DSM-IV-TR* (4<sup>th</sup> ed., test revision). Washington, DC: American Psychiatric Association.
- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed.). Washington, DC: American Psychiatric Association.
- Andershed, H., Kerr, M., Stattin, H., & Levander, S. (2002). Psychopathic traits in non-referred youths: A new assessment tool. In E. Blaauw, & L. Sheridan (Eds.), *Psychopaths: Current international perspectives* (pp131-158). The Hague: Elsevier.
- Anderson, S. W., Bechara, A., Damasio, H., Tranel, D., & Damasio, A. R. (1999). Impairment of social and moral behavior related to early damage in human prefrontal cortex. *Nature Neuroscience, 2*, 1032-1037.
- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence, 16*, 427-454.
- Baird, A. A., Gruber, S. A., Fein, D. A., Mass, L. C., Steingard, R. J., Renshaw, P. F., Cohen, B. M., & Yurgelun-Todd, D. A. (1999). Functional magnetic resonance imaging of facial affect recognition in children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*, 195-199.

- Bandura, A., Capara, G. V., Barbaranelli, C., Gerbino, M., & Pastorelli, C. (2003). Role of affective self-regulatory efficacy in diverse spheres of psychosocial functioning. *Child Development, 74*, 769-782.
- Bardone, A. M., Moffitt, T. E., Caspi, A., Dickson, N., Stanton, W. R., & Silva, P. A. (1998). Adult physical health outcomes of adolescent girls with conduct disorder, depression and anxiety. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 594-601.
- Bargh, J. A., & Williams, L. E. (2007). On the nonconscious of emotion regulation. In J. Gross (Ed.), *Handbook of emotion regulation* (pp. 429-445). New York: Guilford Press.
- Barker, E. D., Oliver, B. R., Viding, E., Salekin, R. T., & Maughan, B. (2011). The impact of prenatal maternal risk, fearless temperament and early parenting on adolescent callous-unemotional traits: A 14-year longitudinal investigation. *Journal of Child Psychology and Psychiatry, 52*, 878-888.
- Barkley, R. A., Fischer, M., Edelbrock, C., & Smallish, L. (1991). The adolescent outcome of hyperactive children diagnosed by research criteria: III. Mother-child interactions, family conflicts and material psychopathology. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 32*, 233-255.
- Baron-Cohen, S., Ring, H. A., Wheelwright, S., Bullmore, E. T., Brammer, M. J., Simmons, A., & Williams, S. C. R. (1999). Social intelligence in the normal and autistic brain: An fMRI study. *European Journal of Neuroscience, 11*, 1891-1898.
- Bauman, M., & Kemper, T. L. (1985). Histoanatomic observations of the brain in early infantile autism. *Neurology, 35*, 866-874.
- Baumeister, R. F., & Lobbetael, J. (2011). Emotions and antisocial behavior. *Journal of Forensic Psychiatry and Psychology, 22*, 635-649.

- Baumgartner, T., Heinrichs, M., Vonlanthen, A., Fischbacher, U., & Fehr, E. (2008).  
*Neuron*, 58, 639-650.
- Bazerman, M. H. (1994). *Judgment in managerial decision making*. New York: Wiley.
- Beauchaine, T. P. (2001). Vagal tone, development, and Gray's motivational theory:  
Toward an integrated model of autonomic nervous system functioning in  
psychopathology. *Development and psychopathology*, 13, 183-214.
- Beauchaine, T. P., Katkin, E. S., Strassberg, Z., & Snarr, J. (2001). Disinhibitory  
psychopathology in male adolescents: Discriminating conduct disorder from  
attention-deficit/hyperactivity disorder through concurrent assessment of multiple  
autonomic states. *Journal of Abnormal Psychology*, 110, 610-624.
- Bechara, A., Damasio, H., Damasio, A. R., & Lee, G. P. (1999). Different contributions of  
the human amygdala and ventromedial prefrontal cortex to decision-making. *The  
Journal of Neuroscience*, 19, 5473-5481.
- Best, M., Williams, J. M., & Coccaro, E. F. (2002). Evidence for a dysfunctional prefrontal  
circuit in patients with an impulsive aggressive disorder. *Proceedings of the National  
Academy of Sciences USA*, 99, 8448-8453.
- Bierman, K. L., Smoot, D. L., & Aumiller, K. (1993). Characteristic of aggressive-rejected,  
aggressive (nonrejected), and rejected (nonaggressive) boys. *Child Development*, 64,  
139-151.
- Birbaumer, N., Veit, R., Lotze, M., Erb, M., Hermann, C., Grodd, W., & Flor, H. (2005).  
Deficient fear conditioning in psychopathy. *Archives of General Psychiatry*, 62, 799-  
805.
- Blair, R. J. (2007). Empathic dysfunction in psychopathic individuals. In T. F. D. Farrow,  
& P. W. R. Woodruff (Eds.), *Empathy in mental illness* (pp. 3-16). New York:  
Cambridge University Press.

- Blair, R. J. (2005a). Applying a cognitive neuroscience perspective to the disorder of psychopathy. *Developmental Psychopathology*, *17*, 865-891.
- Blair, R. J. (2005b). Responding to the emotions of others: Dissociating forms of empathy through the study of typical and psychiatric populations. *Consciousness and Cognition*, *14*, 698-718.
- Blair, R. J. (2003). Facial expressions, their communicatory functions and neurocognitive substrates. *Philosophical Transactions of the Royal Society of London B*, *358*, 561-572.
- Blair, R. J. (2001). Neuro-cognitive models of aggression, the Antisocial Personality Disorders and Psychopathy. *Journal of Neurology, Neurosurgery and Psychiatry*, *71*, 727-731.
- Blair, R. J. (1999). Responsiveness to distress cues in the child with psychopathic tendencies. *Personality and Individual Differences*, *27*, 135-145.
- Blair, R. J. (1995). A cognitive developmental approach to morality: Investigating the psychopath. *Cognition*, *57*, 1-29.
- Blair, R. J., & Cipolotti, L. (2000). Impaired social response reversal: a case of 'acquired sociopathy'. *Brain*, *123*, 1122-1141.
- Blair, R. J., & Coles, M. (2000). Expression recognition and behavioural problems in early adolescence. *Cognitive Development*, *15*, 421-434.
- Blair, R. J., Colledge, E., Murray, L., & Mitchell, D. G. (2001). A selective impairment in the processing of sad and fearful expressions in children with psychopathic tendencies. *Journal of Abnormal Child Psychology*, *29*, 491-498.
- Blair, R. J., Mitchell, D. G., Peschardt, K. S., Colledge, E., Leonard, R. A., Shine, J. H., Murray, L. K., & Perrett, D. I. (2004). Reduced sensitivity to others' fearful

- expressions in psychopathic individuals. *Personality and Individual Differences*, 37, 1111-1122.
- Blair, R. J., Morris, J. S., Frith, C. D., Perrett, D. I., & Dolan, R. J. (1999). Dissociable neural responses to facial expressions of sadness and anger. *Brain*, 122, 883-893.
- Blakemore, S. J. (2008). The social brain in adolescence. *Nature Reviews Neuroscience*, 9, 267-277.
- Blakemore, S. J., & Choudhury, S. (2006). Development of the adolescent brain: Implications for executive function and social cognition. *Journal of Child Psychology and Psychiatry*, 47, 296-312.
- Boivin, M. & Vitaro, F. (1995). The impact of peer relationships on aggression in childhood: Inhibition through coercion and or promotion through peer support. In J. M. Cord (Ed.), *Coercion and punishment in long-term perspectives* (pp. 183-197). New York: Cambridge University Press.
- Bolton, G. E., & Zwick, R. (1995). Anonymity versus punishment in ultimatum bargaining. *Games and Economic Behavior*, 10, 95-121.
- Boylan, K., Vaillancourt, T., Boyle, M., & Szatmari, P. (2007). Comorbidity of internalizing disorders in children with Oppositional Defiant Disorder. *European Child and Adolescent Psychiatry*, 12, 484-494.
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development, *Annual Review of Psychology*, 53, 371-399.
- Bradley, R. H., & Whiteside-Mansell, L. (1997). Children in poverty. In R. T. Ammerman, & M. Hersen (Eds.), *Handbook of prevention and treatment with children and adolescents* (pp. 13-58). New York: Wiley.

- Brandt, J. R., Kennedy, W. A., Patrick, C. J., & Curtin, J. (1997). Assessment of psychopathy in a population of incarcerated adolescent offenders. *Psychological Assessment, 9*, 429-435.
- Brenhouse, H. C., & Andersen, S. L. (2011). Developmental trajectories during adolescence in males and females: A cross-species understanding of underlying brain changes. *Neuroscience & Biobehavioural Reviews, 35*, 1697-1703.
- Brown, B. B. (2004). Adolescents' relationships with peers. In R. Lerner, L. Steinberg (Eds.), *Handbook of adolescent psychology* (pp. 363-394). New York: Wiley.
- Buckholtz, J. W., Treadway, M. T., Cowan, R. L., Woodward, N. D., Benning, S. D., Li, R., Ansari, M. S., Baldwin, R. M., Schwartzman, A. N., Shelby, E. S., Smith, C. E., Cole, D., Kessler, R. M., & Zaid, D. H. (2010). Mesolimbic dopamine reward system hypersensitivity in individuals with psychopathic traits. *Nature Neuroscience, 13*, 419-421.
- Busso, C., Deng, Z., Yildirim, S., Bulut, M., Lee, C.M., Kazemzadeh, A., Lee, S., Neumann, U., & Narayanan, S. (2004). Analysis of emotion recognition using facial expressions, speech and multimodal information. *International Conference of Multimodal Interfaces. 205-211*.
- Cacioppo, J. T., Berntson, G. G., Larsen, J. T., Poehlmann, K. M., & Ito, T. A. (2000). The psychophysiology of emotion. In R. Lewis & J. M. Haviland-Jones (Eds.), *The handbook of emotions* (pp. 173-191). New York: Guilford Press.
- Calder, A. J. (1996). Facial emotion recognition after bilateral amygdala damage: Differentially severe impairment of fear. *Cognitive Neuropsychology, 13*, 699-745.
- Calder, A. J., Keane, J., Lawrence, A. D., & Manes, F. (2004). Impaired recognition of anger following damage to the ventral striatum. *Brain, 127*, 1958-1969.

