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Callous-Unemotional Traits and Responsiveness to Rewards and Discipline in Young Children

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Doctor of Philosophy

Declaration

I, Celine Chhoa, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Acknowledgements

"It takes a village" so goes the saying and it could not be truer when it came to this PhD thesis. I owe a debt of gratitude to the many people who supported me through this long journey.

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Abstract

Callous-unemotional (CU) traits are associated with a lack of fear of negative consequences, with implications for parent socialisation, conscience development, and intervention efforts for childhood conduct problems (CP). The use of rewards instead may prove a fruitful avenue for promoting prosocial behaviour in children with elevated CU traits. Given the low affinity for social affiliation associated with CU traits, the quality of the parent-child relationship may affect the motivation value of rewards, especially social reward such as praise. This thesis explored the associations among CU traits and responsiveness to punishment and reward in the context of parenting during early childhood. In Chapter 2, I described the development of a novel experimental task designed to capture how well children learn from punishment and reward. Children higher in CU traits showed more difficulty learning from punishment and this was exacerbated by the presence of reward. In Chapter 3, insensitivity to parental punishment was related to poorer conscience and more dysfunctional patterns of parent discipline in children higher in CU traits. In Chapters 4 and 5, child responsiveness to social versus tangible rewards was compared using two newly developed instruments, an experimental task and a parent questionnaire, designed to assess responsiveness to different types of rewards in relation to CU traits. CU traits were unrelated to differences in responsiveness to tangible versus social reward using the novel experimental task (Chapter 4) but were related to decreased responsiveness to social rewards measured by parent report (Chapter 5). In Chapter 6, observation was used to examine parental use of social rewards and child responsiveness to rewards in the home setting. Children were equally responsive to parents' positive attention regardless of level of CU traits, but emotional interactions were less positive in dyads with children high in CU traits.

Impact Statement

Childhood CP represent one of the most frequent reasons for children being referred to child and adolescent mental health services in the UK. CU traits delineate a heterogenous pathway to CP that is more severe and protracted, with higher risk for later psychopathy and serious criminality. This thesis contributes to current understanding of this pathway to CP to help inform early identification and treatment to prevent maladaptive outcomes later in life.

A well-established correlate of CU traits, insensitivity to punishment has been implicated in the immoral behaviour and lack of concern for others in children high in CU traits. Yet much of the research on CU traits and abnormal punishment processing has been conducted with adults or adolescents. This thesis addressed the dearth of research on responsiveness to punishment during early childhood, a critical period for the development of morality and conscience. A newly developed experimental task showed that punishment insensitivity can be objectively measured in children as young as 3 years, indicating that deficits are already present and identifiable from a young age. Further, this thesis showed that punishment insensitivity (1) may be a potential underlying mechanism that accounts for the relationship between CU traits and poorer conscience, and (2) exacerbated dysfunctional patterns of parent discipline in children higher in CU traits. It is important to identify risk factors before CP and maladaptive trajectories of parent-child interaction become entrenched.

The use of rewards may prove a fruitful avenue for promoting prosocial behaviour in children with elevated CU traits, but no measure assessing sensitivity to different types of caregiver rewards currently exists. A questionnaire assessing the motivational value of various reward types was developed and validated. This new instrument showed promise as a measure of child responsiveness to tangible and social rewards, and could potentially be used by clinicians and caregivers to identify rewards that may provide the optimal motivation for children to comply and behave in a prosocial manner. Despite theory suggesting children with CU traits would not be responsive to social rewards, findings suggest that all rewards are likely to be effective in encouraging positive behaviour while children are young, possibly because they also provide positive parent attention.

The research in this thesis enhances understanding of risk factors associated with the development of CP early in childhood when child behaviour is more malleable and before

children learn to use antisocial behaviour as a means to achieve their goals. Through its examination of how responsiveness to punishment and reward affects parenting in children with CU traits, this work has the potential to inform family interventions and promote prosocial behaviour in at-risk children, thus preventing the development of CP and CU traits and ultimately lessening the burden to health and social services and the education system.

The research in this thesis has been presented at university departmental talks and in symposia at international conferences on child development and psychopathology (details below). These studies will be submitted to peer-reviewed journals on family research and child clinical psychology. This dissemination ensures that the research has wide impact.

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Chapter 1
Literature Review

1.1 Chapter Overview

This literature review begins by presenting an overview of childhood conduct problems (CP) and their impact on children, families, and society. Callous-unemotional (CU) traits (limited empathy, lack of guilt and concern about the feelings of others, and lack of concern about one's performance at school or work) will then be presented, highlighting the importance of delineating this unique group of antisocial children. Given the lack of moral emotions and proneness to immoral behaviour associated with CU traits, this literature review will then consider conscience development in children with elevated CU traits and theories proposed for problems in conscience development among these children. The main focus of this thesis is the theory that puts forward deficits in responsiveness to reward and punishment as risk factors for impaired conscience observed in individuals high in CU traits. Thus, theories and evidence for deficits in processing rewards and punishment among children with CU traits will be discussed in relation to conscience development and antisocial behaviour. The impact of reward and punishment processing deficits on parents' attempts to socialise children high in CU traits using discipline and reward-based strategies will then be considered. Finally, research on the treatment of CP and CU traits in young children will be presented, highlighting how abnormalities within the domain of punishment and reward processing may impact parenting responses and the effectiveness of intervention.

1.2 Conduct Problems in Childhood

CP refer to a constellation of recurrent aggressive, oppositional, and antisocial behaviours, including bullying, fighting, defiance, disobedience, lying, stealing, and the destruction of property. These behaviours are encompassed within the diagnostic criteria for oppositional defiant disorder (ODD) and conduct disorder (CD) as described in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association [APA], 2013). Behaviour that violates the rights and welfare of others, such as excessive fighting, stealing, and the destruction of property, represent symptoms of CD. In contrast, behaviours such as irritability, defiance, and disobedience are associated with ODD. CP is a general term most often used to refer to children who exhibit the problematic behaviours described above, even without meeting the threshold for clinical diagnosis.

The Office for National Statistics (ONS) survey of 2005 reported that CP were the most common mental health problem in children aged 5 to 15, with an estimated 5.9% prevalence rate in the UK – higher than any other disorder, including emotional disorders (3.7%) and hyperactivity and inattention (1.5%). CP are the most frequent reason for children to be referred to child and adolescent mental health services in the UK (National Institute for Health and Care Excellence [NICE], 2013) and the strongest predictor of diverse mental health problems in childhood and adulthood (Kim-Cohen et al., 2003; Kim-Cohen et al., 2009). Children with CP experience significant difficulties in several domains of functioning, including at home and in their family life, including harsh parenting and poor attachment relationships (Fearon et al., 2010; Lansford et al., 2011) and at school, such as poor academic outcomes (McEvoy & Welker, 2000) and increased rates of school dropout (French & Conrad, 2001). There are also considerable financial costs for young people with conduct problems, estimated to be ten times higher than those without – £70,019 compared to £7,423 – placing significant burden on health, education, and social services (Scott et al., 2001). Early identification and treatment are crucial, given the poor outcomes for children with CP and the high cost to society.

1.2.1 Subtyping Conduct Problems Based on Age of Onset: Early versus Adolescent-Onset

Considerable research indicates that children with CP constitute a heterogeneous group with unique risk factors and aetiological pathways through which they develop CP (see reviews by Frick & Viding, 2009; Hyde et al., 2013). One of these pathways that has received much empirical support and has consequently been incorporated in the *DSM-5* is by age of onset. Childhood-onset CP or the 'early starter' pathway (i.e., before the age of 10) are more likely than adolescent-onset CP to be lifetime persistent. In contrast, CP that emerge in adolescence are seen as an exaggerated form of adolescent rebelliousness and are less likely to continue into adulthood (Moffitt, 1993). Childhood-onset CP are associated with a significantly increased rate of later criminality, substance abuse, unemployment, antisocial personality disorder (ASPD), and elevated levels of psychopathic traits (Fergusson et al., 2007; Jakobson et al., 2012; Knapp et al., 2011; Moffitt et al., 2002; Simonoff et al., 2004). Furthermore, early-onset CP show higher rates of both dispositional (e.g., 'difficult' temperament and neuropsychological and cognitive deficits) and contextual risk factors (e.g., dysfunctional

parenting; Moffitt & Caspi, 2001). Given the extent of poor outcomes of childhood CP, early identification and treatment are important to prevent maladaptive outcomes later in life.

1.2.2 CU Traits Delineate a Unique Subtype of Childhood Conduct Problems

Conceptualised as the downward extension of the affective dimension of adult psychopathy to children, CU traits limited empathy, lack of guilt and concern about the feelings of others, and lack of concern about one's performance at school or work. While applying the psychopathy construct in children may be controversial, CU traits in children show a similar presentation and correlates to adult psychopathy (e.g., Blair, 1999; Blair, 2005a; Frick et al., 1999). Further, CU traits have been reliably measured in children from as young as 2 years (e.g., Kimonis et al., 2016a; Waller et al., 2016) and show relative stability across development from early childhood (Waller et al., 2012; Willoughby et al., 2011) through middle childhood (Barker & Salekin, 2012; Obradovic et al., 2007) and adolescence (Burke et al., 2007; Loney et al., 2007).

Extensive research supports the subtyping of childhood CP based on the presence of high levels of CU traits (see review by Frick et al., 2014a). Research has demonstrated distinct differences in cognitive, emotional, physiological, and neurological characteristics in antisocial children with and without CU traits, consistent with the literature on adult psychopathy. For example, O'Brien and Frick (1996) found that children high in CU traits are less likely to avoid making risky decisions relative to children low in CU traits. In terms of emotional characteristics, Blair et al. (2001a) reported that boys higher in CU traits were slower or unable to identify fearful and sad facial expressions compared to boys who were low in CU traits. Similar difficulties in detecting and reacting to fear were observed in other studies involving emotionally distressing pictures (Kimonis et al., 2006), fearful vocal tones (Blair et al., 2005), and body postures depicting fear (Muñoz, 2009). These impairments in responsivity to fear have been associated with amygdala hypoactivity in individuals exhibiting high levels of CU traits (Jones et al., 2009), highlighting neurological differences between individuals high in CU traits and those with normative levels. Genetic differences in children with high versus low levels of CU traits have also been found using twin studies. Viding et al. (2008) found a remarkably high heritability for CU traits and for CP in children with elevated CU traits compared to those low in CU traits who showed only modest genetic influence.

Despite the high heritability of CU traits in children with CP, the aetiology of these traits is likely to be influenced by a combination of genetic and environmental factors. One distinct developmental pathway which has been extended to CU traits is known as primary versus secondary psychopathy (Craig & Moretti, 2019). Primary psychopathy is characterised by lack of anxiety, deficits in emotion processing, and diminished sensitivity to others' emotional cues. Secondary psychopathy, in contrast, is characterised by high emotionality and impulsivity. The primary variant of psychopathy is thought to be genetically driven, while the secondary subtype characterises CU traits and psychopathy as an adaptation to environmental factors exposure to trauma and maltreatment (Goulter et al., 2019). While phenotypically indistinct, primary and secondary psychopathy have different origins and developmental outcomes. Adolescents with primary CU traits had lower levels of internalising and externalising problems and higher wellbeing and happiness scores compared to adolescents with the secondary variant (Goulter et al., 2023). Adolescents with secondary CU traits also reported greater levels of risky sexual behaviour and violent offences.

Researchers have also used growth curve modelling to identify distinct developmental trajectories of CU traits in children: stable low, stable high, increasing, and decreasing (Fanti et al., 2017; Fontaine et al., 2010). Children in the stable high trajectory experienced higher increases in CP and hyperactivity, as well as a more difficult family background characterised by greater negative parenting and lower parental involvement. These children also had poorer academic performance and lower peer social support.

The overall outcomes of children with higher CU traits are poorer than those without these traits, regardless of developmental pathway. Children higher in CU traits show a more severe and protracted pattern of antisocial behaviour than those low in CU traits. A recent meta-analysis of 10 studies comprising 5731 participants found a robust positive relationship between CU traits and CP severity (Longman et al., 2015). Moreover, CU traits predicted increased rates of later delinquency, violent criminality, number of arrests, ASPD, and adult psychopathy (Hawes et al., 2016; McMahon et al., 2010; Pardini et al., 2006). In terms of interpersonal functioning, CU traits are related to negative relationships in both the home (Pasalich et al., 2012) and in the school setting (Horan et al., 2016). Another area in which CU traits in children with CP have been detrimental is intervention. Parent training interventions, the most recommended form of treatment for childhood CP, are less effective for children high in CU traits, with a recent review of 11 family-based intervention studies showing a strong

association between CU traits and poorer response to treatment (Hawes et al., 2014). This growing body of literature reviewed above suggests that CU traits designate a distinct subtype of CP with a unique presentation and different correlates to antisocial children low in CU traits and, hence, differing assessment and treatment needs.

As a result of extensive research in this area, the most recent edition of the *DSM* (APA, 2013) included 'limited prosocial emotions' (LPE) as a specifier to CD based on the presence of CU traits. To qualify, children must present with two or more of the following four features: callousness/lack of empathy, lack of guilt or remorse, lack of concern about performance, and shallow affect. Using this specifier threshold, Kahn et al. (2012) examined the prevalence rates of CU traits in clinical (n = 566) and community (n = 1,136) samples of children aged 5 to 18 in the United States. Kahn et al. reported that 21 to 50% of children with CD from the clinical sample met the criteria for the LPE specifier, depending on whether parents or youths themselves reported on CD symptoms and CU trait criteria. The prevalence rate was highest for combined-informant ratings (i.e., using the higher score from the two informants), followed by parent ratings, with youths themselves reporting the lowest LPE prevalence. In the community sample of children with CD, the prevalence rate was 10 to 32% depending on whether the informant was the parent or teacher. Again, prevalence rate was highest for combined-informant ratings in this sample, but teachers reported higher LPE prevalence than parents. Similar prevalence rates were reported in studies using detained adolescents (Colins & Andershed, 2015), at-risk children (Pardini et al., 2012), and community samples (Rowe et al., 2010). These studies also found that children with CD who met the criteria for the LPE specifier show more severe physical and relational aggression, bullying, cruelty, and externalising problems relative to children who met the criteria for CD only. In terms of comorbidity, children with CD and LPE exhibit higher rates of ODD and ADHD compared to those with CD only (Kahn et al., 2012; Pardini et al., 2012). Therefore, in addition to providing estimates of prevalence rates, these studies show that the LPE specifier has clinical utility in identifying children at higher risk for severe and persistent CP.

1.2.3 Summary

CP that feature a childhood onset are more persistent and severe especially when they co-occur with CU traits. Given the poorer outcomes associated with childhood CP, identifying child and family risk factors in early childhood and preventing severe CP is crucial before children learn

to use aggression to achieve their goals and antisocial behaviours have become entrenched. The wealth of research identifying different presentation, cognitive, emotional, and physiological correlates and outcomes in children with CP and high versus low CU traits highlights the importance of recognising the presence of CU traits as a heterogenous pathway to CP. Moreover, the reduced effectiveness of parenting intervention in children with CU traits demonstrates the need to identify malleable risk factors in order to tailor interventions to the unique needs of these children and their families.

1.3 Conscience Development in Children with CU Traits

Conscience refers to the "cognitive, affective, and relational processes that enable children to construct and act according to internalised standards of conduct defined by experience, personal relationships, and societal expectations" (Thompson & Newton, 2003, p. 14). Moral emotions, such as guilt and empathy, have been of particular relevance in the study of the development of conscience. For example, guilt-like behaviour displayed by toddlers following a transgression in a laboratory observation was related to later conscience development at 56 months (Kochanska et al., 2002). Empathy, the other key component of conscience, has been shown in a series of longitudinal studies to develop early in the second year of life, with marked increases by the third year (Knafo et al., 2008; Zahn-Waxler et al., 1992). Research has consistently demonstrated that empathy is associated with prosocial behaviour and reduced aggressive and disruptive behaviours (Eisenberg et al., 2010; Knafo et al., 2008). These studies show that moral emotions are present early in life and provide an important foundation for the development of conscience and the prevention of CP.

The core characteristics of CU traits – that is, lack of empathy, guilt, and concern about the feelings of others – have led researchers to suggest that children with these traits are non-normative in their development of conscience (Frick et al., 2014b). Indeed, research has shown that children and adolescents high in psychopathic traits performed poorly on measures of conscience compared to those low in psychopathic traits. For example, in the moral/conventional distinction task of moral reasoning developed by Turiel (1983), participants were asked to judge the seriousness and permissibility of transgressions that are moral in nature (i.e., those that involve violating the rights or welfare of others such as hitting another child) versus transgressions of conventional and social norms (e.g., talking in class). Children as young as 3 years judged moral transgressions to be more serious and non-

permissible than conventional transgressions, a robust finding consistent among normative samples and across cultures (see review by Nucci, 2001). Children and adolescents with high levels of psychopathic traits were also able to make this distinction between moral and conventional transgressions. However, when rules prohibiting the transgressions were removed by an authority figure, they judged moral transgressions to be equal in permissibility and seriousness as conventional transgressions. This failure to distinguish between wrongdoing that has harmful consequences for others and wrongdoing that only violates conventional norms and thus does not harm others suggests that individuals with psychopathic traits do not place much importance on the welfare of others and indicates poor conscience development. It should be noted that these studies used samples that showed serious CP, including children who were excluded from school (Blair, 1997; Blair et al., 2001b) and adolescent offenders (Dolan & Fullam, 2010); these effects may be weaker in community samples with less severe CP.

Other research using brief, evocative vignettes of social situations found that children and adolescents higher in CU traits were more likely to view aggressive responses as acceptable (Stickle et al., 2009) and an effective way to exert dominance over others (Pardini & Byrd, 2012). Children higher in CU traits were also less concerned over victim suffering and showed less sadness in response to others' distress (Pardini & Byrd, 2012). Similar findings were obtained in behavioural research, with clinic-referred adolescents high in CU traits taking more money for themselves, leaving less in an actual charity donation compared to healthy controls matched on age, sex, and race (Sakai et al., 2012). This study showed that individuals with high levels of CU traits are prone to making self-serving decisions that come at the cost of others. Overall, research evidence of antisocial beliefs and behaviours that disregard the welfare of others point to problematic internal standards of conduct and impairments in the formation of conscience in individuals with CU traits.

1.3.1 The Role of Temperament in Conscience Development

Frick and Viding (2009) proposed that children high in CU traits possess a 'fearless' or 'behaviourally uninhibited' temperament style that can hinder the development of conscience, which in turn increases the risk for developing severe patterns of antisocial behaviour. This temperamental style is defined by the tendency to pursue novel and risky activities, insensitivity to punishment cues, and low levels of physiological arousal in response to anticipated pain, distress, or potentially threatening situations (Frick et al., 2014b). Some

researchers suggest that this temperamental style means children fail to experience negative physiological arousal in response to discipline (Kochanska, 1993) or victims' distressed and fearful facial expressions following a transgression (Blair, 1999). This, in turn, places children at risk for CP and failing to develop an internalised sense of moral values. In contrast, children high in fear are more likely to respond to stressful events with unease or worry (Rothbart & Bates, 1998). This unpleasant emotional arousal, such as guilt or remorse following a transgression, typically serves to inhibit aggressive behaviours or violations of prohibitions and is viewed as critical in the development of conscience and prevention of CP (Kochanska, 1993). Thus, fear has a regulatory function and acts as a control on approach and aggression, resulting in withdrawal from aversive stimulation such as parental discipline or distressed facial expressions (Rothbart, 2007). Similarly, inhibitory control allows children to self-regulate and inhibit aggressive behaviour even in the face of potential rewards (Kochanska et al., 1996a, 1997).

In support of the view that a fearless and uninhibited temperamental style is associated with problems in conscience development, several longitudinal studies have found that early fearfulness predicted later conscience development. Kochanska et al. (2002) reported that observed fearfulness at 33 months predicted increased guilt following mishaps at 45 months. Moreover, children who exhibited more guilt during toddlerhood were less likely to transgress rules of conduct later at 56 months. Conscience was robustly assessed using a multifaceted range of measures, including self-report in a puppet interview, behavioural observation of children's compliance with rules when unsupervised, and responses to story vignettes of moral dilemmas. More evidence of the link between temperament and conscience comes from studies that have found positive relations between children's fearfulness observed in infancy and later empathy and guilt at 3 years (Baker et al., 2012) and 6 to 7 years (Rothbart et al., 1994).

Psychophysiological studies have also linked physiological indices of fearlessness to conscience and, importantly, aggression and antisocial behaviour (Raine, 2013). Activity of the autonomic nervous system (ANS) provides a physiological index of behavioural fear. Hyperactivity in the ANS reflects more fear and anxiety, while hypoactivity indicates blunted fear reactivity to a given stimulus or event. For example, skin conductance level (SCL; i.e., sweat gland activity) indexes expectancy of a possible negative outcome and greater change in SCL indicates higher levels of fear or anxiety. In a prospective study of 1,795 children, Raine et al. (1997) found that a low heart rate at age 3 was associated with more aggressive behaviours

at age 11. Using a different measure of physiological fear, Gao et al.(2010) found reduced SCL activity in response to aversive stimuli predicted criminal offence history at age 23 in the same sample. Linking ANS activity with guilt, Baker et al. (2012) found that heart rate and SCL in infancy predicted observed guilt 3 years later. Of particular note, Colasante et al. (2020) found that lower physiological arousal was associated with higher levels of aggression and this relationship was mediated by lower guilt. This supports the notion that fear serves a regulatory function for antisocial behaviour and that lack of fear may contribute to aggressive and antisocial behaviours by disrupting the normal development of guilt. These studies also suggest that early physiological profiles can assist in identifying children at risk for problems in the development of conscience and later CP.

The research described above provides strong evidence for the role of temperamental fearlessness in conscience development and highlights how certain temperamental characteristics can impede the development of moral emotions and conscience formation during childhood. However, despite theoretical models suggesting that children high in CU traits possess a temperamental style that can hinder the normal development of conscience and, in turn, increase risk for CP (Blair, 2005b; Frick & Viding, 2009; Frick et al., 2014b), studies investigating the temperament-conscience association in relation to CU traits are surprisingly lacking in the literature. There is, however, some evidence for a link between early fearless temperament and later CU traits and CP (Barker et al., 2011; Goffin et al., 2018). Notably, Barker et al. (2011) found that, for adolescents high in CP and CU traits, fearless temperament manifested as reduced responsiveness to punishment cues rather than boldness in novel situations or towards strangers. Similarly, Pardini (2006) found that the association between fearlessness and CU traits was mediated by low sensitivity to punishment. This line of research suggests that children who are temperamentally fearless are less likely to inhibit transgressions of moral behaviour due to lack of concern about negative consequences and that this low responsiveness to fear of punishment following wrongdoing is critical in the development of CU traits and severe CP.

This punishment insensitivity observed in children low in fear has clear implications for the parenting of these children. Parents use sanctions and negative consequences to discourage undesirable behaviour from their children. Without fear of punishment, these children fail to link their misbehaviour with negative consequences and there is no motivation to avoid future misbehaviour since they do not anticipate punishment in future situations. Thus, a lack of fear

of punishment disrupts parents' attempts to discipline their child and the internalisation of parental standards of moral conduct, hindering the normal development of conscience in children temperamentally low in fearfulness (Kochanska, 1993). The following sections consider the role of parenting in the development of moral conscience and the implications of low fear and punishment insensitivity in the context of parenting.

1.3.3 The Interaction between Temperament and Parenting in Conscience Development

The literature clearly demonstrates the importance of both child temperament and parent socialisation in the development of children's moral conduct and conscience. The literature has also examined how characteristics of child temperament and parent socialisation work together to exert their influence on conscience development. Arguably the most influential theory in this area of research was proposed by Kochanska (1993), who posited that non-punitive parenting is most effective for children with normative to high levels of temperamental fearfulness as it evokes optimal levels of arousal and discomfort to promote moral internalisation. For these children, power assertion interferes with internalisation by eliciting excessive arousal such as fear or anxiety, which in turn can overwhelm the child impairing their ability to attend to the parent's socialisation message. For temperamentally fearless children, gentle discipline may not elicit sufficient discomfort and arousal to promote internalisation and firm discipline is needed to promote behaviour change.

Support for Kochanska's theory comes from a longitudinal study of 103 mother-toddler dyads who were observed in a series of laboratory tasks assessing child fearfulness, mother's gentle discipline, and conscience (Kochanska, 1997). Mothers' gentle discipline at toddler age predicted conscience at age 4 in children who were high in fearfulness, but not in children low in fearfulness. These findings were replicated in the same sample using a physiological measure of fear, with gentle discipline predicting conscience in physiologically reactive (high fear) children but not non-reactive (low fear) children (Fowles & Kochanska, 2000). Evidence from these studies support the idea that non-punitive parental discipline sufficiently evokes physiological arousal for conscience development in children with normative levels of fearfulness.

While these studies examined the interplay of gentle discipline and fearfulness on conscience, other studies have investigated the role of power-assertive discipline in the relationship

between fearfulness and conscience. Supporting the notion that power assertion impedes internalisation in children with normative or high levels of fear, Kochanska et al. (2007) found that maternal use of power-assertive discipline during toddlerhood predicted poorer moral self at 4 years in children relatively high in fearfulness but not those low in fear. Moral self refers to a child's perception of him/herself as a moral individual and is suggested to be an internal reflection of the child's actual moral conduct (Kochanska, 2002). Similarly, Colder et al. (1997) found that 9 to 11-year-old boys who experienced higher levels of parents' self-reported harsh discipline were more likely to show aggressive and disruptive behaviours if they were moderately to highly fearful compared to boys low in fear. Children reported on their own level of fear in this study as they were deemed the best judge of their own internal experiences. Somewhat contrary to these findings, Erath et al. (2009, 2011) reported that the relationship between harsh parenting and CP was amplified in boys low in physiologically assessed fearfulness. However, when earlier CP at age 8 was taken into account, CP in these boys remained stable from age 8 to age 10, whereas CP in boys who experienced high levels of harsh parenting and were high in fear increased over time, approaching same levels as boys low in fear by age 10. This pattern of findings suggests that harsh parenting has less impact on boys who are low in fear, supporting previous research by Colder et al. (1997), and that fearlessness is a risk factor for developing more serious CP regardless of parental discipline.

These studies provide robust evidence to support Kochanska's (1993) proposition that power-assertive discipline is particularly detrimental for relatively fearful children and suggest that, for these children, gentle discipline is most effective for the promotion of conscience and the prevention of CP. For temperamentally fearless children, however, neither gentle discipline nor power-assertive discipline appear to facilitate the development of conscience. Due to their propensity to low physiological arousal, these children are less likely to experience guilt and/or fear in response to parental discipline (i.e., they are insensitive to punishment) and are, thus, more resistant to parents' socialisation efforts. How, then, can parents promote conscience development in children low in fear?

Kochanska (1993) suggested that the answer may lie in the quality of the parent-child relationship. Without fear of punishment, children low in fear fail to learn to link their misbehaviour with negative consequences and there is no motivation to avoid future misbehaviour, but children who experience a positive relationship with their caregiver are more motivated to accept parental values and act in accordance with parents' standards of conduct.

In support of this notion, Kochanska (1997) found that attachment security at toddlerhood was related to more mature conscience at age 4 in children low in fear but not children high in fear. Conversely, gentle discipline was related to conscience in children high in fear but not those low in fear. This association held across multiple measures of conscience and across behavioural and physiological assessments of fearfulness (Fowles & Kochanska, 2000). Similar findings were reported by Kochanska et al. (2007), who found that an early positive relationship with the mother but not power assertion predicted later moral self in children who were low in fear. Cumulatively, these studies suggest that, in fearless children who are insensitive to punishment, the rewarding aspects of a close relationship with their parent provide the motivation to uphold parental values and act within standards of conduct. As such, for children low in temperamental fear, parent socialisation should capitalise on children's positive motivation to maintain a good relationship with the parent.

1.3.4 Summary

The antisocial behaviour and immoral attitudes and beliefs associated with CU traits are indicative of problems in the moral conscience of individuals with these traits. Both child temperament and parent socialisation have been strongly implicated in children's emerging moral conduct and conscience. Low fearfulness, in particular, has been identified as a source of differences in conscience development and its effects are two-fold. First, low fearfulness places children at risk for deficits in the early development of moral emotions such as guilt and empathy (Baker et al., 2012; Colasante et al., 2020; Kochanska et al., 2002). Second, low fear appears to manifest as punishment insensitivity (Barker et al., 2011; Pardini, 2006), which may be a barrier to successful socialisation. These detrimental effects, in combination with ineffective parent socialisation practices, can cascade across development potentially leading to psychopathic features and serious antisocial behaviour over time (Dadds & Salmon, 2003). Research suggests that a positive relationship with the parent can buffer against these effects by providing rewarding motivation for children low in temperamental fear to act in accordance with parents' and society's standards of conduct (Kochanska, 1997; Fowles & Kochanska, 2000). The following section focuses on insensitivity to punishment as an aetiological pathway to conscience problems and CP for children high in CU and/or psychopathic traits. Given the potential of the rewarding aspect of a positive parent-child relationship to protect against the development of CP and CU traits, sensitivity to reward will also be considered.

1.4 CU Traits and Sensitivity to Reward and Punishment

Broadly, a reward is any event or stimulus that increases the likelihood of re-occurrence of the original behaviour that led to the reward. Punishment is an event or stimulus that decreases the likelihood of re-occurrence of the original behaviour that led to the punishment. Rewards can be primary reinforcers, which are necessary for survival and reinforce behaviour without learning (e.g., food). Secondary reinforcers (e.g., money), in contrast, become rewarding or punishing after learning an association with a stimulus that functions as a reinforcer (e.g., money enables the procurement of food; Schultz, 2015). In this thesis, reward will refer to any appetitive stimulus or event that increases approach behaviour and punishment will refer to any aversive stimulus or event that decreases approach behaviour.

Insensitivity to punishment has been subject to considerable research attention in the study of psychopathy due to disproportionate rates of criminality and recidivism in adolescent and adult psychopathic populations (Edens et al., 2007; Kimonis et al., 2016; Salekin, 2008). Antisocial behaviour is suppressed through associations with negative contingencies such as punishment, with the level of intervention ranging from parental discipline to legal sanctions. Conversely, interventions aim to reduce antisocial behaviour through rewards for prosocial behaviour and by preventing individuals who transgress moral and societal norms from gaining 'rewards' for aggression and antisocial behaviour (e.g., parental attention, monetary gains). Blair (2005b) suggested that maladaptive reward and punishment sensitivity among individuals high in psychopathic traits results in unresponsiveness to the negative consequences of their actions, in turn, leading to poor decision making as exemplified in their increased risk-taking, substance abuse, and antisocial behaviour. The following section will review theoretical models of reinforcement learning (i.e., learning through reward and punishment) that attempt to explain how abnormalities in sensitivity to reward and punishment can increase risk for CP and CU traits.

1.4.1 The Personality Approach

A conceptual framework that has had significant impact on the understanding of sensitivity to reward and punishment in antisocial behaviour and psychopathy is Gray's (1987) reinforcement sensitivity theory (RST). Rooted in animal learning research, RST is a biologically based theory of personality that posits three central motivational systems underlying behaviour: the behavioural activation system (BAS), the behavioural inhibition

system (BIS), and the flight-fight-freeze system (FFFS). The BAS serves as a reward system modulating response to reward cues giving rise to positive affect and initiation of goal-directed behaviour. This refers to action taken when an individual aims to achieve a specific goal and believes that the behaviour they are performing will lead to the desired outcome. The BIS modulates response to punishment or threat cues and serves to inhibit ongoing goal-directed behaviour that may lead to negative outcomes by increasing negative affect such as fear and anxiety. Sensitivity to punishment reflects the inhibition of goal-directed behaviour in situations that may result in aversive outcomes or when faced with potential punishment, along with the anxiety elicited by the possibility of punishment. Thus, while activation of the BAS leads to approach behaviour, activation of the BIS leads to inhibition of approach behaviour, or 'behavioural inhibition'.

RST has provided a useful framework for understanding personality and psychopathology (Bijttebier et al., 2009). For example, externalising behaviours such as impulsivity and aggression are thought to be motivated by a strong BAS, such that the BAS overrides the BIS in the face of reward. This means the individual is unable to inhibit undesirable behaviour when pursuing a reward (e.g., hitting another child to get a toy). In terms of psychopathic and CU traits, disproportionate rates of offending and recidivism associated with these traits are thought to be a result of a lack of fear of negative consequences (i.e., insensitivity to punishment), thus reflecting a weak BIS with a normal to strong BAS (Kimbrel et al., 2007). In other words, the drive behind antisocial behaviour in individuals with high levels of psychopathic traits is generally viewed as not being the result of reward hypersensitivity as in antisocial individuals with low levels of psychopathic traits, but lack of fear and anxiety which are widely thought to be markers of punishment insensitivity (Matthys et al., 2013). Psychophysiological studies showing reduced autonomic responsivity to punishment cues or aversive stimuli among individuals with high CU or psychopathic traits relative to those low in these traits support this notion (Herpers et al., 2013).

Traditionally, BIS and BAS activity in children has been measured using self or caregiver report of sensitivity to punishment and reward on questionnaires, such as the BIS/BAS Scales (Carver & White, 1994) and the children's version of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ-C; Colder et al., 2011). BIS and BAS activation have also been measured using experimental tasks. In these tasks, response perseveration (e.g., O'Brien & Frick, 1996) and passive avoidance errors (e.g., Hartung et al., 2002) have been

taken as indicators of low behavioural inhibition or 'disinhibition'. Response perseveration is the tendency to persist in a behaviour that was previously rewarded, even in the face of punishment. It is measured using response reversal paradigms in which the likelihood of receiving rewards and punishments changes throughout the task, with a high probability of rewards at the beginning to establish a dominant response set. As the task progresses, participants are required to modify their responses as punishment becomes more frequent than reward. An inability to adapt to a previously rewarded response that is now penalised is indicative of deficits in learning through punishment.

Using a response reversal paradigm-based computerised task, Matthys et al. (2004) found that boys with ODD had greater difficulty inhibiting their responses despite the increasing probability of punishment compared to boys without ODD. Moreover, the ODD group responded faster than healthy controls in the subsequent trial following punishment from the previous trial, indicating that punishment was not a deterrence to respond quickly. There was no difference between groups in time taken before responding following reward, indicating that boys with ODD did not differ from boys without ODD in sensitivity to reward. Psychophysiological assessment of SCL, a marker of autonomic arousal and anxiety, during the task was significantly lower in boys with ODD compared to controls. Together, these findings suggest that CP are related to an insensitivity to punishment rather than a strong BAS in boys with ODD, and thus reflects a weak BIS and relatively normal BAS. Due to the limited sample consisting of only 39 clinic-referred and male participants, only limited conclusions can be drawn from this study. Moreover, CU traits were not measured in this study, so it is unclear whether there is a difference in response in boys with ODD and CU traits and those without co-occurring CU traits.

In relation to CU traits, similar findings were reported by O'Brien and Frick (1996) in clinic-referred and community children aged 6 to 13. In this study, participants were further grouped based on the presence of an anxiety disorder. Children with high levels of CU traits and no comorbid anxiety disorder (n = 29) were more likely to persevere with pursuing reward despite increasing rates of punishment, compared to children high in CU traits with a comorbid anxiety disorder (n = 37) and controls who were both low in CU traits and had no anxiety disorder (n = 46). The presence of anxiety appears to increase children's ability to inhibit reward-dominant behaviour in the presence of punishment cues, which is consistent with RST-proposed activity of the BIS. Compellingly, this finding still held when non-anxious participants high in CU were

divided into those with (n = 8) and without a diagnosis of CD or ODD (n = 22). This suggests that the tendency to continue pursuit of a reward despite potential punishment is uniquely related to CU traits and not CP. Similar findings were reported in a study by Budhani and Blair (2005) in a referred sample of boys aged 9 to 17 years. A computerised response reversal task was used to assess response to reward and punishment. Animals were presented on a screen in pairs and participants had to learn which to select based on whether they won or lost points upon clicking. Boys with CP and high psychopathic traits were less likely to inhibit their response despite higher probability of punishment as the task progressed.

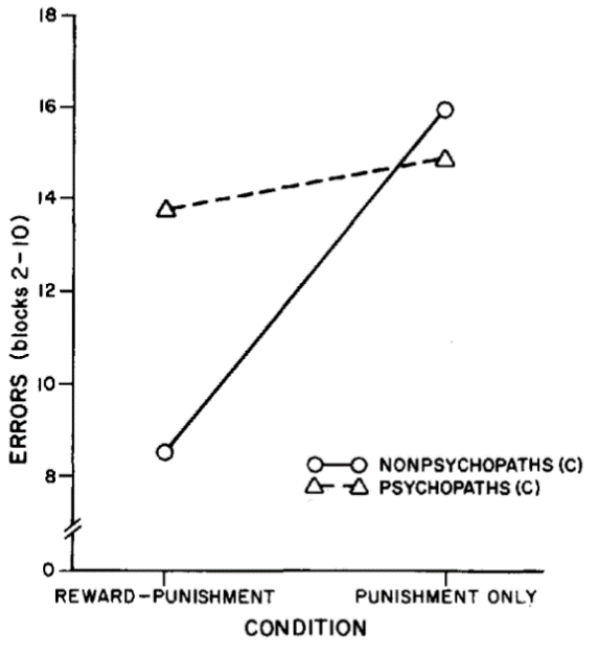
Similar to response perseveration, passive avoidance has been widely used as a measure of BI in laboratory tasks. In the passive avoidance paradigm, participants must learn through reward and/or punishment to respond to the stimuli that give a reward and to withhold responding to aversive stimuli to avoid punishment (i.e., passively avoid punishment). A passive avoidance error occurs when the participant responds to a previously punished stimulus instead of inhibiting response and is an indicator of poor inhibition (i.e., disinhibition; Lykken, 1957; Newman & Kosson, 1986). Several studies using adolescent and adult samples have found an association between CP and poor passive avoidance. In one study, Hartung et al. (2002) examined passive avoidance in a clinical and community sample of 172 adolescents. Participants completed a passive avoidance task under two contingency conditions: 1) *mixed,* where they were rewarded for correct responses and punished for incorrect responses and 2) *punishment only*, that is, no reward for correct responses. CD symptoms were associated with more passive avoidance errors in the mixed-contingency condition but not in the punishment-only condition. More specifically, when the possibility of reward was removed youth with CP can inhibit their responses to aversive stimuli. This suggests that the behaviour of youth with CP is likely driven by sensitivity to reward rather than insensitivity to punishment – that is, by a strong BAS.