- Calder, A. J., Lawrence, A. D., & Young, A. W. (2001). Neuropsychology of fear and loathing. *Nature Reviews Neuroscience*, *2*, 352-363.
- Caputo, A. A., Frick, P. J., Brodsky, S. L. (1999). Family violence and juvenile sex offending: Potential mediating roles of psychopathic traits and negative attitudes toward women. *Criminal Justice and Behavior*, *26*, 338-356.
- Carr, A. (2006). *Child and adolescent clinical psychology*. London: Routledge.
- Catchpole, R. E. H., & Gretton, H. M. (2003). The predictive validity of risk assessment with violent young offenders: A 1-year examination of criminal outcome. *Criminal Justice and Behavior*, *30*, 688-708.
- Chang, L., & Gau, S. S. (2010). Fathering and father-child interactions in families of children with attention-deficit/hyperactivity disorder. *Taiwanese Journal of Psychiatry*, *24*, 14-29.
- Cherek, D. R., Schnapp, W., Moeller, F. G., & Dougherty, D. M. (1997). Laboratory measures of aggressive responding in male parolees with violent and nonviolent histories. *Aggressive Behaviour*, *22*, 27-36.
- Coccaro, E. F., McCloskey, M. S., Fitzgerald, D. A., & Phan, K. L. (2007). Amygdala and orbitofrontal reactivity to social threat in individuals with impulsive aggression. *Biological Psychiatry*, *62*, 168-178.
- Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behaviour. In W. Damon, & N. Eisenberg (Eds.), *Handbook of child psychology* (pp. 779-862). Hoboken, NJ: Wiley.
- Coie, J. D., Lochman, J. E., Terry, R., & Hyman, C. (1992). Predicting early adolescent disorder from childhood aggression and peer rejection. *Journal of Consulting and Clinical Psychology*, *60*, 783-792.

- Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*, 317-333.
- Cole, P. M., Michel, M. K., & Teti, L. O. (1994). The development of emotion regulation and dysregulation: A clinical perspective. *Monographs of the Society for Research in Child Development, 59*, 73-100.
- Cole, J., Terry, R., Lenox, K., Lochman, J., & Hyman, C. (1995). Childhood peer rejection and aggression as predictors of stable patterns of adolescent disorder. *Development and Psychopathology, 7*, 697-713.
- Coleman, J. C., & Hendry, L. B. (1990). *The nature of adolescence*. London: Routledge.
- Collins, W. A., & Repinski, D. J. (1994). Relationships during adolescence: Continuity and change in interpersonal perspective. In R. Montemayor, G. Adams, & T. Gullotta (Eds.), *Advances in adolescent development, personal relationships during adolescence, volume 5* (pp. 7-36). Beverly Hills, CA: Sage.
- Cooke, D. J., & Mitchie, C. (1997). An item response theory analysis of the Hare Psychopathy Checklist. *Psychological Assessment, 9*, 3-14.
- Cooke, D. J., Mitchie, C., & Hart, S. (2006). Facets of clinical psychopathy: Toward clearer measurement. In C. J. Patrick (Ed.), *The handbook of psychopathy* (pp. 91-106). . New York: Guilford Press.
- Cornell, D. G., Warren, J., Hawk, G., Stafford, E., Oram, G., & Pine, D. (1996). Psychopathy in instrumental and reactive violent offenders. *Journal of Consulting and Clinical Psychology, 64*, 783-790.
- Cote, S. M., Vaillancourt, T., Barker, E. D., Nagin, D., & Tremblay, R. E. (2007). The joint development of physical and indirect aggression: Predictors of continuity and change during childhood. *Development and Psychopathology, 19*, 37-55.

- Crick, N.R., & Dodge, K.A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74-101.
- Crockett, M. J., Clark, L., Tabibnia, G., Lieberman, M. D., & Robbins, T. W. (2008). Serotonin modulates behavioural reactions to unfairness. *Science*, *320*, 1739.
- Crowe, S. L., & Blair, R. J. (2008). The development of antisocial behaviour: What can we learn from functional neuroimaging studies? *Developmental Psychopathology*, *20*, 1145-1159.
- Cummings, E. M. & Davies, P. (1994). *Children and marital conflict*. New York: Guilford Press.
- Dackis, C. A., & O'Brien, C. P. (2001). Cocaine dependence: a disease of the brain's reward canters. *Journal of Substance Abuse Treatment*, *21*, 111-117.
- Dadds, M. R., Cauchi, A. J., Wimalaweera, S., Hawes, D. J., & Brennan, J. (in press). Outcomes, moderators, and mediators of empathic-emotion recognition training for complex conduct problems in childhood. *Psychiatry Research*.
- Dadds, M. R., Perry, Y., Hawes, D. J., Merz, S., Riddell, A.C., Haines, D. J., Solak, E., & Abeygunawardane, A. I. (2006). Attention to the eyes and fear-recognition deficits in child psychopathy. *British Journal of Psychiatry*, *189*, 280-281.
- Dadds, M. R., Fraser, J., Frost, A., & Hawes, D. J. (2005). Disentangling the underlying dimensions of psychopathy and conduct problems in childhood: A community study. *Journal of Consulting and Clinical Psychology*, *73*, 400-410.
- Damasio, A. R. (1999). *The feeling of what happens: body and emotion in the meaning of consciousness*. New York: Harcourt Brace.

- Danforth, J. S., Barkley, R. A., & Stokes, T. F. (1991). Observations of parent-child interactions with hyperactive children: Research and clinical implications. *Clinical Psychology Review, 11*, 703-727.
- Davidson, R. J., Jackson, D. C., & Kalin, N. H. (2000a). Emotion, plasticity, context, and regulation: Perspectives from affective neuroscience. *Psychological Bulletin, 126*, 890-909.
- Davidson, R. J., Putnam, K. M., & Larson, C. L. (2000b). Dysfunction in the neural circuitry of emotion regulation – a possible prelude to violence. *Science, 289*, 591-594.
- De Castro, B. O., Slot, N. W., Bosch, J. D., Koops, W., & Veerman, J. W. (2003). Negative feelings exacerbate hostile attributions of intent in highly aggressive boys. *Journal of Clinical Child and Adolescent Psychology, 32*, 56-65.
- De Castro, B. O., Veerman, J. W., Koops, W., Bosch, J. D., & Monshouwer, H. J. (2002). Hostile attribution of intent and aggressive behavior: A meta-analysis. *Child Development, 73*, 916-934.
- Decety, J., Michalska, K. J., Akitsuki, Y., & Lahey, B. B. (2009). Atypical empathic responses in adolescents with aggressive conduct disorder: A functional MRI investigation. *Biological Psychology, 80*, 203-211.
- De Oliveira-Souza, R., Hare, R. D., Bramati, I. E., Garrido, G. J., Ignacio, F. A., Tovar-Moli, F., & Moli, J. (2008). Psychopathy as a disorder of the moral brain: Fronto-temporo- limbic grey matter reductions demonstrated by voxel-based morphometry. *NeuroImage, 40*, 1202-1213.
- De Wied, M., van Boxtel, A., Matthys, W., & Meeus, W. (2012). Verbal, facial and autonomic responses to empathy-eliciting film clips by disruptive male adolescents

- with high versus low callous-unemotional traits. *Journal of Abnormal Child Psychology*, 40, 211-223.
- Dishion, T. J., French, D. C., & Patterson, G. R. (1995). The development and ecology of antisocial behaviour. In D. Cicchetti, B. J. Cohen (Eds.), *Developmental psychopathology: Vol 2. Risk, disorder, and adaptation* (pp. 421-471). New York: Wiley.
- Dodge, K. A. (2003). A biopsychosocial model of the development of chronic conduct problems in adolescence. *Developmental Psychology*, 39, 349-371.
- Dodge, K. A. (1993). Social-cognitive mechanisms in the development of conduct disorder and depression. *Annual Review of Psychology*, 44, 559-584.
- Dodge, K. A. (1985). Attributional bias in aggressive children. In P. C. Kendall (Ed.), *Advances in cognitive and behavioural research and therapy* (Vol. 4, pp. 73-110). San Diego, CA: Academic Press.
- Dodge, K. A., Coie, J. D., & Lynam, D. (2006). Aggression and antisocial behavior in youth. Handbook of child psychology. In N. Eisenberg (Ed.), *Social, emotional, and personality development, volume 3* (pp. 719-788). New York: Wiley.
- Dodge, K. A., Lansford, J. E., Burks, V. S., Bates, J. E., Pettit, G. S., Fontaine, R., & Price, J. M. (2003). Peer rejection and social information-processing factors in the development of aggressive behaviour problems in children. *Child Development*, 74, 374-393.
- Dolan, M., & Fullam, R. (2006). Face affect recognition deficits in personality-disordered offenders: Association with psychopathy. *Psychological Medicine*, 36, 1563-1569.
- Domes, G., Heinrichs, M., Michel, A., Berger, C., & Herpertz, S. C. (2007). Oxytocin improves “mind-reading” in humans. *Biological Psychiatry*, 61, 731-733.

- Dodge, K. A., & Pettit, G. S. (2003). A biopsychosocial model of the development of chronic conduct problems in adolescence. *Developmental Psychology, 39*, 349-371.
- Dougherty, D. D., Shin, L. M., Alpert, N. M., Pitman, R. K., Orr, S. P., Lasko, M., Macklin, M. L., Fischman, A. J., & Rauch, S. L. (1999). Anger in healthy men: A PET study using script-imagery. *Biological Psychiatry, 46*, 466-472.
- Doya, K. (2008). Modulators of decision making. *Nature Neuroscience, 11*, 410-416.
- Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., Murphy, B. C., Losoya, S. H., & Guthrie, I. K. (2001). The relations of regulation and emotionality to children's externalising and internalizing problem behaviour. *Child Development, 72*, 1112-1134.
- Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology, 27*, 495-525.
- Ekman, P., & Friesen, W. V. (1975). *Pictures of facial affect*. Palo Alto, CA: Consulting Psychologists Press.
- Elliott, D. S., Huizinga, D., & Ageton, S. S. (1985). *Explaining delinquency and drug use*. Beverly Hills, CA: Sage.
- Engell, A. D., Haxby, J. V., & Todorov, A. (2007). Implicit trustworthiness decisions: Automatic coding of face properties in the human amygdala. *Journal of Cognitive Neuroscience, 19*, 1508-1519.
- Erickson, M. L., & Jensen, G. F. (1977). Delinquency is still group behaviour! Toward revitalizing the group premise in sociology of deviance. *Journal of Criminal Law and Criminology, 68*, 262-273.
- Erikson, E. H. (1964). *Childhood and society*. New York: Norton.

- Espelage, D. L., Holt, M. K., & Henkel, R. R. (2003). Examination of peer-group contextual effects on aggression during early adolescence. *Child Development, 74*, 205-220.
- Fairchild, G., Passamonti, L., Hurford, G., Hagan, C. C., von dem Hagen, E. A. H., van Goozen, S. H. M., Goodyer, A. J., & Calder, A. J. (2011). Brain structure abnormalities in early-onset and adolescent-onset conduct disorder. *The American Journal of Psychiatry, 168*, 624-633.
- Fairchild, G., Stobbe, Y., van Goozen, S. H. M., Calder, A. J., & Goodyer, I. M. (2010). Facial expression recognition, fear conditioning, and startle modulation in female subjects with conduct disorder. *Biological Psychiatry, 68*, 272-279.
- Fairchild, G., van Goozen, S. H. M., Stollery, S. J., & Goodyer, I. M. (2008). Fear conditioning and affective modulation of the startle reflex in male adolescents with early-onset or adolescent-onset Conduct Disorder and healthy control subjects. *Biological Psychiatry, 63*, 279-285.
- Fairchild, G., van Goozen, S. H. M., Calder, A. J., Stollery, S. J., & Goodyer, I. M. (2009). Deficits in facial expression recognition in male adolescents with early-onset or adolescent-onset conduct disorder. *Journal of Child Psychology and Psychiatry, 50*, 627-636.
- Fairchild, G., van Goozen, S. H. M., Stollery, S. J., Aitken, M. R. F., Savage, J., Moore, S. C., & Goodyer, I. M. (2009b). Decision making and executive functioning in male adolescents with early-onset or adolescent-onset conduct disorder and control subjects. *Biological Psychiatry, 66*, 162-168.
- Farrington, D. P. (2004). Conduct disorder, aggression, and delinquency. In R. Lerner, & L. Steinberg (Eds.), *Handbook of adolescent psychology* (pp. 627-664). New York: Wiley.

- Farrington, D. P. (1989). Early predictors of adolescent aggression and adult violence. *Violence and Victims, 4*, 79-100.
- Farrington, D. P. (1986). Age and crime. *Crime and Justice, 7*, 189-250.
- Farrington, D. P. (1983). Offending from 10 to 25 years of age. In K. van Dusen, & S. A. Mednick (Eds.), *Prospective studies of crime and delinquency* (pp. 17-38). Boston, MA: Kluwer-Nijhoff.
- Farrington, D. P., Ohline, L. E., & Wilson, J. Q. (1986). *Understanding and controlling crime: Toward a new research strategy*. New York: Springer-Verlag.
- Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature, 415*, 137-140.
- Feldman, S., & Elliott, G. R., (1990). *At the threshold: The developing adolescent*. Cambridge: Harvard University Press.
- Ferrari, P. F., van Erp, A. M. M., Tornatzky, W., & Miczek, K. A. (2003). Accumbal dopamine and serotonin in anticipation of the next aggressive episode in rats. *European Journal of Neuroscience, 17*, 371-378.
- Fischer, A. H., & Manstead, A. S. R. (2006). Social functions of emotion. In M. Lewis, J. M. Haviland-Jones, & L. Feldman Barrett (Eds.), *Handbook of Emotions* (pp. 456-470). London: Guilford Press.
- Fischer, A. H., Mosquero, P. M. R., van Vianen, A. E. M., & Manstead, A. S. R. (2004). Gender and culture differences in emotion. *Emotion, 4*, 87-94.
- Fishburn, P. C. (1970). *Utility theory for decision making*. New York: Wiley.
- Fisher, L., & Blair, R. J. (1998). Cognitive impairment and its relationship to psychopathic tendencies in children with emotional and behavioural difficulties. *Journal of Abnormal Child Psychology, 26*, 511-519.

- Flor, H., Birbaumer, N., Hermann, C., Ziegler, S., & Patrick, C. J. (2002). Aversive Pavlovian conditioning in psychopaths: Peripheral and central correlates. *Psychophysiology*, *39*, 505-518.
- Fombonne, E., Wostear, G., Cooper, V., Harrington, R., & Rutter, M. (2001). The Maudsley long-term follow-up of child and adolescent depression. I. Psychiatric outcomes in adulthood. *British Journal of Psychiatry*, *179*, 210-217.
- Fonseca, A. C., & Yule, W. (1995). Personality and antisocial behaviour in children and adolescents: An enquiry into Eysenck's and Gray's theories. *Journal of Abnormal Child Psychology*, *23*, 767-781.
- Forth, A. E., Kosson, D. S., & Hare, R. D. (2003). *The Psychopathy Checklist: Youth Version*. Toronto: Multi-Health Systems.
- Fox, E. (2008). *Emotion science*. Basingstoke: Palgrave Macmillan.
- Frick, P. J. (2006). Developmental pathways to conduct disorder. *Child and Adolescent Psychiatric Clinics of North America*, *15*, 311-331.
- Frick, P. J., & Hare, R. D. (2001). *The antisocial process screening device (APSD)*. Toronto: Multi-Health Systems.
- Frick, P. J., & Marsee, M. A. (2006). Psychopathy and developmental pathways to antisocial behavior in youth. In C. J. Patrick (Ed.), *The handbook of psychopathy* (pp. 353-375). New York: Guilford Press.
- Frick, P. J., & Morris, A. S. (2004). Temperament and developmental pathways to conduct problems. *Journal of Clinical Child and Adolescent Psychology*, *33*, 54-68.
- Frick, P. J., O'Brien, B. S., Wootton, J. M., & McBurnett, K. (1994). Psychopathy and conduct problems in children. *Journal of Abnormal Psychology*, *103*, 700-707.

- Frick, P.J., & White, S.F. (2008). The importance of callous-unemotional traits for developmental models of aggressive and antisocial behaviour. *Journal of Child Psychology and Psychiatry, 49*, 359-375.
- Glass, S.J., & Newman, J.P. (2006). Recognition of facial affect in psychopathic offenders. *Journal of Abnormal Psychology, 115*, 815-820.
- Glenn, A. L., Raine, A., Yaralian, P. S., & Yang, Y. (2010). Increased volume of the striatum in psychopathic individuals. *Biological Psychiatry, 67*, 52-58.
- Glenn, A. L., & Yang, Y. (in press). The potential role of the striatum in antisocial behavior and psychopathy. *Biological Psychiatry*.
- Golan, O., Ashwin, E., Granader, Y., McClintock, S., Day, K., Leggett, V., & Baron-Cohen, S. (2010). Enhancing emotion recognition in children with autism spectrum conditions: An intervention using animated vehicles with real emotional faces. *Journal of Autism and Developmental Disorders, 40*, 269-279.
- Goldsmith, H. H., Pollak, S. D., & Davidson, R. J. (2008). Developmental neuroscience perspectives on emotion regulation. *Child Development Perspectives, 2*, 132-140.
- Gospic, K., Mohlin, E., Fransson, P., Petrovic, P., Johannesson, M., & Ingvar, M. (2011). Limbic justice: Amygdala involvement in immediate rejection in the ultimatum game. *PLOS Biology, 9*: e1001054.
- Goyer, P. F., Andreason, P. J., Semple, W. E., Clayton, A. H., King, A. C., Compton-Toth, B. A., Schultz, S. C., & Cohen, R. M. (1994). Positron-emission tomography and personality disorders. *Neuropsychopharmacology, 10*, 21-28.
- Gray, J. R., Braver, T. S., & Raichie, M. E. (2002). Integration of emotion and cognition in the lateral prefrontal cortex. *PNAS, 99*, 4115-4120.
- Gregory, A., & Ripski, M. B. (2008). Adolescent trust in teachers: Implications for behaviour in the high school classroom. *School Psychology Review, 37*, 337-353.

- Gross, J. J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology*, *39*, 281-291.
- Guth, W., Schmittner, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behaviour & Organization*, *3*, 376.
- Haltigan, J. D., Roisman, G. I., Susman, E. J., Barnett-Walker, K., & Monahan, K. C. (2011). Elevated trajectories of externalizing problems are associated with lower awakening cortisol levels in midadolescence. *Developmental Psychology*, *47*, 472-478.
- Harbaugh, W. T., Krause, K., & Liday, S. G. (2003). Bargaining by children. *University of Oregon Economics Working Paper No. 2002-4*.
- Hare, R. D. (2003). *Manual for the Psychopathy Checklist-Revised (2<sup>nd</sup> ed.)*. Toronto: Multi-Health Systems.
- Hare, R. D. (1993). *Without conscience: The disturbing world of the psychopaths among us*. New York: Pocket Books.
- Hastings, M.E., Tangney, J.P., & Stuewig, J. (2008). Psychopathy and identification of facial expressions of emotion. *Personality and Individual Differences*, *44*, 1474-1483.
- Helliwell, J. F., & Putnam, R. D. (2004). The social context of well-being. *Philosophical Transactions of the Royal Society B, Biological Sciences*, *359*, 1435-1446.
- Henry, B., & Moffitt, T. E. (1997). Neuropsychological and neuroimaging studies of juvenile delinquency and adult criminal behaviour. In D. M. Stoff & J. Breiling (Eds.), *Handbook of antisocial behaviour* (pp. 280-288). New York: Wiley.
- Herpertz, S. C., Huebner, T., Marx, I., Vloet, T. D., Fink, G. R., Stoecker, T., Shah, N. J., Konrad, K., & Herpertz-Dahlmann, B. (2008). Emotional processing in male

- adolescents with childhood-onset conduct disorder. *Journal of Child Psychology and Psychiatry*, 49, 781-791.
- Herpertz, S. C., Mueller, B., Quanaibi, M., Lichterfeld, C., Konrad, K., & Herpertz-Dahlmann, B. (2005). Response to emotional stimuli in boys with conduct disorder. *American Journal of Psychiatry*, 162, 1100-1107.
- Herpertz, S. C., Werth, U., Lukas, G., Quanaibi, M., Schuerkens, A., Kunert, H. J., Freese, R., Flesch, M., Mueller-Isberner, R., Osterheider, M., & Sass, H. (2001). Emotion in criminal offenders with psychopathy and borderline personality disorder. *Archives of General Psychiatry*, 58, 737, 745.
- Hoeve, M., Semon Dubas, J., Eichelsheim, V. I., van der Laan, P. H., Smeenk, W., & Gerris, J. R. M. (2009). The relationship between parenting and delinquency: A meta-analysis. *Journal of Abnormal Child Psychology*, 37, 749-775.
- Hoffman, M. L. (1987). The contribution of empathy to justice and moral judgment. In N. Eisenberg & J. Strayer (Eds.), *Empathy and its development* (pp. 47-80). Cambridge: Cambridge University Press.
- Hoffman, R., & Tee, J. (2006). Adolescent-adult interactions and culture in the ultimatum game. *Journal of Economic Psychology*, 27, 98-116.
- Home Office. (2012). Youth Justice Statistics – 2012/11: England and Wales. (<http://www.justice.gov.uk/downloads/statistics/youth-justice/yjb-statistics-10-11.pdf>)
- Home Office. (2011). Police Service Strength: England and Wales, 31 March 2011. (<http://www.homeoffice.gov.uk/publications/science-research-statistics/research-statistics/police-research/hosb1311/hosb1311?view=Binary>)
- Home Office. (2005). Young people, crime and antisocial behaviour: findings from the 2003 Crime and Justice Survey.