Passive avoidance learning has also been investigated in relation to psychopathic traits. Newman and Kosson (1986) conducted a study examining the relationship between psychopathic traits and passive avoidance learning. The study involved 60 incarcerated males who were divided into two groups based on their scores on the Psychopathy Checklist (PCL; Hare, 2003): psychopathic and non-psychopathic. Participants completed a passive avoidance task under two conditions – one where they could win or lose money based on their responses (punishment and reward) and the other where they would only lose money for incorrect

responses (punishment only). The results indicated that individuals with high psychopathic traits made more passive avoidance errors in the mixed contingency condition compared to those with low psychopathic traits (Figure 1.1). Furthermore, removing the reward did not improve the performance of individuals high in psychopathic traits, suggesting that they were not influenced by reward sensitivity. Consistent with Hartung et al.'s (2002) findings in relation to CD symptoms, the finding that incarcerated individuals low in psychopathic traits performed better in the condition where they received rewards suggests that they are hypersensitive to rewards relative to those high in psychopathic traits. In contrast, reward sensitivity did not appear to interfere with in individuals high in psychopathic traits.

Figure 1.1

Mean Number of Passive Avoidance Errors as a Function of Psychopath Group and Contingency Condition



Note. Passive avoidance errors in each contingency condition are shown for the non-psychopaths group and psychopaths group. The solid line represents the non-psychopaths group and the dotted line represents the psychopaths group. From "Passive Avoidance Learning in Psychopathic and Nonpsychopathic Offenders," by J. P Newman and D. S. Kosson, 1986, *Journal of Abnormal Psychology, 95*(3), p. 255. Copyright 1986 by the American Psychological Association.

Similar findings were reported in a community sample of 308 16-year-old boys and girls (Vitale, Newman, Bates, Goodnight, Dodge, & Petit, 2005). Anxiety, in addition to psychopathic traits, was assessed. Youth classified as high on psychopathic traits but low in anxiety committed more passive avoidance errors compared to youth with low levels of both psychopathic traits and anxiety. According to RST, anxiety is indicative of hypoactive BIS and thus reduced sensitivity to punishment (Gray, 1987). The finding that psychopathic traits are associated with reduced ability to inhibit response to punishment cues in the absence of high anxiety suggests that this deficit is driven by punishment sensitivity. These findings, taken together with findings from Hartung et al. (2002) and Newman and Kosson (1986), suggest that CP are driven by a strong BAS in contrast to psychopathic traits which appear to be associated with a weak BIS, consistent with the RST account of CP and psychopathy (Bijttebier et al., 2009).

A limitation of response reversal and passive avoidance tasks is difficulty clarifying the separate influences of reward and punishment since these paradigms incorporate aspects of both (Byrd et al., 2014). As such, any attributions made about behaviour during these tasks to the activity of the BIS or BAS and to what degree these behaviours correspond to either or both systems are questionable. Questionnaire measures, though not without their disadvantages, can address this since each item on a questionnaire assesses either reward or punishment exclusively. Comparing a questionnaire measure of sensitivity reward and punishment against an experimental measure, Colder and O'Connor (2004) found that both low levels of sensitivity to punishment and high sensitivity to reward as reported by caregivers were associated with behavioural disinhibition in a laboratory task in a community sample of 9 to 12-year-old children. Moreover, disinhibition was significantly associated with increasing levels of CP. These findings suggest that CP as a result of disinhibition is due to both a lack of responsiveness to potential punishment and strong sensitivity to reward. In terms of CU traits, Allen et al. (2016) found that punishment insensitivity but not reward sensitivity was related to CU traits in adolescent boys while controlling for CP. This finding was consistent across informants on both child self-report and teacher report on the SPSRQ-C. A limitation of this study is the small sample size (N=39) which comprised of boys only. Similar findings, however, were reported in a larger community study of 437 children aged 11 to 14 using both child and teacher report (Allen et al., 2018). Findings from these studies corroborate those from experimental studies and suggest that CU behaviours are driven by a weak BIS rather than reward sensitivity. It should be noted, as mentioned earlier, that questionnaire measures of sensitivity to reward and

punishment are not without limitations. Reward and punishment processing are considered automatic processes that can occur outside of awareness and, thus, self-report due to potential lack of insight may not sufficiently capture these processes. In similar vein, parent report is also problematic as it cannot capture the child's inner experience, only overt behaviour.

1.4.2 The Associative Learning Approach

In operant conditioning, positive outcomes increase likelihood of behaviour reoccurring while negative consequences (punishment) decrease recurrence of the original behaviour. In a similar fashion, children learn to suppress misbehaviour through learned associations between discipline and negative emotional arousal (e.g., fear, anxiety) when being disciplined for misconduct (Kochanska, 1994). Repeated disciplinary interactions create an association between the act of wrongdoing and the unpleasant emotional arousal experienced by children during discipline. This leads to conditioning where the children experience heightened negative arousal when thinking about or committing a misdeed. As a result, the probability of engaging in such behaviours is reduced. Through this process of socialisation, children internalise parental values and standards of conduct, forming the basis of children's early conscience development.

In acknowledgement of the biological basis for the development of conscience, Kochanska (1994) emphasised the role of temperament, proposing that children with fearless temperament do not experience negative emotional arousal when disciplined for misconduct and, therefore, have difficulty establishing conditioned associations between punishment and antisocial acts resulting in reduced sensitivity to punishment. As previously discussed in Section 1.3 of this thesis, this prevents children low in fear from developing appropriate internal standards of conduct, placing them at risk for CP. It is thought that temperamental fearlessness is an early manifestation of CU traits and, indeed, an established correlate of CU traits is low fear and physiological hypoactivity (Herpers et al., 2013). In a longitudinal cohort study with a broadly representative sample, Barker et al. (2011) found that fearless temperament at age 2 was associated with increased rates of CU traits in adolescence and that this fearlessness manifested specifically as lower response to punishment cues rather than low fear towards new situations and/or strangers. Further support for Kochanska's (1994) theory comes from studies showing an association between children's affective discomfort (i.e., distress, guilt, apology, concern

about the bond with the parent after wrongdoing) and lower levels of transgressions in laboratory-based observation tasks (Kochanska et al., 1994; Kochanska et al., 2002).

Blair's (2005b) Integrated Emotion Systems (IES) theory, which is similarly based on associative learning theory and the role of emotion, posits that the inability to form stimulus-reinforcement associations among individuals with CU traits can be attributed to amygdala dysfunction. The role of the amygdala in stimulus-reinforcement learning is to encode the emotional valence of stimuli (i.e., the affective components of reward and punishment) to allow emotional learning to occur (Baxter & Murray, 2002). Individuals with high levels of CU traits are viewed as unable to learn the association between a behaviour and its valence (i.e., positive or negative), leading to deficits in approach and avoidance motivation (Blair, 2005b). For example, children tend to find distress signals, such as fearful or sad faces, aversive and therefore learn to avoid behaving aggressively in ways that elicit such signals. In individuals with high levels of CU traits, however, difficulties in learning associations between antisocial behaviour and distressed expressions of others leads to deficits in recognising distress cues. In the context of parenting, children with high levels of CU traits do not experience the unpleasant arousal that typically developing children do when reprimanded or punished for misbehaviour (e.g., hitting) and, thus, do not form an association between the transgression and unpleasant feelings following punishment. The failure to establish associations between antisocial behaviour and negative consequences means children do not anticipate these negative feelings in future situations and puts them at risk of learning to use antisocial behaviour as a means to achieve their goals.

Evidence for Blair's (2005b) IES theory comes from tests of learning stimulus-reward association, which measure an individual's ability to link neutral stimuli with a reinforcer (e.g., money, toy). Response reversal paradigms require the participant to make and break stimulus–reward associations. As the ratio of reward and punishment changes throughout the task, participants are required to adjust their performance when stimuli that is previously rewarded is now punished. As discussed in the previous section, children who exhibit psychopathic tendencies and CU traits show impairments in modulating their responses to changing contingencies and are more likely to continue the task despite increasing rates of punishment (Fisher & Blair, 1998; O'Brien & Frick, 1996). Blair argued that this is indicative of an inability to break previously learned stimulus-reward associations and learn new associations, lending support to the IES theory's position that stimulus-reinforcement learning is impaired in

individuals with psychopathic/CU traits. As such, children have difficulty learning to avoid resorting to antisocial behaviour because of impairment in learning the association between causing distress or disciplinary action (i.e., the punishment) and the behaviour that caused the victim's distress. The implications of this are that early identification and prevention of severe CP is crucial before children learn to use aggression as a means to achieve their goals and antisocial behaviours have become entrenched.

Lending support for Blair's (2005b) proposition that amygdala dysfunction underlies impaired stimulus-reinforcement learning in individuals high in CU traits, neuroimaging studies have found reduced activity in the amygdala in boys with high levels of CU traits (Jones et al., 2009; Sebastian et al., 2014). Attenuated eye-blink startle response, a measure of amygdala dysfunction, has also been found in incarcerated adults males high in psychopathic traits (Levenston et al., 2000), providing further evidence that the amygdala is compromised in individuals with psychopathic traits. An advantage of the IES theory of punishment and reward processing is that it provides an account of the processes underlying deficits in the ability to normatively process reward and punishment observed in individuals with psychopathic/CU traits.

1.4.3 The Cognitive Approach

Newman (1998) proposed that abnormal reward and punishment processing in individuals high in psychopathic/CU traits reflect attention problems rather than impaired stimulus-reinforcement learning as Blair (2005b) suggested. Newman's (1998) response modulation (RM) hypothesis posits that individuals high in psychopathic traits are impaired in the ability to shift attention to non-dominant contextual cues (e.g., another child's upset face) when focused on goal-directed behaviour (e.g., snatching a toy from the upset child). RM refers to the "rapid and relatively automatic, i.e., non-effortful or involuntary shift of attention from the effortful organization and implementation of goal-directed behaviour to its evaluation" (Newman et al., 1997, p. 564). RM enables monitoring of information that is not the current focus of attention and, if that information is relevant, using it to adjust their behaviour accordingly. Decision-making deficits, as exemplified by response perseveration and poor passive avoidance in individuals with psychopathic traits, can be accounted for by the failure to process information that is not directly related to their focus of attention. That is, impaired RM leads to an exclusive focus on the potential of behaviour to generate reward (the main

goal), disregarding the potential of this behaviour for aversive consequences which are peripheral to the primary goal. In terms of psychopathic traits, a deficient ability to shift attention to peripheral contextual cues – such as parental disapproval, victim distress, moral conventions, and even legal repercussions – when focused on reward leads these individuals to focus on potential rewards rather than the negative consequences of antisocial behaviour.

Evidence for Newman's attentional account of aberrant punishment and reward processing comes from studies using tasks that minimise the need for RM. For example, individuals high in psychopathic traits performed similar to those low in psychopathic traits on a passive avoidance task when participants were required to process both reward and punishment contingencies at the beginning of the task (Newman et al., 1990) and given more time to process less salient information between trials (Newman & Wallace, 1993). Both these procedures minimise the need for RM by eliminating the need for participants to attend to and process stimuli that is not relevant to their goal during the task.

Studies examining attention more directly provide further support for the response modulation model. In one study, Newman et al. (1997) examined response modulation in psychopathic versus non-psychopathic incarcerated males using a picture-word Stroop task, which assesses interference of automatic cognitive processes to the main task as in the classic Stroop test. In the picture-word Stroop task, participants are asked to name pictures presented with an incongruent or congruent word (e.g., picture of a cow presented with the incongruent word 'sheep'). Typically developing individuals are not impaired in their ability to modulate response to stimuli that is not relevant to their goal and, thus, the presence of incongruent words produce interference resulting in slower reaction time in incongruent versus congruent trials. In contrast, participants with psychopathic traits showed no difference in reaction time between congruent and incongruent trials, suggesting the presence of peripheral stimuli (i.e., incongruent words) did not cause interference. This finding has been replicated in female offenders (Vitale et al., 2007) and adolescents with psychopathic traits (Vitale et al., 2005).

In another study examining attentional processes, Newman et al. (2010) assessed fear-potentiated startle (FPS) response in 125 incarcerated men. FPS is the eye-blink startle response following paired presentations of a neutral stimulus (e.g., a red letter) and an aversive stimulus (e.g., electric shock). High psychopathic participants showed little to no FPS response when asked to focus on non-threat related aspect of the stimulus (e.g., capital or lower case). When

told to attend to the cues indicating punishment (e.g., colour of the letter), the FPS of prisoners high in psychopathic traits normalised to low psychopathy levels. These studies strongly suggest that reward and punishment processing is not impaired in psychopathic individuals. Rather, findings indicate that impairments on reward and punishment tasks may reflect an inability to reflexively guide attention to non-dominant contextual cues meaning this information is not processed. That is, cues indicating potential punishment are not attended to and processed in the pursuit of reward, with these deficits manifesting as poor passive avoidance, increased response perseverance, and increased risk-taking behaviour. When attention is drawn to cues indicating punishment, however, individuals high in psychopathic traits are able to alter their response to avoid punishment.

The finding that individuals high in psychopathic traits could alter their response avoid punishment by engaging in effortful processing may have important implications for interventions. Baskin-Sommers et al. (2015) conducted an intervention targeting the attention deficits exhibited by individuals high in psychopathic traits in a sample of 103 male offenders aged 18 to 45. Participants received training in techniques to enhance their ability to focus on and incorporate contextual cues in their surroundings – for example, rule changes and emotional information – to modulate behaviour. Prior to the intervention and after six weeks of cognitive remediation training, participants were administered pre/post tasks evaluating attention to context. These included measures of FPS response, interference to distracting contextual information on the modified Stroop task, and responsiveness to task-irrelevant words on a lexical decision task. Results showed that participants showed significant improvement in task performance on all three attention-to-context tasks following training. Interestingly, participants also showed improvement on pre/post tasks of affective cognitive control which are primarily associated with deficits in antisocial individuals *low* in psychopathic traits. For individuals high on psychopathic traits who are considered difficult to treat, this study presents a promising avenue for intervention research by showing that their cognitive deficits may be trained and rehabilitated. This study also promotes the personalisation of treatment for conduct problems and antisocial behaviour based on the unique cognitive and affective characteristics of individuals with CP. However, more research is needed as it is unclear whether improvements can be applied to real-world situations and behaviours, such as criminal activity and substance abuse. Moreover, research on the RM hypothesis, including this intervention study, has primarily been conducted with male offender samples. It is unclear whether the failure to consider important contextual information is already present early in life

or a learned result of life-long practice of gaining rewards by ignoring information that is secondary to the reward.

1.4.4 Overall Limitations of Research Evidence

Several theoretical models have been proposed to account for potential mechanisms underlying the development of CP and CU traits. As a whole, theoretical and experimental evidence points to deficits in processing reward and punishment among individuals with CU/psychopathic traits, whether it is a primary deficit (e.g., impaired learning of stimulus-reinforcement associations) or a secondary underlying deficit (e.g., attentional problems leading to non-attendance of information peripheral to goal-directed behaviour). Primary deficits refer to the direct effect of a single deficit, while secondary deficits refer to the effect caused by the primary deficit (Pennington, 2006). However, there are several limitations of the research in this area which are outlined below.

First, the paradigms typically used in studies of reinforcement learning include aspects of both punishment and reward. They are therefore limited in their ability to determine the independent influences of punishment and reward systems (Byrd et al., 2014). For example, response reversal tasks assess an individual's ability to detect changing contingencies of both punishment and reward and modulate response accordingly (e.g., Matthys et al., 2004; O'Brien & Frick, 1996). There is a chance of both punishment or reward for every response and, as such, it is unclear whether difficulties regulating behaviour are due to insensitivity to punishment or a heightened sensitivity to reward or both, preventing firm conclusions about underlying mechanisms. Similarly, passive avoidance tasks require participants to learn through punishment and reward to which stimuli they should respond or withhold response. Thus, it is not clear whether they are learning through reward only or punishment only or both. However, an advantage of passive avoidance tasks is that they can be set up with multiple conditions whereby participants are only rewarded for correct responses (i.e., no punishment), only punished for incorrect responses (i.e., no reward), or both (i.e., reward and punishment). The difference in task performance between conditions can indicate nonnormative sensitivity towards rewards or punishment.

Second, researchers have pointed to a distinction between the regulation of behaviour in the presence of rewards or punishment and emotional arousal experienced at the prospect or receipt

of a reward or punishment (Marini & Stickle, 2010). The regulation of behaviour, which tends to be the primary focus of research in this area, is only part of the full response to a reward or punishment. To exemplify this point, Matthys et al. (2013) suggest that CP are associated with low autonomic responsivity and basal heart rate to stimulation. As such, higher than normal levels of sensory input are needed to achieve a pleasant level of emotional state. This manifests as sensation-seeking behaviour such as substance abuse, fighting, breaking rules, etc. Thus, according to this view, rather than increased sensitivity to rewards as the behavioural research shows, reduced sensitivity to rewarding stimulation is thought to underlie CP behaviour. The authors have therefore suggested that future research should consider using multi-method paradigms that allow consideration of both psychophysiological reactivity and behavioural regulation in response to reward and punishment.

A third limitation of the current literature is the use of tangible rewards and punishment, such as the win or loss of money or points, largely ignoring the potentially disparate effects of other reward types. Only a handful of studies to date have examined responsiveness to different forms of reward and punishment in individuals with psychopathic/CU traits. In one study, Foulkes et al. (2014a) used money and the 'thumbs up' icon synonymous with social approval in social media as rewards and found a preference for social rewards in adults with higher levels of psychopathic features. Mirroring these findings, in Allen et al.'s (2016) qualitative study of teacher-child interactions, teachers reported that adolescent boys who scored high on CU traits were particularly responsive to praise in front of peers, social approval, and admiration. These studies used subjective self or teacher report, whereas behavioural studies can better tap into processes less subject to conscious processing. There is a significant gap within this area of research and future studies should investigate responsiveness to various types of reward as these differences may have important implications for treatment.

Fourth, research on sensitivity to punishment and reward has tended to focus on the use of experimental methods to measure responsiveness to reward and punishment. In some studies, the stimuli and set-up are often arbitrary and meaningless to participants, for example, pressing a button in response to 2-digit numbers arbitrarily assigned as positive or negative (e.g., Hartung et al., 2002). It is unclear how this might affect task performance and, thus, findings from these studies. Moreover, the use of arbitrary stimuli may be less engaging for young children. Another consequence of artificial experiments is that the literature has largely ignored the social context within which the child develops. Yet developmental research has

demonstrated the crucial role that parenting plays in the development of conscience and CP. Research on responsiveness to punishment and reward should consider the wider context in addition to the characteristics of the individual child.

Finally, research on CU traits and reward and punishment processing during the early childhood period is scarce. The only known study to date to examine CU traits and reinforcement learning processes in preschool-aged children was conducted by Briggs-Gowan et al. (2014) using a passive avoidance paradigm adapted for children. As expected, preschoolers rated by mothers as being high in punishment insensitivity showed more passive avoidance errors. However, no associations were found between low concern for others and impairments in reinforcement learning. This study makes an important contribution by linking impaired reinforcement learning with parent-reported punishment insensitivity, suggesting that problems processing punishment are a global deficit consistent across contexts and that experimental assessment of punishment insensitivity is viable. However, it is unclear to what extent findings map onto CU traits given that this study did not assess CU traits per se but, rather, features of CU behaviour including punishment insensitivity and low concern for others. The dearth of research in early childhood is concerning given that the foundations for empathy and conscience development are laid during early life and are paramount for the prevention of antisocial behaviour (Eisenberg et al., 2010; Knafo et al., 2008). There is a need for research in early childhood to further understanding of emergence of reward and punishment processing deficits in children high in CU traits and how early deficits relate to the development of CP.

1.3.2 The Role of Parenting in Conscience Development

The previous section presented an overview of the role that temperament plays in the development of conscience and how this relates to CU traits. The developmental context of the child is also important in conscience formation, with parent socialisation playing a critical role. Socialisation refers to the processes by which individuals learn and internalise standards and values of the culture in which the individual lives for competent functioning. The literature on the development of moral emotions and conscience has primarily focused on two main areas of parent socialisation: (1) the broader indices of the quality of the parent-child relationship such as warmth and attachment security, and (2) the more immediate parenting behaviours such as parent's disciplinary practices (Laible et al., 2015). Given the relevance of insensitivity to

punishment in the development of CP and CU traits, this section primarily focuses on the latter – that is, parental discipline – in conscience development.

A distinction is made in the literature between disciplinary practices that are power assertive and those that are inductive in nature. Inductive discipline relies on parent reasoning, explanation of rules, and emphasis on the effects of children's actions to prevent future misbehaviour. Power-assertive discipline, in contrast, is coercive and forceful, whereby direct pressure is exerted on the child to comply with parental demands (e.g., shouting, physical punishment). Kochanska (1997) proposed that power-assertive discipline interferes with children's ability to internalise rules and, in turn, develop conscience. In support of this view, a significant body of research has found robust links between power-assertive parenting and impaired development of moral emotions and conscience in children. For example, Eisenberg, et al. (1983) found that mothers' corporal punishment was associated with less mature moral reasoning and empathy in a small sample of 17 preschoolers. Kochanska et al. (2002) reported similar findings in a significantly larger sample of 112 mother-child dyads. In this study, higher maternal power assertion at 22 months was correlated with less observed guilt in children following transgression at 33 and 45 months, accounting for earlier guilt at 22 months. This was true for measures of parenting based on both self-report and observation. In the same sample, Kochanska et al. (2003) found that early power-assertive discipline was also related to poorer moral conduct and reasoning and higher levels of CP at age 6.

These findings were replicated in another study by Kochanska et al. (1996b) employing a broad spectrum of measures of power assertion and conscience, thereby increasing the robustness of findings. In this study of 103 mother-child dyads, a negative association was found between mothers' power-assertive discipline at toddler age and child conscience at preschool age, again controlling for child age and defiance. Maternal discipline was assessed via observation, while conscience was assessed using multiple measures, including mother-report on a questionnaire, child's response to hypothetical moral dilemmas, and observation of child's moral conduct (compliance with mother's rules, internalisation of mother's rules even when unsupervised, reluctance to violate standards of conduct, and internalisation of experimenter's rules of conduct). Thus, significant links between parents' use of power-assertive discipline and poorer moral conduct and conscience development in children were evident across multiple studies employing objective observations and maternal reports that encompassed a broad spectrum of conscience.

In terms of the relationship between power-assertive discipline and CP, there is abundant research evidence showing that harsh parenting practices are associated with increased CP over time (e.g., Fine et al., 2004; Knutson et al., 2005; Lansford et al., 2011). This pattern of findings is not unexpected, given that conscience promotes moral conduct and protects against aggression and antisocial behaviour (Eisenberg et al., 2010). The evidence for CU traits and harsh parenting is more mixed. Some research has shown that the relationship between harsh parenting and CP was stronger in children lower in CU traits (e.g., Crum et al., 2015; Hipwell et al., 2007). Parents may find harsh punishment less effective for children who are high in CU traits and less responsive to punishment and, as such, engage less in such disciplinary practices. However, these studies were cross-sectional and more recent studies using longitudinal designs have reported that higher levels of harsh parenting were related to increased CU traits (Barker et al., 2011; Wagner et al., 2019; Waller et al., 2012). Notably, Larsson et al. (2008) found that while higher CU traits are associated with harsh parenting, this effect may be child- rather than parent-driven. A possible explanation for this effect is insensitivity to punishment, that is, children who do not respond to milder forms of discipline may evoke increasingly harsher methods from parents. This illustrates how temperament and parent socialisation may interact in the development of moral conduct and conscience.

1.4.5 Summary

Theory and evidence support a strong link between CU traits and abnormalities in sensitivity to punishment and reward. Several theories have been suggested by researchers in the field to explain these links. Primarily a theory of personality, RST (Gray, 1987) posits that brain-based motivational systems underlie individual variations in sensitivity to rewards and punishment. Blair's (2005b) IES theory is similarly a theory with a basis in biology, proposing that amygdala dysfunction leads to impaired stimulus-reinforcement learning and, in turn, non-normative responsiveness to rewards and punishment. In contrast, the third theory explored in this section, Newman's (1998) RM hypothesis, provides a cognitive account of reward and punishment processing. The RM hypothesis proposes that problems in reward and punishment processing in psychopathy is not a primary but secondary deficit, resulting from the failure to direct attention to less salient contextual cues, such as the negative consequences of antisocial behaviour. The theories and research presented in this section provided critical contributions to furthering understanding of punishment and reward processing in relation to psychopathy

and CU traits. However, many of the studies on which these theories are based were conducted with adolescent and adult samples and little is known about how these deficits emerge in children particularly during early childhood, an important developmental period for empathy and moral emotions. More research during this critical period is needed to identify those at risk for developing severe CP. Furthermore, many of the studies in this area have insufficiently applied theory and evidence more practically to broader social contexts. This is possibly due, in part, to the focus on experimental tasks in a laboratory setting in the current literature. For example, intervention effectiveness of Baskin-Sommer et al.'s (2015) cognitive remediation training which was based on RM hypothesis, was measured using experimental tasks and it is unclear whether improvements apply to everyday behaviours. The following section moves beyond the realm of individual behaviour and considers reward and punishment processing deficits in the social context of the child, specifically, the parent-child relationship and interactions which comprise a child's earliest social experiences.

1.5 Implications of CU Traits and Deficient Responsiveness to Reward and Punishment in the Context of Parenting

The literature on reward and punishment has shown that children with CP and elevated CU traits exhibit non-normative reward and punishment processing and, as a result, problems in learning from reinforcement. This has implications for parent socialisation processes and parenting interventions that focus on parents' effective use of discipline and rewards to reduce child CP. The literature on parenting practices and their contribution to the development of CP and CU traits, which was briefly discussed in Section 1.3, will be considered in further detail here. Given that interventions for CP in young children rely on teaching parents how to effectively implement reinforcement strategies to shape and manage child behaviour, the implications of abnormal punishment and reward processing for the treatment of children with high levels of CU traits will then be considered.

1.5.1 Parental Reinforcement in the aetiology of Conduct Problems and CU Traits

Several theories based on reinforcement learning principles have been suggested to account for the development of CP. According to Patterson's (1982) coercion model, parents and children can get drawn into continual 'coercive cycles' of increasingly aggressive and coercive interactions. Coercive cycles between parents and children typically commence when a parent issues a directive that the child refuses to follow. In response, the parent can either escalate the

demand or give in to the child's protest. Giving in inadvertently reinforces the child's misbehaviour. Conversely, if the parent responds to the child's refusal with threats or physical aggression, the child may comply out of fear, thus reinforcing the parent's coercive behaviour. This creates a negative cycle that increases the likelihood of further use of negative disciplinary practices in the future. According to Patterson (1982), sustained coercive interactions between a parent and child are prone to escalate over time, culminating in the development of persistent oppositional and aggressive behaviour that persist in school settings and into adulthood.

Evidence for the coercion model comes from longitudinal studies which found a positive reciprocal relationship between parents' use of harsh discipline and children's conduct problems, such that an increase in one led to an increase in the other (Fine et al., 2004; Knutson, et al., 2005; Lansford et al., 2011). These findings support Patterson's (1982) proposition that increasingly coercive parent-child interactions can lead to the development of CP. The magnitude of coercive cycles could be amplified in parent-child dyads with fearless or high CU children who have low fear of negative consequences, including parental punishment. Insensitivity to punishment in high CU children may lead parents to escalate the severity of discipline in order to have an impact on their child's behaviour. Indeed, Barker et al. (2011) found that fearlessness (considered a precursor to CU traits) which manifested as punishment insensitivity, led to an increase in parents' use of harsh discipline.

Low responsiveness to punishment associated with CU traits disrupts parents' attempts to discipline their child, hindering the normal development of conscience. These detrimental effects in combination with ineffective parent socialisation practices can cascade across development, potentially leading to psychopathic features and serious antisocial behaviour over time (Blair, 2005b; Dadds & Salmon, 2003). Coercive and harsh parenting practices, in particular, are thought to interfere with children's ability to internalise parental messages about behaviour during disciplinary encounters due the high emotional state such practices elicit (Kochanska, 1997). In support of this view, a significant body of research has found robust links between harsh parenting (e.g., yelling, spanking) and impaired development of guilt (Kochanska et al., 2002), empathy (Eisenberg et al., 1983), moral reasoning, and moral conduct (Kochanska et al., 2003) for measures of parenting based on both parent self-report and observation. These were discussed in detail in Chapter 1, Section 1.3.2. There is also abundant research evidence showing that harsh parenting practices are associated with increased CP over time (e.g., Fine et al., 2004; Lansford et al., 2011).

The relationship between CU traits and harsh parenting is more mixed. There is some evidence that the relationship between harsh parenting and CP was stronger in children with lower levels of CU traits compared to those higher in CU traits (e.g., Edens et al., 2008; Hipwell et al., 2007; Oxford et al., 2003; Wootton et al., 1997). It can be reasoned that harsher parenting practices may not be as strongly associated with CU traits, given that punishment insensitivity is implicated in the development of CU traits. Parents may find harsh punishment less effective for children higher in CU traits who are less responsive to punishment and, as such, engage less in such disciplinary practices. However, these studies were cross-sectional and more recent studies using longitudinal designs have reported that when earlier CP and CU are controlled for, greater levels of harsh parenting were related to increased CU traits across multiple time points (Pardini et al., 2007; Wagner et al., 2019; Waller et al., 2012). In a cohort study of 4430 twins, Larsson et al. (2008) found that the association between harsh parenting and later CU traits disappeared when controlling for earlier CP, suggesting that this effect is child rather than parent-driven. Genetic analyses support these findings, as CU traits showed high heritability and no shared environmental influence.

1.5.2 The Parent-Child Relationship in the Aetiology of Conduct Problems and CU Traits

Although deficits in responsiveness to punishment and reward are associated with higher levels of CP and CU traits, these relationships may be moderated by the quality of the parent-child relationship. As discussed in Section 1.3 of this thesis, a warm, positive relationship with caregivers may provide the optimal route for the development of conscience in children who are high in CU traits. Discipline may be less effective for children who are insensitive to punishment, but the emotional incentives of a positive relationship with the caregiver (e.g., praise, affection, time spent with their caregiver) provide alternative reinforcement for prosocial and moral behaviour (Thompson & Newton, 2013). When the parent-child relationship is good, the child's motivation for behaving prosocially comes from the desire to maintain a positive relationship with the parent rather than from fear of negative consequences. Therefore, the parent-child relationship quality can be especially important for children who experience difficulty learning from punishment.

In support of this view, longitudinal studies have found that securely attached preschoolers scored higher on mother-reported conscience development and were less likely to transgress in

a resistance-to-temptation task (Laible & Thompson, 2000; Kochanska et al., 2005). Kochanska et al. (2005) also found that parental use of power in discipline practices, such as verbal threats and physical control, mediated the relationship between poor parent-child relationship quality and problems in conscience development and moral conduct over time. This suggests that a positive parent-child relationship not only promotes conscience development but also reduces power-assertive discipline practices and that positive emotional incentives for children's prosocial behaviour are complemented by calm, consistent use of non-physical discipline strategies (e.g., time-out). Further support for the importance of the quality of the parent-child relationship comes from Deater-Deckard et al.'s (2006) study of biological and adoptive families. This study found that maternal warmth moderated the relationship between harsh discipline and child CP, such that harsh parental discipline and child CP were more strongly related when maternal warmth was low. This finding suggests that the impact of harsh discipline can be mitigated by parental warmth, which may protect against the development of behaviour problems. Lending strength to these findings, the three constructs were reported on by multiple informants including interviewer ratings and both paternal and maternal report.

The importance of parental warmth has also been demonstrated in the development of CU traits. Pardini et al. (2007) found that parental warmth was longitudinally associated with reduced CU traits and CP in a sample of 120 9 to 12-year-olds. Similar findings were reported in another longitudinal study with a high-risk sample of 2 to 3-year-olds and their mothers (Waller et al., 2015). Together, these studies suggest that negative and harsh parenting have less effect on the behaviour of children higher in CU traits, but positive parenting may be particularly influential for these children. These studies stress the importance of parent-child relationship quality on child outcomes and suggest ways that the focus of treatment can be adapted for different subgroups of children with CP. Specifically, treatment of CP for children high in CU traits should focus on promoting more positive parenting methods and, by proxy, improving the parent-child relationship.

This section has, thus far, only considered how the parent-child relationship and attachment quality contribute to the aetiology of CP and CU traits in children. It is important to note that parent-child relationship and attachment quality themselves are is influenced by both parent and child characteristics. Attachment quality is often assessed by measuring parent sensitivity and responsiveness to their child, for example, in the Strange Situation procedure (Cassidy &

Shaver, 2016). However, child temperament can influence their own responsiveness to parental care which in turn impacts upon the security of the attachment relationship. Moreover, a child who is difficult or hard to manage elicit less sensitive and less warm parenting while a child who is anxious may elicit parenting characterised by parental intrusiveness. Conversely, parent characteristics such as distress caused by low income, marital conflict, and poor mental health can all impact on parental sensitive responding and by proxy attachment security (Cassidy & Shaver, 2016). Additionally, parents' own attachment security may affect their own levels of sensitivity and how they well respond to their child.

1.5.3 Implications for the Treatment of Childhood Conduct Problems and CU Traits

The presence of high levels of CU traits can complicate intervention efforts with children who exhibit serious CP. Current best practice intervention programmes for childhood CP target core parent skills, including reinforcement strategies of discipline (e.g., time-out) and reward (e.g., parent praise) to reduce disruptive behaviour. These parenting interventions, such as the Incredible Years, Triple P, and Parent-Child Interaction Therapy (PCIT), have demonstrated success in reducing child CP and promoting positive parenting practices and parent-child interaction (Kaminski et al., 2017; Leijten et al., 2019). However, reduced responsiveness to punishment among children with high levels of CU traits suggests that typical discipline strategies may not be as effective for this subgroup of children with CP and may underlie the limited effectiveness of parenting intervention programmes that utilise reinforcement strategies to modify undesired behaviour (Hawes et al., 2014).

In an intervention study for childhood CP, Hawes and Dadds (2005) found that boys higher in CU traits were less responsive to the discipline component (i.e., time-out) of treatment relative to those low in CU traits. Observation showed that they also reacted to time-out with fewer displays of negative emotionality, suggesting that this method of parent socialisation is less likely to promote behaviour change in children with high levels of CU traits in line with the notion that punishment-based methods may be less effective for this group of children. In contrast, these boys responded similarly to those low in CU traits on the reward component of treatment (i.e., descriptive praise), suggesting that rewards are effective and may be a good alternative to punishment-based discipline. Therefore, interventions for children high in CU traits may benefit from de-emphasising punishment-based strategies and focusing on alternative strategies such as reward-based strategies.

The National Institute for Health and Care Excellence (NICE, 2013) guidelines for conduct disorders recommend the use of calm, consistent discipline and limit setting, and positive parenting in the form of tangible and social rewards (including affection and verbal praise). Traditionally, affection has not been considered a conventional form of reward, but attachment research and training programmes advocate the use of affection or spending time with children as ways of rewarding prosocial behaviour and encouraging cooperation (Dadds & Hawes, 2006; Murrihy et al., 2010; Webster-Stratton, 2005). These types of social rewards are referred to as affiliative rewards. As discussed in Section 1.3 of this literature review, this has been suggested to be the optimal approach for children with fearless temperament and/or high levels of CU traits (Kochanska, 1994; Fowles & Kochanska, 2000).

However, it remains unclear whether social rewards are more effective than traditional tangible rewards for children high in CU traits. Foulkes et al. (2014) suggested that the propensity towards manipulative use of others for personal gain in psychopathic adults indicates that social rewards may be more motivational than tangible rewards (e.g., money). Allen et al. (2016) similarly reported that adolescents who scored high on CU traits were particularly responsive to teacher praise in front of peers, social approval, and admiration. These findings suggest that individuals with these traits value social rewards particularly if they lead to some form of personal gain, in this case, social dominance and status over others. They may pursue dominance and status as a means to manipulate and exploit others more effectively, for example, for financial or sexual gain (Hare, 2003). However, the applicability of these findings to young children is questionable given they do not possess the same cognitive capacity for mentalising (i.e., understanding other's minds or perspectives) and planning deliberate manipulation of others. In young children whose main interactions will be with their parents, social affiliation such as affection and shared time with the parent is more likely to be more rewarding than social dominance and manipulation. Dadds and Hawes (2006) argued that such rewards are more effective than tangible rewards and even verbal praise, because they are related to basic attachment drives. They are more likely to be emotional, involve eye contact, and/or parents come into close proximity to their child (e.g., when giving their child a hug).

However, given that a hallmark of psychopathy is the inability to form meaningful relationships and lasting bonds with others (Hare, 2003), individuals high in psychopathic/CU traits may not find social rewards as motivating and rewarding as individuals with normative levels of

psychopathic/CU traits. According to Waller and Wagner's (2019) Sensitivity to Threat and Affiliative Rewards (STAR) model, CU traits are underpinned by a low intrinsic motivation for social affiliation. Individuals with high levels of CU traits are less likely to show affiliative behaviours such as proximity seeking and affection, as well as being less responsive to affiliative inputs from the environment (e.g., from caregivers) beginning in infancy (Bedford et al., 2015, 2017). These impairments in social behaviours are thought to arise from individual differences in genetic and neural factors linked to social bonding and processing of social cues (Cohn et al., 2015; Dadds et al., 2014b, 2014c; Viding & McCrory, 2019). In addition to exhibiting lower affiliative behaviours, children higher in CU traits also receive less affiliative inputs from environment either due to their own characteristics shaping their caregiving environment (e.g., a child who is not responsive to affection may be shown less by their parent) or the parent themselves less likely to engage in social affiliative behaviours, resulting in even limited opportunities to develop affiliative behaviour patterns (Waller & Wagner, 2019). In light of this, social rewards may not provide sufficient motivation to drive behaviour change in children high in CU traits. To date, no studies have compared sensitivity to different types of reward in children with CU traits. More research is needed given the potential for further tailoring parenting programmes used to treat serious CP in children with high levels of CU traits.

A consideration of how parents' own traits may affect how rewarding they find child responses is also important given the transactional nature of parent-child effects. Research has found biases in parental response and perception of their children based on parents' personality traits. Parents with higher levels of agreeableness were more likely to respond positively to their child's warmth and prosocial behaviours and view their child's expressions of affection as rewarding (Deater-Deckard & Petrill, 2004). Conversely parents with higher levels of neuroticism tended to interpret their child's positive behaviours as negative or less rewarding (Bridgett et al., 2009). Parental attachment styles, which are influenced by their own attachment experiences, can also impact how they perceive their child's expressions of warmth. Parents with secure attachment styles are more likely to interpret their child's warmth as genuine and rewarding, while those with insecure attachment styles may struggle to trust and fully engage in positive interactions (Feeney & Hohaus, 2001). Parental stress is another factor that can have a significant impact on how parents respond to and interact with their child (Crnic et al., 2005; Crnic & Low, 2002). Parents who are emotionally unavailable due to stress or distress may have reduced capacity for perceiving the effect of their own harshness on their children.

1.5.4 Summary

Reward and punishment are powerful tools used by parents for the socialisation of children, instilling internal moral codes and standards of behaviour. Reduced responsiveness to punishment may disrupt socialisation processes, potentially placing children who exhibit high levels of CU traits at risk for serious CP and other poor outcomes. This also has implications for the treatment of children high in CU traits given current best practice interventions for childhood CP are based on teaching parents effective reinforcement strategies for managing behaviour problems. Understanding how child CU traits relate to differential responses to parental reward and discipline can inform and suggest ways that treatment can be tailored to the unique cognitive, emotional, and behavioural characteristics of this high-risk subgroup of antisocial children.

1.6 The Current Thesis

A large body of evidence indicates that CU traits are associated with difficulty learning from punishment and lack of fear of negative consequences, with detrimental effects across multiple areas of functioning, including problems in conscience and conduct. However, there are limited studies on the emergence of deficits in punishment and reward sensitivity and their association with CU traits during early childhood, a crucial time for moral and conscience development. Low responsiveness to punishment has implications for the parenting of children high in CU traits, with research suggesting that typical disciplinary practices are less effective in this population. The use of rewards instead may prove a fruitful avenue for promoting prosocial behaviour and cooperation in children who exhibit CU traits. Given the propensity towards low social affiliation in individuals high in CU traits, it is important to compare the motivational value of various reward types in the context of parenting and how the quality of the parent-child relationship relates to the motivational value of social rewards. For children low in temperamental fear, parent socialisation should capitalise on children's positive motivation to maintain a good relationship with the parent.

This thesis aims to explore the associations among CU traits, sensitivity to punishment and different reward types, and conscience in relation to parenting during early childhood. In Chapter 2, the relationship between CU traits and punishment insensitivity in children aged 3 to 6 was examined using a novel experimental task designed to capture how well children learn

from punishment and reward. A novel task was needed because tasks in the current literature are not appropriate and sufficiently engaging for young children. This study aimed to investigate whether deficits in reinforcement learning are present in early childhood and how these deficits relate to CU traits. Moreover, this study aimed to disentangle the effects of reward and punishment. This study addressed a gap in the existing literature as there is a dearth of studies on CU traits and reinforcement learning during this critical period for moral and conscience development.

The study in Chapter 3 explored the role that punishment insensitivity plays in the associations between CU traits and conscience and between CU traits and parenting practices. Building on Chapter 2, this study investigated the theory that the relationship between CU traits and conscience problems is mediated by punishment insensitivity. Researchers have suggested that temperamental fearlessness, which manifests as insensitivity to punishment, places children at risk for immoral conduct and conscience problems (Frick et al., 2014b; Frick & Viding, 2009). Punishment insensitivity has been hypothesised to impede the internalisation of moral rules and conduct during parent socialisation encounters, which in turn impedes conscience formation. Despite this theory being widely agreed among researchers in the field, no studies have investigated this in relation to CU traits in young children. A second aim of this study was to explore how punishment insensitivity affects the parenting of children high in CU traits. Despite featuring in multiple theoretical models on the aetiology of CU traits with implications for the effectiveness of parent discipline, no studies have tested the effects of insensitivity to punishment on parenting in children high in CU traits.

Chapter 4 explored how CU traits are related to responsiveness to social versus tangible rewards. The association between punishment insensitivity and CU/psychopathic traits suggests that the use of rewards may be even more important in children who are higher in CU traits. Previous research found that higher levels of parental warmth were associated with decreases in CU traits over time (Pardini et al., 2007; Waller et al., 2015) and suggests that social rewards may be particularly motivating in children for whom traditional forms of discipline and limit-setting may not be as effective. Chapter 4 extends prior research by examining CU traits and the motivational value of different positive reinforcers, namely praise and tangible rewards, during early childhood using a novel experimental task. This study addressed a gap in the existing literature as, to our knowledge, no study currently exists that

has examined responsiveness to different reward types in relation to CU traits during early childhood.

Chapter 5 extends Chapter 4 by further exploring the association between CU traits and response to different types of social rewards. This chapter reports the validation of a questionnaire designed to elucidate children's responsiveness to different parental rewards, including social in addition to traditional tangible rewards. Responsiveness to social reward in the form of verbal praise was investigated in the previous chapter; the questionnaire used in this study was developed to examine responsiveness to more specific social rewards that are typically recommended in parent training interventions – that is, affection and time with the parent (Dadds & Hawes, 2006; Webster-Stratton, 2005).

In Chapter 6, the role parenting plays in the relationships between CU traits and sensitivity to punishment and reward was investigated using observation. To date, research on CU traits and response to punishment and reward has tended to rely solely on experimental measures and thus it is difficult to generalise findings to real-world interactions. Observation is widely recognised as the gold standard in attachment and parent-child interaction research as opposed to more common assessments relying on respondents' perceptions (e.g., parent-report via questionnaires) or representations (e.g., use of dolls and narrative to enact a story) of the parent-child relationship. Observation provides rich and detailed data and allows researchers to observe phenomenon as it is happening 'in the field'. This study observed parenting behaviours including use of coercion, praise, and affiliative rewards and child behaviours including compliance, coercion, and responsiveness to parental rewards. Dyadic behaviours including joint attention and shared warmth were also observed. Although the term "compliance" was used in this thesis, we do not refer to compliant behaviour as mindless compliance with parent demands and passive adherence to authority. Compliance in the context of this thesis refers to cooperation with parental rules and standards in order to not cause harm or violate the rights of others.

Chapter 7 summarises the findings from the research in this thesis, followed by a discussion of the key implications of these studies and suggestions for future research. The limitations of the research were then considered in this concluding chapter.

All studies in this thesis were conducted with children aged 3 to 8. The foundations for moral emotions and empathy are laid down early in life and early childhood is an important period for the formation of conscience. Furthermore, both parenting practices and child behaviour are more likely to be more malleable during early childhood as opposed to later childhood support should be provided problems escalate and producing more distress and impairment. It is therefore important to identify risk factors before CP become severe, placing pressure on the parent-child relationship and leading to increasingly dysfunctional patterns of parent-child interaction and, importantly, before they become entrenched. Overall, this thesis intends to (1) contribute to knowledge and understanding of how individual differences in sensitivity to punishment and reward can contribute to the development and maintenance of CU traits, and (2) suggest ways in which interventions can be personalised in light of the unique characteristics of children with elevated CU traits.

Chapter 2
Callous-Unemotional Traits and Reinforcement Sensitivity: Development of an Experimental Task to Assess Learning through Punishment and Reward in Young Children

In this chapter, I will describe the development of a novel experimental task to assess reinforcement learning in young children. This experimental task investigated the association between CU traits and deficits in reinforcement-based decision-making in children aged 3 to 6 years. This study aimed to provide further evidence about the age when these deficits may be present.

2.1 Introduction

Reinforcement learning refers to the process by which an individual learns through reward and punishment. Reward increases the likelihood of the rewarded behaviour reoccurring, while punishment decreases the likelihood of punished behaviour reoccurring. Lykken's (1957) low-fear hypothesis, one of the earliest accounts of psychopathy, proposed that individuals with psychopathic traits exhibit diminished fear reactivity to aversive stimuli resulting in the inability to inhibit behaviour to avoid punishment. Lykken argued that this failure to learn from punishment gives rise to the antisocial behaviour associated with psychopathy. Other theories have since elaborated on the processes underlying impaired reinforcement learning in psychopathy, such as Blair's (2005b) IES theory and Newman's (1998) RM hypothesis. These were discussed in Chapter 1, section 1.4. At the heart of these models is the reduced ability to process punishment cues and, to a lesser extent, cues that signal reward. This chapter will focus on the experimental tasks used to investigate the link between CU traits and reinforcement learning.

Punishment and reward learning has primarily been investigated using experimental tasks. Compared to parent or self-report measures, experimental tasks can better capture processes considered to be outside of conscious processing and are not subject to response bias. One such task, the response reversal paradigm, first described in Chapter 1 (section 1.4.2), requires individuals to change their response as reward and punishment contingencies vary throughout the task. Typically, the task starts with a high probability of reward (e.g., 90%) and a low probability of punishment (e.g., 10%). After every few trials, the probability changes until there

is a 0% chance of reward and 100% chance of punishment. Participants can stop playing at any time and collect their reward (e.g., points accumulated). A greater number of trials played – that is, persevering despite increasing rates of punishment – is taken to indicate deficits in reinforcement learning.

O'Brien and Frick (1996) designed a computerised response reversal task for children in which they could choose to either view behind a door, the other side of a card, under a box, or select a fishing pole. They could also choose to stop the game and collect any points earned instead. In addition to the gain or loss of points, participants were shown a happy or a sad face to respectively indicate a successful or unsuccessful outcome. The goal was to earn points as contingency dropped from a 90% probability of being rewarded to 0%. Children in this study were more likely to persist in pursuing rewards despite increasing rates of punishment if they had high levels of CU traits and low anxiety compared to the children in the high CU and high anxiety group and low CU and low anxiety controls. Moul et al. (2012) argued that these findings point to CU traits being associated with deficits in learning through punishment but not reward. At the beginning of the task when the probability of reward was high (the acquisition phase), children with CU traits were able to learn to respond to the stimuli that resulted in reward, thus indicating stimulus-reward learning. However, in the second phase, when contingencies are reversed and previously rewarding stimuli became increasingly punished, the performance of children higher in CU traits decreased, indicating a reduced ability to form stimulus-punishment associations.

Similar to O'Brien and Frick (1996), Budhani and Blair (2005) found that, compared to youth who were low on CU traits, youth high on psychopathic traits were less likely to inhibit their response despite the higher probability of punishment as the task progressed. This study also used a computerised response reversal task to assess response to reward and punishment. Animals were presented in pairs and participants had to learn which one to click based on whether they won or lost points upon clicking. A limitation of these studies is the wide age range of the participants making it difficult to pinpoint when in development, deficits in processing punishment and reward are present. Participants were age 6 to 13 years in the O'Brien and Frick study and 9 to 17 years in Budhani and Blair's. Moreover, Budhani and Blair's sample consisted of referred boys only, limiting the generalisability of findings.

Laboratory tasks of risk-taking behaviours have also been used to assess sensitivity to reward and punishment. For example, the Iowa Gambling Task (IGT; Bechara et al., 1994) was designed to simulate real-life decision-making in a gambling task with the goal to win as much money as possible. Participants are presented with two or more decks of cards. Choosing from one deck results in larger rewards (e.g., gain £100) or even larger and more frequent punishment (e.g., lose £150), while the other deck has smaller rewards (e.g., gain £50) but smaller and fewer penalties (e.g., lose £25). The 'safer' desk ultimately leads to a better payout over time. Compared to children and adolescents low in psychopathic traits, those high in psychopathic traits were more likely to choose risky desks that yielded higher rewards despite even higher penalty (Mitchell et al., 2001; Gao et al., 2009). These findings corroborate evidence from research using response reversal tasks showing that children high in psychopathic traits experience difficulty learning to modulate behaviour through reinforcement, especially if they have previously been rewarded for that behaviour. However, a common limitation of research using response reversal and risk-taking paradigms is the inability to distinguish whether it is reward or punishment that is driving decision-making processes since there is chance of both processes contributing to each response.

Another widely used paradigm in the investigation of reinforcement learning is the passive avoidance task. This paradigm was first described in this thesis in Chapter 1, section 1.4.2. In this task, participants learn through trial and error which stimulus to respond to gain a reward or avoid punishment. Participants must passively avoid (i.e., not respond to) stimuli that lead to punishment or negative consequences, giving rise to the term 'passive avoidance'. Task performance is typically measured using the number of times the participant responds to a previously punished stimulus (commission or 'passive avoidance' errors) and the frequency that the participant fails to respond to a previously rewarded stimulus (omission errors). A higher number of passive avoidance errors indicates deficits in punishment learning, while a higher number of omission errors indicates deficits in reward learning.

In one version of the passive avoidance paradigm, stimuli consisted of eight 2-digit numbers, half of which yielded a reward and the other half punishment. Incentives were money or tokens that could be traded for cash. Studies using this version of the task found that higher CU or psychopathic traits were associated with more passive avoidance errors and fewer omission errors in 16-year-old boys (Vitale et al., 2005) and adolescent juvenile offenders (Scerbo et al., 1990). Research with adult male forensic samples using the same passive avoidance task

corroborates these findings (Newman & Kosson, 1986). Finger et al. (2011) reported similar findings using images of random objects as stimuli (e.g., a picture of a key, drawer, etc.) and points as rewards in their version of the passive avoidance task. Additionally, neuroimaging results from this study showed that higher CU traits were associated with lower response in brain areas associated with reinforcement learning.

In contrast, White et al. (2016) and Zhang et al. (2021) found no association between CU traits and deficient reward and punishment processing in adolescents. In their version of the passive avoidance paradigm, participants were shown coloured shapes on a computer screen (e.g., yellow triangle, red circle). Responding to certain shapes yielded money as the reward, while others resulted in loss of money as punishment. Performance on the task was associated with higher levels of CP but not CU traits (White et al., 2016; Zhang et al., 2021). However, fMRI revealed different levels of activation in the reinforcement processing areas of the brain in participants with high versus low levels of CU traits. Thus, reward and punishment still appear to be processed differently but only at the neural level.

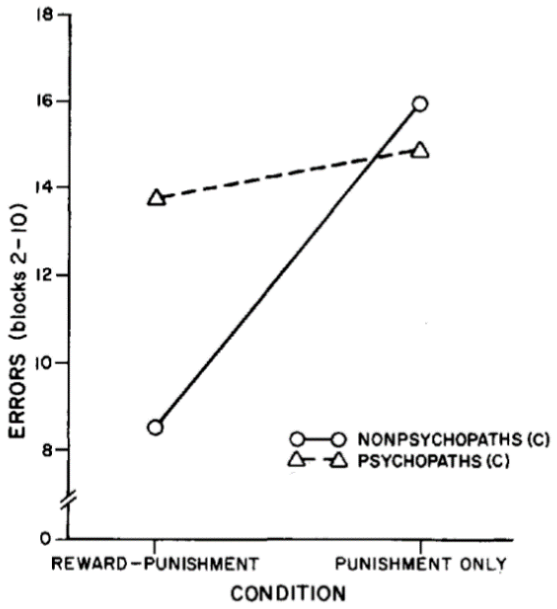
The majority of the studies conducted on reinforcement learning and CU traits are with samples of adolescents and older children. To the best of my knowledge, only one experimental study has investigated reinforcement learning and CU traits in children younger than 6 years. In Briggs-Gowan et al.'s (2014) Stars in Jars passive avoidance study with children aged 3 to 5 years, four jars in different shapes and colours were presented on a touchscreen tablet. Selection of 'good' jars resulted in the child winning a star and selection of 'bad' jars led to the loss of a star. However, rather than a standard measure of CU traits, Briggs-Gowan et al. measured more specific features of CU traits, namely low concern for others and insensitivity to punishment. Insensitivity to punishment but not low concern was associated with more passive avoidance errors and poorer ability to discriminate between 'good' and 'bad' jars indicating deficits in reinforcement learning. Although this study did not examine CU traits in the traditional sense, the findings indicate that atypical reinforcement learning is already present during early childhood and can be seen during interactions with parents.

An advantage of the passive avoidance paradigm is that it can distinguish whether poor decision-making is an effect of reward or punishment by comparing performance under different conditions with different reinforcement contingencies: a condition where the participant is rewarded for correct responses and not punished for incorrect responses (reward

only), a condition where the participant is punished for incorrect responses and no reward is given for correct responses (punishment only), and a condition with both reward and punishment (mixed contingency). In contrast to the reward-only and mixed-contingency conditions, the only goal in the punishment-only condition is to avoid punishment allowing a comparison of participants' sensitivity to punishment when reward is removed.

Figure 2.1

Mean Number of Passive Avoidance Errors as a Function of Psychopathic and Non-Psychopathic Offenders and Contingency Condition



Note. Passive avoidance errors in each contingency condition are shown for non-psychopathic and high-psychopathic groups. The solid line represents the non-psychopathic group and the dotted line represents the high-psychopathic group. From "Passive Avoidance Learning in Psychopathic and Non-psychopathic Offenders," by J. P Newman and D. S. Kosson, 1986, *Journal of Abnormal Psychology, 95*(3), p.255. Copyright 1986 by the American Psychological Association.

The original pioneers of the passive avoidance paradigm in the study of psychopathic traits, Newman and Kosson (1986), used the passive avoidance task to investigate disinhibited behaviour in male inmates high in psychopathic traits. In this study, the performance of participants high in psychopathic traits did not differ across conditions, with a similar number of passive avoidance errors committed in both the mixed-contingency and punishment-only conditions. In contrast, participants low in psychopathic traits made more passive avoidance

errors in the punishment-only condition compared to the mixed-contingency condition featuring both reward and punishment (Figure 2.1). Thus, the presence of reward appeared to be more motivating for individuals lower in psychopathic traits as their performance was poorer when there was no reward. For participants high in psychopathic traits, the number of passive avoidance errors they made was high across both conditions and the presence of reward did not appear to interfere with task performance. These findings suggest that individuals with psychopathic traits are more likely to be insensitive to punishment than sensitive to rewards. These experimental studies are consistent with studies using self-report questionnaires that showed CU traits were associated with insensitivity to punishment but not reward in adolescents (Allen et al., 2016, 2018).

To the best of my knowledge, only one study has been conducted with young children using different reinforcement contingencies, but this study did not assess CU traits, only externalising problems (Castellanos-Ryan et al., 2011). Using a passive-avoidance task, Castellanos et al. argued that more errors in the conditions with reward compared to the punishment-only condition indicate reward response bias and hypersensitivity to reward. Conversely, more errors in the punishment-only condition suggest insensitivity to punishment. Their study found that more errors in the reward condition than the punishment-only condition (i.e., reward response bias) were associated with more frequent binge drinking and sensation seeking but not CD symptoms or drug use. Thus, this paradigm represents a useful way to compare sensitivity to reward versus sensitivity to punishment.

2.1.1 The Current Study

The evidence for atypical reward and punishment learning and CU traits in children and adolescents is mixed. This could be attributed to differences in methodology (e.g., stimuli and incentive used) and wide age ranges of the samples used. The literature reviewed above specifically focused on research conducted with children and adolescents; however, even with this focus on childhood samples, studies have rarely been conducted with children younger than 7 years of age. The mixed findings of studies in this area could also be due to methodological factors. Stimuli were often artificial or meaningless to the participant (e.g., random still images, coloured shapes, 2-digit numbers) and arbitrarily designated as positive or negative (e.g., yellow triangles are positive, blue circles are negative). Furthermore, the types of incentives used may call into question how motivated participants were to perform well. For

example, money may be appropriate for adolescents and adults who have learned its value in procuring desirable items, but younger children are less likely to be aware of its value. Moreover, while some studies have found no link between CU traits and performance on experimental tasks of reinforcement learning, neuroimaging evidence from these same studies shows that atypical reinforcement learning is already present in late childhood and early adolescence in individuals high in CU traits at the neural level. It stands to reason, then, that methodological differences in experimental tasks may have contributed to the mixed findings in this area. Alternatively, inconsistent findings could be attributed to developmental changes due to brain maturation. Evidence of atypical reinforcement learning at the neural level but not the behavioural level suggests that the foundations of atypical responsiveness to reward and punishment may already be in place by early childhood. However, these deficits may not become apparent until later in development, as children mature and learn to use antisocial behaviour to achieve their goals without considering the negative consequences of such behaviour.

Therefore, the aim of this study is to investigate reinforcement learning and CU traits in early childhood with a particular focus on age 3 to 6 years. Few studies have examined these processes in younger children with the wealth of studies conducted with adults and older youth, yet this period is critical for conscience and empathy development (Knafo et al., 2008; Kochanska et al., 2002). Examining reward and punishment mechanisms during this period of early childhood may give a clearer idea of when deficits in reinforcement learning may already be present and whether they can be identified in early childhood. As discussed in Chapter 1, childhood-onset CP are more likely to be lifetime-persistent, and since child patterns of interaction are less rigid and thus potentially more amenable to intervention in early childhood, it is important to identify risk factors early on. Given the above-stated issues with methodology in the current literature, a novel computerised task designed to be developmentally sensitive and appropriate for young children was developed to assess atypical reinforcement learning.

It was hypothesised that higher levels of CU traits would be associated with greater punishment insensitivity as indicated by poorer performance on the experimental task. It was predicted that reinforcement contingency would moderate the association between CU traits and task performance, such that lower CU traits would predict poorer performance when reward is removed. Higher levels of CU traits are predicted to be associated with poorer performance irrespective of reinforcement contingency. Finally, it is hypothesised that reinforcement

learning deficits can be measured reliably in this age group using an experimental task that features developmentally appropriate stimuli and rewards. Child age, gender, and externalising problems (combined hyperactivity and CP) were included in the analyses given their known associations with CU traits to control for potential confounds.

2.2 Method

2.2.1 Participants

Participants were recruited from schools and children's centres in England and advertisements placed in community newsletters and parenting magazines in the UK. One hundred and nine children (46% female) aged 3 to 6 years (M = 4.87, SD = 1.06) and their parents took part. Child gender was identified by caregivers and we did not differentiate between gender and biological sex at birth given that our target age range was 3 to 5 years and the persistence of gender incongruence and dysphoria most commonly occurs between the age of 10 and 13 years. Most children came from two-parent families (91%) and had English as their first language (94%). Children were identified by caregivers as 71% White, 12% Asian, 8% Black, and 9% mixed White and Black or White and Asian. All primary caregivers (M age in years = 37.46, SD = 4.43) were the child's biological parent and comprised primarily of mothers (97% mothers, 3% fathers). Most parents had an undergraduate degree or equivalent and above (96%). All families received a £10 shopping voucher for participating in the research.

2.2.2 Parent Questionnaires

Externalising problems. The Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) was used to assess parent report of child externalising problems. The SDQ is a 25-item rating scale comprising the following subscales: Conduct Problems, Emotional Symptoms, Hyperactivity, Peer Problems, and Prosocial Behaviour. Each item is rated on a 3-point Likert scale ranging from 0 'not at all true' to 2 'certainly true'. For the purposes of this research, only the Conduct Problems and Hyperactivity subscales were used and combined to assess child externalising problems. This broader externalising problems subscale shows good predictive validity and improved internal consistency (Goodman et al., 2009). The alpha for the combined externalising subscale in the present study was .80.

CU traits. The University of New South Wales (UNSW) system (Dadds et al., 2005) of pooling items from the SDQ and the Antisocial Process Screening Device (APSD; Frick & Hare, 2001)

was used to measure child CU traits. The APSD assesses three dimensions of psychopathic traits: CU Traits (6 items), Narcissism (7 items), and Impulsivity (5 items). However, it has been criticised for containing items that overlap with features of disruptive behaviour problems and, thus, its ability to distinguish between CU traits and CP (Dadds et al., 2005). Dadds et al.'s (2005) factor analysis of the items from the SDQ and APSD produced a reliable index of CU traits that form a separate dimension from CP. It includes three items drawn from the APSD's CU Traits scale (Appendix C) and five reverse-scored items from the SDQ's Prosocial Behaviour scale (Appendix B). This index of CU traits termed the 'UNSW system' after the authors' affiliation, was used in the present study. The UNSW system has demonstrated good reliability and validity in both community and clinical samples with a range of age groups (Dadds et al., 2005; Dadds et al., 2009; Dadds et al., 2011; Dadds et al., 2014a). The alpha for the combined UNSW CU Traits scale was .91 compared to .78 for the APSD in the present sample, indicating significant improvement in its internal reliability as with previous studies.

Sensitivity to punishment. The Punishment Insensitivity subscale of the Multidimensional Assessment Profile of Disruptive Behavior (MAP-DB; Wakschlag et al., 2010) was used to assess parent report of child sensitivity to punishment (Appendix D). Items are rated on a 6-point Likert scale ranging from 0 'never' to 5 'all the time'. The Punishment Insensitivity subscale (7 items) has demonstrated good reliability and validity (Nichols et al., 2014). The alpha for the present sample was .92.

Sensitivity to reward. The children's version of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ-C; Colder et al., 2011) is a 33-item rating scale that measures Punishment Sensitivity (15 items) and Reward Sensitivity (18 items). Parents rate each item for its accuracy in describing their child on a 5-point Likert scale from 1 'strongly disagree' to 5 'strongly agree'. The SPSRQ-C has good reliability and validity (Colder et al., 2011; Luman, et al., 2012). The Punishment Sensitivity subscale was not used as punishment sensitivity is conceptualised as longer-term anxiety/worry (e.g., '*Your child thinks a lot before complaining about something'*, *'Your child often has difficulty falling asleep because they think about things they have done or must do'*; Appendix E), as opposed to a more immediate response to an environmental event intended to be perceived as aversive by the child, and thus contains numerous items that do not conceptually fit the punishment sensitivity construct examined in this research. The alpha for the Reward Sensitivity subscale in the present sample was .71.

Autism symptoms. A brief 16-item version of the Social Responsiveness Scale (SRS-brief; Moul et al., 2015) was completed by parents to assess children's autism symptoms. Parents rated each item on a 4-point Likert scale ranging from 0 'not true' to 3 'almost always true'. The SRS-brief has shown good reliability and validity compared to the original 65-item SRS (Moul et al., 2015). There is considerable phenotypic overlap between CU traits and autistic traits, such as low empathy and emotion processing deficits, yet these are distinct conditions with different origins, diagnostic criteria, and support or treatment needs (Jones et al., 2010). Therefore, it is necessary to exclude participants who may show clinical levels of autistic traits to mitigate potential confounds of a similar but clinically distinct condition. Children who scored above the clinical cut-off for autism (≥ 60) on the SRS-brief were not included in study analyses. None of the children scored above the clinical cut-off and, therefore, all participants were included in study analyses. The alpha for the present sample was .88.

2.2.3 Child Experimental Task: Moles in Holes

This experimental task assessed punishment and reward sensitivity in a computerised task of learning through both punishment and reward. Children played a touchscreen tablet game, 'Moles in Holes', in which they were asked to help a farmer catch the moles stealing apples from his farm (Figure 2.2). There were four different shaped holes: rounded, rectangular, triangular and wavy-edged. Two of the holes had a mole inside and if these holes were selected the child wins an apple (reward; Figure 2.3). The other two holes did not have a mole inside and selecting these holes resulted in the loss of an apple (punishment). Participants had to learn through trial and error to select the stimuli that give a reward and withhold selecting the stimuli that result in punishment. The task was programmed to randomly select which holes would yield a reward and which would lead to punishment for each block. Participants start each block with ten apples.

There were two conditions: (1) mixed-contingency condition (punishment and reward), in which participants were punished for incorrect responses and rewarded for correct responses; and (2) punishment-only condition, in which participants were punished for incorrect responses but did not receive any rewards. In contrast to the mixed-contingency condition, the only goal in the punishment-only condition was to avoid punishment. This allowed us to see if participants were able to correctly respond when the reward was removed. The order of presentation of the conditions was counterbalanced randomly to control for order effects. There

were two blocks representing each experimental condition with 20 trials in each block. The first four trials were excluded from scoring because they were the child's first exposure to each of the stimuli and their associated reward or punishment, and thus should represent chance performance. At the end of the first block, children are asked if they would like to take a short break.

Prior to the experiment, participants completed a practice task in which they had to either give five consecutive correct responses or complete 20 practice trials if they did not give five correct responses to proceed to the actual task. The decision to allow children to proceed to the actual task even when they did not give sufficient correct answers assumes that if participants cannot learn to give correct answers after 20 trials in the practice task, then they will not in the actual task, thus, reflecting deficits in reinforcement learning.

Task performance on the Moles in Holes task was measured by calculating the following four scores: (1) the number of passive avoidance errors (or 'commission errors'); (2) the number of omission errors; (3) and *d*-prime (*d'*). A passive avoidance error occurs when the participant fails to inhibit response to a previously punished stimulus; that is, the participant presses the hole that should be avoided as it previously led to the loss of an apple. An omission error occurs when the participant fails to respond to a previously rewarded stimulus; that is, the participant does not respond to the hole that has a mole in it. The third outcome variable, *d'*, is an index of the ability to discriminate between the target and non-target stimuli and correctly respond (Macmillan & Creelman, 2005). It is calculated by subtracting the *z*-score of the false alarm rate (i.e., the probability of a yes response given the target is absent) from the *z*-score of the hit rate (i.e., the probability of a yes response given the target is present). *d'* uses both correct and incorrect responses in its calculation and thus accounts for random responses and response bias. A higher value of *d'* indicates greater discrimination sensitivity; that is, a greater ability to learn from trial and error on the task. Passive avoidance errors and *d'* are the primary variables of interest. Passive avoidance errors reflect the inability to inhibit behaviour despite that behaviour having been previously punished and *d'* models the ability to discriminate stimuli while accounting for chance performance and bias.

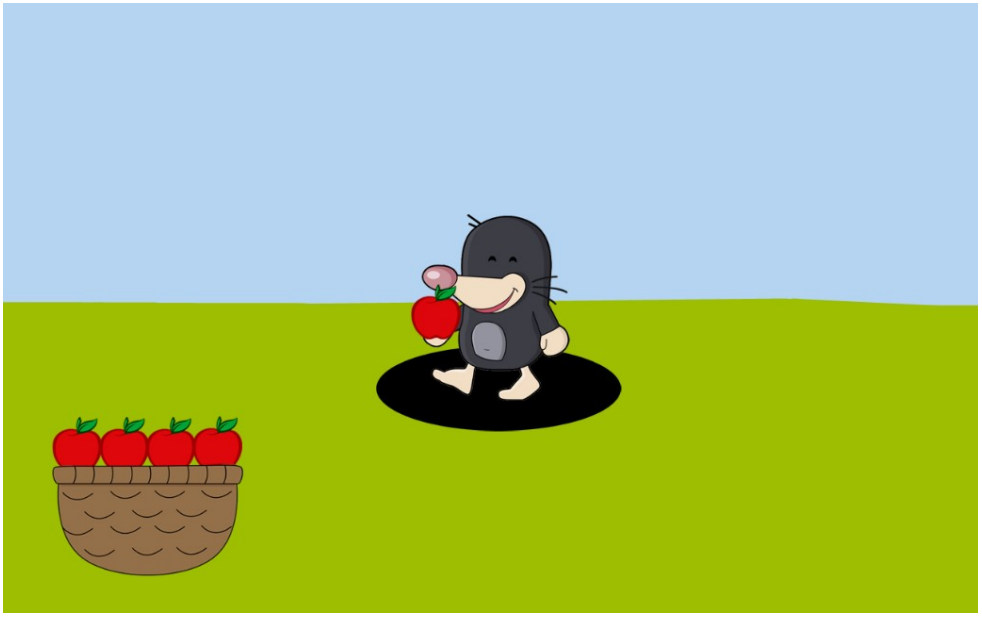
Figure 2.2

The Moles in Holes Experimental Task of Learning through Punishment and Reward

Note. This figure shows the setting up of the scenario for the experimental task. A mole is shown stealing an apple from Farmer Joe's farm.

Figure 2.3

The Moles in Holes Task Stimuli



Note. In this screen capture, the participant has responded correctly by touching a hole with a mole inside. The apple the mole is holding then goes into the basket for their reward.

Task development. The aim was to create an experimental task that would be appropriate and engaging for younger children. The task was adapted from the passive avoidance paradigm which has been used to assess reinforcement learning and psychopathy in adolescents and adults. In other tasks that have been used to assess reinforcement-based decision-making, such as the response reversal or risk-taking tasks, performance reflects either or both reward and punishment and the influence of either cannot be disentangled. The passive avoidance paradigm can be modified to assess sensitivity to either reward or punishment by comparing performance across multiple experimental conditions with different contingencies including reward only, punishment only, and/or mixed reward and punishment. To minimise fatigue effects as the target sample was young children aged 3 to 6 years, I included only two conditions in the task: punishment only and mixed contingency. In contrast to the mixed-contingency condition, the only goal in the punishment-only condition was to avoid punishment, allowing a comparison of participants' sensitivity to punishment when reward is removed.

Previous experimental studies on reinforcement learning often used artificial stimuli arbitrarily assigned as positive or negative, for example, 2-digit numbers (Vitale et al., 2005), random images (Finger et al., 2011), and coloured shapes (e.g., White et al., 2016). Incentives were usually monetary or tokens which participants could use to trade for real money (Vitale et al., 2005). Children in the target age range of this research, 3 to 6 years, are less likely to be familiar with or understand the value of money or tokens. Therefore, my version of the passive avoidance task used child-friendly stimuli and rewards (farm, animals, apples) and emulated a typical tablet game with bright colours and a real-life scenario to increase engagement of younger children. The aim was to ensure the stimuli made sense and appealed to children. The Moles in Holes task was created using images from free stock photo websites in accordance with the non-commercial research and private study guidelines of the UK Copyright, Designs and Patents Act (1988) and was programmed using OpenSesame (Mathôt et al., 2012).

A pilot study was conducted with seven volunteer families with children aged 3 to 5 years (M = 5.2, SD = 1.2, 96% female). Children's performance on the task was compared against the parent report of punishment insensitivity (i.e., the MAP-DB). The results showed a significant positive correlation between parent report of punishment insensitivity and passive avoidance errors (r = .95, p < .05). Based on these findings and observation of children during the task, the task is age-appropriate, instructions are comprehensible, and the procedures are feasible.

2.2.4 Procedure

Ethical approval was obtained from the university departmental research ethics committee. Participants were recruited through social media, local community groups, schools, and nurseries in the West Midlands area of the UK. Flyers notified parents of research into young children with behaviour problems and included the researcher's contact details (phone and email). The following wording was used in recruitment flyers: *'Do you have a child aged 3 to 6 years old? Is your child's behaviour hard to manage? Researchers at the UCL Institute of Education are looking for families to take part in a study on children's responses to parental rewards and discipline.'* To ensure that the sample included children with CP and would contain sufficient participants who score relatively high in CU traits, caregivers were offered the opportunity to attend a one-session group seminar providing information about childhood CP and managing challenging behaviour following their assessment session. Parents who contacted the researcher were provided with information about the study over the phone or via email. An assessment session was scheduled with families who met the inclusion criteria. All questionnaires were completed by the child's primary caregiver following receipt of written informed consent from the child's primary caregiver. Children completed the experimental task described above on a touchscreen-enabled device. The experimenter read the instructions out loud as they appeared on the screen. All children received a small prize when they completed the task. Parents were debriefed following all assessment procedures. Families received a £10 shopping voucher upon completion of all assessment tasks.

2.2.5 Data Analysis

Data were analysed using the Statistical Package for the Social Sciences, version 27. An alpha level of .05 was used for all analyses. In preliminary explorations of the data, all variables were examined for deviation from normality and outliers. Outliers were only removed if entered erroneously. Cases of outliers were cross-checked against data collected via paper questionnaires and OpenSesame. All cases were determined to have been entered correctly and, therefore, no outliers were removed.

Two-tailed Pearson's correlations were used to examine bivariate associations among study variables and to check for multicollinearity. Several variables were not normally distributed but contained zero and negative values so could not be transformed. Simulation studies have shown that Pearson's r is robust to non-normality if the sample size is not small ($n > 5$) and

data is not highly skewed or kurtic (skew > 3, kurtosis ≥ 17; Bishara & Hittner, 2012). None of the variables were highly skewed or highly kurtic (Table 2.2). Correlations were conducted with bootstrapping at 3000 resamples with bias-corrected and accelerated (BCa) confidence intervals.

The effects of contingency condition (two levels: mixed contingency and punishment only) and CU traits on task performance were examined using linear mixed-effects regression. Mixed-effects models account for the inherent correlation among the multiple observations from the same participant (Gueorguieva & Krystal, 2004). Contingency condition, CU traits, and their interaction were entered as fixed effects. The other independent variables (i.e., child age, sex, and externalising problems) were also entered as fixed effects. A random intercept was specified for participant to account for within-subject correlations. Continuous variables were standardised prior to model fitting to assist in interpretation. Restricted maximum likelihood estimation was used to account for missing data. Three models were fitted for each of the continuous measures of task performance: passive avoidance errors, omission errors, and *d'*. Models were fitted first without and then with the interaction effect. Akaike's Information Criterion (AIC) was used to check model fit. Significant interactions were probed at low (- 1 *SD*), average (mean), and high (+ 1 *SD*) values of CU traits using the method described in Preacher et al. (2006). All analyses were conducted with bootstrapping at 3000 resamples with BCa confidence intervals.

In preliminary analyses, two unconditional models with no predictors were fitted for each of the three outcome variables – one with a random intercept specified for participant and one without the random intercept to check if there was a clustering effect of participant. Specifying a random intercept for participant allowed task performance to vary by participant accounting for inherent within-subject correlation. The amount of variation in task performance accounted for by participant was checked by calculating intraclass correlations (ICCs) for the random intercept models. Likelihood ratio tests (LRT) were used to compare the model fit. ICCs were high, ranging from .52 to .68 (Table 2.1) indicating that 52-68% of the variance can be accounted for by participant. LRT indicated that the addition of the random intercept significantly improved model fit for all three measures of task performance (*p*s < .01).

Table 2.1

Tests of Variance Parameters for the Unconditional Models

	Passive avoidance errors	Omission errors	Discrimination sensitivity
Random effects			
Level 2 variance	2.80	1.23	.99
Level 1 variance	1.32	.81	.93
Intraclass correlation	.68	.60	.52
Likelihood ratio test (*df* = 1)	67.35*	14.14*	33.673*

Note. df = degrees of freedom.

* $p < .01$.

2.3 Results

2.3.1 Descriptive Statistics and Covariates

Means and standard deviations for parent-report measures and indices from the experimental task are reported in Table 2.2. The mean score for the externalising problems subscale of the SDQ in the present study fell above those previously reported in European community samples, which ranged from 4.29 to 5.52 (Maurice-Stam et al., 2018; Mølland et al., 2023). Mean CU traits scores fell within the range of those previously reported in community samples of young children, which ranged from approximately 2.76 to 5.57 (Dadds et al., 2005; Dadds et al., 2014a; Fontaine et al., 2010).