<http://webarchive.nationalarchives.gov.uk/20110218135832/rds.homeoffice.gov.uk/rds/pdfs05/r245.pdf>).

- Horn, N. R., Dolan, M., Elliott, R., Deakin, J. F. W., & Woodruff, P. W. R. (2003). Response inhibition and impulsivity: An fMRI study. *Neuropsychologia, 41*, 1959-1966.
- Hornak, J., Bramham, J., Rolls, E. T., Morris, R. G., O'Doherty, J., Bullock, P. R., & Polkey, C. E. (2003). Changes in emotion after circumscribed surgical lesions of the orbitofrontal and cingulate cortices. *Brain, 125*, 1691-1712.
- Hornak, J., Rolls, E. T., & Wade, D. (1996). Face and voice expression identification in patients with emotional and behavioural changes following ventral frontal lobe damage. *Neuropsychologia, 34*, 247-261.
- Huebner, T., Vloet, T. D., Marx, I., Konrad, K., Fink, G. R., Herpertz, S. C., & Herpertz-Dahlmann, B. (2008). Morphometric brain abnormalities in boys with conduct disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*, 540-547.
- Huesmann, L. R., Eron, L. D., Lefkowitz, M. M., & Walder, L. O. (1984). Stability of aggression over time and generations. *Developmental Psychology, 20*, 1120-1134.
- Irwin, G. & McClelland, J. R. (2003). Negative consequences of dichotomizing continuous predictor variables. *Journal of Marketing Research, 40*, 366-371.
- Jolliffe, D., & Farrington, D. P. (2004). Empathy and offending: A systematic review and meta-analysis. *Aggression and Violent Behavior, 9*, 441-476.
- Jones, A. P., Happe, F. G. E., Gilbert, F., Burnett, S., & Viding, E. (2010). Feeling, caring, knowing: Different types of empathy deficit in boys with psychopathic tendencies and autism spectrum disorder. *Journal of Child Psychology and Psychiatry, 51*, 1188-1197.

- Jones, A. P., Laurens, K. R., Herba, C. M., Barker, G. J., & Viding, E. (2009). Amygdala hypoactivity to fearful faces in boys with conduct problems and callous-unemotional traits. *American Journal of Psychiatry, 166*, 95-102.
- Kazdin, A. (2001). *Conduct disorders in childhood and adolescence* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.
- Kazdin, A. (1995). Treatment of conduct disorders. In J. Hill & B. Maughan (Eds.), *Conduct disorders in childhood and adolescence* (pp. 408-448). Cambridge: Cambridge University Press.
- Keating, D. P. (2004). Cognitive and brain development. In R. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (pp. 45-84). New York: Wiley.
- Keltner, D., & Kring, A. M. (1998). Emotion, social function, and psychopathology. *Review of General Psychology, 2*, 320-342.
- Kiehl, K. A., Smith, A. M., Hare, R. D., Mendrek, A., Forster, B. B., Brink, J., & Liddle, P. F. (2001). Limbic abnormalities in affective processing by criminal psychopaths as revealed by functional magnetic resonance imaging. *Biological Psychiatry, 50*, 677-684.
- Kimbrell, T. A., George, M. S., Parekh, P. I., Ketter, T. A., Podell, D. M., Danielson, A. L., Repella, J. D., Benson, B. E., Willis, M. W., Herscovitch, P., & Post, R. M. (1999). Regional brain activity during transient self-induced anxiety and anger in healthy adults. *Biological Psychiatry, 46*, 454-465.
- Kobak, R., Zajac, K., & Levine, S. (2009). Cortisol and antisocial behavior in early adolescence: The role of gender in an economically disadvantaged sample. *Development and Psychopathology, 21*, 579-591.

- Koenigs, M., Kruepke, M., & Newman, J. P. (2010). Economic decision-making in psychopathy: A comparison with ventromedial prefrontal lesion patients. *Neuropsychologia, 48*, 2198-2204.
- Koenigs, M. & Tranel, D. (2007). Irrational economic decision-making after ventromedial prefrontal damage: Evidence from the ultimatum game. *The Journal of Neuroscience, 27*, 951-956.
- Kosson, D. S., Suchy, Y., Mayer, A. R., & Libby, J. (2002). Facial affect recognition in criminal psychopaths. *Emotion, 2*, 398-411.
- Krueger, R. F., Watson, D., & Barlow, D. H. (2005). Introduction to the special section: Toward a dimensionally based taxonomy of psychopathology. *Journal of Abnormal Psychology, 114*, 491-493.
- Kruesi, M. J. P., Casanova, M. F., Mannheim, G., & Johnson-Bilder, A. (2004). Reduced temporal lobe volume in early onset conduct disorder. *Psychiatry Research: Neuroimaging, 132*, 1-11.
- Kupersmidt, J. B., Burchinal, M., & Patterson, C. J. (1995). Developmental patterns of childhood peer relations as predictors of externalizing behavior problems. *Development and Psychopathology, 7*, 825-843.
- Kupersmidt, J. B., Coie, J. D., & Dodge, K. A. (1990). The role of poor peer relationships in the development of disorder. In S. R. Asher & J. D. Coie (Eds.), *Peer rejection in childhood* (pp. 274-305). New York: Cambridge University Press.
- Ladd, G. W., Birch, S. H., & Buhs, E. S. (1999). Children's social and scholastic lives in kindergarten: Related spheres of influence? *Child Development, 70*, 1373-1400.
- Lahey, B. B., Loeber, R., Quay, H. C., Applegate, B., Shaffer, D., Waldman, I., Hart, E. L., McBurnett, K., Frick, P. J., Jensen, P. S., Dulcan, M. K., Canino, G., & Bird, H. R.

- (1998). Validity of DSM-IV subtypes of conduct disorder based on age of onset. *Journal of the American Academy of Child and Adolescent Psychiatry*, *37*, 435-442.
- Laird, R. D., Jordan, K. Y., Dodge, K. A., Pettit, G. S., & Bates, J. E. (2001). Peer rejection in childhood, involvement with antisocial peers in early adolescence, and the development of externalizing behavior problems. *Development and Psychopathology*, *13*, 337-354.
- Larsson, H., Andershed, H., & Lichtenstein, P. (2006). A genetic factor explains most of the variation in the psychopathic personality. *Journal of Abnormal Psychology*, *115*, 221-230.
- Lawrence, A. D., Calder, A. J., McGowan, S. W., & Grasby, P. M. (2002). Selective disruption of the recognition of facial expressions of anger. *Neuroreport*, *13*, 881-884.
- LeDoux, J. E. (2000). The amygdala and emotion: A view through fear. In J. P. Aggleton (Ed.), *The amygdala: A functional analysis* (pp. 289-310). Oxford: Oxford University Press.
- Leist, T., & Dadds, T. R. (2009). Adolescents' ability to read different emotional faces relates to their history of maltreatment and type of psychopathology. *Clinical Child Psychology and Psychiatry*, *14*, 237-250.
- Levenson, R. W. (2003). Blood, sweat, and fears. *Annals of the New York Academy of Sciences*, *1000*, 348-366.
- Leventhal, T., & Brooks-Gunn, J. (2004). Diversity in developmental trajectories across adolescence: Neighborhood influences. In R. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (pp. 451-486). Hoboken, NJ: Wiley.
- Lewis, M. D., Granic, I., Lamm, C., Zelado, P. D., Stieben, J., Todd, R. M., Moadab, I., & Pepler, D. (2008). Changes in the neural bases of emotion regulation associated with

- clinical improvement in children with behaviour problems. *Development and Psychopathology*, 20, 913-939.
- Loeber, R. (1982). The stability of antisocial and delinquent child behavior: A review. *Child Development*, 53, 1431-1446.
- Loeber, R., Burke, J. D., & Lahey, B. B. (2002). What are adolescent antecedents to antisocial personality disorder? *Criminal Behavior and Mental Health*, 12, 24-36.
- Loeber, R., Burke, J. D., Lahey, B. B., Winters, A., Zera, M. (2000). Oppositional defiant and conduct disorder: A review of the past 10 years, part 1. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 1468-1484.
- Loeber, R., Burke, J. D., & Pardini, D. A. (2009). Development and etiology of disruptive and delinquent behavior. *Annual Review of Clinical Psychology*, 5, 291-310.
- Loeber, R., & Farrington, D. P. (1998). Serious and violent juvenile offenders: Risk factors and successful interventions. In R. Loeber, & L. Steinberg (Eds.), *Serious & violent juvenile offenders: Risk factors and successful interventions* (pp.30-46). Thousand Oaks, CA: Sage.
- Loeber, R., & Le Blanc, M. (1990). Toward a developmental criminology. *Crime and Justice*, 12, 375-473.
- Loewenstein, G., & Lerner, J. S. (2003). The role of affect in decision making. In R. Davidson, H. Goldsmith, & K. Scherer (Eds.), *Handbook of affective science* (pp. 619-642). Oxford: Oxford University Press.
- Lopez-Duran, N. L., Olson, S. L., Hajal, N. J., Vazquez, D. M., & Felt, B. T. (2009). Hypothalamic pituitary adrenal axis functioning in reactive and proactive aggression in children. *Journal of Abnormal Child Psychology*, 37, 169-182.