Bivariate correlations between the main study variables are reported in Table 2.3. Significant bivariate correlations were found between child age and all measures of performance on the experimental tasks. Age was negatively correlated with the number of commission and omission errors and positively correlated with *d'*, indicating that the older the child the better their performance on the task. CU traits were positively associated with passive avoidance errors and negatively with discrimination sensitivity, indicating that higher CU traits were related to poorer task performance. Externalising problems were not significantly related to any of the measures of task performance. Passive avoidance errors and omission errors were not significantly related to one another.

Table 2.2

Descriptive Statistics of Main Study Variables

Variable	*M*	*SD*	Range	Skewness (*SE*=.24)	Kurtosis (*SE*=.47)
Child age	4.87	1.06	3-6	.29	-.85
Externalising problems	6.40	3.94	0-8	.42	-.73
CU traits	5.02	3.97	0-16	.41	-.59
Parent-reported punishment insensitivity	16.83	6.86	3-40	1.07	1.92
Parent-reported reward sensitivity	25.59	4.34	14-34	-.37	-.12
Passive avoidance errors	7.43	3.72	0-19	.38	.10
Omission errors	3.86	2.56	0-20	2.48	13.62
Discrimination sensitivity (*d'*)	-.01	1.20	-6.23-2.23	-1.63	6.92

Note. CU = callous-unemotional.

Table 2.3

Bivariate Correlations among Study Variables

Variable	1	2	3	4	5	6	7	8
1. Child age	-							
2. Gender (male = 1)	-.01	-						
3. Externalising problems	.22*	.18	-					
4. CU traits	-.06	.41**	.59**	-				
5. Parent-reported punishment insensitivity	.06	.28**	.73**	.71**	-			
6. Parent-reported reward sensitivity	.09	-.18	-.29**	-.52**	-.51**	-		
7. Passive avoidance errors	-.41**	.10	.07	.30**	.19*	-.24*	-	
8. Omission errors	-.38**	.09	-.11	.07	.06	-.15	-.08	-
9. Discrimination sensitivity	.50**	-.17	.08	-.23*	-.14	-.21*	-.50**	-.73**

Note. CU = callous-unemotional.

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

2.3.2 Linear Mixed-Effects Models

Results of the linear mixed-effects models are presented in Table 2.4. Age significantly predicted passive avoidance errors such that older children made less passive avoidance errors. CU traits significantly predicted more passive avoidance errors indicating that children higher in CU traits were more likely to respond to stimuli that was previously punished. Experimental condition was also a significant predictor of passive avoidance errors with more being made in the mixed-contingency condition which had both punishment and reward, compared to the punishment-only condition. This indicates that when reward was present children were more likely to make a response when they should not. The CU traits x Condition interaction was also a significant predictor. Lower CU traits predicted lower passive avoidance errors in both conditions while children higher in CU traits made most errors in the mixed-contingency condition (Figure 2.4A). This indicates that higher CU traits are associated with less ability to inhibit response in the presence of reward. Simple slopes analysis revealed that the interaction was significant at all three conditional values of CU traits. Although all participants made more passive avoidance errors in the mixed-contingency condition, this effect was stronger in participants with high levels of CU traits ($B = 4.04$, $SE = .15$, $p < .01$) compared to those with average CU traits ($B = 2.41$, $SE = .15$, $p < .01$) and low CU traits ($B = .78$, $SE = .15$, $p < .01$).

Table 2.4

Effect Estimates of Condition, CU Traits, Externalising Problems, and Sociodemographic Variables Predicting Task Performance

Variable	Passive avoidance errors		Omission errors		Discrimination sensitivity	
	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	3.54**	.24	2.06**	.19	-.19	.16
Gender [a]	.09	.32	-.31	.25	.33	.20
Child age	-.78**	.15	-.55**	.12	.61**	.09
Externalising problems	-.15	.20	-.12	.16	.21	. 13
CU traits	.50*	.25	-.05	.19	-.32*	.16
Condition [b]	.34*	.15	.07	.13	.01	.14
CU traits x Condition	.41**	.15	.14	.13	.02	.14

Note. CU = callous-unemotional.

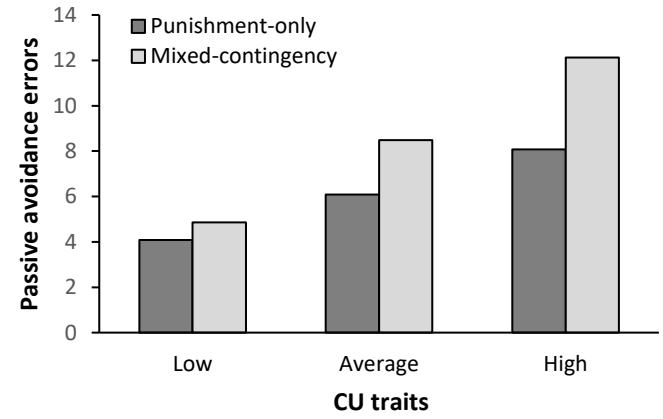
[a] 0 = female, 1 = male. [b] 0 = punishment-only, 1 = mixed-contingency.

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

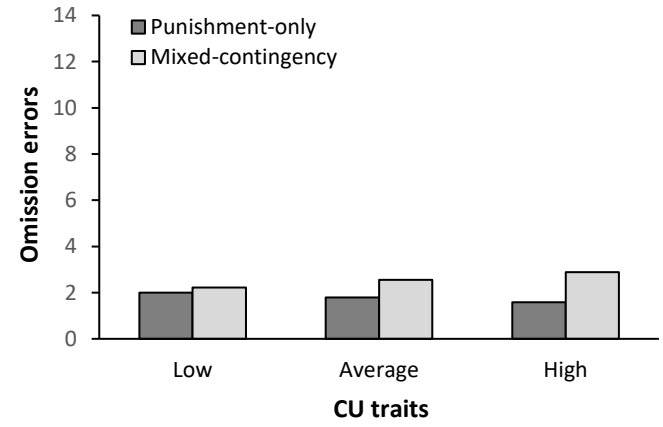
Figure 2.4

Task Performance as a Function of Experiment Condition and CU Traits

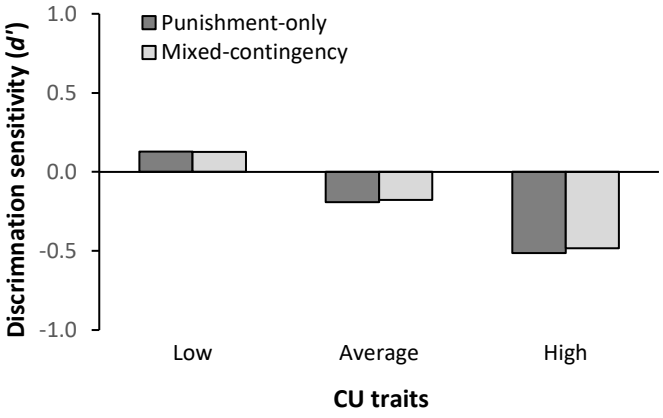
A



B



C



Note. Panel A: Passive avoidance errors as a function of experimental condition and CU traits. Panel B: Omission errors as a function of experimental condition and CU traits. Panel C: Discrimination sensitivity as a function of experimental condition and CU traits. Low, average,

and high CU traits respectively corresponded to 1 SD below the sample mean, the sample mean, and 1 SD above the sample mean for CU traits scores.

With respect to omission errors, age was the only significant predictor of omission errors. Younger children were more likely to fail to respond to a previously rewarded stimulus. None of the other predicters were significant. The same results were obtained for the model without the interaction term entered. For d', age was again a significant predictor. Older children were more likely to be able to discriminate between stimuli that led to punishment and stimuli that led to reward. CU traits was also a significant predictor of d', such that higher CU traits were associated with poorer ability to discriminate between the target and non-target stimuli (Figure 2.4C). The CU Traits x Condition interaction effect was not significant.

For passive avoidance errors, AIC indicated improvement in model fit with the addition of the CU Traits x Condition interaction term ($\Delta AIC = 5$). For omission errors and d', AIC were equivalent for models without and with the interaction effect indicating no improvement in model fit with the addition of the interaction term. To allow ease of comparison across the three measures of task performance and because there were no changes in the significance of effects, models with the interaction term were retained.

2.3.3 Correlations between Parent-Report and Experimental Measures of Reinforcement Sensitivity

The validity of the novel experimental task was checked by examining correlations between the task performance and validated questionnaire measures of punishment and reward sensitivity. Parent-reported insensitivity to punishment was positively correlated to number of passive avoidance errors but not to the other indices of task performance. Parent-reported reward sensitivity was negatively correlated with the number of passive avoidance errors and d'.

2.4 Discussion

The aim of the research reported in this chapter was to examine the association between reward and punishment learning and CU traits in early childhood using a novel experimental task designed to be developmentally sensitive for young children. As predicted, higher CU traits were significantly related to poorer performance on the experimental task. Children higher in

CU traits committed more passive avoidance errors, indicating that they were less able to withhold responding to stimuli that had been previously punished. This is consistent with previous research using similar experimental tasks with children and adolescents that have found an association between CU/psychopathic traits and more passive avoidance errors (Finger et al., 2011; Scerbo et al., 1990; Vitale et al., 2005). These studies also found no association between CU traits and omission errors, and the results from the current study are consistent with this finding. An omission error occurs when the individual fails to respond to a previously rewarded stimulus and, thus, reflects the failure to learn from reward cues. A greater number of these types of errors are thought to represent hyposensitivity to reward (Newman et al., 1985; Scerbo et al., 1990). The null relationship between CU traits and omission errors taken together with the finding of a significant positive association between CU traits and passive avoidance errors suggests that CU traits may be more strongly related to insensitivity to punishment rather than hypersensitivity to reward. This is in line with experimental (Blair et al., 2006; Budhani & Blair, 2005) and questionnaire (Allen et al., 2016, 2018) studies that found punishment insensitivity but not reward sensitivity was related to CU traits.

With respect to the differences in performance between the two contingency conditions, participants higher in CU traits in the present study made more passive avoidance errors when reward was present compared to the punishment-only condition. This suggests that the presence of competing reward interferes with punishment learning in children higher in CU traits. This effect was observed in children with average levels of CU traits as well, but the effect was weaker. These findings are contrary to predictions and inconsistent with previous research which found no difference between conditions in passive avoidance errors made in participants high in psychopathic traits (Newman & Kosson, 1986). Discrepant findings could be explained by the vastly different sample characteristics between studies. Newman and Kosson conducted their study with an adult and male only forensic sample, while the present sample comprises of a community sample of young boys and girls. Thus, not only are participants in original study older they also have more serious antisocial behaviour which could have contributed to differences in findings between studies.

The difference in findings could also be explained by the measurement of CU traits in the current study rather than psychopathic traits as in Newman & Kosson (1986). Psychopathy is a multidimensional construct encompassing grandiose-manipulative, CU (affective), and impulsive-irresponsible dimensions (Hare, 2003), whereas CU traits represent only the

affective dimension of psychopathic traits. There appears, then, to be differential relations between the ability to inhibit goal-directed behaviour and CU traits versus the broader construct of psychopathic traits. Indeed, reviews by Salekin (2017) and Frick (2022) of the three dimensions of psychopathy and their correlates found that each dimension differentially related to different outcomes and risk factors in children. Thus, as suggested by Salekin, all three dimensions of psychopathic traits should be examined in future research and tested separately to determine if one dimension hides or suppresses the effects of the other dimensions, which may be the case in Newman and Kosson's findings.

Dadds et al.'s (2005) factor analysis of the items from the SDQ and APSD produced a reliable index of CU traits that form a separate dimension from CP. It includes three items drawn from the APSD's CU Traits scale (Appendix C) and five reverse-scored items from the SDQ's Prosocial Behaviour scale (Appendix B). This index of CU traits termed the 'UNSW system' after the authors' affiliation, was used in the present study. The UNSW system has demonstrated good reliability and validity in both community and clinical samples with a range of age groups (Dadds et al., 2005; Dadds et al., 2009; Dadds et al., 2011; Dadds et al., 2014a). The alpha for the combined UNSW CU Traits scale was .91 compared to .78 for the APSD in the present sample, indicating significant improvement in its internal reliability as with previous studies.

In terms of *d'*, consistent with Briggs-Gowan et al. (2014), the current results show that CU traits were significantly associated with lower *d'*. Children higher in CU traits had poorer ability to discriminate between stimuli that resulted in reward and those that resulted in punishment, suggesting that atypical reinforcement learning could lead to antisocial behaviours commonly associated with CU traits. A limitation of assessing task performance based on passive avoidance and omission errors only, is that these indices do not account for response bias. For example, a participant may respond to all stimuli or not respond to all stimuli, which results in a 50% success rate. The inclusion of *d'* as an outcome variable accounts for such response bias and uses all responses in its calculation: hits, misses (omission errors), false alarms (passive avoidance errors), and correct rejection. Although Briggs-Gowan et al. (2014) also assessed *d'* when examining punishment insensitivity in a community sample of preschool-aged children, they did not investigate its relationship to CU traits but instead to features of CU traits, including low concern for others and insensitivity to punishment as reported by parents. They found that parent-reported punishment insensitivity but not low

concern was associated with lower *d'*. Therefore, the current study extends the findings of Briggs-Gowan et al. (2014) to CU traits and supports their claim that reinforcement learning can be measured in children as young as 3.

Notably, although CU traits were associated with lower *d'*, this association was not moderated by reinforcement contingency, contrary to study predictions. This result indicates that the presence of competing reward did not influence the ability to discriminate between target and non-target stimuli through reward and punishment learning regardless of severity of CU traits. This contrasts with the current findings for passive avoidance errors in which there was an interaction effect of condition and CU traits. These findings do not necessarily contradict each other as they assess slightly different constructs. Passive avoidance errors are made when an individual fails to withhold responding to previously punished stimuli and reflects insensitivity to punishment, while *d'* is an index of the ability to distinguish between target and non-target stimuli which is learned through both punishment *and* reward in this paradigm. Moreover, insensitivity to punishment as reported by parents was significantly positively related to number of passive avoidance errors but not to the other indices of task performance, while parent-reported reward sensitivity was significantly negatively related to the number of passive avoidance errors and *d'* (Table 2.3). Taken together, this suggests that passive avoidance uniquely measures insensitivity to punishment, but *d'* is a better metric for overall reinforcement learning.

Unexpectedly, there were no associations between any of the indices of task performance and child externalising problems in the present study. This is contrary to previous experimental research which found links between atypical reward and punishment processing and CP (Matthys et al., 2004). However, these studies were conducted with smaller clinical samples of children with ODD. The null findings for externalising problems in the present study could be due to the use of a community sample with lower levels of CP or to a lack of variance in externalising problems in small clinical samples.

2.4.1 Limitations

There were several limitations of this study. First, the cross-sectional design precludes conclusions about the directionality of the relationships between studied constructs. A longitudinal design commencing in early life assessing how associations between CU traits and

sensitivity to reward and punishment change over time would help to gain a better understanding of whether atypical reinforcement learning predicts increased CP and CU traits, if CP and CU traits precede poor reinforcement learning, or whether bidirectional effects are present. Moreover, imaging studies show age-related differences in reward and punishment sensitivity with significant developmental changes in adolescence to brain systems relating to reward (Galván, 2010; 2013). Therefore, multi-method assessments including neural measures at several time points across childhood could provide further information as to whether experimental measures of reward and punishment sensitivity relate to changes in the brain's reward systems. This could also provide insights into the optimal time to implement interventions aimed at addressing deficits in inhibition and self-regulation.

A second limitation of this research is the reliance on parents as the single informant for CU traits and other covariates (e.g., externalising problems). Parents may not always be aware of the disruptive behaviours of their children that take place outside of the home. Parents could also have the tendency to over or under report due to social desirable answering, their own mood or functioning (e.g., stress), or poor parent-child relationships. It is worth noting that the parent report of punishment insensitivity was significantly related to the objective measure (i.e., the experimental task) in the current study, providing evidence for the validity of parent report in the current study. Future research should use multiple informants (e.g., teachers, early childcare workers) and observational assessments. The use of multiple informants can capture behaviour across a range of settings (e.g., teachers can report on behaviours in the school setting), while child observation is more objective, naturalistic, occurs in real-time, and is not influenced by informant biases (Aspland & Gardner, 2003). Additionally, observation can capture behavioural and relational elements of interaction that parents may struggle to articulate or measure accurately through self-report methods.

A further limitation is the use of a community sample so findings may not generalise to clinical samples. The mean scores for the CP ($M = 2.02$) and hyperactivity ($M = 4.38$) subscales of the SDQ, which were used to form the measure of externalising problems in the present study, fell within the range of those obtained in children aged 3 to 5 years from the Millenium Cohort Study, a large-scale cohort study of more than 18,000 families in the UK, where mean scores ranged from approximately 1.3 to 2.1 for CP and 2.9 to 4.4 for hyperactivity (Griffiths et al., 2011). Comparatively, scores in clinical samples of past studies were higher, ranging from 2.2 to 4.1 for CP and 4.6 to 6.8 for hyperactivity (Becker et al., 2004; Dadds et al., 2014a; Klasen

et al., 2000). Although the findings of the current study may not be generalisable to clinical samples, examination of individual variation in CU traits within the general population can be beneficial in furthering our understanding before conducting more costly and resource-intensive research with clinical samples.

The use of experimental methods is both an advantage and a limitation. Experimental measures allow the researcher greater control and the provision of conditions to elicit behaviours of interest, ensuring exposure to both punishment and reward that may not be available in a 'real life' setting for ethical or practical reasons. However, experimental tasks are based on artificial rewards and stimuli and are not carried out during 'real life' social interactions with parents, peers, and teachers. Despite these limitations, the current study represents a significant improvement upon prior studies because of several changes made to the reinforcement learning task. First, the inclusion of different reinforcement contingency conditions enabled a comparison of response to punishment with and without competing reward and, thus, sensitivity to punishment versus sensitivity to reward. Second, the stimuli and task set-up simulated a real-life scenario and were arguably more meaningful to participants than relatively artificial stimuli such as 2-digit numbers and static images. Finally, the presentation of the task as a form of a game rather than a laboratory task is more engaging for younger participants. Age was a significant predictor of all measures of task performance, supporting the idea that experimental tasks should be developmentally appropriate. An important issue to consider when using cognitive tasks in research on CU traits is that CU traits are associated with a lack of concern over performance (Ciucci et al., 2014) yet not with impairment in IQ or ability tests (Allen et al., 2013). A possible explanation for higher errors and poorer ability to discriminate between stimuli in children higher in CU traits is that they were simply not motivated to perform well and not that they lack the capacity to learn. That is, they lack proclivity rather than ability. This is in line with current thinking on motivation and CU traits (Groat & Shane, 2020) and should be considered in future studies using experimental tasks with participants high in CU traits. This highlights the importance of the need for any experimental task to be engaging and rewards meaningful and motivating to participant to capture children's true ability.

2.4.2 Conclusion

Overall, the current findings indicate that CU traits are associated with deficits in learning through reinforcement and difficulty altering behaviour even in the face of punishment. Lack of consideration or fear of the negative consequences of antisocial behaviour could lead to children learning to use antisocial behaviour as a means of achieving their goals even at the expense of others (e.g., take another child's toy). Additionally, impairment in learning from punishment may mean discipline is ineffective in home or school settings. Cumulatively, these deficits may lead to chronic and entrenched patterns of CP that are difficult to change. From a clinical standpoint, as previously suggested by Hawes et al. (2014), individual differences in reinforcement learning could explain the finding that children who are high in CU traits respond less well to parent training interventions which aim to improve child behaviour by reducing parental harsh and inconsistent discipline and replacing these coercive parenting practices with calm, consistent non-physical discipline strategies. Given the abnormalities in responsiveness to punishment associated with CU traits, it stands to reason that parent training programmes are less effective for children high in CU traits. Findings from this study suggest that a cognitive profile that is deficient in reinforcement learning, particularly punishment learning, may be a target for improving treatment response of children with CU traits.

Chapter 3

Associations among Callous-Unemotional Traits, Parent Discipline, and Conscience: The Role of Insensitivity to Punishment

In the previous chapter, I investigated the relationship between CU traits and learning through punishment and reward in young children aged 3 to 6 years. CU traits were found to be associated with poorer reinforcement learning, in particular insensitivity to punishment rather than reward. Building on Chapter 2, this chapter aims to elucidate whether CU traits are associated with impaired conscience via insensitivity to punishment. Given the implications of child insensitivity to punishment in relation to parent socialisation processes, an additional aim is to investigate the effect of punishment insensitivity in the association between parenting and CU traits. It is important to note that, in this thesis, the term punishment refers to any event or stimulus perceived as aversive, including parental discipline. This includes all forms of parent discipline that children may find aversive, whether they are or are not experienced as aversive by the child in reality. All references to punishment include both punitive and non-punitive discipline.

3.1 Introduction

The term conscience is used to refer to an individual's inner sense of right and wrong and is often described as an inner compass that guides a person's ethical and moral decision-making. In scientific terms, conscience refers to the "cognitive, affective, and relational processes that enable children to construct and act according to internalised standards of conduct defined by experience, personal relationships, and societal expectations" (Thompson & Newton, 2003, p. 14). The subject of decades of research, the study of conscience has traditionally adopted a cognitive approach with the focus on children's comprehension of societal rules and assessed by their capacity to reason about hypothetical dilemmas (e.g., Kohlberg, 1969; Piaget, 1965). In these early conceptualisations of conscience, moral development was seen as the product of cognitive maturation. A criticism of the hypothetical dilemmas used in Kolhberg's moral reasoning tasks focus on justice-based decision-making with consequences to the self only, for example, should a man steal medicine that he cannot afford for his dying wife? While moral reasoning tasks that examine self-consequences can shed light on how individuals make decisions when personal interests are at stake, they do not capture the full complexity of

conscience, which encompasses a wider range of moral concerns, empathy for others, and the sense of moral duty (Eisenberg & Mussen, 1989; Gilligan, 2014).

Emphasising the role of empathy, Eisenberg and Mussen (1989) devised moral dilemmas that focused on prosocial reasoning in which children had to make a choice between helping someone and meeting their own needs. An example of this is whether a girl witnessing another girl getting bullied should intervene and risk getting bullied herself. Eisenberg and Mussen argued that prosocial moral reasoning involves evocation of moral emotions such as empathy and reflects care-based rather than justice-based moral reasoning. In defining conscience, it should be noted that moral emotions alone do not constitute conscience. Empathy, the capacity to feel and understand the feelings and perspectives of others drive prosocial behaviour and often precedes moral decision-making and conduct. Guilt is feeling of remorse that arises when an individual believes they have committed a moral transgression and helps prevent aggressive and disruptive behaviours that can hurt or cause distress to others. Therefore, moral emotions form the foundations of conscience and morality. Indeed, contemporary literature represents a shift to characterising the affective component of conscience – that is, the capacity to experience guilt and discomfort after transgressions and empathy towards others and to early socialisation experiences (Kochanska & Aksan, 2006). Specifically, research on conscience in the past three decades have assessed a combination of moral emotions such as guilt and empathy, moral conduct or compliance with rules and standards, alongside moral cognition (Aksan & Kochanska, 2005; Kochanska et al., 2005; Thompson & Newton, 2013). Conscience is, therefore, a multifaceted construct.

The core features of CU traits are the lack of moral emotions of guilt and empathy, leading researchers to hypothesise that individuals high in CU traits have problems in the normal development of conscience (Blair, 2005b; Frick et al., 2014b). Indeed, a wealth of research has shown that early conscience leads to positive outcomes in children, including more prosocial and rule-abiding behaviour and lower levels of aggressive and antisocial behaviour (e.g., Eisenberg et al., 2010; Knafo et al., 2008). As described in Chapter 1, children and adolescents higher in CU traits tend to perform poorly across various measures of conscience, including moral reasoning tasks (Blair, 1997; Blair et al., 2001b; Dolan & Fullam, 2010), hypothetical vignettes of social situations (Northam et al., 2022; Pardini & Byrd, 2012), and experimental tasks (Sakai et al., 2012). Evidence from these studies shows that children high in CU traits

have more problematic beliefs and internal standards of conduct and indicate an impaired and poorly developed conscience.

Problems in conscience development have been suggested to stem from a fearless temperamental style that hinders conscience development placing children with high levels of CU traits at risk for CP (Chapter 1, Section 1.3). This temperamental style is characterised by reduced negative physiological arousal in response to aversive stimuli or events, such as discipline or distressed facial expressions (Blair, 2005b; Kochanska, 1993). In children with typical levels of fearfulness, this unpleasant emotional arousal, such as guilt or remorse following a transgression, typically serves to inhibit aggressive behaviours or violations of standards of conduct and is viewed as critical in the development of conscience and prevention of CP (Kochanska, 1993). Thus, children with low levels of temperamental fear lack have lower capacity for recognising and processing distress cues and experience impairment at most foundational level of conscience development. Additionally, without fear, children fail to learn the association between their aggressive and disruptive behaviour with negative consequences and, therefore, have reduced motivation to avoid future misbehaviour since they do not anticipate punishment in future situations (Blair, 2005b; Dadds & Salmon, 2003). Barker et al. (2011) found that, for adolescents high in CP and CU traits, fearless temperament manifested as reduced responsiveness to punishment cues rather than boldness in novel situations or towards strangers. Similarly, Pardini (2006) found that the relationship between fearlessness and CU traits was mediated by insensitivity to punishment. In experimental research with adults, it has been consistently found that psychopathic traits are associated with a failure to learn to change behaviour to avoid punishment (Newman et al., 1990; Newman & Kosson, 1986). More recently, these findings have been extended to children and adolescents high in CU traits (Budhani & Blair, 2005; Vitale et al., 2005). The research reported in Chapter 2 of this thesis also corroborates previous findings indicating that CU traits are associated with difficulty learning from punishment.

This insensitivity to punishment cues is a central feature of theoretical models of CU traits and has been identified as a key mechanism explaining poor conscience formation in children with CU traits (e.g., Blair, 2005b; Hawes et al., 2014; Frick et al., 2014b). Insensitivity to punishment may hinder the typical development of conscience by reducing the effectiveness of parental discipline. A child who is less responsive to the negative consequences of disruptive behaviour (e.g., parental discipline) is more likely to fail to internalise parents' messages about

standards of conduct. This, in turn, leads to a failure to alter future behaviour and problems in conscience. These detrimental effects, in combination with ineffective parent socialisation practices, can cascade across development potentially leading to psychopathic features and serious CP over time (Dadds & Salmon, 2003; Frick et al., 2014b). However, despite theory and evidence suggesting that children high in CU traits possess a temperamental style that predisposes them to be insensitive to punishment and can hinder the normal development of conscience, no studies have investigated the association between punishment insensitivity and CU traits in relation to conscience. Specifically, that insensitivity to punishment might be the mechanism explaining poorer conscience in children who are high in CU traits.

In terms of the parent socialisation processes involved in conscience development, coercive and harsh parenting practices specifically are thought to interfere with children's ability to internalise parental messages about behaviour during disciplinary encounters due to the high emotional state such practices elicit (Kochanska, 1997). In support of this view, a significant body of research has found longitudinal links between harsh parenting (e.g., yelling, spanking) and various indices of conscience, including impaired guilt (Kochanska et al., 2002), empathy (Eisenberg et al., 1983), moral reasoning, moral conduct (Kochanska et al., 2003), and CP (Barker et al., 2011; Lansford et al., 2011). These associations were reported for both parent self-report and observational methods assessing parenting. These studies were discussed in detail in Chapter 1, Section 1.3.2.

With respect to CU traits, it is not clear whether harsh parent discipline evoke high emotional state in children with high levels of CU traits, given that low physiological arousal and emotionality is a well-established correlate of CU traits (Herpers et al., 2014). Hawes and Dadds (2005) found that clinic-referred boys higher in CU traits responded with less negative emotionality to being placed in time-out (sadness, anger, fear) compared to those lower in CU traits. There is evidence that negative parenting was associated with lower CU traits in children with CP compared to those higher in CU traits (e.g., Crum et al., 2015; Edens et al., 2008; Hipwell et al., 2007; Pasalich et al., 2011; Wootton et al., 1997). High levels of CU traits may exert a protective effect against punitive parenting practices due to punishment insensitivity. However, these studies were cross-sectional and more recent studies using longitudinal designs have reported that higher levels of harsh parenting were related to increased CU traits across multiple time points (Pardini et al., 2007; Wagner et al., 2019; Waller et al., 2012). Somewhat contrary to these findings, Larsson et al. (2008) found that the positive association between

harsh parenting and later CU traits disappeared when controlling for earlier CP in a cohort study of over 4000 twins. Larsson et al. argued that this shows that the CP of children with high levels of CU traits elicit harsh parenting, which is supported by genetic analyses showing high heritability for CU traits and no shared environmental influence. Thus, this study suggests that while higher CU traits are associated with harsh parenting, this effect may be child- rather than parent-driven. A possible explanation for this effect is insensitivity to punishment, that is, children who do not respond to milder forms of discipline may evoke increasingly harsher methods from parents. However, no studies to date have investigated the possibility that punishment insensitivity may moderate parenting in children with CU traits.

A challenge for research in this area is the broad range of definitions of harsh or negative parenting across studies. Corporal punishment (e.g., spanking) and yelling feature most commonly in studies that have found that negative parenting was associated with increased CU traits (e.g., Larsson et al., 2008; Pardini et al., 2007; Waller et al., 2019). Studies that found no relationships between poor parenting and CU traits tended to use broader measures of negative parenting. For example, Wootton et al.'s (1997) conceptualisation of negative parenting incorporated inconsistent parenting, poor supervision, and more typical measures of harsh parenting such as corporal punishment. Edens et al.'s (2008) measure also included inconsistent parenting along with rejection-oriented punishment practices (e.g., parent stays angry for a long time). Diaz et al. (2018) similarly included the broadly defined concept of negative parenting which included inconsistent parenting and low monitoring. Thus, prior studies have either considered only one dimension of harsh parenting (usually corporal punishment) or aggregated multiple dimensions of parent behaviours under one umbrella term of negative or harsh parenting (e.g., inconsistent discipline with corporal punishment), making it difficult to disentangle the unique and/or relative roles of specific parenting behaviours.

Indeed, research over the decades has conceptualised numerous dimensions of parenting styles and behaviours, from those characterised by low control and low strictness (such as rule-setting, teaching, and explaining) to high control and more punitive methods (such as physical punishment, psychological aggression) – a number of which have had differential associations with child outcomes (Grusec et al., 2017; Pinquart et al., 2017). A recent meta-analysis by Leijten et al. (2019) testing the discrete components of parenting interventions found that positive reinforcement in the form of praise and non-violent discipline for misbehaviour in the form of logical consequences (e.g., removal of a toy if the child is playing too rough with it),

had the strongest associations with success in reducing disruptive behaviour. Thus, more focused and clearly defined measures may clarify the relationship between CU traits and negative or harsh parenting and provide greater utility for tailoring parenting interventions for children with differing temperament profiles. Furthermore, more gentle inductive methods such as parental teaching and reasoning, ignoring misbehaviour, redirection, and returning positive attention when the child's behaviour improves have been underrepresented in the CU traits literature. Past research has shown that inductive methods predicted increased moral and prosocial behaviour (Augustine & Stifter, 2015; Farrant et al., 2012). Thus, inductive discipline could be a potential pathway to prosocial behaviour for children high in CU traits.

3.1.1 The Current Study

Theory and research suggest that insensitivity to punishment impedes the internalisation of moral rules and conduct during parent socialisation encounters, placing children with high levels of CU traits at risk for CP and impaired conscience development (Blair, 2005b; Frick et al., 2014b). Despite this theory being widely cited among researchers, no studies have investigated insensitivity to punishment as a mechanism underlying the relationship between CU traits and conscience. Further, while theory highlights the importance of parenting in the development of conscience and CU traits, harsh parenting has been conceptualised differently across studies. Corporal punishment is one of the most common indices of harsh parenting with less punitive corrective parental behaviours, such as ignoring misbehaviour and explaining and teaching, largely underrepresented in the CU traits literature. A better understanding of how CU traits relate to individual differences in conscience and parenting may help to personalise interventions aimed at promoting prosocial behaviour and moral emotions in antisocial children based on their unique temperamental characteristics.

There were two main aims of the current study. First, this study builds on findings from Chapter 2 that CU traits are associated with a reduced tendency to alter behaviour in the face of punishment by investigating the pathway from CU traits to conscience via punishment insensitivity. The current study focuses primarily on the affective component of conscience given its relevance to CU traits. Second, the effect of punishment insensitivity on parenting in children with CU traits is examined. Rather than exclusively focusing on harsh parenting, the current study considers different methods of discipline ranging from non-punitive and corrective (e.g., redirecting child's attention, ignoring misbehaviour) to more punitive methods

(e.g., making the child feel ashamed, spanking). It should be noted that punishment in this study refers primarily to parental punishment rather than the broader definition whereby punishment is any aversive event or stimulus that decreases the antecedent behaviour that led to punishment in the first place.

The current study sample comprises children between the age of 3 to 8 years. This age group was selected for several reasons. First, in addition to encompassing a critical period for conscience and moral development (Knafo et al., 2008; Kochanska et al., 2002), this is a period of significant transitions as children grow and learn to be independent and their behaviour becomes more challenging to manage (Webster-Stratton, 2005). Throughout this developmental period, parents use an increasingly wider variety of strategies to manage their child's behaviour. For example, parents of younger children may rely on redirecting their child's attention as a behaviour management strategy, whereas parents of older children begin to explain and teach household or social rules with children's developing verbal ability. Corporal punishment rates have also been shown to decline as children grow older (Straus & Stewart, 1999). Moreover, interactions with parents dominate the majority of children's experiences during this period of childhood and parents continue to be a significant influence throughout childhood until adolescence when peer influence becomes more relevant (Allen et al., 2015). Finally, childhood-onset CP are more likely to be lifetime-persistent and since family patterns of interaction are less rigid and thus potentially more amenable to intervention in early childhood, it is crucial to identify risk factors early on.

With respect to the first aim of the study, it was predicted that higher levels of CU traits would be associated with a poorer conscience. A second prediction was that insensitivity to punishment would have a significant indirect effect on the association between CU traits and conscience. Specifically, higher CU traits would be related to greater punishment insensitivity which, in turn, would be related to lower conscience. With respect to the relation between CU traits and parenting (the second aim of this study), it was hypothesised that higher CU traits would be associated with greater use of harsh parental discipline (corporal punishment, psychological aggression, deprivation of privileges) and a lower frequency of non-punitive discipline (explain/teach, ignore misbehaviour). It was further hypothesised that punishment insensitivity would moderate the association between harsh discipline and CU traits, such that the combination of greater punishment insensitivity and harsh discipline would be associated with higher CU traits. In terms of non-punitive discipline, it was hypothesised that lower levels

of non-punitive discipline would be associated with lower CU traits and that there would be no interaction effect of punishment insensitivity. Child age, gender, and externalising problems were examined as potential confounds given known associations with CU traits.

3.2 Method

3.2.1 Participants

Participants were 131 children (49% female) aged 3 to 8 years (M = 5.23, SD = 1.41) and their primary caregivers (98% mothers, 2% fathers). Most children were White (71%), 11% Asian, 7% Black, and 11% mixed White and Black or mixed White and Asian. Most children came from two-parent families (89%) and had English as their first language (88%). Parents were aged 37.64 years (SD = 4.50) and most had an undergraduate degree and above (96%). Compared to the national rates in the UK, participants in the present sample had lower rates of non-White ethnicity (29% in the present sample vs. 34.5% national average), single-parent families (11% vs. 15.4%), and English as a second language (12% vs. 19.5%; Department for Education, 2022; Office for National Statistics [ONS], 2021a, 2021b). In terms of parent education, parents in this study had a much higher rate of higher education compared to the national average in the UK (96% vs. 34%; ONS, 2021a).

3.2.2 Main Variables

CU traits. The UNSW system assessed parent report of child CU traits (Dadds, Fraser, Frost, & Hawes, 2005). In this system, items from the SDQ (Goodman, 1997) and the APSD (Frick & Hare, 2001) were pooled to form an index of CU traits with improved reliability over the APSD alone. As described in Chapter 2, the APSD CU traits scale contains items that overlap with features of CP and has been criticised for conflating CU traits and CP (Dadds et al., 2005). The combined SDQ and APSD measure of CU traits has demonstrated good validity and improved reliability over the CU traits scale of the APSD in both community and clinical samples across a range of age groups (Dadds et al., 2005; Dadds et al., 2009; Dadds et al, 2011; Dadds et al., 2014a). The alpha for the combined UNSW CU Traits scale was .90 compared to .75 for the APSD in the present sample, indicating significant improvement in its internal reliability consistent with previous studies.

Sensitivity to punishment. Caregiver report of child sensitivity to punishment was assessed using the 7-item Punishment Insensitivity subscale of the MAP-DB (Wakschlag et al., 2010).

Caregivers rated items, such as *'Act like rules don't matter'*, *'Keep on misbehaving no matter what you do'*, on a 6-point Likert scale ranging from 0 'never' to 5 'all the time'. The Punishment Insensitivity subscale has demonstrated good reliability and validity (Nichols et al., 2015). Alpha was .90.

Conscience. The My Child questionnaire (Kochanska, DeVet, et al., 1994) assessed parent report of child conscience. My Child contains two higher-order scales: Affective Conscience which assesses emotional arousal associated with actual or potential wrongdoing, and Behavioural Conscience which assesses the ability to refrain from wrongdoing and behave in accordance with standards of conduct. Due to their importance in parent socialisation (Kochanska, 1994) and relevance to CU traits, only the Affective Conscience scale and its subscales were used in this research. The subscales were: Guilt, Remorse/Other Emotional Reactions after Transgressions, Mishap, Wrongdoing (18 items); Concern over Good Feelings with Parent after Wrongdoing (8 items); and Apology and/or Promise Not to Do It Anymore (6 items; Appendix G). Each item was scored on a 7-point Likert scale from 1 'extremely untrue' to 7 'extremely true'. The My Child questionnaire has shown good validity and internal consistency (Kochanska et al., 1994; Cornell & Frick, 2007). The alpha for the higher order scale Affective Conscience which encompasses all the above subscales was .94.