- Louilot, A., Le Moal, M., & Simon, H. (1986). Differential reactivity of dopaminergic neurons in the nucleus accumbens in response to different behavioural situations. An in vivo voltametric study in free moving rats. *Brain Research*, 397, 395-400.
- Luman, M., Sergeant, J. A., Knol, D. L., & Oosterlaan, J. (2010). Impaired decision making in oppositional defiant disorder related to altered psychophysiological responses to reinforcement. *Biological Psychiatry*, 68, 337-344.
- Lykken, D. T. (1995). *The antisocial personalities*. Mahwah, NJ: Erlbaum.
- Lykken, D. T. (1957). A study of anxiety in the sociopathic personality. *Journal of Abnormal and Social Psychology*, 55, 6-10.
- MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods*, 7, 19-40.
- Marsden, C. D., & Obeso, J. A. (1994). The functions of the basal ganglia and the paradox of stereotaxic surgery in Parkinson's disease. *Brain*, 117, 877-897.
- Marsee, M.A. & Frick, P.J. (2007). Exploring the cognitive and emotional correlates to proactive and reactive aggression in a sample of detained girls. *Journal of Abnormal Psychology*, 35, 969-981.
- Marsee, M. A., Silverthorn, P., & Frick, P. J. (2005). The association of psychopathic traits with aggression and delinquency in non-referred boys and girls. *Behavioral Sciences and the Law*, 23, 803-817.
- Marsh, A. A., & Ambady, N. (2007). The influence of the fear facial expression on prosocial responding. *Cognition and Emotion*, 21, 225-247.
- Marsh, A. A., Ambady, N., & Kleck, R. E. (2005). The effects of fear and anger facial expressions on approach- and avoidance-related behaviours. *Emotion*, 5, 119-124.

- Marsh, A. A., & Blair, R. J. (2008). Deficits in facial affect recognition among antisocial populations: A meta-analysis. *Neuroscience and Biobehavioural Reviews*, 32, 454-465.
- Marsh, A. A., Finger, E. C., Mitchell, D. G. V., Reid, M. E., Sims, C., Kosson, D. S., Towbin, K. E., Leibenluft, E., Pine, D. S., & Blair, R. J. (2008). Reduced amygdala response to fearful expressions in children and adolescents with callous-unemotional traits and disruptive behaviour disorders. *American Journal of Psychiatry*, 165, 712-720.
- Matheson, E., & Jahoda, A. (2005). Emotional understanding in aggressive and nonaggressive individuals with mild or moderate mental retardation. *American Journal of Mental Retardation*, 110, 57-67.
- Matthys, W., van Goozen, S. H. M., Vries, H. D., Cohen-Kettenis, P. T., & van Engeland, H. (1998). The dominance of behavioural activation over behavioural inhibition in conduct disordered boys with or without attention deficit hyperactivity disorder. *Journal of Child Psychology and Psychiatry*, 39, 643-651.
- Meyer-Lindenberg, A. (1996). The evolution of complexity in human brain development: An EEG study. *Electroencephalography and Clinical Neurophysiology*, 99, 405-411.
- Miller, P. A., & Eisenberg, N. (1988). The relation of empathy to aggressive and externalizing/antisocial behavior. *Psychological Bulletin*, 103, 324-344.
- Miller-Johnson, S., Cole, J. D., Maumary-Gremaud, A., Lochman, J., & Terry, R. (1999). Relationship between childhood peer rejection and aggression and adolescent delinquency severity and type among African American youth. *Journal of Emotional and Behavioural Disorders*, 7, 137-147.
- Ministry of Justice (2011). Youth justice statistics 2010/11.  
(<http://www.justice.gov.uk/downloads/statistics/youth-justice/yjb-statistics-10-11.pdf>)

- Moffitt, T. E. (2005). The new look of behavioural genetics in developmental psychopathology: Gene-environment interplay in antisocial behaviours. *Psychological Bulletin, 131*, 533-554.
- Moffitt, T. E. (2003). Life-course persistent and adolescence-limited antisocial behavior: A 10-year research review and a research agenda. In B. B. Lahey, T. E. Moffitt, & A. Caspi (Eds.), *Causes of conduct disorder and juvenile delinquency* (pp. 49-75). New York: Guilford Press.
- Moffitt, T. E. (1993). Adolescence-limited and life-course persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674-701.
- Moffitt, T. E., Caspi, A., Dickson, N., Silva, P., & Stanton, W. (1996). Childhood-onset versus adolescent-onset antisocial conduct problems in males: Natural history from ages 3 to 18 years. *Development and Psychopathology, 8*, 399-424.
- Moffitt, T. E., Caspi, A., Harrington, H., & Milne, B. J. (2002). Males on the life-course persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. *Development and Psychopathology, 14*, 179-207.
- Moffitt, T. E., Caspi, A., Rutter, M., Silva, P. A. (2001). Sex differences in antisocial behavior: *Conduct disorder, delinquency, and violence in the Dunedin longitudinal study*. Cambridge: Cambridge University Press.
- Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2009). Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. *Developmental Psychology, 45*, 1654-1668.
- Morgan, A. B., & Lilienfeld, S. O. (2000). A meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. *Clinical Psychology Review, 20*, 113-136.

- Morris, J. S., Frith, C. D., Perrett, D. I., Rowland, D., Young, A. W., Calder, A. J., & Dolan, R. J. (1996). A differential neural response in the human amygdala to fearful and happy facial expressions. *Nature*, *383*, 812-815.
- Mrug, S., Hoza, B., & Bukowski, W. M. (2004). Choosing or being chosen by aggressive-disruptive peers: Do they contribute to children's externalising and internalizing problems? *Journal of Abnormal Child Psychology*, *32*, 53-65.
- Muller, J. L., Sommer, M., Dohnel, K., Weber, T., Schmidt-Wilcke, T., & Hajak, G. (2008). Disturbed prefrontal and temporal brain function during emotion and cognition interaction in criminal psychopathy. *Behavioral Sciences and the Law*, *26*, 131-150.
- Muller, J. L., Sommer, M., Wagner, V., Lange, K., Taschler, H., Roder, C. H., Schuierer, G., Klein, H. E., & Hajak, G. (2003). Abnormalities in emotion processing within cortical and subcortical regions in criminal psychopaths: Evidence from a functional magnetic resonance imaging study using pictures with emotional content. *Biological Psychiatry*, *54*, 152-162.
- Murnighan, J. K., & Saxon, M. S. (1998). Ultimatum bargaining by children and adults. *Journal of Economic Psychology*, *19*, 415-445.
- Murphy, F. C., Nimmo-Smith, I., & Lawrence, A. D. (2003). Functional neuroanatomy of emotions: a meta-analysis. *Cognitive, Affective, and Behavioural Neuroscience*, *3*, 207-233.
- Murrie, D. C., & Cornell, D. G. (2002). Psychopathy screening of incarcerated juveniles: A comparison of measures. *Psychological Assessment*, *14*, 390-396.
- Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development*, *70*, 1181-1196.

- Nelson, D. A., & Coyne, S. M. (2009). Children's intent attributions and feelings of distress: Associations with maternal and paternal parenting practices. *Journal of Abnormal Child Psychology, 37*, 223-237.
- Newman, J. P., & Kosson, D. S. (1986). Passive avoidance learning in psychopathic and nonpsychopathic offenders. *Journal of Abnormal Psychology, 95*, 252-256.
- Newman, J. P., Patterson, C. M., Howland, E. W., & Nichols, S. L. (1990). Passive avoidance in psychopaths: The effects of reward. *Personality and Individual Differences, 11*, 1101-1114.
- Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationships to depressive symptoms. *Personality and Individual Differences, 51*, 704-708.
- O'Brien, B. S., & Frick, P. J. (1996). Reward dominance: Associations with anxiety, conduct problems, and psychopathy in children. *Journal of Abnormal Child Psychology, 24*, 223-240.
- Odgers, C. L., Caspi, A., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., & Moffitt, T. E. (2007). Prediction of differential adult health burden by conduct problem subtypes in males. *Archives of General Psychiatry, 64*, 476-484.
- Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., Poulton, R., Sears, M. R., Thomson, W. M., & Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology, 20*, 673-716.
- Offord, D. R., & Bennett, K. J. (1994). Conduct disorder: Long-term outcomes and intervention effectiveness. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 1069-1078.

- Olesen, P.J., Westerberg, H., & Klingberg, T. (2004). Increased prefrontal and parietal activity after training of working memory. *Nature Neuroscience*, *7*, 75-79.
- Oosterhof, N. N., & Todorov, A. (2009). Shared perceptual basis of emotional expression and trustworthiness impression from faces. *Emotion*, *9*, 128-133.
- Papps, B. P., Calder, A. J., Young, A. W., & O'Carroll, R. E. (2003). Dissociation of affective modulation of recollective and perceptual experience following amygdala damage. *Journal of Neurology, Neurosurgery, and Psychiatry*, *74*, 253-254.
- Pardini, D. A., Lochman, J. E., & Frick, P. J. (2003). Callous/unemotional traits and social-cognitive processes in adjudicated youths. *Journal of American Academy of Child and Adolescent Psychology*, *42*, 364-371.
- Passamonti, L., Fairchild, G., Goodyer, I. M., Hurford, G., Hagan, C. C., Rowe, J. B., & Calder, A. J. (2010). Neural abnormalities in early-onset and adolescence-onset conduct disorder. *Archives of General Psychiatry*, *67*, 729-738.
- Patterson, G. R. (1993). Orderly change in a stable world: The antisocial trait as a chimera. *Journal of Consulting and Clinical Psychology*, *61*, 911-919.
- Patterson, G. R. (1992). Developmental changes in antisocial behaviour. In R. D. V. Peters, R. J. McMahon & V. L. Quinsey (Eds.), *Aggression and violence throughout the life span* (pp. 52-82). Thousand Oaks, CA: Sage.
- Penton-Voak, I. S., Bate, H., Lewis, G., & Munafo, M. R. (2012). Effects of emotion perception training on mood in undergraduate students: Randomised controlled trial. *The British Journal of Psychiatry*, *201*, 71-72.
- Phelps, E. A. (2006). Emotion and cognition: Insights from studies of the human amygdala. *Annual Review of Psychology*, *57*, 27-53.