Parent disciplinary practices. The Dimensions of Discipline Inventory (DDI; Straus & Fauchier, 2011) was used to assess the frequency of use of parental discipline methods. The DDI provides exhaustive coverage of parental discipline including spanking, yelling, explaining rules, deliberate ignoring of misbehaviour, making their child feel ashamed, and so on. The following subscales were selected for this research: Corporal Punishment, Deprivation of Privileges, Psychological Aggression, Diversion, Explain/Teach, and Ignore Misbehaviour. This selection represents parenting strategies for managing child behaviour ranging from low-level and non-punitive discipline methods that parents might use before escalating to more punitive methods such as yelling and corporal punishment. In accordance with the DDI manual, the subscales Corporal Punishment (e.g., shake, spank, slap child), Deprivation of Privileges (e.g., take away toys, restrict activities), and Psychological Aggression (e.g., make child feel ashamed or guilty, withhold affection) were summed to create the higher-order scale Punitive Discipline (Straus & Fauchier, 2011). The remaining subscales Diversion (e.g., time out), Explain/Teach (e.g., demonstrate right thing to do), and Ignore Misbehaviour (e.g., not pay attention to misbehaviour) were summed to create the higher-order scale of Non-Punitive

Discipline. Parents rated each item for frequency of use on a 10-point Likert scale from 0 ‘not in the past year, but in a previous year’ to 9 ‘two or more times a day’. The DDI has been shown to have good validity but poor internal consistency (Van Leeuwen et al., 2012). The main advantage of the DDI is the low administration time due to its brevity (two to four items per scale) yet exhaustive coverage of parenting behaviours. However, the low number of items per scale means there is a trade-off between breadth of coverage and alpha since alpha is a function of the number of items in a scale (Kline, 2000; Streiner et al., 2014). Thus, internal consistency was checked using mean inter-item correlations (MIC) which are not sensitive to scale length. The acceptable range for MIC is .15 to .50 (Streiner et al., 2014). MICs for the present sample were .44 for Corporal Punishment, .38 for Psychological Aggression, and .32 for Deprivation of Privileges. For the higher-order scale Punitive Discipline, the MIC was .33. With respect to the non-punitive discipline subscales, MICs in the present sample were .11 for Diversion, .45 for Explain/Teach, .30 for Ignore Misbehaviour, and .20 for the higher-order scale Non-Punitive Discipline. As the subscale Diversion was below the acceptable range, it was not used in this study.

3.2.3 Covariates

Sociodemographic characteristics. Caregivers reported on caregiver and child age, gender, ethnicity, family structure, and caregiver education. We did not differentiate between gender and biological sex at birth given that our target age range was 3 to 8 years and the persistence of gender incongruence and dysphoria most commonly occurs between the age of 10 and 13 years (Steensma et al., 2011).

Externalising problems. Caregivers reported on child externalising problems using the Conduct Problems and Hyperactivity scales on the SDQ (Goodman, 1997; Goodman et al., 2009). Further details on the SDQ were described previously in Chapter 2. Alpha for the combined externalising subscale in the present study was .81.

Autism symptoms. Given the overlap between features of CU traits and autistic traits (Jones et al., 2010), to avoid confounding the two conditions, children’s autism symptoms were assessed using the brief 16-item version of the SRS (SRS-brief; Moul et al., 2015). Reliability and validity for the SRS-brief were described in Chapter 2. None of the children had scores above

the clinical cut-off score of 60 and therefore all participants were included in study analyses. The alpha for scores on the SRS-brief was .88.

3.2.4 Procedure

Following ethical approval from the university departmental research ethics committee, flyers were placed on social media, in community and school newsletters, and parenting magazines in England notifying parents of research into young children with behaviour problems. Questionnaires were completed by caregivers following receipt of written informed consent. Families received a £10 shopping voucher upon completion of all questionnaires.

3.2.5 Data Analysis

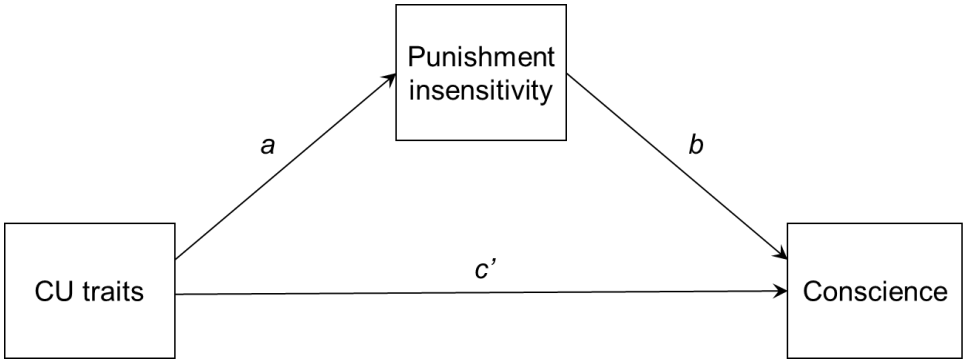
Data analyses were conducted using the Statistical Package for the Social Sciences, version 27. An alpha level of .05 was used for all analyses. In preliminary analyses, visual inspection of histograms and q-q plots revealed that several variables deviated from normality but contained zero and negative values and could not be transformed. Simulation studies have shown that Pearson's *r* is robust to non-normality if the data is not highly skewed or kurtic (Bishara & Hittner, 2012). There were acceptable levels of skewness (< 3) and acceptable levels of kurtosis (< 10; Kline, 2011). Two-tailed Pearson's correlations were used to examine bivariate associations among study variables and to check for multicollinearity. Correlations were conducted with bootstrapping at 3000 resamples with BCa confidence intervals.

The first set of analyses tested the hypothesis that there would be an association between CU traits and conscience, and that insensitivity to punishment would account for this association. The mediation model is shown in Figure 3.1 and was examined using the PROCESS macro for SPSS (Hayes, 2013). PROCESS uses ordinary least squares (OLS) regression for model estimation. The indirect effect is the product of the regression coefficient for the effect of the independent variable on the mediator (i.e., CU traits → punishment insensitivity; labelled *a* in Figure 3.1) and the mediator's regression coefficient with the dependent variable (i.e., punishment insensitivity → conscience; *b* in Figure 3.1). Child age, sex, and externalising problems were entered as covariates. 95% bootstrap confidence intervals using 3000 bootstrap samples were used for inferential testing of all effects, as no assumptions are made about the distribution of the sample and power is maximised while minimising Type I error rates. If the confidence limits did not include zero, then the effect was significant (i.e., the indirect effect is

different from zero). PROCESS produces the completely standardised indirect effect as the measure of the effect size of the mediation (Hayes, 2013).

Figure 3.1

Statistical Diagram Modelling the Indirect Effect of CU Traits on Conscience via Punishment Insensitivity



Note. Labels attached to arrows between variables represent the regression coefficient for each path in the model. The indirect effect of the mediator on the dependent variable is the product of paths *a* and *b*. The direct effect is path *c'*. CU = callous-unemotional.

The second set of analyses concerned the second aim of the present study. Linear regression analyses were conducted to investigate insensitivity to punishment as a potential moderator of the association between parent discipline and CU traits. Interaction terms were created by multiplying scores for each discipline strategy by child punishment insensitivity scores. Continuous variables were centred prior to creating interaction terms. Child age, gender, externalising problems, and punishment insensitivity were entered into the model, followed by the interaction term. The dependent variable was CU traits. This model was fitted for each higher-order factor of discipline, that is, *Punitive Discipline* and *Non-Punitive Discipline*. The same models were fitted again with each factor broken down into their discrete components. For Punitive Discipline, these were *Corporal Punishment*, *Psychological Aggression*, and *Deprivation of Privileges*. For Non-Punitive Discipline, the components were *Explain/Teach* and *Ignore Misbehaviour*. Thus, a total of four models were fitted. Significant interactions were probed using the PROCESS macro (Hayes, 2013) and plotted at low (- 1 *SD*), average (mean), and high (+ 1 *SD*) values of punishment insensitivity. Externalising problems, CU traits, and punishment insensitivity were highly correlated (*r*s = .72-.73) and thus analyses were rerun with externalising problems removed as a predictor. No changes in the significance of

predictors for CU traits were observed when externalising problems were removed. Thus, models with all predictors were reported here.

3.3 Results

3.3.1 Descriptive Statistics and Covariates

Means and standard deviations for the main study variables are reported in Table 3.1. Mean CU traits score in this study sample fell within the range of those previously reported in community samples of young children, which ranged from 2.76 to 5.57 (Dadds et al., 2005; Dadds et al., 2014a; Fontaine et al., 2010). The mean score for the externalising problems subscale of the SDQ in the present study fell below the range of those previously reported in European community samples, which ranged from 4.29 to 5.52 (Maurice-Stam et al., 2018; Mølland et al., 2023).

Bivariate correlations are reported in Table 3.2. Male gender was significantly related to more externalising problems, higher CU traits, greater punishment insensitivity, and lower affective conscience. CU traits were significantly related to more severe externalising problems. Both externalising problems and CU traits were significantly related to greater punishment insensitivity and lower affective conscience. Greater punishment insensitivity was significantly related to lower conscience.

With respect to parent discipline, male gender was associated with greater levels of punitive discipline, specifically, psychological aggression. This indicates that parents were more likely to withdraw affection or try to make their child feel guilty or ashamed for boys versus girls. Externalising problems were positively related to parental use of punitive methods of discipline. CU traits and punishment insensitivity were positively associated with both punitive and non-punitive discipline, indicating that parents of children with greater levels of CU traits and punishment insensitivity more frequently disciplined their child regardless of the level of harshness of the discipline strategy used. In terms of specific punitive disciplinary methods, corporal punishment was related to externalising and punishment insensitivity but not CU traits. Psychological aggression and deprivation of privileges were related to externalising problems, CU, and punishment insensitivity.

In terms of non-punitive discipline, parents' use of ignoring misbehaviour was related to externalising problems. Non-punitive discipline was related to CU traits and punishment insensitivity, but when broken down into specific methods, they only correlated with parents' use of ignoring misbehaviour. Conscience was negatively related to parents' use of psychological aggression and positively related to parents' use of teaching and explaining.

Table 3.1

Descriptive Statistics of Main Study Variables

Variable	*M*	*SD*	Range	Skewness (*SE* = .22)	Kurtosis (*SE* = .43)
Child age	5.23	1.41	3-8	.68	-.25
Externalising problems	3.84	2.94	0-7	.48	-.58
CU traits	4.70	3.81	0-16	.52	-.37
Punishment insensitivity	16.29	6.47	3-40	1.22	2.57
Affective conscience	13.31	3.21	7-19	-.38	-.89
Punitive discipline [a]	1.90	.99	0-4	.46	-1.00
Corporal punishment	.61	.71	0-3	1.18	.72
Psychological aggression	2.63	1.58	0-6	.37	-1.26
Deprivation of privileges	2.46	1.29	0-6	-.11	-.92
Non-punitive discipline [b]	4.59	1.37	1-8	-.13	.36
Explain/Teach	6.5	1.46	2-9	-1.13	1.81
Ignore misbehaviour	2.68	1.87	0-7	.10	-.97

Note. CU = callous-unemotional.

[a] This higher-order scale on the Dimensions of Discipline Inventory (DDI) consists of the subscales Corporal Punishment, Psychological Aggression, and Deprivation of Privileges. [b] This higher-order scale on the DDI consists of the subscales Explain/Teach and Ignore Misbehaviour.

Table 3.2

Bivariate Correlations among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Child age	-											
2. Gender [a]	-.25**	-										
3. Externalising problems	.04	.21*	-									
4. CU traits	-.12	.39***	.58***	-								
5. Punishment insensitivity	-.02	.28**	.73***	.72***	-							
6. Affective conscience	.13	-.33***	-.50***	-.75***	-.71***	-						
7. Punitive discipline [b]	.06	.18*	.38***	.31***	.43**	-.24**	-					
8. Corporal punishment	-.05	.13	.22*	.15	.18*	-.16	.74***	-				
9. Psychological aggression	.12	.18*	.24**	.34**	.44***	-.29**	.87***	.53**	-			
10. Deprivation of privileges	.01	.11	.46***	.21*	.36**	-.13	.82***	.52**	.49***	-		
11. Non-punitive discipline [c]	.03	.07	.16	.23**	.23**	.00	.15	-.14	.26**	.09	-	
12. Teach / Explain	-.12	.00	.02	.07	-.08	.18*	-.07	-.13	-.08	.02	.77***	-
13. Ignore misbehaviour	.14	.10	.22*	.28**	.41***	-.14	.26***	-.10	.45**	.12	.87***	.34***

Note. CU = callous-unemotional.

[a] 0 = female, 1 = male. [b] This is a higher-order scale on the Dimensions of Discipline Inventory consisting of the subscales Corporal Punishment, Psychological Aggression, and Deprivation of Privileges. [c] This is a higher-order scale on the Dimensions of Discipline Inventory consisting of the subscales Explain/Teach and Ignore Misbehaviour.

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

3.3.2 The Indirect Effect of CU Traits on Conscience through Punishment Insensitivity

Path estimates are presented in Table 3.3. There was a significant indirect effect of CU traits on conscience through punishment insensitivity. That is, CU traits were a significant predictor of punishment insensitivity, and punishment insensitivity was a significant predictor of conscience. The direct effect of CU traits on conscience was significant. The total effect of CU traits on conscience, which is the sum of both the indirect and direct effects, was also significant, B = -.55, SE = .07, β = .06, 95% CI[-.69, -.43]. Child age, gender, and externalising problems did not predict conscience in the model. The model is summarised in Figure 3.2.

Table 3.3

Path Estimates for the Proposed Model

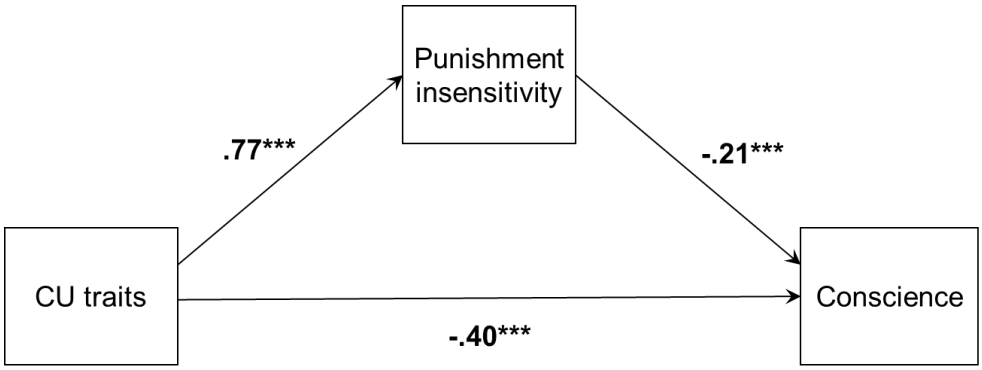
				95% CI	
Path	*B*	*SE*	*B*	LL	UL
CU Traits → Punishment Insensitivity	**.77**	.12	.46	.54	1.01
Punishment Insensitivity → Conscience	**-.21**	.05	-.42	-.30	-.12
CU Traits → Punishment Insensitivity → Conscience [a]	-.16	.03	-.16	-.24	-.10
CU Traits → Conscience [b]	**-.40**	.07	-.47	-.54	-.25
Age → Conscience	.12	.13	.05	-.14	.39
Gender → Conscience	-.20	.40	-.03	-.98	.58
Externalising Problems → Conscience	.13	.14	.07	-.14	.40

Note. Significant effects are in bold. CU = callous-unemotional; CI = confidence interval; LL = lower limit; UL = upper limit.

[a] The indirect effect. [b] The direct effect.

Figure 3.2

Path Diagram Depicting Indirect Associations between CU Traits and Conscience via Punishment Insensitivity



Note. Child age, gender, and externalising problems were entered as control variables, but these are not shown. The numbers presented are unstandardised coefficients. CU = callous-unemotional.

*** $p < .001$.

3.3.3 Unique Associations among CU Traits, Punishment Insensitivity, and Punitive Parent Disciplinary Practices

Regression parameters and collinearity statistics for overall punitive discipline are presented in Table 3.4. Collinearity statistics (variance inflation factor [VIF] and tolerance values) were within accepted limit for all variables.

Analyses revealed that male gender and greater punishment insensitivity predicted higher levels of CU traits. Parents' overall punitive discipline was not related to CU traits, nor was there evidence for a moderating effect of punishment insensitivity on this relationship. When punitive discipline was broken down into its subscales in analyses, male gender and greater punishment insensitivity remained predictors of higher CU traits (Table 3.5). More frequent corporal punishment was related to lower CU traits, but there was no relation with parents' use of psychological aggression or deprivation of privileges. Punishment insensitivity moderated the relation between corporal punishment and CU traits, such that higher frequency of corporal punishment predicted lower CU traits in children with lower punishment insensitivity (B = -3.28, SE = .74, $p < .01$) but higher CU traits in children with greater punishment insensitivity (B = 1.46, SE = .50, p = .04). Corporal punishment also predicted lower CU traits in children

with average levels of PI (*B* = -.91, *SE* = .44, *p* < .01), but this effect was less strong than the effect for children lower in PI. The interaction is visualised in Figure 3.3A.

With respect to deprivation of privileges, this discipline strategy did not predict CU traits but its interaction with punishment insensitivity did. Higher use of deprivation of privileges predicted higher levels of CU traits for children lower in punishment insensitivity (B = .82, SE = .41, p = .05), but lower CU traits in children with greater punishment insensitivity (B = -.84, SE = .42, p = .05). The interaction is visualised in Figure 3.3B.

Table 3.4

Effect Estimates of Punitive Discipline, Externalising Problems, and Sociodemographic Variables Predicting Callous-Unemotional Traits

	Model without interaction					Model with interaction				
Predictor	*B*	*SE*	*β*	Tol	VIF	*B*	*SE*	*β*	Tol	VIF
Child age	-.16	.17	-.06	.92	1.08	-.16	.17	-.06	.92	1.08
Gender [a]	**1.54****	.49	.20	.56	1.16	**1.55****	.50	.20	.83	1.2
Externalising problems	.34	.22	.13	.50	2.00	.34	.22	.13	.49	2.03
Punishment insensitivity	**.34*****	.05	.58	.45	2.24	**.35*****	.06	.59	.41	2.46
Punitive discipline [b]	-.13	.23	-.03	.79	1.26	-.13	.28	-.03	.79	1.26
Punitive discipline [b] x PI						-.01	.05	-.01	.84	1.20
ΔR^2						0				
Total R^2						.57				

Note. CU = callous-unemotional; PI = punishment insensitivity; Tol = tolerance.

[a] 0 = female, 1 = male. [b] This is a higher-order scale on the Dimensions of Discipline Inventory consisting of the subscales Corporal Punishment, Psychological Aggression, and Deprivation of Privileges.

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

Table 3.5

Effect Estimates of the Discrete Components of Punitive Discipline, Externalising Problems, and Sociodemographic Variables Predicting CU Traits

	Model without interactions					Model with interactions				
Predictor	*B*	*SE*	*β*	Tol	VIF	*B*	*SE*	*β*	Tol	VIF
Child age	-.20	.17	-.08	.88	1.13	-.24	.16	-.09	.88	1.14
Gender [a]	**1.46****	.49	.19	.85	1.17	**1.00***	.46	.13	.79	1.26
Externalising problems	.44	.22	.17	.47	2.14	.24	.21	.09	.44	2.26
Punishment insensitivity	**.33*****	.05	.55	.42	2.40	**.47*****	.06	.81	.27	3.77
Corporal punishment	.11	.41	.02	.61	1.64	**-.91***	.44	-.17	.45	2.25
Psychological aggression	.18	.19	.08	.54	1.86	.15	.18	.06	.50	2.00
Deprivation of privileges	-.37	.23	-.12	.60	1.68	.04	.23	.01	.49	2.02
Corporal punishment x PI						**.37*****	.07	.33	.70	1.43
Psychological aggression x PI						.02	.04	-.04	44	2.23
Deprivation of privileges x PI						**-.12***	.05	-.24	.29	3.51
ΔR^2						**.08*****				
Total R^2						.66				

Note. CU = callous-unemotional; PI = punishment insensitivity; Tol = tolerance.

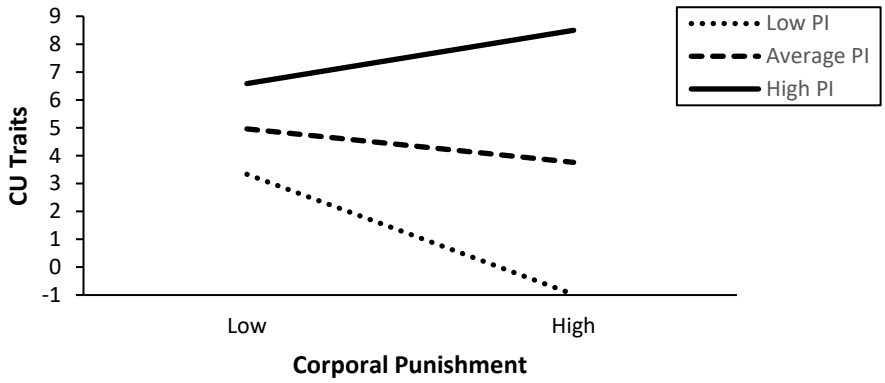
[a] 0 = female, 1 = male.

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

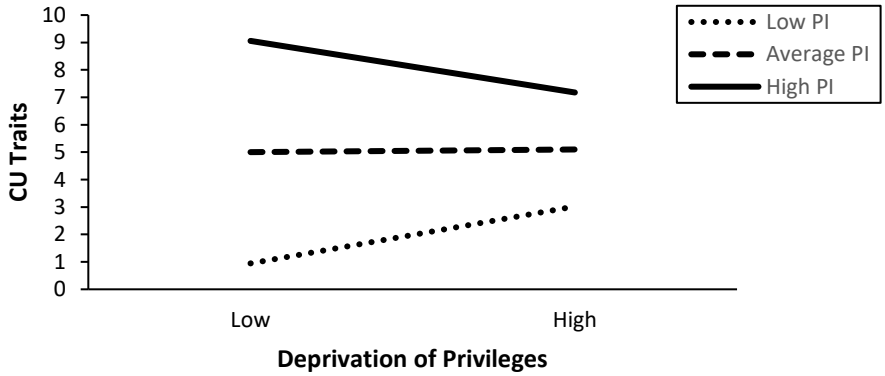
Figure 3.3

CU Traits as a Function of Punitive Parental Discipline and Punishment Insensitivity

A



B



Note. Panel A: CU traits as a function of corporal punishment and punishment insensitivity. Panel B: CU traits as a function of deprivation of privileges and punishment insensitivity. Low, average, and high punishment insensitivity respectively correspond to 1 SD below the sample mean, the sample mean, and 1 SD above the sample mean for punishment insensitivity. This is the same for each parent discipline strategy. CU = callous-unemotional; PI = punishment insensitivity.

3.3.4 Unique Associations among CU Traits, Punishment Insensitivity, and Non-Punitive Parent Disciplinary Practices

Regression parameters and collinearity statistics for non-punitive discipline are presented in Table 3.6. Collinearity statistics (VIF and tolerance values) were within accepted limit for all variables.

Analyses revealed that male gender and greater punishment insensitivity predicted higher levels of CU traits. Parents' overall non-punitive discipline was not related to CU traits, nor was there evidence for a moderating effect of punishment insensitivity on this association. Results of regression analysis for the discrete components of non-punitive discipline are presented in Table 3.6. When non-punitive discipline was broken down into its subscales in the analyses, male gender and greater punishment insensitivity remained predictors of higher CU traits. More frequent use of explaining and teaching predicted higher CU traits, while ignoring misbehaviour predicted lower CU traits. Punishment insensitivity moderated the relation between the discipline strategy of teaching/explaining and CU traits, such that higher frequency of teaching/explaining predicted higher levels of CU traits in children with greater punishment insensitivity ($B = 1.30$, $SE = .26$, $p < .01$). The same was found for children with average levels of punishment insensitivity but effect was smaller ($B = .46$, $SE = .16$, $p < .01$). This interaction effect was not significant for children with lower levels of punishment insensitivity ($B = -.38$, $SE = .25$, $p = .13$). The interaction is visualised in Figure 3.4.

Table 3.6

Effect Estimates of Non-Punitive Parent Discipline, Externalising Problems, and Sociodemographic Variables Predicting CU Traits

	Model without interaction					Model with interaction				
Predictor	*B*	*SE*	*β*	Tol	VIF	*B*	*SE*	*β*	Tol	VIF
Child age	-.17	.17	-.06	.92	1.08	-.16	.17	-.06	.92	1.09
Gender [a]	**1.51****	.49	.20	.56	1.15	**1.55****	.50	.20	.83	1.16
Externalising problems	.32	.22	.13	.50	2.07	.34	.22	.13	.49	2.08
Punishment insensitivity	**.34*****	.05	.57	.45	2.08	**.35*****	.06	.59	.41	2.30
Non-punitive discipline [b]	.06	.18	.02	.79	1.12	-.13	.28	-.03	.79	1.12
Non-punitive discipline [b] x PI						-.01	.05	-.01	.84	1.32
ΔR^2						.00				
Total R^2						.57				

Note. CU = callous-unemotional; PI = punishment insensitivity; Tol = tolerance.

[a] 0 = female, 1 = male. [b] This is a higher-order scale on the Dimensions of Discipline Inventory consisting of the subscales Explain/Teach and Ignore Misbehaviour.

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

Table 3.7

Effect Estimates of the Discrete Components of Non-Punitive Parent Discipline, Externalising Problems, and Sociodemographic Variables Predicting CU Traits

	Model without interactions					Model with interactions				
Predictor	*B*	*SE*	*β*	Tol	VIF	*B*	*SE*	*β*	Tol	VIF
Child age	-.09	.17	-.03	.86	1.16	-.18	.16	-.07	.85	1.18
Gender [a]	**1.53****	.48	.20	.87	1.16	**1.51*****	.44	.20	.87	1.16
Externalising problems	.28	.21	.11	.49	2.03	.12	.20	.05	.47	2.12
Punishment insensitivity	**.37*****	.05	.63	.41	2.42	**.47*****	.06	.80	.34	3.00
Explain/Teach	**.38***	.17	.15	.77	1.30	**.46****	.16	.18	.75	1.34
Ignore misbehaviour	-.16	.15	-.08	.65	1.54	**-.30***	.14	-.15	.61	1.64
Explain/Teach x PI						**.13*****	.03	.25	.87	1.15
Ignore misbehaviour x PI						-.03	.02	-.10	.77	1.31
ΔR^2						**.06*****				
Total R^2						.65				

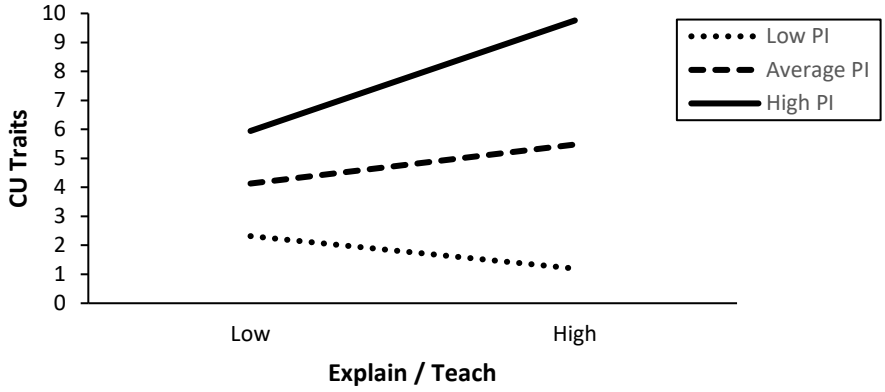
Note. CU = callous-unemotional; PI = punishment insensitivity; Tol = tolerance.

[a] 0 = female, 1 = male.

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

Figure 3.4

CU Traits as a Function of Non-Punitive Parental Discipline and Punishment Insensitivity



Note. Low, average, and high punishment insensitivity respectively correspond to 1 SD below the sample mean, the sample mean, and 1 SD above the sample mean for punishment

insensitivity. This is the same for the parent discipline strategy Explain/Teach. CU = callous-unemotional; PI = punishment insensitivity.

3.4 Discussion

The current study examined the role of punishment insensitivity in relation to CU traits, conscience, and parenting. The first aim was to examine whether there was an indirect effect of CU traits on poorer conscience through punishment insensitivity. Prior studies have independent associations between CU traits and poorer conscience (Blair et al., 2001b; Sakai et al., 2012) and punishment insensitivity (Pardini, 2006), but this was the first study to test punishment insensitivity as a potential mechanism underlying the association between CU traits and conscience. Results supported the hypothesis that insensitivity to parental punishment is a mechanism explaining the link between CU traits and conscience. The current study is cross-sectional and therefore cannot determine causality but provides preliminary evidence to support theories of the aetiology of CU traits and psychopathy that have emphasised the importance of insensitivity to punishment (Blair, 2005b; Dadds & Salmon, 2003; Frick et al., 2014b) and extends prior work showing a link between CU traits and poorer conscience (Blair et al., 2001b; Goffin et al., 2018) by identifying a potential mechanism underlying this association. The current finding should be confirmed in longitudinal studies. Existing parenting interventions aim to promote prosocial behaviour in young children with CP largely through discipline and reward-based strategies (e.g., Incredible Years, Triple P). The current findings are consistent with previous research (e.g., Garcia et al., 2018; Hawes & Dadds, 2005) suggesting that discipline-based strategies may be less effective for children who exhibit high levels of CU traits given their insensitivity to punishment.

The second aim of the current study was to examine whether insensitivity to parental punishment moderated the relation between CU traits and various disciplinary practices. Contrary to previous research (Pardini et al., 2007; Waller et al., 2015), there was no association between overall harsh discipline and CU traits in this sample. However, when harsh discipline was broken down into more specific dimensions, corporal punishment was associated with lower CU traits but only in children with low to average punishment insensitivity. For children with greater punishment insensitivity, corporal punishment was associated with higher CU traits in line with previous studies which also used the narrower definition of harsh parenting as corporal punishment (Barker et al., 2011; Pardini et al., 2007). The current findings that

corporal punishment was associated with lower CU traits in children low in punishment insensitivity but higher CU traits in those high in punishment insensitivity, suggests that parents of children who are not insensitive to punishment do not need to use harsh discipline to promote conscience development. In contrast, parents of children with greater punishment insensitivity may be more likely to resort to harsher methods in response to misbehaviour if they feel that milder forms of punishment do not have the desired result. This supports previous research that suggests that parenting behaviour is child- rather than parent-driven in children with CP and high levels of CU traits (Larsson et al., 2008; Muñoz et al., 2011; Salihovic et al., 2012). Alternatively, harsh parenting may lead children to become less sensitive to punishment, for example, if parents frequently punish the child regardless of whether the child behaves well or not. Slow escalation of punishment from low-level discipline, such as demands and put-downs, to more extreme discipline, such as corporal punishment, can also inadvertently reinforce insensitivity to parental punishment (Dadds & Salmon, 2003). As the current study utilised a cross-sectional design, it is not possible to draw conclusions regarding causality or the direction of effects. However, the current findings highlight the importance of individual temperament in relation to parenting and show that even within CU traits there can be additional individual child characteristics such as punishment insensitivity that could potentially influence children's response to parenting practices.

With respect to deprivation of privileges, another dimension of harsh discipline in this study, the effect was the opposite of that of corporal punishment. More frequent parental use of privilege deprivation was related to lower CU traits in children with greater punishment insensitivity, but higher CU traits in children lower in punishment insensitivity. These findings suggest that removing or withholding toys and other privileges as a consequence for misbehaviour may promote conscience for children with high levels of CU traits and for those who are insensitive to punishment regardless of CU traits. Removal of privileges was examined in an intervention study under the umbrella of punishment-based parenting strategies by Ortiz et al. (2018). In their study, CU traits did not predict differential responses to punishment versus reward-based treatment, contrary to expectations that the punishment-based treatment arm of the intervention would be less effective for children with CU traits. Although not always feasible in an intervention study, the current study findings suggest that these different disciplinary strategies should be tested separately due to differential associations between CU traits and different parenting practices for conscience.

The third and final dimension of harsh discipline investigated in the current study was psychological aggression. There was no relation with CU traits nor was there a moderating effect of punishment insensitivity. This is inconsistent with previous studies in which harsh parenting predicted increased CU traits (Pardini et al., 2007; Wagner et al., 2019). In these studies, however, psychological aggression was amalgamated with other harsh disciplinary methods such as corporal punishment. In contrast, a study by Sng et al. (2018), in which the effects of psychological and physical aggression were assessed as separate constructs, found no relation between CU traits and psychological aggression, consistent with current findings. Thus, the delineation of the distinct dimensions of discipline into discrete variables shows that different strategies have differential associations with CU traits. It is possible that the effects of physical discipline overshadowed the effects of other dimensions in studies that assess a variety of disciplinary methods as falling under a single combined construct. Indeed, Leijten et al. (2015) suggested using micro interventions that test discrete parenting techniques to tease out specific parenting elements that may help develop more efficient, brief interventions tailored to specific child and family needs. Thus, the differences in findings across all three dimensions of harsh discipline in this study suggest that investigating disciplinary strategies separately may provide unique insight into the relative influence of distinct forms of parent discipline on affective conscience in children with CU traits.

The current literature has primarily focused on punitive dimensions of parent discipline and underrepresented non-punitive corrective discipline, such as redirection of a child's attention or ignoring misbehaviour. These discipline strategies are milder in terms of the consequence for the child and thus may not be as influenced by insensitivity to punishment. The prediction that non-punitive discipline would be related to lower CU traits was only partially supported by the current findings. Overall non-punitive discipline was not related to CU traits; however, when broken down into discrete dimensions, ignoring misbehaviour was associated with lower CU traits regardless of the level of insensitivity to punishment, while explaining/teaching rules was related to higher CU traits but only in children with greater insensitivity to punishment. These findings show that parents of children higher in CU traits tended not to ignore child misbehaviour and more frequently explained rules and demonstrated correct behaviour, perhaps due to the greater difficulty encountered in the socialisation of moral norms, or because other methods such as ignoring misbehaviour were related to poorer conscience. It is possible that parents find it more difficult to ignore the negative behaviour of children higher in CU traits due to more severe externalising problems, leading parents to feel the need to intervene

more often. Explaining and teaching is an inductive method of discipline which focuses on addressing child behaviour by shaping their understanding of morality, specifically by teaching children the impact of their misconduct on others (Hoffman, 2000). It has been shown to be associated with increased prosocial and moral behaviour (Augustine & Stifter, 2015; Farrant et al., 2012) but may not be effective for children high on CU traits given their lack of empathy and reduced proclivity for mentalising and concern about the welfare of others (Frick & Kemp, 2022).

Overall, the current findings suggest that only certain non-punitive techniques are related to optimal conscience development for children higher on CU traits and greater punishment insensitivity, inconsistent with the literature for typically developing children (Augustine & Stifter, 2015). An explanation for these discrepant findings could be poor implementation of these strategies by parents rather than the strategy itself, which is a barrier to the success of parent training programmes (Kaminski et al., 2008). Interestingly, in clinical samples, rewards were consistently shown to be associated with reductions in CP in parent training interventions (Leijten et al., 2019), but research in typically developing samples shows that rewards can undermine intrinsic motivation and altruistic behaviour (Warneken & Tomasello, 2008). Thus, these non-punitive discipline strategies need to be examined within a randomised controlled trial where 1) the effects of each discrete strategy are examined separately (Leijten et al., 2015); 2) parents can be coached and given feedback to ensure proper implementation (Kaminski et al., 2008); and 3) the direction of effect can be ascertained.

It is worth noting that the measure of insensitivity to punishment used in the current study was mainly specific to parental discipline (e.g., *'act like rules don't matter', 'keep on misbehaving no matter what you do'*). Thus, the current study investigates parent-perceived child insensitivity to discipline rather than punishment insensitivity as measured in experimental and neurocognitive paradigms (e.g., Newman & Kosson, 1986; Vitale et al., 2005) such as in Chapter 2 of this thesis. However, models of psychopathic and CU traits acknowledge that neurocognitive punishment insensitivity is a general deficit that affects all areas of functioning, such as reduced sensitivity to distressed facial expressions and negative consequences from socialisation experiences, appraisal about the expected outcomes of antisocial behaviour (Blair, 2005b; Frick et al., 2014b; Waller & Wagner, 2019), and as such, these models also apply to children's responses to real-life parental discipline.

The measure of CU traits used in the present study is an amalgamation of reverse-scored prosocial items from the SDQ and three CU traits items from the APSD and has been proved to be a reliable and valid measure of CU traits in childhood (Dadds et al., 2005; Dadds et al., 2009; Dadds et al., 2011; Dadds et al., 2014a). For a full list of the items, please see Appendices B and C. This amalgamation means there is overlap of the constructs of prosociality and CU traits in this measure. CU traits and prosocial behaviour are related but distinct constructs with the lack of prosocial behaviour forming only part of the features of CU traits, which also include lack of remorse, empathy, and concern about school and performance. A recognition of the overlap and distinction between both constructs can have implications for assessment and diagnosis as well as treatment. For children with CP and low prosocial behaviour, interventions may focus on enhancing their social skills and inductive reasoning. In contrast, treatments for children high in CU traits may need to target both insensitivity to punishment as well as empathy deficits (Frick & Kemp, 2021). Due to their empathy deficits, inductive reasoning alone may not be sufficient to encourage prosocial behaviour in children higher in CU traits.

Similarly, there is overlap in the measurement of the construct of insensitivity to parental punishment in the present study with the concept of defiance (i.e., open and deliberate refusal to comply with parental requests or rules). The items used to operationalise sensitivity to parental punishment were drawn from the non-compliance subscale of the MAP-DB which was developed to assess the dimensions of disruptive behaviour in young children (Wakschlag et al., 2010). Please see Appendix D for a list of items. While these seven items loaded onto a single factor and showed good psychometric properties in a large sample of preschoolers (N = 1,855; Nichols et al., 2014), there is significant conceptual overlap between defiance and non-compliance. While the behaviours resulting from an insensitivity to punishment may be similar to defiant behaviour, they likely have different aetiology and risk factors (Waldman & Lahey, 2013). Punishment insensitivity is thought to stem from a biologically-based temperamental fearlessness resulting in the inability to learn from past punishments and thus repeat misbehaviour (Blair, 2005b), while defiant behaviour is thought to stem from the interplay of genetic and environmental factors (Waldman & Lahey, 2013). Therefore, the measure used in the present study may not be an appropriate index of punishment insensitivity due to its inability to distinguish between punishment insensitivity and defiant behaviour.