- Phillips, M. L., Young, A. W., Senior, C., Brammer, M., Andrew, C., & Calder, A. J. (1997). A specific neural substrate for perceiving facial expressions of disgust. *Nature*, *389*, 495-498.
- Pillutla, M. M., & Murningham, J. K. (1996). Unfairness, anger, and spite: Emotional rejections of ultimatum offers. *Organizational Behavior and Human Decision Processes*, *68*, 208-224.
- Piquero, A. R. (2007). Taking stock of developmental trajectories on criminal activity over the life course. In A. Liberman (Ed.), *The long view of crime: A synthesis of longitudinal research* (pp. 23-78). New York: Springer.
- Piquero, A. R., Blumstein, A., Brame, R., Haapanen, R., Mulvey, E. P., & Nagin, D. S. (2001). Assessing the impact of exposure time and incapacitation on longitudinal trajectories of criminal offending. *Journal of Adolescent Research*, *16*, 54-74.
- Pollak, S. D., Cicchetti, D., Hornung, K., & Reed, A. (2000). Recognizing emotion in faces: Developmental effects of child abuse and neglect. *Developmental Psychology*, *36*, 679-688.
- Pollak, S. D., & Sinha, P. (2002). Effects of early experience on children's recognition of facial displays of emotion. *Developmental Psychology*, *38*, 784-791.
- Porter, S., England, L., Juodis, M., ten Brinke, L., & Wilson, K. (2008). Is the face a window to the soul? Investigations of the accuracy of intuitive judgments of the trustworthiness of human faces. *Canadian Journal of Behavioural Science*, *40*, 171-177.
- Poythress, N. G., Dembo, R., Wareham, J., & Greenbaum, P. E. (2006). Construct validity of the Youth Psychopathic Traits Inventory (YPI) and the Antisocial Process Screening Device (APSD) with justice involved adolescents. *Criminal Justice and Behavior*, *33*, 26-55.

- Preuschoft, S. (2000). Primate faces and facial expressions. *Social Research*, 67, 245-271.
- Pulkkinen, L., & Pitkänen, T. (1993). Continuities in aggressive behaviour from childhood to adulthood. *Aggressive Behavior*, 19, 249-263.
- Rabiner, D. L., Coie, J. D., Miller-Johnson, S., Boykin, A. S. M., & Lochman, J. E. (2005). Predicting the persistence of aggressive offending of African American males from adolescence into young adulthood: The importance of peer relations, aggressive behaviour, and ADHD symptoms. *Journal of Emotional and Behavioural Disorders*, 13, 131-140.
- Radice-Neumann, D., Zupan, B., Tomita, M., & Willer, B. (2009). Training emotional processing in persons with brain injury. *Journal of Head Trauma Rehabilitation. Focus on Clinical Research and Practice, Part 2*, 24, 313-323.
- Raine, A. (2002). Annotation: The role of prefrontal deficits, low autonomic arousal, and early health factors in the development of antisocial and aggressive behaviour in children. *Journal of Child Psychology & Psychiatry*, 34, 417-434.
- Raine, A. (1996). Autonomic nervous system factors underlying disinhibited, antisocial and violent behavior biosocial perspectives and treatment implications. *Annals of the New York Academy of Sciences*, 794, 46-59.
- Raine, A. (1993). *The psychopathology of crime: Criminal behaviour as a clinical disorder*. San Diego, CA: Academic Press.
- Raine, A., & Buchsbaum, M. S. (1996). Violence, brain imaging and neuropsychology. In D. M. Stoff & R. B. Cairns (Eds.), *Aggression and violence: Genetic, neurobiological, and biosocial perspectives* (pp. 195-217). Mahwah, NJ: Lawrence Erlbaum Associates.
- Raine, A., Buchsbaum, M. S., & LaCasse, L. (1997). Brain abnormalities in murderers indicated by positron emission tomography. *Biological Psychiatry*, 42, 495-508.

- Raine, A., Lencz, T., Bihrlé, S., LaCasse, L., & Colletti, P. (2000). Reduced prefrontal gray matter volume and reduced autonomic activity in antisocial personality disorder. *Archives of General Psychiatry, 57*, 119-127.
- Raine, A., Lencz, T., Taylor, K., Hellige, J. B., Bihrlé, S., Lacasse, L., Lee, M., Ishikawa, S., & Colletti, P. (2003). Corpus callosum abnormalities in psychopathic antisocial individuals. *Archives of General Psychiatry, 60*, 1134-1142.
- Raine, A., & Venables, P. H. (1981). Classical conditioning and socialization – a biosocial interaction. *Personality and Individual Differences, 2*, 273-283.
- Raine, A., & Yang, Y. (2006). Neural foundations to moral reasoning and antisocial behavior. *Social Cognitive and Affective Neuroscience, 1*, 203-213.
- Rainer, G., & Miller, E. K. (2000). Effects of visual experience on the representation of objects in the prefrontal cortex. *Neuron, 27*, 179-189.
- Rhee, S., & Waldman, I. D. (2002). Genetic and environmental influences on antisocial behavior: A meta-analysis of twin and adoption studies. *Psychological Bulletin, 29*, 490-529.
- Ritchell, R. A., Mitchell, D. G. V., Peschardt, K. S., Winston, J. S., Leonard, A., Dolan, R. J., & Blair, R. J. (2005). Trust and distrust: The perception of trustworthiness of faces in psychopathic and non-psychopathic offenders. *Personality and Individual Differences, 38*, 1735-1744.
- Robins, L. N. (1979). Follow-up studies. In H. C. Quay, & J. S. Werry (Eds.), *Psychopathological disorders of childhood. 2<sup>nd</sup> Edition* (pp. 483-513). New York: Wiley.
- Roisman, G. I., Aguilar, B., & Egeland, B. (2004). Antisocial behavior in the transition to adulthood: The independent and interactive roles of developmental history and emerging developmental tasks. *Development and Psychopathology, 16*, 857-871.

- Roisman, G. I., Monahan, K. C., Campbell, S. B., Steinberg, L., & Cauffman, E. (2010). Is adolescence-onset antisocial behavior developmentally normative? *Development and Psychopathology, 22*, 295-311.
- Ross, C. E., & Jang, S. J. (2000). Neighborhood disorder, fear, and mistrust: The buffering role of social ties with neighbors. *American Journal of Community Psychology, 28*, 401-420.
- Ross, C. E., Mirowsky, J., & Pribesh, S. (2001). Powerlessness and the amplification of threat: Neighborhood disadvantage, disorder, and mistrust. *American Sociological Review, 66*, 568-591.
- Rotenburg, K. J., McDougall, P., Boulton, M. J., Vallancourt, T., Fox, C., & Hymel, S. (2004). Cross sectional relations among trustworthiness, social relationships, and psychological adjustment in children and early adolescents from the United Kingdom and Canada. *Journal of Experimental Child Psychology, 88*, 46-67.
- Rottenberg, J., & Gross, J. J. (2003). When emotion goes wrong: Realizing the promise of affective science. *Clinical Psychology Science and Practice, 10*, 227-232.
- Rotter, J. B. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality, 35*, 651-665.
- Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Journal, 37*, 1588-1602.
- Rubia, K., Smith, A. B., Halari, R., Matsukura, F., Mohammad, M., Taylor, E., & Brammer, M. J. (2009). Disorder-specific dissociation of orbitofrontal dysfunction in boys with pure conduct disorder during reward and ventrolateral prefrontal dysfunction in boys with pure ADHD during sustained attention. *American Journal of Psychiatry, 166*, 83-94.
- Rutter, M. (1993). *Developing minds*. London: Penguin.

- Sainsbury Centre for Mental Health (2009). Preventing early conduct problems and reducing crime. ([http://www.centreformentalhealth.org.uk/pdfs/chance\\_of\\_a\\_lifetime.pdf](http://www.centreformentalhealth.org.uk/pdfs/chance_of_a_lifetime.pdf))
- Sanfey, A. G., Rilling, J. K., Aronson, J. A., Nystrom, L. E., & Cohen, J. D. (2008). The neural basis of economic decision-making in the ultimatum game. *Science, 300*, 1755-1758.
- Schaefer, S. M., Jackson, D. C., Davidson, R. J., Aguirre, G. K., Kimberg, D. Y., & Thompson-Schill, S. L. (2002). Modulation of amygdalar activity by the conscious regulation of negative emotion. *Journal of Cognitive Neuroscience, 14*, 913-921.
- Scott, S., Knapp, M., Henderson, J., & Maughan, B. (2001). Financial cost of social exclusion: Follow-up study of antisocial children into adulthood. *British Medical Journal, 323*, 1-5.
- Seguin, J. R., Sylver, P., & Lilienfeld, S. O. (2007). The neuropsychology of violence. In I. D. Waldman, D. J. Flannery, & A. T. Vazsonyi (Ed.), *The Cambridge handbook of violent behavior*. New York: Cambridge University Press.
- Sharp, C., Monterosso, J., & Montague, P. R. (2012). Neuroeconomics: A bridge for translational research. *Biological Psychiatry, 72*, 87-92.
- Siegler, R. (2006). *How children develop*. New York: Worth.
- Skeem, J. L., & Cauffman, E. (2003). Views of the downward extension: Comparing the youth version of the psychopathy checklist with the youth psychopathic traits inventory. *Behavioural Sciences and the Law, 21*, 737-770.
- Snoek, H., van Goozen, S. H. M., Matthys, W., Buitelaar, J. K., & van Engeland, H. (2004). Stress responsivity in children with externalizing behavior disorders. *Development and Psychopathology, 16*, 389-406.

- Soderstrom, H., Tullberg, M., Wikkelsoe, C., Ekholm, S., & Forsman, A. (2000). Reduced regional cerebral blood flow in non-psychotic violent offenders. *Psychiatry Research: Neuroimaging*, 98, 29-41.
- Spear, L. P. (2000). The adolescent brain and age-related behavioural manifestations. *Neuroscience and Biobehavioral Review*, 24, 417-463.
- Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review*, 28, 78-106.
- Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Science*, 9, 69-74.
- Steinberg, L. (2001). We know some things: parent-adolescent relationships in retrospect and prospect. *Journal of Research on Adolescence*, 11, 1-19.
- Steinberg, L. (1990). Autonomy, conflict, and harmony in the family relationship. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 255-276). Cambridge: Harvard University Press.
- Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Journal of Cognitive Education and Psychology*, 2, 55-87.
- Sterzer, P., Stadler, C., Krebs, A., Kleinschmidt, A., & Pustka, F. (2005). Abnormal neural responses to emotional visual stimuli in adolescents with conduct disorder. *Biological Psychiatry*, 57, 7-15.
- Sterzer, P., Stadler, C., Poustka, F., & Kleinschmidt, A. (2007). A structural neural deficit in adolescents with conduct disorder and its association with lack of empathy. *NeuroImage*, 37, 335-342.
- Stevens, D., Charman, T., & Blair, R. J. (2001). Recognition of emotion in facial expressions and vocal tones in children with psychopathic tendencies. *Journal of Genetic Psychology*, 162, 201-211.

- Stouthamer-Loeber, M., Wei, E., Loeber, R., & Masten, A. F. (2004). Desistance from persistent serious delinquency in the transition to adulthood. *Development and Psychopathology, 16*, 897-918.
- Sutter, M., & Kocher, M. G. (2007). Trust and trustworthiness across different age groups. *Games and Economic Behaviour, 59*, 364-382.
- Taylor, S. E., Lerner, J. S., Sage, R. M., Lehman, B. J., & Seeman, T. E. (2004). Early environment, emotions, responses to stress, and health. *Journal of Personality, 72*, 1365-1394.
- Theodoridou, A., Rowe, A. C., Penton-Voak, I. S., & Rogers, P. J. (2009). Oxytocin and social perception: Oxytocin increase perceived facial trustworthiness and attractiveness. *Hormones and Behaviour, 56*, 128-132.
- Tiihonen, J., Hodgins, S., Vaurio, O., Laakso, M., Repo, E., Soininen, H., Aronen, H. J., Nieminen, P., & Savolainen, L. (2000). Amygdaloid volume loss in psychopathy. *Society for Neuroscience Abstracts*, 2017.
- Tisch, S., Silberstein, P., Limousin-Dowsey, P., & Jahanshahi, M. (2004). The basal ganglia: Anatomy, physiology, and pharmacology. *Psychiatric Clinics of North America, 27*, 757-799.
- Todorov, A. (2008). Evaluating faces on trustworthiness: An extension of systems for recognition of emotions signalling approach/avoidance behaviours. *Annals of the New York Academy of Sciences, 1124*, 208-224.
- Todorov, A., & Duchaine, B. (2008). Reading trustworthiness in faces without recognizing faces. *Cognitive Neuropsychology, 25*, 395-410.
- U.S. Bureau of the Census. (1998). *Current population reports, P20-514, marital status and living arrangements, March 1998*. Washington, DC: U.S. Government Printing Office.

- Van Baardewijk, Y., Stegge, H., Andershed, H., Thomaes, S., Scholte, E., & Vermeiren, R. (2008). Measuring psychopathic traits in children through self-report. The development of the youth psychopathic traits inventory – child version. *International Journal of Law and Psychiatry*, *31*, 199-209.
- Van der Schalk, J., Hawk, S. T., Fischer, A. H., & Doosje, B. J. (2011). Validation of the Amsterdam Dynamic Facial Expression Set (ADFES). *Emotion*, *11*, 907-920.
- Van Goozen, S. H. M., Cohen-Kettenis, P. T., Snoek, H., Matthys, W., Swaab-Barneveld, H., & van Engeland, H. (2004). Executive functioning in children: A comparison of hospitalized ODD/ADHD children and normal controls. *Journal of Child Psychology and Psychiatry*, *45*, 284-292.
- Van Goozen, S. H. M., & Fairchild, G. (2008). How can the study of biological process help design new interventions for children with severe antisocial behaviour? *Development and Psychopathology*, *20*, 941-973.
- Van Goozen, S. H. M., Fairchild, G., Snoek, H., & Harold, G. T. (2007). The evidence for a neurobiological model of childhood antisocial behavior. *Psychological Bulletin*, *133*, 149-182.
- Van Leijenhorst, L., Moor, B. G., Op de Macks, Z. A., Rombouts, S. A. R. B., Westenberg, P. M., & Crone, E. A. (2010). Adolescent risky decision-making: Neurocognitive development of reward and control regions. *NeuroImage*, *51*, 345-355.
- Van't Wout, M., Kahn, R. S., Sanfey, A. G., & Aleman, A. (2006). Affective state and decision-making in the Ultimatum Game. *Experimental Brain Research*, *169*, 564-568.
- Veit, R., Flor, H., Erb, M., Hermann, C., Lotze, M., Grodd, W., & Birbaumer, N. (2002). Brain circuits involved in emotional learning in antisocial behaviour and social phobia in humans. *Neuroscience Letters*, *328*, 233-236.

- Viemero, V. (1996). Factors in childhood that predict later criminal behavior. *Aggressive Behavior, 22*, 87-98.
- Vloet, T. D., Konrad, K., Huebner, T., Herpertz, S., & Herpertz-Dahlmann, B. (2008). Structural and functional MRI-findings in children and adolescents with antisocial behaviour. *Behavioural Sciences & the Law, 26*, 99-111.
- Volkow, N. D., Tancredi, L. R., Grant, C., Gillespie, H., Valentine, A., Mullani, N., Wang, G., & Hollister, L. (1995). Brain glucose metabolism in violent psychiatric patients: A preliminary study. *Psychiatry Research: Neuroimaging, 61*, 243-253.
- Vuilleumier, P. (2005). How brains beware: Neural mechanisms of emotional attention. *Trends in Cognitive Sciences, 9*, 585-594.
- Warr, M. (2002). *Companions in crime*. New York: Cambridge University Press.
- Wechsler, D. (1999). *Wechsler Abbreviated Scale of Intelligence (WASI)*. San Antonio, TX: Psychological Corporation.
- Weiss, B., Dodge, K. A., Bates, J. E., & Petit, G. S. (1992). Some consequences of early harsh discipline: Child aggression and a maladaptive social information processing style. *Child Development, 63*, 1321-1335.
- Whalen, P. J., Rauch, S. L., Etcoff, N. L., McInerney, S. C., Lee, M. B., & Jenike, M. A. (1998). Masked presentations of emotional facial expressions modulate amygdala activity without explicit knowledge. *Journal of Neuroscience, 18*, 411-418.
- Willis, M. L., Palermo, R., & Burke, D. (2011). Social judgments are influenced by both facial expression and direction of eye gaze. *Social Cognition, 29*, 415-429.
- Winston, J. S., O'Doherty, J., & Dolan, R. J. (2003). Common and distinct neural response during direct and incidental processing of multiple facial emotions. *NeuroImage, 20*, 84-97.

- Wolfgang, M. E., Thornberry, T. P., & Figlio, R. M. (1987). *From boy to man, from delinquency to crime*. Chicago: University of Chicago Press.
- Wong, M. T., Fenwick, P. B., Lumsden, J., Fenton, G. M., Maisey, M.N., Lewis, P., & Badawi, R. (1997). Positron emission tomography in male violent offenders with schizophrenia. *Psychiatry Research*, *68*, 111-123.
- Yang, Y., Raine, A., Lencz, T., Bihrlle, S., Lacasse, L., & Colletti, P. (2005). Volume reduction in prefrontal gray matter in unsuccessful criminal psychopaths. *Biological Psychiatry*, *57*, 1103-1108.
- Yang, Y., Raine, A., Narr, K. L., Colletti, P., & Toga, A. W. (2009). Localization of deformations within the amygdala in individuals with psychopathy. *Archives of General Psychiatry*, *66*, 986-994.
- Youniss, J., & Smollar, J. (1985). *Adolescent relations with mothers, fathers, and friends*. Chicago, IL: University of Chicago Press.
- Yurgelun-Todd, D. A. (2007). Emotional and cognitive changes during adolescence. *Current Opinion in Neurobiology*, *17*, 251-257.
- Zak, P. J., Kurzban, R., Ahmad, S., Swerdloff, R. S., Park, J., Efremidze, L., Redwine, K., Morgan, K., & Matzner, W. (2009). Testosterone administration decreases generosity in the ultimatum game. *PLoS One*, *4*.
- Zimring, F. (1998). *American youth violence*. New York: Oxford University Press.

# Appendix 1

## Offence severity scores

### Section 8: Annexes

CODE	CATEGORY	SCORE	'SERIOUS OFFENCE' (ISSP)
<b>01</b>	<b>VIOLENCE AGAINST THE PERSON</b>		
<b>0101</b>	<b>Abduction/Kidnapping</b>	<b>7</b>	
	Abduction of female by force		Serious
	Child abduction		
	False imprisonment		Serious
	Hijacking		Serious
	Kidnapping		Serious
<b>0102</b>	<b>Assault police officer (common assault)*</b>	<b>3</b>	
	Assault with intent to resist arrest or assaulting a person assisting a police constable		
<b>0103</b>	<b>Common assault*</b>	<b>3</b>	
	Assault & battery		
	Assault by beating		
<b>0104</b>	<b>Grievous Bodily Harm (wound or inflict)*</b>	<b>6</b>	
<b>0105</b>	<b>Manslaughter*</b>	<b>8</b>	<b>Serious</b>
	Child destruction, infanticide or manslaughter due to diminished responsibility		
<b>0106</b>	<b>Murder*</b>	<b>8</b>	<b>Serious</b>
	Attempted murder		
<b>0107</b>	<b>Indictable firearms offences</b>	<b>5</b>	
	Possessing a real or imitation firearm at the time of committing or being arrested for an offence specified in Schedule 1 of the Firearms Act 1968		
	Possession of real or imitation firearms/explosives with intent to commit an indictable offence – including resisting arrest		Serious
	Possession of real or imitation firearms/explosives with intent to cause violence		
<b>0108</b>	<b>Other wounding*</b>	<b>4</b>	
	Administering poison with intent to injure or annoy		
	Assault occasioning actual bodily harm (ABH)		
<b>0109</b>	<b>Possession of an offensive weapon</b>	<b>3</b>	
	Having an article with a blade or point in a public place		
<b>0110</b>	<b>Threatening, abusive or insulting words or behaviour</b>	<b>3</b>	
<b>0111</b>	<b>Threat or conspiracy to Murder</b>	<b>5</b>	<b>Serious</b>
	Soliciting to commit murder		
<b>0112</b>	<b>Wounding or other act endangering life*</b>	<b>7</b>	
	Attempting to choke, suffocate with intent to commit an indictable offence (garrotting)		Serious
	Burning or maiming by explosion		
	Creating danger by causing anything to be on the road, or interfering with a vehicle or traffic equipment		
	Causing explosions or casting corrosive fluids with intent to do grievous bodily harm		Serious
	Endangering life or causing harm by administering poison		
	Endangering railway passengers (by placing anything on railway, taking up rails, changing points and signals or by throwing anything at railway carriages)		Serious
	Causing danger to road users (throwing stones etc.)		
	Possession of firearms with intent to endanger life or injure property		Serious
	Using chloroform to commit or assist in committing an indictable offence		Serious
	Using firearms or imitation firearms with intent to resist arrest		Serious
<b>0113</b>	<b>Wounding with intent to cause grievous bodily harm (section 18)*</b>	<b>7</b>	<b>Serious</b>