3.4.1 Limitations

There were several limitations of this research. First and foremost, the present study is cross-sectional and thus conclusions regarding the directionality of effect cannot be made. This is particularly relevant to the first aim of the present study which was to test the indirect effect of CU traits on conscience through punishment. The lack of temporal precedence in this study precludes any conclusions regarding cause and effect between the predictor, mediator, and outcome (Lemmer & Gollwitzer, 2017; Wiedermann & von Eye, 2015). However, since no prior studies have examined punishment insensitivity as a mediator explaining the link between CU traits and conscience, this initial investigation provides preliminary evidence that this model is worth replicating in a more time and resource-intensive longitudinal design. With regard to the second study aim, the cross-sectional nature of the data means it cannot be concluded whether children develop increased CU traits in response to more punitive parenting or if parents use more punitive methods when their children have higher CU traits (Larsson et al., 2008; Muñoz et al., 2011). Children with CP and/or CU traits may evoke more punitive disciplinary practices and elicit less warmth from parents. Conversely, parents' own characteristics can affect they way in which they parent their children. For example, a parent with poorer emotional health and well-being may be more lax or harsher in their interactions with their child (Sanders & Morawska, 2018). Without a longitudinal design, it was not possible to determine whether CU traits led to changes in parenting, parenting led to changes in CU traits, or if parent-child effects are bidirectional. A longitudinal study capturing change over time could determine the directionality of relationships between parenting, insensitivity to punishment, and CU traits.

Second, parents were the sole informant for both parenting and child characteristics and thus the data is subject to potential biases. For example, parents who experience difficulty managing their children's behaviour may report their child to be more insensitive to punishment and/or higher in CU traits, thus, inflating the relationship between these variables. Indeed, CU traits, conscience, and insensitivity to punishment were highly correlated (*r*s = .71-.75), which may be due to shared method variance given the reliance on parents as the sole informant. In future research, different methods could be used to assess conscience such as moral reasoning tasks, observation of children's rule-abiding behaviour, or response to hypothetical moral dilemmas. Meanwhile, using multiple informants would provide a more comprehensive picture of child behaviour across multiple settings (e.g., teachers in school, parents at home). Parents could

also under-report punitive discipline methods such as corporal punishment and psychological aggression due to social desirability effects. A multi-method study including family observation would provide more objective assessments of both parent discipline and child responses to parent discipline.

Third, the instrument used to assess parent discipline in the current study contains subscales with very few items – between two and four per subscale. The main advantage of the DDI is the low administration time due to its brevity yet exhaustive coverage of discipline behaviours. Although short scales require less time from respondents, their ability to adequately capture a construct based on only two items may be limited for more complex constructs. In this study, each discrete discipline method was narrowly defined and, thus, should not be regarded as ambiguous or complex. However, there is a need to replicate these findings using different approaches to measurement. Observation of parenting behaviours would provide a more reliable measure of parent discipline, but this is difficult to implement in practice due to the ethical implications of using harsh methods with children.

Fourth, sample characteristics limit the generalisability of findings. The present sample primarily comprises predominantly middle-class, well-educated parents recruited from the community. This could affect the types of discipline used by parents. For example, low-income parents tended to endorse more harsh discipline (Pinderhughes et al., 2000). Ethnicity has also been found to be a factor in differential use of discipline with African American parents more likely to report the use of spanking (Silveira et al., 2021). The current findings may also not generalise to clinical samples which are more likely to have more severe externalising problems and CU traits, and more extremes of parenting. Therefore, future research should use diverse samples that includes participants with lower SES, diverse cultural backgrounds, and referred children.

3.4.2 Conclusion

Overall, this study demonstrated the importance of the role of low responsiveness to parental punishment in the relations among CU traits, conscience, and parenting. Theory and research have emphasised the importance of insensitivity to punishment to impaired conscience in children high in CU traits (Frick et al., 2014b; Goffin et al., 2018), but no studies have formally tested punishment insensitivity as a mediator of the link between CU traits and conscience.

Although conclusions cannot be made about causality, it provides preliminary support for punishment insensitivity as a possible mechanism underlying this association. In terms of harsh parenting practices, a wealth of research has found strong links with CU traits (e.g., Larsson et al., 2008; Pardini et al., 2007; Wagner et al., 2019), but the current study was the first to test punishment insensitivity as a moderator of this link, showing differential relationships between distinct discipline strategies and CU traits based on children's levels of insensitivity to punishment. Findings suggest that punitive strategies such as corporal punishment were related to higher CU traits only in children with greater punishment insensitivity, with the opposite effect for deprivation of privileges. Surprisingly, evidence from the present study suggests that some non-punitive forms of parental discipline were related to poor conscience. Further family observational work is needed to clarify whether this is due to poor parent implementation of these strategies, or if the strategies themselves predict poor affective conscience development in children.

Chapter 4
Callous-Unemotional Traits and Reward Preferences: Development of an Experimental Task to Assess Responsiveness to Social and Tangible Rewards in Young Children

As reported in Chapter 3, CU traits were associated with more negative parent discipline for children with greater punishment insensitivity. These findings suggest that alternative behaviour management strategies, such as reward-based strategies, are needed for children higher in CU traits. However, it is unclear whether and what rewards are optimal for conscience development and the prevention of antisocial behaviour. Building on findings from previous chapters, this chapter will aim to elucidate which types of rewards may encourage prosocial behaviour and cooperation and shed light on reinforcement factors in children who exhibit high levels of CU traits. I will describe the development of an experimental task to assess responsiveness to social and tangible rewards in young children. This task investigates the association between CU traits and preference for different types of rewards in children aged 3 to 6 years.

4.1 Introduction

Impaired reinforcement learning is a core feature in many theoretical accounts of psychopathy and CU traits (e.g., Frick et al., 2014b; Newman, 1998; Moul et al., 2012). There is evidence for links between psychopathic and/or CU traits and deficits in processing punishment and, to a lesser degree, rewards using a wide variety of methods and across a wide range of age groups (see reviews by Blair, 2017; Byrd et al., 2014). Findings from Chapter 2 of this thesis support these findings showing that young children higher in CU traits had difficulty altering behaviour in the face of punishment. Although participants did not appear to show impairment in learning from reward (i.e., they could learn which stimuli led to reward), deficits in learning through punishment were amplified in the face of reward, consistent with findings from prior studies (e.g., Budhani & Blair, 2005; O'Brien & Frick, 1998). These impairments in reinforcement learning and the failure to learn from negative consequences have implications for parenting children with high levels of CU traits. These children may not respond well to punishment-based parent discipline and require alternative strategies for successful socialisation.

The insensitivity to punishment associated with CU traits has implications for intervention programmes for childhood CP. The current 'best practice' treatment for childhood CP recommended by the National Institute for Health and Care Excellence (NICE, 2013) is parent training, which focuses on teaching parents strategies such as active listening, effective communication, parent-child relationship enhancement, and providing psychoeducation about child development and parent-child interactions (e.g., the Incredible Years, Triple P, PCIT). The core component of parenting intervention programmes, however, is to teach parents the use of effective reinforcement strategies such as calm and consistent discipline (e.g., time-out) and the use of tangible and social rewards (Leijten et al., 2019). However, standard behavioural treatment may not be as effective for shaping behaviour and promoting prosocial behaviour in children high in CU traits who do not respond well to punishment. Indeed, children high in CU traits displayed less emotion and more negative behaviours during time-out (Garcia et al., 2018; Hawes & Dadds, 2005) but did not differ from those low in CU traits on the reward-based component of treatment (Hawes & Dadds, 2005). Therefore, interventions for children high in CU traits may benefit from de-emphasising punishment-based strategies and focusing on alternative strategies such as reward-based strategies.

Supporting the view that reward-based strategies may be effective for promoting prosocial behaviour in children high in CU traits, Pardini et al. (2007) found that child-reported parental reward and involvement was related to decreases in both CP and CU traits, controlling for earlier CP and CU. In a longitudinal intervention study spanning ten years, Pasalich et al. (2016) found that positive attention, operationalised as descriptive praise and non-verbal approval, was related to lower CU traits but only in bivariate analyses that did not control for earlier CU traits or other covariates. In an adoption study, Hyde et al. (2016) found that observed praise from adoptive mothers buffered the effects of inherited risk for CU traits showing that CU traits are malleable to environmental factors such as reward-based parenting strategies. Notably, Clark and Frick (2018) found that parents' use of praise and tangible rewards was associated with lower CP for children high in CU traits but not those low in these traits, suggesting that while external rewards are effective for children high in CU traits, they are less effective for children low in CU traits. Research on samples with typical levels of CU traits has reported mixed findings for the effects of external rewards such as praise, which are thought to undermine intrinsic motivation and free choice behaviour in children (Owen et al., 2012). In sum, these studies show that parents' use of reward-based strategies may be particularly important for reducing both CP and CU traits and may be an optimal route to

positive conscience development in children with high levels of CU traits. What remains unclear is which types of reward provide the most motivational value for encouraging prosocial behaviour and cooperation in children high in CU traits. A meta-analysis of experimental studies examining the effects of verbal and tangible rewards found that verbal rewards enhanced motivation but this effect was stronger for adults than children, while tangible rewards significantly undermined intrinsic motivation in children (Deci et al., 1999). In terms of CU traits, prior studies examined reward with other positive parenting strategies (Pardini et al., 2007) or tested different types of reward strategies together, for example, verbal praise combined with non-verbal approval (Pasalich et al., 2016) or praise with tangible rewards (Clark & Frick, 2018). This makes it difficult to pinpoint which types of rewards may be most effective for children with CU traits.

According to aetiological theories of CU traits, social rewards such as praise or non-verbal cues, such as smiles and physical affection, may provide less motivational value for children who exhibit high levels of CU traits than their typically developing peers (Viding & McCrory, 2019; Waller & Wagner 2019). These types of rewards are also known as affiliative rewards and refer to the pleasurable feelings derived from obtaining affiliation, such as a hug, a smile, or verbal affection. Affiliative rewards are intrinsically motivating with the evolutionary goal of maintaining strong bonds with others to ensure survival (Viding & McCrory, 2019). In their Sensitivity to Threat and Affiliative Rewards (STAR) model, Waller and Wagner (2019) posited that low social affiliation is one of two key mechanisms that underlies the development of CU traits, with the other being low sensitivity to threat, discussed in previous chapters of this thesis. According to the STAR model, children with CU traits are not only genetically predisposed to low affiliative reward but also receive low affiliative inputs from their environment (e.g., from parents and caregivers), which further exacerbates the child's low motivation for affiliation. Thus, children high in CU traits may have less drive to seek social approval or affiliation and social rewards, such as praise, may be less effective in promoting prosocial behaviour in children higher in CU traits.

There is evidence supporting the view that social rewards may be of less value to children with CU traits. Perlstein et al. (2022) found that parent-reported low sensitivity to affiliation was associated with higher CU traits but lower CP in two independent samples of children. Mirroring these findings, self-reported low affiliation was associated with higher scores on the affective dimension of psychopathy but lower scores on the impulsive-antisocial dimension in

a third sample of young adults (Perlstein et al., 2022). In studies using the Social Reward Questionnaire (SRQ; Foulkes et al., 2014b) to assess response to different types of social rewards, psychopathic traits were associated with increased pleasure from others' psychological pain (e.g., enjoying embarrassing others) and less kind and reciprocal relationships in adults (Aldridge-Waddon et al., 2022; Foulkes et al., 2014a, 2014b). Similar results were reported for CU traits in adolescents using the adolescent version of the SRQ (Foulkes et al., 2017). These studies show that social rewards are varied, encompassing affiliation as well as social dominance and that they can be of value to individuals high in psychopathic or CU traits for self-serving purposes.

The research mentioned above only considered social rewards. In a qualitative interview study about the effectiveness of classroom behaviour management techniques in China, preschool teachers reported that children higher in CU traits were responsive to all forms of rewards, including social rewards (e.g., praise), tangible rewards (e.g., stickers), or a privilege (e.g., given priority to choose a toy; Cao et al, 2023). Contrary to findings from Perlstein et al. (2022) that CU traits are related to lower affiliation, teachers reported that praise had motivational value even for children high in CU traits, particularly when given in front of other students. In contrast, teachers in the UK reported that adolescents high in CU traits were less responsive to social rewards such as praise, except when the social reward could be used for gloating, boasting, or abuse of privileges given as a reward (Allen et al., 2016, 2018). They were, however, responsive to tangible rewards and school points system rewards (Allen et al., 2018). The results of these studies suggest that children high in CU traits value both social and tangible rewards and that these can be used to drive behaviour change. However, for social rewards the value comes from some form of personal gain, such as social approval and admiration, similar to the adult literature. Children and youths may pursue these social rewards that lead to higher status and social dominance for the instrumental use of others to aid their own advancement, such as financial gain. Moreover, individuals high in CU traits may also possess narcissistic traits including a grandiose sense of self-importance and a desire for admiration and recognition (Frick & Hare, 2001). These narcissistic tendencies can drive them to seek high social status and dominance (Hare, 2003). For younger children, status-seeking behaviour may be more rudimentary and motivating simply because it makes them feel good without thought of consequences to others.

The research evidence on CU traits and the motivational value of different rewards described so far were based on parent-, teacher-, or self-report, which are subject to biases such as socially desirable answering or potentially influenced by the quality of the relationship between the child and the adult reporting on the child's characteristics and behaviour. Experimental measures can overcome these limitations and do not require participants' ability or willingness to reflect on inner experiences. Using symbolic representations of rewards in an experimental task, Foulkes et al. (2014a) measured participants' reaction time to a thumbs-up symbol to represent social approval and a pound sign (£) to represent monetary reward. Adults higher in psychopathic traits responded quicker when cued with the social symbol. These participants also rated themselves higher in being cruel and using others for personal gain, which could explain the aspects of social rewards that these individuals find rewarding. In Aldridge-Waddon et al.'s (2022) task, animated avatars selected by the participants to represent themselves were used instead of symbolic representations of monetary and social rewards. The avatar receiving money was the monetary reward. For social rewards, the avatar was shown engaging in different types of social reward. In contrast to Foulkes et al.'s (2014a) findings, psychopathic traits were related to more responsiveness to social rewards, specifically the enjoyment of large social gatherings. There was no difference in responsiveness to other forms of social reward or monetary reward in relation to psychopathic traits.

To date, experimental studies comparing responsiveness to different types of rewards in relation to psychopathic or CU traits have all been conducted with adult samples, and therefore the rewards featured in the experiments are not relevant to younger children. There are few experimental tasks assessing the associations between CU traits and responsiveness to different types of rewards that are designed for young children. Some studies have found that children and adolescents higher in CU traits show poor task performance regardless of whether the reinforcement is monetary (Vitale et al., 2005; White et al., 2016), points (O'Brien & Frick, 1996), or stars (Briggs-Gowan et al., 2014). However, none of these studies included a comparison between different types of reward within a single design, meaning that the differential effects of social versus tangible rewards could not be determined. Moreover, in the adult literature, there were stronger links between different types of social rewards using self-report questionnaires compared to experimental measures of responsiveness to social rewards (Aldridge-Waddon et al., 2022; Foulkes et al., 2014a). Studies using experimental designs are needed to compare the motivational value of different types of rewards in relation to CU traits in children.

4.1.1 The Current Study

The link between insensitivity to punishment and CU traits suggests that rewards may be useful to encourage prosocial behaviour and promote moral and conscience development in children with high levels of CU traits. Evidence from intervention research shows that punishment techniques used in standard behavioural treatments (i.e., time-out, loss of privileges) are less effective for children who exhibit high levels of CU traits (Garcia et al., 2018; Hawes & Dadds, 2005). Moreover, children with CU traits have been shown to pursue reward despite punishment (O'Brien & Frick, 1996; Budhani & Blair, 2006) and are more likely to be driven by self-serving motivations (Pardini & Byrd, 2012; Sakai et al., 2012). Taken together, the evidence suggests that the use of reward strategies may be even more salient in shaping the behaviour of children who are higher in CU traits. Current theory posits that children with CU traits are less driven by social approval or affiliation (Viding & McCrory, 2019; Waller & Wagner, 2019). Tangible rewards that mean personal gain for the individual may be more effective in achieving child prosocial behaviour and cooperation for children high in CU traits. However, previous research suggests that social rewards may be motivating for children and adolescents higher in CU traits due to gains in social dominance and admiration (Allen et al., 2016; Foulkes et al., 2017), known to be valuable to children high in CU traits (Pardini & Byrd, 2012). These types of social rewards mimic tangible rewards in that the consequence of these rewards includes increased status, power or personal gain for the individual. However, the applicability of these findings to young children is questionable, given that they do not possess the same cognitive capacity for mentalising (i.e., understanding others' minds or perspectives) and planning the deliberate manipulation of others (Wellman et al., 2001).

Although past research has examined the effects of rewards on the behaviour of children high in CU traits, rewards were conflated with other components of positive parenting or combined different reward techniques (Pardini et al., 2007; Pasalich et al., 2016). Although these studies demonstrated that reward strategies may be effective for driving behaviour change in children high in CU traits, no studies have compared the differential effects of various types of rewards. Studies that compared responsiveness to different types of rewards in relation to CU traits and/or psychopathic traits have tended to focus on adult samples and thus used rewards that are not salient to younger children (Aldridge-Waddon et al., 2022; Foulkes et al., 2014a, 2014b). Studies that have focused on early childhood used parent report and only tested

affiliative rewards, ignoring the potential value of tangible rewards, which may be particularly motivating for young children (Perlstein et al., 2022). To date, no experimental studies have examined the motivational value of different types of rewards, including both social and tangible, in relation to CU traits in young children.

Therefore, the aim of the current study was to investigate the association between CU traits and responsiveness to different types of rewards in young children using an experimental task. I focused specifically on rewards that have the most relevance to parenting, that is, social rewards in the form of praise and tangible reward. These types of rewards are also the recommended components of positive parenting strategies in parent training programmes for childhood CP (Leijten et al., 2019). An experimental task was used to compare differential responsiveness to social versus tangible reward. Experimental measures overcome inherent limitations of questionnaire measures, such as response bias and participants' ability or willingness to reflect on inner experiences. Given that early childhood is a critical period for conscience and moral development (Knafo et al., 2008; Kochanska et al., 2002), the current study focuses on children aged 3 to 6. Moreover, since child behaviour and patterns of interaction are less rigid and thus potentially more amenable to intervention in early childhood, it is important to identify factors that may prevent or contribute to the development or maintenance of CP and CU traits early on. Enhancing understanding of how CU traits relate differentially to different types of rewards may provide information as to how interventions for children with CP and co-occurring CU traits can be individualised based on their unique temperamental characteristics.

It was hypothesised that there would be no association between CU traits and overall task performance since children with CU traits have been shown to be responsive to rewards in general. It was hypothesised that higher levels of CU traits would be associated with less responsiveness to social reward compared to tangible reward given their propensity towards self-fulfilment and personal gain. Given known associations with CU traits, age, gender, and externalising problems (combining hyperactivity and CP) were included in the analyses to control for potential confounds.

4.2 Method

4.2.1 Participants

One hundred and nine children (46% female) aged 3 to 6 years and their parents participated in the study. Details of participants and procedures are described in Chapter 2.

4.2.2 Parent Questionnaires

Sociodemographic characteristics. Details about parent and child age, gender, ethnicity, family structure, and parent education were obtained through a brief parent-report questionnaire.

Externalising problems. Parent report of child externalising problems was assessed using the SDQ (Goodman, 1997; Goodman et al., 2009). As described in Chapter 2, the Conduct Problems and Hyperactivity subscales were summed to create a measure of child externalising problems. Further details on this scale are described in Chapter 2. The alpha for the externalising subscale in the present study was .80.

CU traits. Child CU traits were assessed using the UNSW system of pooling items from the SDQ and the APSD (Dadds et al., 2005). As described in Chapter 2, the items on the APSD overlap with features of CP, whereas the index of CU traits measured by the UNSW system forms a separate dimension from CP. Further details on the psychometric properties of the UNSW system are detailed in Chapter 2. In the present sample, the alpha for the combined UNSW CU Traits scale was .91.

Sensitivity to reward. Child sensitivity to reward was assessed using caregiver report on the children's version of the SPSRQ (SPSRQ-C; Colder et al., 2011). As described in Chapter 2, only the Reward Sensitivity subscale was used as the items on the Punishment Sensitivity subscale are conceptualised as longer-term worry rather than specific and more immediate aversive events. The alpha for the Reward Sensitivity subscale in the present sample was .71.

Autism symptoms. Given the overlap between some CU traits and autistic traits (Jones et al., 2010), to avoid confounding the two conditions, children's autism symptoms were assessed using the SRS-brief (Moul et al., 2015). Children who scored above the clinical cut-off (≥ 60) on the SRS-brief were not included in study analyses. None of the children had scores above

the clinical cut-off, and therefore all participants were included in study analyses. The alpha for the SRS-brief total score was .88.

4.2.3 Child Experimental Task: Odd One Out

The experimental task assessed responsiveness to two different types of rewards, namely tangible rewards (stars) and social rewards (praise). The task was a continuation of the experimental task described in Chapter 2 in which children were asked to help a farmer named Joe catch moles who were stealing apples from this farm. Children completed a simple 'odd one out' task in which they were asked to continue helping Farmer Joe by finding his animals that had escaped their pens at the village fair (see Figure 4.1). Children were presented with four black-and-white images (e.g., four sheep). Three out of the four images were identical, while the fourth contained one slight difference (e.g., a missing ear; see Figure 4.2). Children were asked to indicate which of the four images was different by touching it on the tablet.

Figure 4.1

Screen Capture from the Odd One Out Experimental Task of Responsiveness to Reward Type

Note. This figure shows the setting up of the scenario for the experimental task. Chickens are shown escaping from a broken pen.

There were two conditions counterbalanced across participants, with 20 trials in each condition. In one condition, every correct response was rewarded with the experimenter providing verbal

praise (e.g., “Well done!”). In the other condition, a star appeared on the screen and a twinkly noise was played for every correct answer. Children were told that if they won many stars they could pick a toy from the prize box. Given the known association between CU traits and deficits in recognising facial expressions and to avoid influencing participants, the experimenter maintained a neutral expression throughout testing. The dependent variable was the total number of correct responses across conditions. At the end of the first block, children were asked if they would like to take a short break. Before the task, children completed a practice task where they had to either give five consecutive correct responses or complete 15 practice trials if they did not give five correct responses to proceed to the actual task. Once the practice trials were completed, the task took approximately 10 minutes to complete. All children picked a prize from the prize box regardless of their performance on the task.

Figure 4.2

The Odd One Out Task Stimuli

Note. Stimuli from the Odd One Out task, showing three identical animals and one with a slight difference (i.e., added horns). Participants must select the animal that is different from the others (i.e., the first animal).

Task development. The aim was to create an experimental task that would be engaging and meaningful for young children. Previous experimental studies on CU traits and reward and punishment processing conducted with children often used artificial and arbitrary stimuli, for example, 2-digit numbers (e.g., Vitale et al., 2005) and coloured shapes (e.g., White et al., 2016). Therefore, this task used child-friendly stimuli (farm, fair, animals) and emulated a real-life scenario to increase the engagement of younger children. The tangible reward was a star that appeared on the screen with every correct answer that the children could use to trade for toys. Stars are often used to represent rewards for young children, for example, in the commonly used reward system of star charts or in a classroom given by teachers for good behaviour. The aim was to ensure that the stimuli and rewards made sense and appealed to

children. The Odd One Out task was created using images from stock photo websites in accordance with the non-commercial research and private study guidelines of the UK Copyright, Designs and Patents Act (1988) and was programmed using OpenSesame (Mathôt et al., 2012).

4.2.4 Procedure

Ethical approval was obtained from the university departmental research ethics committee prior to data collection. The procedure for data collection is described in Chapter 2. All children received a small prize which they could pick out of a box upon completion of all experimental tasks. Families who completed all assessment tasks received a £10 shopping voucher.

4.2.5 Data Analysis

Data were analysed using the Statistical Package for the Social Sciences, version 27. An alpha level of .05 was used for all analyses. First, variables were examined for deviation from normality. Several variables were not normally distributed but contained zero and negative values so could not be transformed. Simulation studies have shown that Pearson's *r* is robust to non-normality if the sample size is not small and data is not highly skewed or kurtic (skew > 3, kurtosis ≥ 17; Bishara & Hittner, 2012). As all variables fell within this limit, I proceeded with two-tailed Pearson's correlations to examine bivariate associations among study variables and to check for multicollinearity. Correlations were conducted with bootstrapping at 3000 resamples to ensure the data were statistically robust.

Linear mixed-effects regression was conducted to examine the effect of reward type (two levels: praise and tangible reward) and CU traits on the number of correct answers. Unlike analysis of variance (ANOVA), mixed-effects models account for the inherent correlation among the multiple observations from the same participant in a within-subjects design (Gueorguieva & Krystal, 2004). The fixed effects were reward-type condition (0 = tangible reward, 1 = social reward) and CU traits. Covariates including child age, sex, and externalising problems were also entered as fixed effects. A random intercept was specified for participant to account for within-subject correlations. Continuous variables were standardised prior to model fitting to assist in interpretation. Restricted maximum likelihood estimation was used to account for missing data. The model was fitted first without and then with the interaction effect.

AIC and LRT were used to check model fit. Regressions were conducted with bootstrapping at 3000 resamples as no assumptions were made about the sample distribution.

In preliminary analyses, two unconditional models with no predictors were fitted – one with a random intercept specified for participant and one without the random intercept to check if there was a clustering effect of participant. Specifying a random intercept for participant allowed task performance between conditions to vary by participant accounting for inherent within-subject correlation. The ICC for the random intercept model was used to check the amount of variation in task performance accounted for by participant. Likelihood ratio tests (LRT) were used to compare model fit. ICC was .92 indicating that 92% of the variance can be accounted for by participant. LRT indicated that model fit significantly improved with the addition of the random intercept, $\chi^2(1, N = 109) = 207.06$, $p < .01$.

4.3 Results

4.3.1 Descriptive Statistics and Covariates

Means and standard deviations for parent-report measures and indices from the experimental task are reported in Table 4.1. The scores for the externalising problems subscale of the SDQ in the present study fell above those previously reported in European community samples, which ranged from 4.29 to 5.52 (Maurice-Stam et al., 2018; Mølland et al., 2023). Mean CU traits scores fell within the range of those previously reported in community samples of young children, which ranged from 2.76 to 5.57 (Dadds et al., 2005; Dadds et al., 2014a; Fontaine et al., 2010).

Table 4.1

Descriptive Statistics of Main Study Variables

Variable	*M*	*SD*	Range	Skewness (*SE* = .24)	Kurtosis (*SE* = .47)
Child age	4.87	1.06	3-6	.29	-.86
Externalising problems	6.40	3.93	0-8	.42	-.73
CU traits	5.02	3.97	0-16	.41	-.59
Parent-reported punishment insensitivity	16.83	6.86	3-40	1.22	2.57
Punishment insensitivity	7.43	3.72	0-19	.38	.10

Parent-reported reward sensitivity	26.59	4.34	14-34	-.37	-.12
Correct responses on the experimental task					
Tangible reward condition	10.65	3.44	2-16	-.82	.01
Social reward condition	11.18	3.59	2-16	-.72	-.33

Note. CU = callous-unemotional.

Bivariate correlations between the main study variables are reported in Table 4.2. Significant bivariate correlations were found between child age and the number of correct responses made in both tangible and social rewards conditions. This indicates that older children performed better on the task in both reward conditions. Externalising problems, CU traits, and parent-reported punishment insensitivity were not significantly related to task performance in either condition. The number of correct responses made in the condition with tangible rewards was highly correlated with the number of correct responses made in the condition with social rewards.

Table 4.2

Bivariate Correlations among Study Variables

Variable	1	2	3	4	5	6	7
1. Child age	-						
2. Gender (male = 1)	-.01	-					
3. Externalising problems	.24**	.17	-				
4. CU traits	-.05	.41***	.59***	-			
5. Parent-reported reward sensitivity	.07	-.17	-.27**	-.52***	-		
6. Passive avoidance errors	-.41***	.10	.07	.30**	-.24*	-	
7. Correct responses in the tangible reward condition	.65***	.16	.12	-.07	.25*	-.45***	-
8. Correct responses in the social reward condition	.68***	.06	.11	-.10	.26**	-.46***	.96***

Note. CU = callous-unemotional.

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

4.3.2 Convergent and Discriminant Validity of the Experimental Task

Convergent validity of the novel experimental task was checked by examining correlations between performance on the task of reward preference and the SPSRQ-C, a validated questionnaire measure of reward sensitivity. Parent-reported sensitivity to reward was positively correlated to the number of correct responses in both reward conditions, demonstrating convergent validity with the experimental task. Discriminant validity was examined by comparing task performance on the present task against performance on the task of reinforcement learning in Chapter 2, specifically, passive avoidance errors which are indicative of insensitivity to punishment. There was a significant negative correlation between punishment insensitivity as indicated by increased passive avoidance errors and task performance in both reward conditions in the present task. This indicates that is the 'Odd One Out' experimental task shows discriminant validity.

4.3.3 Linear Mixed-Effects Models

Results of the linear mixed-effects models are presented in Table 4.3. In terms of demographic variables, male gender predicted more errors on the experimental task, while age predicted more correct answers. CU traits were related to overall poorer performance on the task. Experimental condition was a significant predictor of the number of correct answers made, with overall better task performance in the condition in which children were rewarded with stars compared to the condition in which they were praised for correct answers. However, when the interaction terms (gender by condition, age by condition, and externalising problems by condition) were added to the model, experimental condition was no longer a predictor of task performance. None of the interactions were significant; that is, there was no effect of condition by gender, age, externalising problems or CU traits. LRT indicated that model fit did not significantly improve with the addition of the interaction terms, χ^2 (1, N = 109) = -1.96, $p >$ .05.

Table 4.3

Effect Estimates of Condition, CU traits, Externalising Problems, and Sociodemographic Variables Predicting Task Performance

	Model without interaction				Model with interaction			
			95% CI				*95% CI*	
Variable	Estimate	*SE*	*LL*	*UL*	Estimate	*SE*	*LL*	*UL*
Intercept	**11.85*** **	.18	11.51	12.22	**11.70*** **	.20	11.30	12.12
Gender [a]	**-1.48*** **	.25	-1.98	-.96	**-1.15** **	.30	-1.78	-.59
Age	**2.47*** **	.13	2.20	2.74	**2.58*** **	.15	2.31	2.89
Externalising problems	.05	.15	-.24	.35	.01	.18	-.38	.35
CU traits	**-.50*** **	.14	-.79	-.22	**-.46** **	.18	-.82	-.10
Condition [b]	**-.50***	.16	-.80	-.19	-.19	.24	-.64	.32
Gender x Condition [b]	-	-	-	-	-.66	.35	-1.33	.01
Age x Condition [b]	-	-	-	-	-.23	.16	-.57	.10
Externalising problems x Condition [b]	-	-	-	-	.09	.23	-.36	.58
CU traits x Condition [b]	-	-	-	-	-.09	.22	-.53	.35
-2Log-likelihood	844.47				842.51			
AIC	848.47				846.51			

Note. CU = callous-unemotional; CI = confidence interval; LL = lower limit; UL = upper limit; AIC = Akaike's Information Criteria.

[a] 0 = female, 1 = male. [b] 0 = tangible reward, 1 = social reward.

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

4.4 Discussion

The aim of the current study was to examine the association between CU traits and responsiveness to different types of rewards in young children. Two types of rewards were investigated using an experimental task: social reward in the form of praise and tangible reward in the form of stars gained. Contrary to predictions, CU traits were not associated with a difference in reward preference on the task. Children were not more responsive when rewarded with stars that they could trade for a toy compared to when they were rewarded with praise, inconsistent with evidence that children and adolescents higher in CU traits tend to have self-serving motivations (Pardini & Byrd, 2012; Sakai et al., 2012) and that they value tangible rewards that can be used for gloating and boasting to others in research on adolescents' response to teacher discipline and reward strategies (Allen et al., 2016). In the current study, the task was completed in a quiet room with only the researcher and in isolation from the child's social context without peers or siblings to whom they could boast or gloat, which could explain why they did not show a preference for the tangible reward. Although theory suggests that CU traits would be associated with lower responsiveness to social rewards (Waller & Wagner, 2019), existing evidence is mixed. Previous studies with preschool-aged children higher in CU traits were reported to be responsive to both praise and tangible rewards by teachers in the school setting (Cao et al., 2023) and by parents in the home setting (Clark & Frick, 2018) in line with current findings that there was no difference in responsiveness to tangible or social rewards. Thus, it appears that young children may be responsive to all types of rewards regardless of CU traits level.

The current findings that there were no relationships between CU traits and preference for tangible versus social reward could be explained by the person delivering the social reward. Theory and evidence suggest CU traits are associated with reduced sensitivity to affiliative rewards, such as praise (Perlstein et al., 2022; Waller & Wagner, 2019). However, some studies suggest that children high in CU traits are responsive to affiliative rewards, such as positive attention and praise (Clark & Frick, 2019). In the current study, praise was delivered by the researcher (myself), a person who was not familiar with the child. Evidence suggests that praise has more motivational value when delivered by a person meaningful to the individual receiving the praise, such as a caregiver (Owen et al., 2012). Importantly, this meaningful person should also have a positive relationship with the child receiving the praise. Praise is not a primary reinforcer such as food or water; that is, it does not reinforce behaviour without learning

(Schultz, 2015). It must be paired over time with another reinforcer, for example, a positive relationship with a caregiver, to become reinforcing. Praise from that caregiver is then a reinforcer that can effectively shape behaviour. Conversely, the presence of a novel stranger (myself as the researcher) in the home may represent an opportunity for children to "show off" and make a positive impression. Evidence has shown that children higher in CU traits can value social rewards as a means to gain higher status or to boast or show off in front of peers (Allen et al., 2016). Thus, in the present study, praise may have differing levels of motivational value than it would have had coming from the child's caregiver. Future research should have the parent deliver the praise or elicits views of child responsiveness to different types of rewards from the parent's point of view. The quality of the parent-child relationship should be examined when investigating praise and other social rewards.

An explanation for the unexpected finding that CU traits were not related to preference for tangible rewards is related to the nature of the tangible reward used in the present study. Although stars or 'points' are synonymous with rewards and are commonly used to reward desirable behaviour in the home by parents or in the school setting by teachers with good effect (McMahon & Forehand, 2005), they are not the same as actual tangible rewards that children can hold and touch. They are representations of tangible rewards rather than the reward itself, with children in the present study being told they had to earn the stars in order to pick a prize from the toy box (participants were able to pick from the prize box regardless of their actual performance but were not aware of this until the end). Thus, the tangible reward used in this study was more akin to a reward chart or token economy system with a delay in receiving the actual tangible reward, which may not have provided sufficient motivational value to detect a difference in child reward preference. Experimental research has shown that children with CP chose small immediate rewards over larger future rewards and this did not differ for those who were low versus high in CU traits (White et al., 2014). Future research could use actual tangible rewards such as stickers or small toys. The use of food as rewards for behaviour is generally not recommended and has been shown to have adverse effects on health and behaviour (Fedewa & Davis, 2015). The lack of difference between responsiveness to social versus tangible rewards could also be due to the measurement of task performance. Task performance was measured as the number of correct responses in each reward condition, social and tangible, as a proxy of responsiveness to each respective reward. A more appropriate measure of how motivating a reward may be persistence on a task as assessed by the amount of time a child spends persisting to complete a task or the number of trials they complete within a set amount

of time. Task persistence has been shown to be a valid measure of the motivational effects of reinforcement (Dovis et al., 2012).

As predicted, CU traits were associated with fewer correct responses overall, indicating poorer motivation to perform well on the task. It may be that the rewards were not sufficiently motivating for various reasons, such as the nature of the tangible reward (i.e., the reward being a star vs. actual tangible reward) and the way in which the social reward (i.e., praise) was delivered in the present study. Praise was given using a neutral tone of voice due to the potential confounding effects of emotion recognition deficits in children higher in CU traits. However, non-verbal cues such as tone and body language play an important role in enhancing the effectiveness of verbal praise and in real-world contexts praise is generally delivered with enthusiasm and a positive tone of voice (Hess et al., 2015). The context of delivery could also affect how much motivational value is attached to the reward, for example, children higher in CU traits were responsive to praise and even tangible rewards if they could be used to show off in front of peers (Allen et al., 2016). This is in line with research that has shown that the presence of peers increases reward-seeking behaviour (Centifanti & Modecki, 2013). A third reason that a given reward may not be sufficiently motivating is related to the person delivering the reward, for example, praise from the researcher who was a stranger to the child may not be as motivating as praise from a caregiver who is bonded with the child (Owen et al., 2012). Fourth, the task may not be sufficiently engaging due to the general low motivation of children high in CU traits to perform well (Groat & Shane, 2020). In school settings, for example, children high in CU traits report a lack of concern about the negative consequences of poor academic outcomes (Ciucci et al., 2014) but CU traits have not shown a relationship to deficits in intelligence (Allen et al., 2013), leading researchers to conclude that poor performance of participants high in CU traits is driven, at least in part, by poor motivation. This highlights the need for any experimental or experimental task used in CU traits research to be engaging and rewards meaningful and motivating.

With respect to demographic characteristics, gender was related to overall task performance with boys making significantly more incorrect responses compared to girls. There was, however, no difference between boys and girls in responsiveness to tangible versus social rewards. No predictions were made regarding the relationship between gender and performance on the task as prior studies did not suggest sex differences in responsiveness to certain types of rewards (Allen et al., 2016; Godfrey et al., 2022). In line with current findings, girls tend to

out-perform boys on multiple cognitive tasks (Berlin & Bohlin, 2002, Bezdjian et al., 2009; Byrne & Worthy, 2015) during early childhood. Moreover, girls tend to value closeness and intimacy of relationships more than boys (Berenbaum & Ruble, 2008) and, as such, may be more motivated by rewards that are social in nature, though this was not observed in the current study.

4.4.1 Limitations

The current study had several limitations that should be taken into consideration. Participants were recruited from the community and did not include parents and children with significant behaviour problems. It is, therefore, unclear if the current study findings would generalise to a clinical sample. In addition, no conclusions could be made about the direction of effects of studied constructs as this study was cross-sectional in design. A longitudinal study would be able to assess whether tangible or social rewards are effective in reducing CU traits and externalising problems over time. A longitudinal design would also allow an assessment of changes in the motivational value of different types of rewards over time. For example, praise may be valued by younger children, whereas for adolescents who become more independent from parents, praise from parents may begin to lose motivation value with the approval of peers taking greater prominence. This could provide valuable information as to what forms of rewards for shaping behaviour would be most beneficial during different developmental periods, along with the best person to deliver the rewards. Third, parents were the sole informant for CU traits and externalising problems. Parents may not always be aware of the behaviours of their children that take place outside of the home and, due to social desirability or other subjective biases, may not provide an accurate report of their child's traits and behaviour.

4.4.2 Conclusion

The current study was the first to investigate CU traits and responsiveness to different types of rewards. Reward strategies have been shown to be effective in clinical samples (Leijten et al., 2019), but interventions aimed at reducing child behaviour problems are typically multi-component including training parents to implement skills in multiple dimensions of parenting such as discipline, rule setting, active listening, and a variety of reward-based strategies including praise and use of tangible rewards. As such, it is difficult to determine which treatment components contribute to positive child outcomes. This study tested the two

commonly used, specific strategies to address child externalising problems: praise and tangible rewards, isolated from other positive parenting strategies. The limited research evidence available suggests that children with CU traits may show differential response to different types of rewards, specifically, that they would be less responsive to social rewards outside of the peer context but potentially more responsive to tangible rewards (Allen et al, 2016; Waller & Wagner, 2019). The current findings only partially supported this hypothesis, with CU traits showing no difference in responsiveness to tangible versus social rewards. It may not matter what types of rewards are used as long as parents are vigilant and involved during interactions with children, and increase their monitoring of children in order to catch as many opportunities to reward positive behaviours as possible. More research is needed using different types of tangible rewards and social rewards delivered by different people (e.g., parents, teachers, peers) and in different contexts to gain a more nuanced view of the responsiveness of children with elevated CU traits to rewards to more effectively shape the positive behaviour and development of these at-risk children based on their unique characteristics.

Chapter 5
Reward Preferences Questionnaire (RPQ): Development and Validation of a Questionnaire to Assess Responsiveness to Social and Tangible Rewards in Young Children

This chapter builds on Chapter 4 by examining responsiveness to additional types of social rewards, including affection and spending time with parents as well as praise, and their relationship with CU traits. In this chapter, parent perceptions were elicited as the value of a reward to young children may be influenced by the person who delivers it. No current instrument assesses differential responsiveness to parent rewards. Thus, this chapter describes the development and validation of a questionnaire to assess parent report of child response to different types of parental rewards.

5.1 Introduction

Positive parenting is one of the key components of parenting intervention programmes and is thought to be particularly important for the treatment of CP in children who exhibit high levels of CU traits (Hawes et al., 2014). Positive parenting has been operationalised in parenting programmes as reward-based strategies and parent-child relationship enhancement (Hanf, 1969; Patterson, 1982). Parental rewards refer to verbal praise and other social rewards, such as affection and spending time with parents, and tangible rewards, all of which are recommended by evidence-based parenting interventions as effective rewards for children with behaviour problems (Leijten et al., 2019). The current chapter focuses on this aspect of positive parenting.

Based on behaviourist principles, rewards are used to reinforce and promote desirable behaviours in children. Rewarding cooperation and prosocial behaviours reinforces the re-occurrence of these behaviours in the future. While two meta-analyses of the components of parenting programmes found that rewards and praise are effective in reducing CP (Kaminski et al., 2008; Leijten et al., 2019), inconsistent outcomes have been reported from studies with non-clinical and mixed samples of both clinic-referred children and children recruited from the community (Owen et al., 2012). In fact, there is evidence in community samples of preschool-aged children that external rewards, such as praise and tangible rewards, may have detrimental effects on intrinsic motivation (Warneken & Tomasello, 2008). A review of the literature on

the motivational value of praise as verbal reinforcement found that praise can be effective in promoting prosocial behaviour in children if the recipient perceives it as sincere, does not make the recipient feel monitored, and is not used to control their performance (Henderlong & Lepper, 2002). Moreover, rewards such as praise are not primary reinforcers (such as food, water, and sex) and are not inherently reinforcing (Schultz, 2015). They must be paired over time with another reinforcement, such as a positive relationship with a caregiver, to become reinforcing. Thus, the person delivering the reward may also play an essential role in determining how motivating a given reward is for the recipient.

Support for the notion that the motivational value of a reward is influenced by contextual factors, such as who delivers the reward, comes from findings from intervention studies where treatments have de-emphasised punishment-based strategies and enhanced reward-based techniques. Interventions where parents were trained in implementing rewards were effective in significantly reducing both CP and CU traits (Kimonis & Armstrong, 2012; Fleming et al., 2019), but when praise was given by trained counsellors rather than parents, the reward-enhanced phase of intervention was not more effective than the standard phase (Miller et al., 2014). Therefore, praise and other reward strategies may be more effective if the parent or another person with a meaningful relationship with the child delivers the reward. Experimental measures of sensitivity to different types of rewards have found mixed evidence for a link between psychopathic traits and social rewards (Aldridge et al., 2022; Foulkes et al., 2014). In contrast, studies using self, teacher, or parent report measures find that CU traits were associated with responsiveness to both praise and tangible rewards (Cao et al., 2023; Clark & Frick, 2018; Pasalich et al., 2016). Questionnaire measures are based on the respondent's perception of 'real life' settings, whereas the rewards used in experimental tasks featured representations displayed on a computer screen (e.g., a 'thumbs up' icon for social reward, pound sterling sign for monetary reward; Foulkes et al., 2014). Thus, it may be more meaningful to extract information about children's responsiveness to rewards from the person giving the reward or through direct observation. This may be particularly salient for young children, for whom most interactions are with their caregivers.

Other rewards recommended by parenting interventions are affection and spending time with the parent. These types of rewards, along with praise, are considered to be affiliative rewards. According to Waller and Wagner's (2019) Sensitivity to Threat and Affiliative Rewards (STAR) model of the aetiology of CU traits, children with CU traits are genetically predisposed

to be less motivated by affiliation, as reflected in their poor quality relationships with significant others. This suggests that affiliative rewards recommended by parenting interventions, such as affection, praise, and spending time with parents, may be less effective in promoting prosocial behaviour in children higher in CU traits. The evidence for this, however, is mixed with some studies finding that parent positive attention, praise, non-verbal, and involvement approval were associated with lower CU traits (Pardini et al., 2007; Pasalich et al., 2016), while others found that low sensitivity to affiliation was related to high CU traits (Domínguez-Álvarez et al., 2021; Perlstein et al., 2022). The studies that have found a link between low affiliation and increased CU traits measured general affiliation in all forms of social interaction (e.g., engages others in conversation, plays make-believe with other children). In contrast, the studies that found the opposite effect specifically measured parental affiliation, which is typically higher in intensity on an emotional level. This suggests that parental affiliation may be particularly important in protecting against the development of CU traits.

The emotional incentives of a positive relationship with caregivers, that is, parental affiliation, provide reinforcement for prosocial and moral behaviour (Thompson & Newton, 2013). When the parent-child relationship is positive, the child's motivation for behaving in a prosocial manner comes from the intrinsic desire to maintain a positive relationship with the parent rather than from fear of negative consequences. Therefore, the quality of the parent-child relationship may be especially important for children high in CU traits who experience difficulty learning from punishment. In support of this view, longitudinal studies have found that preschoolers with a more mutually responsive and warm relationship with their mothers scored higher on mother-reported conscience and were less likely to transgress in a resistance-to-temptation task (Kochanska et al., 2005). Notably, a positive parent-child relationship not only promoted conscience development but also reduced punitive discipline practices. Several meta-analyses have reported links between parental warmth and more positive child outcomes, including increased prosocial behaviour (van der Storm et al., 2022) and decreased internalising and externalising behaviours (Pinquart, 2017a, 2017b). In terms of CU traits, longitudinal studies have found that lower CU traits were related to later increased positive parent feelings about their child (Barker et al., 2011), higher child-reported parental warmth (Hipwell et al., 2007), stronger parent bonds (Kimonis et al., 2013), and higher levels of parents' expressed warmth (Waller et al., 2014). These studies suggest that rewards such as affection and spending time

with the parent may provide more motivation for children higher in CU traits to behave in a prosocial manner.

5.1.1 The Current Study

Parenting interventions focus on promoting positive parenting strategies, including the enhancement of parent-child relationship quality and the effective and appropriate use of reward strategies. Key recommended rewards include tangible rewards, such as toys and stickers, and social rewards, such as praise, affection, and spending time with the parent. Tangible rewards should be small and inexpensive as larger rewards are not practical and can lead to unrealistic child expectations about future rewards (Webster-Stratton, 2005). Praise, affection, and time with the parent are considered to be affiliative rewards. Theory and research suggest that CU traits are associated with lower sensitivity to general affiliation (Perlstein et al., 2022; Waller & Wagner, 2019). However, there is evidence that affiliation specifically with the parent or caregiver may protect against the development of CU traits (Barker et al., 2011; Waller et al., 2014). The previous chapter used an experimental task to compare children's sensitivity to tangible versus social rewards. However, there is evidence to suggest that the effects of rewards are dependent on the context in which they are implemented, including who delivers the reward. Thus, it is important to assess the views of caregivers and parents who provide the reward. However, no instrument assessing child responsiveness to parental rewards currently exists.

Therefore, the aim of the current study is to investigate child responsiveness to different types of parent rewards commonly featured in parenting interventions (e.g., Webster-Stratton, 2005) in relation to CU traits using a newly developed questionnaire. These include tangible rewards and social rewards in the form of praise, affection, and time with parents. The aim was to investigate the reliability and validity of the new parent-report questionnaire assessing child responsiveness to tangible rewards, praise, affection, and spending time with a parent. Given that early childhood is a critical period for conscience and moral development (Knafo et al., 2008; Kochanska et al., 2002), the current study focuses on children aged 3 to 6. Moreover, since child behaviour and patterns of interaction are less rigid and thus potentially more amenable to intervention in early childhood, it is important to identify factors that may prevent or contribute to the development or maintenance of CP and CU traits early on. A better understanding of how CU traits relate differentially to different types of rewards may help to

tailor interventions aimed at promoting prosocial behaviour and moral emotions in antisocial children based on their unique temperamental characteristics. It was hypothesised that CU traits would be associated with increased responsiveness to tangible rewards but reduced responsiveness to social rewards. Responsiveness to social rewards is hypothesised to be associated with overall better child adjustment, including lower CU traits, lower externalising problems, and increased conscience. Responsiveness to social rewards is hypothesised to be associated with less parent negative feelings about their child and more positive feelings. In terms of parent discipline, responsiveness to social rewards is hypothesised to be associated with less punitive parent discipline and more non-punitive parent discipline.

5.2 Method

5.2.1 Participants

Participants were 131 parents (*M* age = 37.64, *SD* = 4.50, 98% mothers) of children aged 3 to 8 years (*M* = 5.23, *SD* = 1.41, 49% female). Most parents were White (75%), 17% Asian, and 8% Black. Ninety-six per cent had an undergraduate degree or above. Compared to the national rates in the UK, participants in the present sample had lower rates of non-White ethnicity (25% in the present sample vs. 34.5% national average) and a much higher rate of higher education compared to the national average in the UK (96% vs. 34%; Office for National Statistics, 2021a).

5.2.2 Reward Preferences Questionnaire Development

Currently, no instrument exists to assess children's preferences for certain types of rewards, for example, tangible rewards, affection, praise, and spending time with parents, all of which are recommended by evidence-based parenting intervention programmes as effective forms of rewards for children with CP (Leijten et al., 2019). Therefore, a new questionnaire assessing children's responsiveness to various types of rewards was developed. The RPQ assesses children's response to tangible rewards, affection, praise, and time with parents. The last three sets of items assess social rewards. The aim of the RPQ was not to capture in full all dimensions of the social reward construct but only those relating to parental rewards commonly included in evidence-based parenting interventions. Modelled on the SPSRQ-C's (Colder et al., 2011) scoring format for ease of comparison, parents rate each item for its accuracy in describing their child on a 5-point Likert scale from 1 'strongly disagree' to 5 'strongly agree'.

The following steps were involved in the development of the RPQ. First, an extensive review was conducted on the literature on parenting practices (e.g., Owen, Slep, & Heyman, 2012), the content of evidence-based parenting programmes (e.g., Dadds & Hawes, 2005; Murrihy et al., 2011; Webster-Stratton, 2005), and parent self-help books aimed at providing guidance on parenting strategies (e.g., McMahon & Forehand, 2005). This review generated 24 items, with six items assessing responsiveness to tangible rewards, six assessing responsiveness to praise, six assessing responsiveness to affection, and six assessing responsiveness to time with parents. Five parents were asked to read the items to assess the face validity and item wording. Following parents' feedback, specific examples of tangible rewards were added to each item of this subscale (*'e.g., toys, stickers, sweets or pocket money'*).

A pilot study was then conducted with 28 4 to 8-year-old children (*M* age = 6.6, *SD* = 1.1, 39% girls) and their primary caregivers (23 mothers, four fathers, one grandparent) as part of a master's dissertation (Abubacker, 2014). Adequate to good internal consistency was reported for all subscales (αs = .68 to .92) with the exception of Affection (α = .54). Examination of the item-total correlation matrix revealed that the negatively worded items on the Affection subscale had low item-total correlations (< .3). Thus, these were rephrased so that all items in the questionnaires were positively worded in accordance with the research that shows using a mix of positively and negatively worded items within an instrument may confuse participants and poses a threat to reliability (van Sonderen et al., 2013). Following these changes, we consulted a further set of parents (N = 7) about the reward strategies they use with their children. This did not generate any additional items. Parents were then asked to indicate that each item represents a reward strategy that they commonly use (yes, no, do not know). Any items consistently placed in the 'no' and 'do not know' categories would be removed from the scale. All items were retained.

Item duplicity and redundancy were checked by examining inter-item correlations. Eleven items had high correlations with other items (rs > .70) or were very similar to other items and were removed. This resulted in a final set of 13 items examining tangible rewards (4 items) and social rewards, which included praise (3 items), affection (3 items), and time with parent (3 items). Proposed subscales and items are summarised in Table 5.1.

Table 5.1

Items on the Reward Preferences Questionnaire

Subscale	Item
Affection	Your child is more likely to do something if he/she receives a hug or a kiss
	Your child looks happy when you tell him/her that you love him/her
	Your child enjoys being given affection
Praise	Your child looks happy when you tell him/her that they are doing a good job
	Being praised makes your child look happy
	Praising your child moves them to action
Spending time with parent	Spending time with you is a strong incentive for your child to do things
	The possibility of doing a fun activity (e.g., playing a game) with you makes your child happy
	Your child is happy about doing activities that involve spending time with you
Tangible	Your child will complete an activity to receive a toy or sweets
	Receiving a tangible reward (e.g., sweets or toys) encourages your child to complete some activities
	Your child enjoys receiving tangible rewards (e.g., toys, stickers or pocket money)
	Your child looks happy when receiving a toy or stickers for good behaviour

5.2.3 Other Measures

CU traits. Child CU traits were assessed using the UNSW system of pooling items from the SDQ and the APSD (Dadds et al., 2005). Further details on this measure are described in Chapter 3. The alpha for the combined UNSW CU Traits scale was .91.

Externalising problems. Parents reported on child externalising problems using Conduct Problems and Hyperactivity subscales on the SDQ (Goodman, 1997; Goodman et al., 2009). Further details on the SDQ are described in Chapter 3. The alpha for the combined externalising subscale in the present study was .81.

Conscience. The My Child questionnaire (Kochanska et al., 1994) was used to assess parent report of child conscience. The alpha in the present study was .94. Further details on this measure are described in detail in Chapter 3.

Parent feelings. Parents' positive and negative feelings towards their child were measured using a brief version of the Parent Feelings Questionnaire (FEEL; Deater-Deckard, 2000). The FEEL contains three items on two scales: Positive (e.g., *'I feel close to my child'*) and Negative (e.g., *'I am frustrated by my child'*). Parents rated each item on a 5-point Likert scale ranging from 1 'definitely not true' to 5 'definitely true'. The FEEL has shown good internal consistency and validity (Deater-Deckard, 2000). The alpha for the present sample was .85 for the Positive scale and .93 for the Negative scale.

Parent disciplinary practices. The DDI (Straus & Fauchier, 2011) was used to assess parental discipline methods. The following subscales were selected for this research: Corporal Punishment, Deprivation of Privileges, Psychological Aggression, Explain/Teach, and Ignore Misbehaviour. Further details on this measure are described in Chapter 3. Mean inter-item correlation (MIC) was used to check internal consistency due to item brevity of the subscales of the DDI. MICs were .44 for Corporal Punishment, .38 for Psychological Aggression, and .32 for Deprivation of Privileges. For the higher-order scale Punitive Discipline, the MIC was .33. With respect to the non-punitive discipline subscales, MICs in the present sample were .45 for Explain/Teach, .30 for Ignore Misbehaviour, and .20 for the higher-order scale Non-Punitive Discipline.

Family sociodemographic characteristics. Details about parent and child age, gender, ethnicity, family structure, and parent education were obtained through a brief questionnaire.

5.2.4 Procedure

Ethical approval was obtained from the university departmental research ethics committee prior to data collection. The procedure for data collection is described in Chapter 3. Families who completed all questionnaires received a £10 shopping voucher.

5.2.5 Data Analysis

Data were analysed using the Statistical Package for the Social Sciences, version 27. An alpha level of .05 was used for all analyses. Principal components analysis (PCA) is a data reduction technique used to test whether variables are sufficiently representative of the construct of interest. PCA reduces the dimensionality of a dataset to obtain a parsimonious solution that

preserves as much variation in the original data as possible (Fabrigar & Wegener, 2012). PCA with a solution of eigenvalues greater than 1 and no constraints on the number of factors was conducted (Kaiser, 1960). As any underlying factors are unlikely to be independent since all items assess responsiveness to some kind of reward, direct oblimin rotation was selected (Fabrigar & Wegener, 2012). To improve the distinction between components, items with loadings less than .3 were suppressed (Fabrigar & Wegener, 2012). The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett's test of sphericity were used to determine the data's suitability for factor analysis. A KMO value greater than .6 indicates that sampling is adequate (Fabrigar & Wegener, 2012).

The internal consistency of each scale was checked using both Cronbach's alpha reliability coefficient and MIC. In contrast to Cronbach's alpha which is a function of the number of items in a scale, MIC is a more appropriate measure of internal consistency for scales with a smaller number of items since it is independent of scale length (Streiner et al., 2014). The acceptable range for Cronbach's alpha is .70 and above, and .15 to .50 for MIC (Streiner et al., 2014). Test-retest reliability was examined in a subset of participants (n = 13) who completed the RPQ approximately six months later.

To establish construct validity of the refined RPQ scales, zero-order and partial correlations with CU traits, externalising problems, conscience, and parent feelings were examined. The data were negatively skewed but contained zero and negative values, so could not be transformed. Therefore, Spearman's rank correlations were conducted to test associations. Partial correlations were conducted with the other reward subscale partialled out.

5.3 Results

5.3.1 Principal Components Analysis

The KMO statistic of sampling adequacy was .78 exceeding the recommended value of .6. The Bartlett's test of sphericity was significant, $\chi^2(78) = 930.20$, $p < .001$. Thus, the suitability of the data for a PCA was supported. PCA revealed three components with eigenvalues exceeding 1. Inspection of the scree plot suggested that only the first two components, explaining 45.27% and 12.59% of the variance, should be retained (Figure 5.1). In this two-factor solution, nine items showed a primary loading on the Responsiveness to Social Reward factor and four on

the Responsiveness to Tangible Reward factor. The factor loadings of the items on their designated factors are shown in Table 5.2.

Figure 5.1

Scree Plot Depicting Eigenvalues of Extracted Components

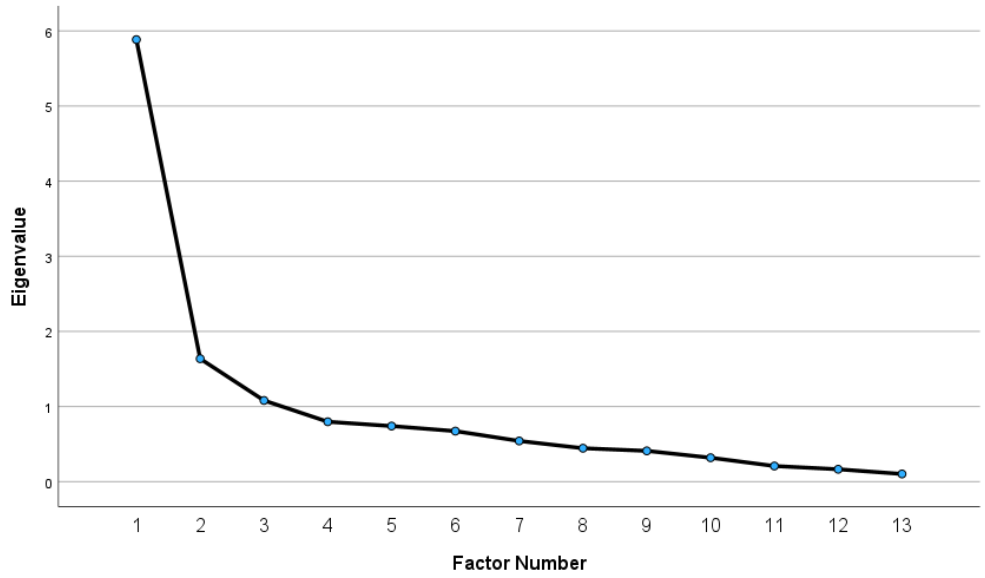


Table 5.2

Factor Loadings for the Two-Factor Solution of the RPQ

Item	Social Reward	Tangible Reward
Your child is happy about doing activities that involve spending time with you.	0.88	
Your child looks happy when you tell him/her that you love him/her.	0.81	
Spending time with you is a strong incentive for your child to do things.	0.81	
The possibility of doing a fun activity (e.g., playing a game) with you makes your child happy.	0.76	
Your child enjoys being given affection.	0.76	
Praising your child moves them to action.	0.74	
Being praised makes your child look happy.	0.72	
Your child is more likely to do something if he/she receives a hug or a kiss.	0.60	
Your child looks happy when you tell him/her that they are doing a good job.	0.45	
Your child will complete an activity to receive a toy or sweets.		0.69
Receiving a tangible reward (e.g., toys, stickers, sweets or pocket money) encourages your child to complete some activities.		0.65
Your child enjoys receiving tangible rewards (e.g., toys, stickers, sweets or pocket money).		0.44
Your child looks happy when receiving a toy or stickers for good behaviour		0.38

5.3.2 Reliability

Cronbach's alpha was very good for Responsiveness to Social Rewards ($\alpha = 0.92$) and adequate for Responsiveness to Tangible Rewards ($\alpha = 0.66$). MIC was also calculated as a more reliable measure of internal consistency for very short scales. MIC for Social Rewards was .54 and .32 for Tangible Rewards, indicating good internal consistency of each subscale. A subset of 13 participants completed the RPQ twice, six months apart. Correlations between RPQ scores across both time points were strong (responsiveness to social rewards: $r = .86$, $p < .001$; responsiveness to tangible rewards: $r = .93$ $p < .001$), indicating that RPQ scores are highly stable over a six-month time frame.

5.3.3 Relationships between Responsiveness to Tangible and Social Rewards and Theoretically Relevant Measures

Zero-order and partial correlations between the main study variables are reported in Table 5.3. Partial correlations were conducted with the other reward subscale partialled out. There were no significant unique associations between responsiveness to tangible rewards and externalising problems, hyperactivity, CU traits, insensitivity to punishment, and conscience. Responsiveness to social rewards was uniquely associated with lower levels of externalising problems, CU traits, punishment insensitivity, and greater levels of conscience. Child responsiveness to both tangible and social rewards was associated with less negative parental feelings and more positive feelings about their child. This suggests that if the parent-child relationship is relatively poor, children are perceived by their parents as less likely to respond to all parental rewards – whether it is social or tangible. Responsiveness to social rewards was associated with reduced use of all forms of power-assertive parental discipline (including psychological aggression and deprivation of privileges) and increased use of non-punitive discipline, specifically ignoring misbehaviour. Responsiveness to tangible rewards was not significantly related to any of the parental discipline methods. This could be due to the Tangible Rewards subscale showing a substantial negative skew indicating that most children are highly responsive to tangible rewards.

Table 5.3

Zero-Order and Partial Correlations of the RPQ Scales with Theoretically Relevant Measures

	RPQ Social Reward		RPQ Tangible Reward	
	Zero-order	Partial	Zero-order	Partial
RPQ Social Reward	-	-	.43***	-
RPQ Tangible Reward	.43***	-	-	-
Child age	-.04	.02	-.12	-.12
Gender [a]	-.13	-.20	.13	.20
Externalising problems	-.56***	-.47***	-.36***	-.17
CU traits	-.64***	-.60***	-.28***	-.01
Punishment insensitivity	-.61***	-.57***	-.27**	-.02
Conscience	.61***	.60***	.19*	-.10
Parent negative feeling	-.38***	-.28**	-.33***	-.20*
Parent positive feeling	.52***	.43***	.35***	.17
Punitive discipline [b]	-.30***	-.33***	.00	.15
Corporal punishment	-.14	-.20*	.09	.17
Psychological aggression	-.33***	-.32***	-.09	.06
Deprivation of privileges	-.28**	-.30***	-.02	.12
Non-punitive discipline [c]	-.13	-.15	.02	.08
Explain / Teach	.14	.12	.08	.02
Ignore misbehaviour	-.24**	-.26**	-.01	.11

Note. CU = callous-unemotional.

[a] 0 = female, 1 = male. [b] This is a higher-order scale on the Dimensions of Discipline Inventory consisting of the subscales Corporal Punishment, Psychological Aggression, and Deprivation of Privileges. [c] This is a higher-order scale on the Dimensions of Discipline Inventory consisting of the subscales Explain/Teach and Ignore Misbehaviour.

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

5.4 Discussion

The aim of the current study was to validate a novel measure of child responsiveness to different types of parental rewards. The rewards focused specifically on those used by parents and recommended by parenting interventions for childhood CP. These included tangible rewards and social rewards such as praise, affection, and time spent with parent. The PCA identified two factors: responsiveness to tangible rewards (four items) and responsiveness to social rewards (nine items). The RPQ subscales had good internal consistency and test-retest reliability, comparable to estimates reported for other questionnaires that assess child sensitivity to social rewards (Sensitivity to Threat and Affiliative Rewards Scale: αs = .75 - .86, Perlstein et al., 2022; Social Reward Questionnaire-Early Childhood: αs = .75 - .88, MICs = .38 - .60, Godfrey et al., 2022). Expected associations between RPQ subscales and assessments of child characteristics and behaviour, as well as parenting behaviours were found, demonstrating construct validity of the RPQ. Findings suggested that young children respond similarly to tangible and social rewards regardless of age and gender. Further research in a larger sample using multigroup CFA is needed to test measurement invariance across age and gender. The finding that child responsiveness to social rewards but not tangible rewards was associated with more positive overall child adjustment provides evidence for the predictive validity of the RPQ in relation to CU traits, externalising problems, and conscience in young children.

The items on the RPQ were derived from the literature on parenting practices (e.g., Sanders & Morawska, 2018), parent self-help books aimed at providing guidance on parenting strategies (e.g., McMahon & Forehand, 2005), and the content of evidence-based parenting interventions (e.g., Dadds & Hawes, 2005; Webster-Stratton, 2005). This produced an array of rewards which included tangible rewards and social rewards that could be categorised as praise, affection, and time with parents. The social reward items were expected to form three distinct factors, with tangible rewards as the fourth factor. However, PCA did not support a four-factor solution and all three types of social rewards loaded onto a single factor. Thus, it appears that parents who report that their child responds positively to one type of social reward are also likely to perceive their child as responding positively to all other types of social rewards. Further research using CFA in a different sample of parents of young children is needed to confirm the factor structure of the RPQ.

The RPQ is currently the only measure that specifically assesses responsiveness to parental rewards. The Social Reward Questionnaire-Early Childhood (SRQ-EC; Godfrey et al., 2022) assesses social rewards in a broader context than parenting, including enjoyment of admiration from others, enjoyment of being cruel to others, enjoyment of kind and reciprocal relationships, and enjoyment of large social gatherings. Similarly, in the Sensitivity to Threat and Affiliative Reward Scale (STARS; Perlstein et al., 2022), the rewards assessed were related to pleasure in engaging in affiliative behaviours within any type of social relationship (e.g., engages others in conversation, plays make believe with other children). Thus, existing measures of social reward differ from the RPQ, which assesses responsiveness to tangible rewards as well as to multiple types of social rewards commonly used in evidence-based parenting interventions but has a narrower focus in that it specifically measures response to rewards given by a parent or caregiver. The greater range and differentiation of types of rewards assessed in the RPQ potentially provide clinical utility by enabling a measure of differential responsiveness to reward strategies recommended by parenting interventions. This could help clinicians and caregivers to identify the rewards that provide the greatest motivational value for individual children, thereby helping to tailor interventions according to individual child characteristics and needs.

A hallmark of CU traits is impaired interpersonal functioning (Viding & McCrory, 2019). Children high in these traits are viewed as finding social relationships less rewarding and thus have reduced motivation to develop and maintain social bonds (Waller & Wagner, 2019). In support of this theory, the current study showed that CU traits were uniquely associated with decreased responsiveness to social rewards using the new measure of child responsiveness to different types of rewards. This finding is consistent with prior questionnaire studies that assessed sensitivity to affiliative rewards and CU traits in children (Domínguez-Álvarez et al., 2021; Perlstein et al., 2022). The current findings are, however, in contrast to findings from the experimental task described in the previous chapter of this thesis, in which CU traits were not found to be associated with differential response to social versus tangible rewards. Due to their inherently artificial nature, experimental tasks may not be sufficiently sensitive to capture behaviour in a real-life context. Previous research has shown that the context in which rewards are delivered and how they are delivered is important (Centifanti & Modecki, 2013; Henderlong & Lepper, 2002). For example, praise has shown more motivational value when delivered by a person meaningful to the recipient, such as a caregiver of the child (Owen et al., 2012). If these findings also apply to other forms of reward, then child responsiveness to reward

may be best assessed by report from the person of interest delivering the reward (e.g., caregiver, teacher) or the recipient themselves. Observation-based methods should also be considered as they may produce a more objective assessment of child responsiveness to reward that is free from the biases inherent in parent report, such as those relating to social desirability, mood, memory, personality, or a poor quality parent-child relationship.

In line with predictions, responsiveness to social rewards but not tangible rewards was associated with more positive overall child adjustment including lower CU traits, lower externalising problems, and greater conscience. This is consistent with prior research indicating that warm and positive parenting is associated with more successful functioning in children (van der Storm et al., 2021) and decreased internalising and externalising behaviours (Pinquart, 2017a, 2017b). Thompson and Newton (2013) posited that the desire to maintain a positive relationship with the parent provides incentives for the child to comply with parent demands and to behave in a prosocial manner and, thus, social rewards may have greater motivational value when the person delivering the reward has a positive relationship with the child receiving the reward (Owen et al., 2012; Waller & Wagner, 2019). Indeed, current findings that responsiveness to social rewards was associated with less parent negative feelings about their child and more positive feelings, suggesting that the quality of the parent-child relationship may influence children's responsiveness to social rewards, or alternatively, that parents feel more positive about their child when she or he responds positively to social rewards. In contrast, tangible rewards were unrelated to any measures of child adjustment. Scores on the Responsiveness to Tangible Rewards subscale on the RPQ showed substantial negative skewness, with most parents reporting that their children liked tangible rewards of sweets, toys, and stickers. This indicates that most children are highly responsive to tangible rewards regardless of levels of CP and CU traits. These results provide preliminary support for the distinctiveness of child responsiveness to tangible rewards and social rewards. Importantly, the differential associations between each subscale of the RPQ and child adjustment have clinical implications for the treatment of childhood CP and CU traits. In line with recommendations of parent self-help books and parenting interventions, social rewards are encouraged over tangible rewards, which parenting intervention texts typically advise should be used sparingly (e.g., Dadds & Hawes, 2006; McMahon & Forehand, 2005).

Another aspect of parenting to consider in relation to parental use of rewards is discipline. Consistent with previous research (Kochanska et al., 2005; van der Storm et al., 2021), current

findings show that responsiveness to social rewards was associated with less frequent use of punitive discipline and more frequent use of non-punitive discipline. This suggests that parents of children who are responsive to social rewards resort less to punitive disciplinary methods to manage their child's behaviour. Alternatively, it could be that frequent use of non-punitive methods results in children being more responsive to social rewards. There was no relationship between child responsiveness to tangible rewards and parent discipline. Most parents rated their children as being highly responsive to tangible rewards, with little variation in the current study sample. It appears that all children are perceived as highly responsive to tangible rewards regardless of parents' feelings towards their child or the type of discipline parents use with their children. Longitudinal studies are needed to clarify the nature and directionality of relationships between responsiveness to different types of rewards in children, parents' feelings towards their child and parental discipline.

5.4.1 Limitations

Participants in the current study were recruited from the community and comprised of predominantly middle-class, well-educated parents. This could affect the types of discipline and rewards parents use (Pinderhughes et al., 2000; Silveira et al., 2020). Furthermore, findings may not generalise to clinical samples with more severe levels of CU traits and CP, who are also more likely to experience more extremes of parenting and more severely impaired relationships with caregivers. Thus, the reliability and validity of the RPQ need to be investigated in more diverse samples that include participants with lower SES and clinical samples in future research. However, examination of the individual variation in child responsiveness to different types of parental rewards within a community sample can be beneficial in furthering understanding before conducting more costly and resource-intensive research with clinical samples. Another limitation is the reliance on parents as the single informant for child characteristics and parenting, potentially leading to significant relationships between constructs of interest due to shared method variance. Furthermore, parents may not be aware of the behaviours of their children that take place outside of the home. Therefore, they may over or under report CU traits or behaviour problems due to social desirable answering and other subjective biases, such as their mood or functioning (e.g., stress) or poor quality parent-child relationships. Future research validating the RPQ should use multiple informants (e.g., teachers, childcare workers) to capture child behaviour across various settings (e.g., teachers can report on behaviours in the school setting). Another improvement would be to

include child and family observation to assess child behaviour, responsiveness to different forms of parental reward, and parent implementation of both reward and discipline strategies to see if scores on the RPQ relate to child and parent behaviour in the real world.

5.4.2 Conclusion

The current study describes the development and validation of the RPQ, a novel 13-item questionnaire designed to elicit parents' views of their child's responsiveness to tangible and social rewards, including praise, parent affection, and time spent with parents. Using PCA, two subscales were identified: responsiveness to tangible reward and responsiveness to social reward. All types of social rewards loaded onto a single social rewards factor rather than separate factors, indicating that parents view their child as showing a similar level of responsiveness to praise, affection, and spending time with their parent. Both subscales showed internal consistency and test-retest reliability. Further, observed relationships for child responsiveness to both social and tangible rewards were in line with previous research and theory. Thus, support for the construct validity of the two-factor RPQ was established. The RPQ provides a relatively brief, valid and reliable tool to help clinicians and caregivers identify rewards that may provide the optimal motivation for children to comply and behave in a prosocial manner. Overall, these results demonstrate promising evidence for the RPQ as a measure of child responsiveness to rewards, though further research is needed using multiple informants and more objective measures of child behaviour, responsiveness to rewards, and parenting practices, such as child and family observation methods or physiological methods to assess child responses to rewards.

Chapter 6
Callous-Unemotional Traits, Responsiveness to Rewards, and the Parent-Child Relationship: An Observation Study

The previous chapters in this thesis considered the child's individual characteristics (punishment and reward sensitivity), parent discipline, and parent rewards in relation to CU traits. The current chapter focuses primarily on the parent-child relationship, an important target of interventions for childhood CP. Observation was used to capture relational dimensions of parent-child interaction and children's response to parent reward and how they related to CU traits. A new coding scheme was developed to assess parent, child, and dyadic behaviours in context. As noted earlier in this thesis, the word "compliance" in the context of this research refers to child cooperation with parents actively participating in family life while still following parental rules and set boundaries, not mere obedience to parent authority.

6.1 Introduction

Current 'best practice' treatment programmes for childhood CP are parent training interventions (National Institute for Health and Care Excellence [NICE], 2013). Many parenting programmes follow the two-stage dual process model pioneered by Constance Hanf (1969), which involves parent-child relationship enhancement strategies before introducing behaviour management strategies. Child compliance often increases as the parent-child relationship improves, and an improved parent-child relationship reduces the likelihood that parents will implement discipline strategies poorly. Enhancing the parent-child relationship also naturally leads to increased effectiveness of reward-based behaviour management techniques. This chapter focuses on these two components of the dual process model: parent-child relationship enhancement and effective behaviour management strategies. The parent-child relationship has been broadly conceptualised in terms of attachment security, parents' sensitive responding, parents' warmth and affection in interactions with their children, parent perceptions of a close and unconflicted relationship, and mutual reciprocity in parent-child interactions (Sanders & Morawska, 2018).

Supporting the notion that parent-child relationship quality can augment the effectiveness of behaviour management techniques, research has shown that poorer parent-child relationships were related to more negative and harsh parent discipline and poorer child outcomes. In a

longitudinal study of 102 families, Boldt et al. (2017) found that preschoolers' rejection of parent attempts at limit setting was related to increased behaviour problems at age 10 to 12 years and that this effect was stronger in parent-child dyads who were insecurely attached at 15 months old. Similar findings were reported in another longitudinal study with 100 families recruited from the community (Kochanska et al., 2009). Mutually coercive parent-child behaviours assessed over time from age 2 to 3 years were related to increased externalising behaviour at age 6 but only in children who were insecurely attached. Notably, in a longitudinal study of 74 children and their mothers, Kochanska et al. (2005) found that a positive parent-child relationship that is mutually responsive not only promoted conscience development through children's enjoyment of interactions with their mothers, but also reduced punitive parent discipline. These findings show that a positive parent-child relationship can buffer the negative effects of coercive discipline and reduce parents' use of coercive discipline. This research also highlights the importance of the parent-child relationship in preventing aggressive and disruptive behaviour in children.

A hallmark of psychopathy and CU traits is the inability to form meaningful relationships and lasting bonds with others (Hare, 2003). According to Waller and Wagner's (2019) Sensitivity to Threat and Affiliative Reward (STAR) model of the aetiology of CU traits, children with CU traits have a low genetic propensity to social affiliation and experience poorer quality relationships with significant others. Social affiliation refers to valuing and deriving pleasure from closeness with others, and affiliative behaviour can include warmth, physical and verbal affection, smiles, hugs, etc. Waller & Wagner, 2019). The STAR model posits that social rewards are not inherently motivating for children high in CU traits due to the low propensity towards affiliation. Supporting the STAR model, lower sensitivity to affiliation was associated with higher CU traits in three separate samples of children ranging in age from 3 to 10 years (Domínguez-Álvarez et al., 2021; Perlstein et al., 2022). However, studies that examined parents' affiliative behaviours rather than children's sensitivity to affiliation in social situations found the opposite relationship. Maternal enjoyment of interactions with their child, positive attention, and involvement assessed by self-report and observation were longitudinally related to lower CU traits (Pardini et al., 2007; Pasalich et al., 2016). Thus, although children higher in CU traits appear to show lower social affiliation, CU traits are not unamenable to positive parenting practices and parents' affiliative behaviours are implicated in the prevention of the development of CU traits.