**Section 8: Annexes**

CODE	CATEGORY	SCORE	'SERIOUS OFFENCE' (ISSP)
0114	Other/unspecified violence against the person	4	
02	<b>SEXUAL OFFENCES</b>		
0201	Buggery*	7	Serious
0202	Gross indecency with a child*	5	
0203	Incest*	7	Serious
	Incest with a female under 13		
	Inciting a girl under 16 to have incestuous sexual intercourse		
0204	Indecent Assault*	5	
0205	Indecent behaviour/exposure	4	
0206	Rape*	8	Serious
	Assault with intent to commit rape or buggery		
	Attempted rape		
	Conspiracy to rape		
0207	Unlawful sexual intercourse with female under 13*	4	Serious
0208	Unlawful sexual intercourse with female under 16*	3	
0209	Other/unspecified sexual offences*	5	
03	<b>DEATH OR INJURY BY DANGEROUS DRIVING</b>		
0301	Death by dangerous driving*	8	Serious
	Causing death by aggravated vehicle taking		
	Causing death by dangerous driving when under the influence of drink or drugs		
0302	Injury by dangerous driving*	5	
	Causing injury by aggravated vehicle taking		
	Causing injury by dangerous driving when under the influence of drink or drugs		
04	<b>MOTORING OFFENCES</b>		
0401	Dangerous Driving	5	
0402	Driving under the influence of drinks/drugs	3	
0403	Driving whilst disqualified	5	
0404	Interfering with a motor vehicle	3	
0405	Refusing to give breath test	4	
0406	Road traffic/Additional Offences	2	
	Driving without due care and attention		
	Driving on a footpath or/and common land		
	Driving defective motor vehicle		
	Exceeding speed limit		
	Failure to wear a seatbelt		
	Failure to comply with a road traffic sign		
	Failure to give particulars after an accident		

Section 8: Annexes

CODE	CATEGORY	SCORE	'SERIOUS OFFENCE' (ISSP)
	Failure to produce documents		
	Failure to report an accident		
	Failure to stop when requested by a constable		
	Failure to stop after an accident		
	Forge vehicle records/licence		
	No insurance		
	No L plates		
	No licence		
	No MOT		
	Not wearing protective headgear		
	Not well maintained indicators/stop/hazard and light reflectors		
	Pedal cycle offences		
0407	Other/unspecified Motoring offences	3	
05	<b>ROBBERY</b>		
0501	Robbery*	6	Serious
	Assault with intent to rob		
	Conspiracy to rob		
06	<b>DOMESTIC BURGLARY</b>		
0601	Aggravated burglary of a dwelling*	7	Serious
	Burglary with violence or threat of violence		
0602	Burglary in a dwelling	6	Serious
	Conspiracy to commit burglary of a dwelling		
0603	Other/unspecified domestic burglary	6	
07	<b>NON-DOMESTIC BURGLARY</b>		
0701	Aggravated burglary of a non-dwelling*	7	Serious
	Burglary with violence or threat of violence		
0702	Burglary in a non-dwelling	4	
	Burglary with intent		
	Conspiracy to commit burglary of a non-dwelling		
0703	Found on enclosed premises	3	
0704	Other/unspecified non-domestic burglary	4	
08	<b>VEHICLE THEFT/UNAUTHORISED TAKING</b>		
0801	Aggravated vehicle taking*	5	
	Injury to person, damage to property or car		
0802	Being carried*	3	
	Being carried (aggravated)	4	
0803	Vehicle taking	4	
	Theft of motor vehicle		
	Unauthorised vehicle taking (TWOC/TADA)		
0804	Other/unspecified vehicle theft/taking	4	

**Section 8: Annexes**

CODE	CATEGORY	SCORE	'SERIOUS OFFENCE' (ISSP)
<b>09</b>	<b>THEFT AND HANDLING STOLEN GOODS</b>		
0901	Handling stolen goods	3	Serious
	Receiving stolen goods		
	Undertaking or assisting in the retention, removal, disposal or realisation of stolen goods, or arranging to do so		
0902	Theft	3	
	Extracting electricity		
	Making off without payment		
	Going equipped for stealing		
	Intent to steal		
0903	Other/unspecified theft & handling	3	
<b>10</b>	<b>FRAUD AND FORGERY</b>		
1001	Forgery	3	
	Forgery, or use, of false prescription		
1002	Fraud	3	
	Acting as a peddler without certificate		
	Counterfeiting		
	Conspiracy to defraud		
	Fraudulent use of documents		
	Obtaining pecuniary advantage by deception		
	Obtaining property by deception		
1003	Public/private service vehicle and rail fare evasion	1	
1004	Other/unspecified fraud and forgery	2	
<b>11</b>	<b>ARSON</b>		
1101	Arson endangering life	6	Serious
	Arson reckless as to whether life is in danger		
1102	Arson not endangering life	5	Serious
1103	Other/unspecified arson	5	
<b>12</b>	<b>CRIMINAL DAMAGE</b>		
1201	Criminal damage endangering life	6	Serious
1202	Other Criminal Damage Over £2000	3	
	Equipped with intent to commit criminal damage		
	Threat to commit criminal damage		
1203	Other Criminal Damage Under £2000	2	
	Equipped with intent to commit criminal damage		
	Threat to commit criminal damage		
1204	Other/unspecified criminal damage	3	
<b>13</b>	<b>DRUGS</b>		
1301	Permitting use of premises for use of Class B or Class C drug	3	Serious

Section 8: Annexes

CODE	CATEGORY	SCORE	'SERIOUS OFFENCE' (ISSP)
1302	Possession – Class A drug	3	
1303	Possession – Class B drug	2	
1304	Possession – Class C drugs	2	
1305	Supply – Class A drug Possessing a class A drug with intent to supply Offering to supply a class A drug	6	Serious
1306	Supply – Class B drug Possessing a class B drug with intent to supply Offering to supply a class B drug	4	Serious
1307	Supply – Class C drug Cultivation of cannabis Possessing a class C drug with intent to supply Offering to supply a class C drug	4	Serious
1308	Unlawful importation or exportation of a controlled drug	5	Serious
1309	Other/unspecified drug offence	2	
14	<b>PUBLIC ORDER</b>		
1401	Affray	4	
1402	Bomb Hoax Supplying false information about the presence of bombs Dispatching articles to create a bomb hoax	5	
1403	Breach of the Peace Behaviour likely to cause breach of the peace	2	
1404	Drunk and Disorderly	1	
1405	Other Public Order Act offences Section 4 Public Order Act 1986 (fear or provocation of violence) Section 4a Public Order Act 1986 (intentional harassment, alarm or distress) Section 5 Public Order Act 1986 (harassment, alarm or distress) Placing people in fear of violence	2	
1406	Rioting	6	
1407	Violent disorder	5	
1408	Other/unspecified public order offence	2	
15	<b>OTHER</b>		
1501	Other specified offences Absconding from lawful custody Air weapons offences Blackmail Cruelty to animals or unlawful killing of animals Firearms Act Offences (e.g. no firearm licence) Interfering with witness/perverting justice Obstruct police or fire service Public nuisance (common law offence) Resisting arrest Sending indecent/offensive articles Trespassing on a railway	5 3 5 3 2 5 3 2 2 4 2	Serious

**Section 8: Annexes**

CODE	CATEGORY	SCORE	'SERIOUS OFFENCE' (ISSP)
<b>1502</b>	<b>Other minor offences</b>	<b>1</b>	
	Abusive language		
	Begging		
	Consuming alcohol under the age of 18 in a public place		
	Concealment of birth		
	Cycling in pedestrian area		
	Failure to make children attend school		
	Infuriating an animal (Section1 (1) (a) Protection of Animals Act 1911)		
	Inciting a child away from Local Authority care		
	Littering		
	Nuisance on educational premises		
	Urinating in a public place		
	Vagrancy		
	Making hoax/abusive or malicious telephone calls		
	Non-payment of financial penalty		
	Purchasing alcohol under the age of 18		
	Wasting police time		
<b>1503</b>	<b>Other/unspecified offence</b>	<b>3</b>	
<b>16</b>	<b>RACIALLY AGGRAVATED</b>		
<b>1601</b>	<b>Criminal damage – racially aggravated</b>	<b>3</b>	<b>Serious</b>
<b>1602</b>	<b>Other wounding – racially aggravated*</b>	<b>3</b>	
	Actual bodily harm		
	Common assault		
	Intentional harassment alarm or distress		
	Putting people in fear of violence		
	Threatening, abusive or insulting words or behaviour		
<b>1603</b>	<b>Wounding or other act endangering life – racially aggravated*</b>	<b>6</b>	<b>Serious</b>
	Wounding with intent to do grievous bodily harm		
<b>1604</b>	<b>Other/unspecified racially aggravated offence</b>	<b>3</b>	
<b>17</b>	<b>BREACH OF CONDITIONAL DISCHARGE – this only applies where the breach has resulted in an additional substantive outcome. Where a young person has been re-sentenced, please refer back to the original offence for the seriousness.</b>		
<b>1701</b>	<b>Breach of conditions of discharge</b>	<b>1</b>	
<b>18</b>	<b>BREACH OF BAIL – this only applies where the breach has resulted in an additional substantive outcome. Where a young person has been re-sentenced, please refer back to the original offence for the seriousness.</b>		
<b>1801</b>	<b>Breach of conditions of bail</b>	<b>2</b>	
<b>19</b>	<b>BREACH OF STATUTORY ORDER – this only applies where the breach has resulted in an additional substantive outcome. Where a young person has been re-sentenced, please refer back to the original offence for the seriousness.</b>		
<b>1901</b>	<b>Breach of Order or license conditions</b>	<b>4</b>	