The finding that CU traits are not unamenable to positive parenting practices is significant given that a key correlate of CU traits is low sensitivity to punishment, meaning reward-based strategies as an alternative to discipline-based methods are needed to encourage prosocial behaviour and prevent antisocial behaviour. Indeed, while harsh parenting longitudinally predicted increases in CU traits (Waller et al., 2012), positive reinforcement was related to lower CU traits over time (Hawes et al., 2011). Intervention research also showed that the effectiveness of the treatment was driven by parents' increased use of praise, rewards, and positive physical contact (Kjøbli et al., 2018). Notably, parents' use of praise and tangible rewards was associated with lower CP for children high in CU traits but not those low in these traits (Clark & Frick, 2018), suggesting that external rewards are more effective for children high in CU traits than for children low in CU traits. However, teachers reported that all children were responsive to rewards regardless of level of CU traits (Cao et al., 2023). Thus, the context and the person delivering the reward may impact the effectiveness of the reward. In sum, these studies show that parents' use of reward-based strategies effectively reduces CU traits and may be an optimal route to prosocial behaviour and positive conscience development in children with high levels of CU traits.

In their theory of parenting in relation to child moral development, Thompson and Newton (2013) argued that the emotional incentives of a positive relationship with caregivers provide reinforcement for prosocial and moral behaviour. When the parent-child relationship is positive, the child's motivation for cooperation with parents and prosocial behaviour comes from the intrinsic desire to maintain a positive relationship with the parent rather than from fear of negative consequences. The effectiveness of rewards may be dependent on who delivers the reward and a positive parent-child relationship may increase the motivational value of rewards such as praise and non-verbal approval (Owen et al., 2012; Scott & Dadds, 2009). This may be particularly salient for children high in CU traits due to the association between CU traits and low responsiveness to punishment, which may explain why some studies have found that punishment-based discipline is less effective for children high in CU traits and suggested that treatment focus more heavily on reward strategies (e.g., Hawes & Dadds, 2005). Thus, theory and research suggest that the quality of the parent-child relationship may therefore be crucial in ensuring that social rewards, which are recommended by parenting interventions, could have motivational value for children with CU traits.

In support of the view that parent-child relationship quality may be especially important for children high in CU traits, longitudinal studies have found that lower CU traits were related to multiple indicators of parent-child relationship quality. Goulter et al. (2020) found that parental warmth assessed during kindergarten through grades 1 to 2 were associated with lower adolescent CU traits but not CP in a sample of 753 ethnically diverse, at-risk children. Parental warmth was assessed via observation and operationalised as the enjoyment of interactions with the child, sensitive responding, and time spent with the child. Waller et al. (2014) reported similar results in a low-SES and ethnically diverse sample of 731 mother-child dyads. Two measures of maternal warmth were used, observed warmth (operationalised as responsiveness, involvement, positive affect towards child, affection, and praise) and expressed warmth in speech samples from mothers. Both observed and expressed warmth at age 2 predicted lower CU traits but not CP at age 3. Notably, parental warmth was related to CU traits but not CP in both studies. There is also evidence that a positive parent-child relationship not only leads to lower CU traits but also lower CP and this effect is stronger in children high in CU traits. In a community sample of 1,233 girls, Kroneman et al. (2011) found that parental perceptions of a close and unconflicted relationship with their child was associated with a greater reduction in CP symptoms over time for girls high in CU traits than for those low in CU traits. Pasalich et al. (2011) reported similar findings for both maternal and paternal warmth in a clinical sample of boys aged 4 to 12 years.

Overall, these studies highlight the importance of parent-child relationship quality in preventing the development and maintenance of CU traits. However, a limitation of these studies is the parent-oriented assessments of the parent-child relationship that did not differentiate between parent behaviour and child behaviour. For example, studies assessed parents' enjoyment of interactions, parent sensitivity (Goulter et al., 2020), parents' expressed warm feelings about their child from 5-minute speech samples (Pasalich et al., 2011), or parents' perception of a close relationship with their child (Kroneman et al., 2011). Often it is parents' perceptions that are elicited or parents' behaviour that is observed with a dearth of studies looking at children's contribution to the assessment of parent-child relationship quality (e.g., children's own warmth towards the parent) or their responses to parenting. One of the exceptions to this is a study by Kochanska et al. (2013) who assessed the *reciprocal* nature of the parent-child relationship, including shared warmth and a 'mutually responsive orientation' (MRO) in a sample of 100 two-parent families recruited from the community. MRO was operationalised as a mutually cooperative relationship with harmonious communication and

shared joy and affection. Controlling for earlier CP and CU traits, parent-child MRO and shared warmth at age 3 to 4 longitudinally predicted lower externalising problems at age 6 to 8 but only in children high in CU traits. In another study, Dadds et al. (2014a) assessed both parent *and* child affection and eye contact in a brief interaction task. This study found that there was no difference between mothers of clinic-referred children with or without CU traits and controls in their expression of verbal and physical affection and eye contact. In contrast, children with CP and high CU traits were less likely to reciprocate parental affection and eye contact, compared to children with CP but low levels of CU traits and controls. Thus, by assessing both parent and child behaviours, this study was able to differentiate the impairments in behaviours of mothers versus children to conclude that children but not parents were impaired in their ability to express warmth and love in dyads with children high in CU traits.

6.1.1 The Current Study

The quality of the parent-child relationship may play a role in the effectiveness of rewards for encouraging compliance with rules and prosocial behaviour in children with elevated CU traits (Scott & Dadds, 2009). In the literature, parent-child relationship quality has tended to be considered from a parent-oriented lens. That is, it is parents' perceptions of the relationship or positive feelings about their child that is elicited, or parents' behaviour that is observed (e.g., Pasalich et al., 2016; Waller et al., 2014). Children's behaviour, perceptions of the parent-child relationship, and responses to parenting were rarely assessed except in a small handful of studies (e.g., Kochanska et al., 2013). Research should examine children's contributions in the assessment of parent-child relationship quality. Moreover, studies have examined children's response to rewards in relation to CU traits based on parent report (e.g., Perlstein et al., 2022) but no studies have examined this relationship in a real-life context.

Therefore, the aim of the current study is to investigate patterns of parent-child interaction, including child response to parental affiliative reward and the quality of the parent-child relationship in relation to CU traits using observation. Parent, child, and dyadic behaviours were coded in two observation tasks, the tangrams task and the Etch a Sketch task. These two tasks were selected as they provide different but complementary contexts to assess parental involvement and mutual cooperation. For the tangrams task, parents were instructed to step in only when they felt their child needed help, whereas the Etch a Sketch task requires parent cooperation from the start. Tasks were selected to provide a situational 'press' on the parent-

child interaction and potentially elicit intrusive and/or coercive behaviour in parents, while also providing opportunities for parents to demonstrate sensitivity to when their child is struggling with the tangram and requires help. The tasks also provide opportunities for parents to reward their child for completing a puzzle. As with previous chapters, the current study focuses on young children aged 3 to 6 as this is a significant developmental period for morality and conscience development. Furthermore, child traits and behaviours are less likely to be severe and rigid in early childhood and are thus potentially more amenable to intervention. A better understanding of how CU traits relate to certain patterns of parent-child interactions may help to identify factors that may prevent or contribute to the development or maintenance of CP and CU traits early on.

There were three sets of hypotheses for the current study. The first set concerns observed parent behaviour. It was hypothesised that CU traits and externalising problems would be related to indices of poorer parenting quality, including decreased sensitive responding, increased intrusiveness and verbal and physical coercion, and less use of praise to reward children. It was also predicted that CU traits and externalising problems would be related to more parental negative affect and less positive effect. The second set of hypotheses concerns child behaviour in the observation tasks. CU traits and externalising problems were hypothesised to be related to more coercive behaviour and non-compliance. CU traits were hypothesised to be associated with less responsiveness to parental reward. In terms of emotional displays, higher CU traits are hypothesised to be related to less positive affect, more negative affect, and less affection towards the parent. Finally, the parent-child relationship is hypothesised to be associated with lower CU traits.

6.2 Method

6.2.1 Participants

Thirty-one children aged 3 to 6 years (M = 4.82, SD = 1.07, 42% female) and their mothers (M age = 37.63, SD = 3.67) participated in the research. Most children came from two-parent families (94%) and had English as their first language (97%). Parents identified children as 64% White, 13% Asian, 10% Black, and 13% mixed White and Black or White and Asian. Most parents had an undergraduate degree or equivalent and above (97%). The present sample had similar rates of non-White ethnicity as the general population in the UK (36% in the present

sample vs. 34.5% national average), but a much higher rate of higher education compared to the national average in the UK (97% vs. 34%; Office for National Statistics, 2021a).

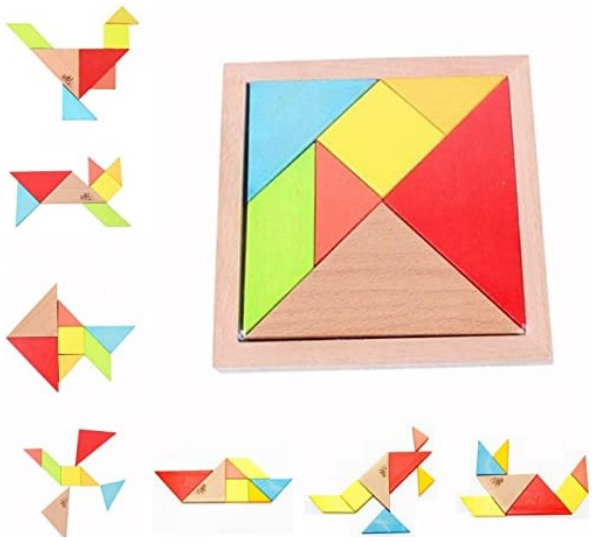
6.2.2 Observation Tasks

Parents and children completed two tasks together: a tangrams task and an Etch a Sketch task. In the tangrams task, children must create shapes using smaller geometric shapes (Figure 6.1). The puzzles were designed to start with more simple shapes (forming a square) and increased in difficulty (forming an animal) as children progressed. Before the task, the researcher read out the following instructions:

> The first game is a puzzle game called Tangrams. You put these small shapes together to make the big shape in the picture, a bit like a jigsaw puzzle. Please make as many of the shapes in the book as you can. Mum/dad, you are going to sit there for support. Most children can do it, but some find it a bit hard to get going. You can help if you think he/she really needs it. (Adapted from Hudson & Rapee, 2001, p. 1416).

Figure 6.1

Geometric Shapes Used in the Tangrams Task



The second observation task is the Etch a Sketch task. In this task, children and parents cooperate to produce a drawing using an Etch-a-Sketch toy (Figure 6.2). The toy has two knobs, one of which can only produce vertical lines and the other only horizontal lines. Using both

knobs simultaneously produces diagonal lines. Parent-child dyads were told that one person could only control one knob while the other could only control the other. Thus, parents and child must cooperate, strategise, and take turns to produce a simple line drawing of a house (a triangle on top of a rectangle with two squares for windows and a smaller rectangle for a door).

Figure 6.2

The Etch-a-Sketch Toy

Both tasks have been used in previous research on parent-child interaction (e.g., Hudson & Rapee, 2001; Kreppner et al., 2011). They were selected as structured activities which provide a 'press' on the parent-child interaction to elicit the target behaviours of interest, including child transgressions and parental attempts at limit setting and reward when the child complies or succeeds at the task. The two tasks contrast each other in terms of parent involvement. The tangrams task requires little parental involvement unless the child requires help. This means the parent needs to monitor and be sensitive to the child's verbal and non-verbal cues. The Etch a Sketch task requires the parent's direct involvement to complete the task. The order in which parent-child dyads completed the tasks was randomly counterbalanced to prevent carryover effects.

6.2.3 Observation Coding Scheme

A new coding scheme was created to assess individual parent and child behaviours, as well as dyadic behaviours. There were 9 codes for parent behaviours, 6 codes for child behaviours, and 2 codes for dyadic behaviours (Table 6.1). The aim was to capture both verbal and nonverbal exchanges and dynamics of the parent-child relationship. The codes for parents assessed the relational qualities of parent behaviours such as sensitive responding, intrusiveness,

expressions of positive affect (or warmth), and negative affect, and affection. Parent codes also assessed the use of praise, verbal coercion (e.g., shouting), and physical coercion (e.g., holding the child in place if the child is fidgeting). The codes for children assessed children's coercive behaviours, non-compliance, expressions of positive and negative affect, and affection towards their parent. Child responses to parent's praise or non-verbal approval was also assessed. Finally, the quality of parent-child relationship was assessed by observation of joint attention on task and shared positive affect indicating dyadic synchrony and a mutually responsive relationship (Harrist & Waugh, 2002). Each code was rated for frequency and intensity on a 5-point scale from 1 'no occurrence of the behaviour' to 5 'behaviour occurred a lot of the time and was of high intensity'. This method of coding based on the quality of behaviours along with frequency, means valuable contextual information was retained (e.g., age appropriateness of behaviours, intensity, etc.) over coding simple frequency counts (Dirks et al., 2012).

The coding scheme was informed by the literature on parenting behaviours as well as other coding scheme manuals used for assessing the parent-child interaction. The Coding of Attachment-Related Parenting (CARP; Matias et al., 2006) and the I-Love-You Coding Scheme (Dadds et al., 2012) informed relational-based codes, including parent sensitivity, affect, and joint attention. The Family Observation Schedule (FOS; Pasalich & Dadds, 2009) and the Emotional Availability Scales (Biringen et al., 2000) were used to inform social learning-related codes, including parent and child coercive behaviours, praise, and child non-compliance. See Appendix B for the coding scheme, which includes detailed information on codes and scoring.

Observations were video recorded to allow for later transcription and coding. Coding was carried out independently by two raters who were blind to children's scores on the current study measures, coded the observation data. The first rater (myself) developed the coding scheme and trained the second rater (a postgraduate in developmental psychology) in coding interactions using two randomly selected video recordings. Coders' ratings were compared for 32% of the videos to assess inter-rater reliability.

Table 6.1

Description of Parent, Child, and Dyadic Behaviours in Coding Scheme

Observation Variables	Description
Parent behaviour	
Sensitivity	Awareness of the child's needs and sensitivity to the child's verbal and non-verbal cues. Also includes autonomy-promoting behaviours and/or verbalisations that encourage the child to perform actions by himself/herself.
Intrusiveness	Instances where the parent does not leave enough space for the child to explore and lead. The parent interrupts, breaks the child's flow, dictates the pace, imposes suggestions/ideas, gives insufficient time to finish, and jumps in to do too much for the child.
Parent positive affect	General positive mood, positive facial expressions, bodily gestures, tone of voice, and expression of genuine enthusiasm and pleasure.
Parent negative affect	General negative mood, negative facial expressions, bodily gestures, tone of voice & lack of enthusiasm.
Parent affection	Parent's intentional and overt expression of feelings of closeness, care, and fondness for their child. Can be verbal or non-verbal.
Physical coercion	Use of negative physical force to direct child's behaviour (e.g., holding the child to prevent an action/behaviour).
Verbal coercion	Use of verbal instructions and directives that specify behaviour requested of the child. Tone of voice is harsh, commanding, forceful, and/or hostile.
Praise / Social reward	Verbal or non-verbal cues that express praise, approval, or appreciation of the child or child's behaviour in regard to current task or past, present, and future events.
Child behaviour	
Positive affect	Same as parent version.
Negative affect	Same as parent version.
Affection	Same as parent version.
Coercive behaviour	Physical aggression from the child. Verbalisations and demands delivered with a harsh tone of voice towards.

Non-compliance	Any instance when the child deliberately does not follow specific parental instruction. This includes when a child ignores a parental request or command. The child may also behave in a manner which is difficult or disruptive in response to parental request or command.
Responsiveness to reward	Positive response to parent's verbal or non-verbal approval. This includes smiles, positive affect, eye contact with the parent following the reward.
Dyadic synchrony	
Joint attention	Attentiveness to each other's comments and actions. Parent and child have joint focus of attention.
Shared positive affect	Parent and child display positive state similarity and enthusiasm. Appropriate positive affect matching, reciprocity, or complementary behaviour (e.g., if child smiles at parent, parent smiles back or pats head).

6.2.4 Questionnaire Measures

CU traits. Child CU traits were assessed using the UNSW system of pooling items from the SDQ and the APSD (Dadds et al., 2005). The alpha for the combined UNSW CU Traits scale was .93. Further details on this measure are described in previous chapters.

Externalising problems. Parents reported on child externalising problems using Conduct Problems and Hyperactivity subscales on the SDQ (Goodman et al., 2009). Further details on the SDQ are described in previous chapters. The alpha for the combined externalising subscale in the present study was .84.

Positive parenting. The Positive Parenting subscale on the brief version of the Alabama Parenting Questionnaire (brief APQ; Scott et al., 2011) was used to assess positive parenting practices. The original APQ (Frick, 1991) is a 42-item rating scale that measures five parenting constructs: Positive Parenting, Involvement, Supervision, Inconsistent Discipline, and Corporal Punishment. The brief version retains the same subscales with three items per subscale. Parents rate each item on a 5-point Likert scale ranging from 1 'never' to 5 'always'. The brief version of the APQ has shown good reliability and validity (Scott et al., 2011). The alpha was .79 in the current study.

Harsh discipline. The DDI (Straus & Fauchier, 2011) was used to assess the frequency of parental use of punitive discipline. The Punitive Discipline scale includes 12 items assessing corporal punishment, deprivation of privileges, and psychological aggression. The alpha for the current study was .80. Further details on the DDI are available in Chapter 3.

Parent feelings. Parents' positive and negative feelings towards their children were measured using a brief version of the FEEL (Deater-Deckard, 2000). The alpha was .89 for the Positive scale and .94 for the Negative scale. Details on the FEEL were described in Chapter 5.

Autism symptoms. The 16-item version of the SRS (SRS-brief; Moul et al., 2015) was completed by parents to assess children's autism symptoms given the overlap between CU traits and autistic traits, such as low empathy and emotion processing deficits (Jones et al., 2010). Children who scored above the clinical cut-off (≥ 60) on the SRS-brief were not included

in study analyses. None of the children scored above the clinical cut-off and therefore all participants were included in analyses. The alpha for the present sample was .91.

Family sociodemographic characteristics. Details about parent and child age, gender, ethnicity, family structure, and parent education were obtained through a brief questionnaire.

6.2.5 Procedure

Ethical approval was obtained from the university departmental research ethics committee prior to data collection. Written informed consent was obtained from parents and verbal assent from children. All assessment procedures took place in the participants' homes. Prior to the observation tasks, the children were encouraged to look at the video-recording equipment and play with the video-recording and photo-taking functions of the cameras to facilitate familiarity with the presence of the equipment. These steps were taken to enhance the validity of the observation sessions (Gardner, 1997). After reading out the instructions for the first observation task, the researcher (myself) left the room. After five minutes, the researcher returned and told participants their time was up before proceeding to start the second observation task. Both tasks were video recorded to enable later coding. After completing all assessment tasks, parents were debriefed and received a £10 shopping voucher.

6.2.6 Data Analysis

Data analyses were conducted using the Statistical Package for the Social Sciences, version 27. An alpha level of .05 was used for all analyses. In preliminary analyses, visual inspection of histograms and q-q plots revealed that several variables deviated from normality but contained zero and negative values and could not be transformed. The data was not highly skewed (< 3) nor highly kurtic (<10; Kline, 2012). Therefore, parametric tests with bootstrapping at 1000 resamples with BCa confidence intervals were used for analyses.

Scores on the UNSW CU traits scale were used to designate high and low CU traits groups. Consistent with previous research (Castagna & Waschbusch, 2021; Dadds et al., 2008; Frick et al., 2003a), children who scored in the top 25% of the CU traits score designated the high CU group (n = 8) and the remainder as low CU (n = 23). Multivariate analysis of covariance (MANCOVA) was used to test differences between the groups on each of the observed parent-child behaviours. The independent variable was CU group (2 levels: high, low) and the

dependent variables were the coded parent and child behaviours (8 parent codes, 6 child codes, and 2 dyadic codes). Externalising problems were the continuous covariate.

Partial correlations were conducted to examine associations between CU traits and observation variables controlling for externalising problems. This was repeated for externalising problems controlling for CU traits. Pearson's correlations were then conducted to compare observation variables against questionnaire measures of positive parenting, punitive discipline, parents' positive feelings about their child, and parents' negative feelings about their child to check the validity of the coding scheme. Inter-rater reliability of observation variables was assessed by conducting Intraclass Correlation Coefficients (ICC) for each code.

6.3 Results

6.3.1 Descriptive Statistics

Means and standard deviations for study variables are reported in Table 6.2. The mean CU traits score in this sample was higher than those previously obtained in community samples of young children, where mean scores ranged from 2.76 to 5.57 (Dadds et al., 2005; Dadds et al., 2014; Fontaine et al., 2010). The scores for the externalising problems subscale of the SDQ in the present study also fell above the range of those previously obtained in European community samples, where mean scores ranged from 4.29 to 5.52 (Maurice-Stam et al., 2018; Mølland et al., 2023). Inter-rater reliability between coders was very good with ICCs ranging from .83 to 1.00 (Table 6.2).

6.3.2 Group Differences on Observed Parent and Child Behaviours

The means and standard deviations of the observation variables for the high CU and low CU groups are reported in Table 6.3. For parent behaviour, there were significant group differences for positive affect and physical coercion (ps < .05). Parents of children in the high CU group displayed less positive affect and, unexpectedly, engaged in less physical coercion than parents of children in the low CU group. For child behaviour, there was a significant group effect for positive affect (p < .05). Children with high levels of CU traits displayed less positive affect compared to children in the low CU group. For dyadic synchrony, no differences between groups were observed.

Table 6.2

Descriptive Statistics of Main Study Variables for the Whole Sample

Variable	*M*	*SD*	Range	Skewness (*SE* = .42)	Kurtosis (*SE* = .82)	ICC
Child age	4.82	1.07	3 - 6	.22	-.90	-
Externalising problems	7.29	4.42	1-15	.15	-1.17	-
CU traits	6.13	4.57	0 - 14	-.06	-1.14	-
Positive parenting	26.45	2.45	20 - 30	-.89	.54	-
Punitive discipline	2.25	.92	1 - 4	.02	-1.16	-
Parent positive feelings	13.45	2.43	8 - 15	-1.21	-.21	-
Parent negative feelings	8.26	3.43	4 - 14	.26	-1.49	-
Observed parent behaviour						
Sensitivity	3.06	.73	2 - 4	-.10	-1.01	.96
Intrusiveness	2.13	.92	1 - 4	.55	-.32	.88
Parent positive affect	2.87	.76	1 - 4	-.25	-.14	.89
Parent negative affect	1.61	.76	1 - 4	1.29	1.83	.94
Parent affection	2.00	.68	1 - 3	.00	-.71	1.00
Physical coercion	1.39	.62	1 - 3	1.38	.98	1.00
Verbal coercion	1.74	.96	1 - 4	1.04	-.05	1.00
Praise / Social reward	3.29	.64	2 - 4	-.34	-.59	.94
Observed child behaviour						
Positive affect	2.32	.87	1 - 4	.27	-.42	.97
Negative affect	1.80	.65	1 - 3	.21	-.57	1.00
Affection	1.39	.56	1 - 3	1.09	.29	.83
Coercive behaviour	1.23	.43	1 - 2	1.38	-.11	.93
Non-compliance	1.81	1.01	1 - 5	1.44	2.13	.94
Responsiveness to reward	2.26	1.00	1 - 4	.30	-.90	.84
Observed dyadic synchrony						
Joint attention	3.51	1.00	1 - 5	-.59	.07	.97
Shared positive affect	2.45	.85	1 - 4	-.01	-.47	.95

Note. CU = callous-unemotional; ICC = Intraclass Correlation Coefficient.

Table 6.3

Descriptive Statistics for the High CU Groups and the Low CU Group

	Group mean (*SD*)			
	High CU (*n* = 8)	Low CU (*n* = 23)	*p*	η^2
Child age	5.17 (.69)	4.70 (1.17)	.57	.01
Gender: male, *n* (%)	6 (75)	11 (48)	.09	.35
Externalising problems	9.5 (6.22)	6.53 (4.40)	-	-
CU traits	**11.50 (1.60)**	**4.26 (3.67)**	**.001**	**.55**
Positive parenting	25.88 (3.04)	26.65 (2.25)	.43	.02
Punitive discipline	2.81 (.39)	2.06 (.97)	.11	.09
Parent positive feelings	13.50 (2.07)	13.43 (2.59)	.18	.06
Parent negative feelings	8.50 (3.85)	8.17 (3.35)	.14	.08
Parent behaviour				
Sensitivity	2.88 (.64)	3.13 (.76)	.70	.01
Intrusiveness	2.25 (1.04)	2.09 (.90)	.58	.01
Parent positive affect	**2.25 (.71)**	**3.09 (.67)**	**.02**	**.17**
Parent negative affect	2.00 (.93)	1.48 (.67)	.34	.03
Parent affection	2.00 (.53)	2.00 (.74)	.92	.00
Physical coercion	**1.13 (.35)**	**1.48 (.67)**	**.03**	**.16**
Verbal coercion	1.88 (.99)	1.70 (.97)	.67	.01
Praise / Social reward	3.13 (.64)	3.35 (.65)	.46	.02
Child behaviour				
Positive affect	**1.63 (.52)**	**2.57 (.84)**	**.03**	**.16**
Negative affect	2.13 (.35)	1.70 (.70)	.37	.03
Affection	1.13 (.35)	1.47 (.59)	.19	.06
Coercive behaviour	1.25 (.46)	1.22 (.42)	.52	.02
Non-compliance	2.13 (.83)	1.70 (1.06)	.80	.00
Responsiveness to reward	2.75 (1.16)	2.09 (.90)	.31	.04
Dyadic synchrony				
Joint attention	3.25 (.89)	3.61 (1.03)	.86	.00
Shared positive affect	2.00 (.76)	2.61 (.84)	.17	.07

Note. Significant effects are in bold. CU = callous-unemotional.

6.3.3 Associations between CU Traits, Externalising Problems, and Observed Parent and Child Behaviours

Partial correlations between observation variables and CU traits controlling for externalising problems are reported in Table 6.4. Children's CU traits were not related to any of the observed parenting variables after controlling for externalising problems but were uniquely related to decreased positive affect and increased negative affect in children.

6.3.4 Associations between Observed Behaviours and Parent Report of Parenting Behaviours and Feelings about their Child

Correlations between the observed parent-child interaction and questionnaire measures of positive parenting, punitive discipline, and parents' feelings about their child are reported in Table 6.5. There were no associations between parent self-report of positive parenting and any of the observed child and parent behaviours. Parents' self-reported punitive discipline was related to greater observed parent and child negative affect. Parents' positive feelings about their child were related to greater dyadic synchrony and more positive parenting behaviours, including increased sensitivity, lower intrusiveness, negative affect, and coercive interactions. In terms of child behaviour, parents' positive feelings about their child were related to lower coercive behaviours and non-compliance. In contrast, more negative parental feelings about their child were related to more observed negative parenting behaviour, including increased intrusiveness, negative affect, and verbal coercion. Greater negative parental feelings about their child were also related to increased negative child behaviours, including negative affect, coercive behaviours towards the parent, and non-compliance. Greater negative feelings were also related to lower levels of observed dyadic synchrony.

Table 6.4

Zero-Order and Partial Correlations between CU Traits and Observation Variables

	CU Traits	
	Zero-order	Partial [a]
Parent behaviour		
Sensitivity	-.29†	-.16
Intrusiveness	.36*	-.05
Parent positive affect	-.47**	-.21
Parent negative affect	.50**	.21
Parent affection	-.04	.00
Physical coercion	.16	-.13
Verbal coercion	.32*	-.08
Praise / Social reward	-.09	-.06
Child behaviour		
Positive affect	-.57***	-.33*
Negative affect	.57***	.33*
Affection	-.23	-.15
Coercive behaviour	.31*	-.04
Non-compliance	.47**	.19
Child responsiveness to reward	.40*	.15
Dyadic synchrony		
Joint attention	-.48**	-.05
Shared positive affect	-.33*	-.21

Note. CU = callous-unemotional.

[a] Controlling for externalising problems. [b] Controlling for CU traits.

† p <.10. * p < .05. ** p < .01. *** p < .001.

Table 6.5

Correlations between Questionnaire Measures of Parenting and Observation Variables

	Positive Parenting	Punitive Discipline	Parent Positive Feelings	Parent Negative Feelings
Parent behaviour				
Sensitivity	.19	-.34*	.38*	-.26†
Intrusiveness	.03	.27†	-.53**	.57***
Parent positive affect	.28	-.28†	.16	-.19
Parent negative affect	-.15	.40*	-.57***	.56***
Parent affection	.10	-.17	-.06	.09
Physical coercion	-.05	-.02	-.50**	.47**
Verbal coercion	-.18	.19	-.66***	.63***
Praise / Social reward	-.13	.02	-.07	.13
Child behaviour				
Positive affect	-.15	-.24†	.35*	-.33*
Negative affect	-.32*	.54***	-.28†	.48**
Affection	.06	-.15	-.04	.16
Coercive behaviour	.06	.36*	-.52**	.55**
Non-compliance	-.02	.30*	-.53**	.47**
Responsiveness to reward	-.01	.11	-.28†	.41*
Dyadic synchrony				
Joint attention	.07	-.19	.49**	-.52**
Shared positive affect	.09	-.09	.32*	-.26†

† p <.10. * p < .05. ** p < .01. *** p < .001.

6.4 Discussion

The current study examined patterns of parent-child interactions and quality of the parent-child relationship in relation to CU traits using observation. We expected parents of children with higher CU traits to exhibit a more negative pattern of parenting practices and relationship with their child. The current findings partially supported our hypotheses. Parents of children high in CU traits displayed fewer positive emotions in interactions with their child compared to the low CU group. Unique associations of CU traits with sensitivity, positive affect, and negative affect were in the directions we expected but did not reach statistical significance. Current findings are in line with those from prior studies that found parents' sensitive responding, warmth, and affection were associated with reduced CU traits (Pardini et al., 2007; Goulter et al., 2020), but the weaker relationships observed in the present study may be due to differences in sample characteristics. The present sample comprised primarily of well-educated parents whereas prior research used at-risk and low-SES samples. SES affects parenting practices with low-SES parents engaging in more coercive parenting and showing less sensitivity and warmth (Hoff & Lausen, 2019). Thus, negative parenting may be generally lower in the present sample than in past studies. Moreover, the present study used a cross-sectional design and did not assess changes in parenting over time. CU traits have been shown to drive changes in negative parenting over time (Pasalich et al., 2011) and increased negative parenting may not yet be reflected in the present sample with very young children.

Unexpectedly, parents of children in the high CU groups engaged in less physical coercion than parents of children lower in CU traits. A well-established correlate of CU traits is insensitivity to punishment (Frick et al., 2014b) and parents of children high in CU traits may find harsher methods ineffective and thus engage in less coercive discipline. Alternatively, it is possible that due to the awareness of being observed, all parents were responsive to their child regardless of CU traits status and may have actively reduced their own coercive behaviours. This is supported by the current study findings that observed coercive behaviours were unrelated to questionnaire measures of punitive discipline. Parents may have felt that the questionnaires afforded greater anonymity than a video-recorded interaction and thus may have been more open to disclosing parenting practices commonly viewed as undesirable. Children, however, are likely less self-conscious than parents of being observed, supported by the finding that CU traits were associated with lower positive affect and higher negative affect as observed in children. In addition, the observation paradigms may not have afforded enough of a situational

'press' to elicit the negative parenting behaviours of interest. Paradigms that place more stress on the parent-child interaction (e.g., giving dyads an unsolvable puzzle, giving conflicting instructions to parent and children) may be more effective in eliciting parent-child conflict and the negative parenting behaviours of interest.

The emotional aspects of parent-child interactions in relation to CU traits were also examined. The core features of CU traits are blunted emotionality (Fanti et al., 2016) and reduced responsiveness to affiliation (Waller & Wagner, 2019). Indeed, children higher in CU traits displayed less observed positive affect and more negative affect in interactions with their parents in the current study. This effect was stronger for children than for parents which did not reach statistical significance despite being in the expected direction of effect. Similarly, CU traits was related to lower shared affect but this relationship was not statistically significant. Current findings are contrary to existing evidence that CU traits are associated with reduced social affiliation (Domínguez-Álvarez et al., 2021; Perlstein et al., 2022). Constructs were assessed using single-informant questionnaire in these prior studies and, thus, the relationship between CU traits and lower affiliation may have been inflated due to shared method variance. Together, current findings indicate that emotional interactions were overall less positive in high CU dyads, but this style of parent-child interaction characterised by less positive affect appears to be driven more by children than the parents.

The current study also assessed parents' use of praise and affection and child responsiveness to such rewards. Contrary to predictions, CU traits were unrelated to parent praise, affection, and child responsiveness to praise. This finding is inconsistent with theory and evidence that suggests that children high on CU traits are less responsive to affiliative rewards such as praise and affection (Perlstein et al., 2022; Waller & Wagner, 2019). Conflicting findings may be due to differences in the nature or intensity of the relationship within which affiliation was assessed. Perlstein et al. (2022) assessed sensitivity to affiliation in all social interactions (with peers, other adults, etc.), whereas this study exclusively focused on response to parent affiliation. Differences in age groups could have also contributed to discrepant findings. The sample in Perlstein et al.'s (2022) study ranged in age from 3 to 10 years, whereas the age range in the current study sample was narrower focusing on younger children aged 3 to 6. Praise and affection are highly motivating for younger children due to the positive attention the child receives (Hawes & Allen, 2016). Studies using similar age range as the present study found that rewards were equally effective in children regardless of levels of CU traits (Cao et al.,

2023; Hawes & Dadds, 2005). Additionally, given the structured nature of the tasks, there was likely less opportunity for physical affection and positive behaviours. A free-play task or a paradigm designed to elicit parent affection towards their child (e.g., the 'I-Love-You' paradigm; Dadds et al., 2012) may provide more opportunities for affiliative behaviours from parents and children. Positive and negative behaviours should also be measured in separate observation sessions to avoid carryover effects between tasks. One session could use more structured activities or those that place more stress on the parent-child interaction (e.g., unsolvable puzzles) to elicit negative behaviours and emotions, while the other session could involve free play to assess positive behaviours.

Observed behaviours were also compared against parent report of parenting practices and feelings about their child. Current findings for parental feelings about their child were largely in line with predictions. Parents' positive feelings about their children were related to more positive and less negative parenting behaviours observed during the two tasks. Conversely, parents' negative feelings were related to more negative observed parent and child behaviours, including lower observed child responsiveness to reward. In contrast, convergence between observation and questionnaire measures of parenting practices was lower. For self-reported positive parenting practices, there were relationships with observed sensitivity, positive parent affect, and verbal coercion in the expected directions, but these did not reach statistical significance. Self-reported parental punitive discipline was also unexpectedly unrelated to parents' physical and verbal coercion in the observation tasks. However, self-reported punitive discipline was related to lower parent sensitivity and greater parent negative affect. In terms of children's behaviour, punitive discipline was related to greater child negative affect and coercive and non-compliant behaviour. Weak associations between questionnaire and observation measures of parenting could be due parents being less likely to engage in verbal reprimands or physical punishment when they know they are being observed or overall low levels of child misbehaviour. There is extensive research showing high convergence between measures by the same rater in the same context (De Los Reyes et al., 2015) suggesting that the selected paradigms for observation in the current study may not have effectively elicited the target behaviours. The structured nature of the tasks used in the current study may have led to a focus on the task with less interactions between parents and children. A free-play and tidy-up task may elicit more positive and negative behaviours. Further, in questionnaires, parent report on behaviours and feelings across a wider time span and across a range of contexts, whereas observation measures behaviour in narrow, select contexts.

6.4.1 Limitations

The current findings should be considered in light of several limitations of this study. First, although observation is considered reliable and objective, it is not entirely free from participant bias. Participants were still aware they were being observed and may not have behaved as they usually would be due to social desirability. Further, the nature of the tasks may imply that children are being tested on their ability and parents may have tried to 'help' the research and satisfy the perceived needs of the researcher, which could have led them to alter their normal behaviour. Attempts were made to increase the ecological validity of observations and reducing potential reactivity effects, including conducting the assessment in participants' homes, being in a different room to avoid interacting with families during recording, and familiarising families with the recording equipment prior to observation (Gardner, 1997). These steps were taken to ensure that participants were at ease in their usual surroundings and, consequently, more inclined to display their usual behaviour even if it may not be considered socially desirable such as harshness or coercion.

A second limitation is there was little convergence between the self-reported and observation-based measures of parenting practices. It is unclear whether this means parents are not accurate reporters of their own behaviours, or that parents altered behaviours when they know they are being observed due to social desirability bias, reactivity effects, demand characteristics, or a combination of these factors. However, it is not uncommon for parent report and observations of parenting and parent-child interactions show low associations (Hendrinks et al., 2018; Schofield et al., 2016). Moreover, discrepancies between parent and observer reports highlight how behaviour may vary across context, which can be useful for identifying triggers or situational factors that influence behaviour (Schofield et al., 2016). The low frequency of coercive parent and child behaviours observed in the present study may also simply reflect a high functioning community sample, though the mean CU traits score in this sample was higher than those previously reported in community samples of young children (Dadds et al., 2005; Dadds et al., 2014a; Fontaine et al., 2010). Alternatively, the modest sample size made it more difficult to detect significant relationships. Future research should use a larger sample of clinic-referred children and families.

Third, this research involved mothers only and findings may be specific to maternal behaviour only. Research has shown that fathers have different parenting styles and practices from

mothers (Cabrera et al., 2018; Yaffe, 2020). Involving both parents in future studies could be beneficial in understanding the distinct effects of maternal versus paternal parenting behaviours on externalising problems and CU traits. Furthermore, by involving both parents, the effects of parent-child gender matching (i.e., father-son, father-daughter, mother-son, and mother-daughter) can be examined, given the theories and evidence on the impact of parent and child gender on child outcomes (Feldman et al., 2013).

A fourth limitation relates to the sample characteristics of the current study. Participants were recruited from the community and the sample did not include children who experience more significant impairment and more extremes of parenting. It is unclear how findings apply to more severely affected children who are the ones who need the most support. Moreover, the present sample comprises predominantly middle-class, well-educated parents. Studies have shown that SES affects parenting practices with low-SES parents engaging in more coercive parenting and showing less sensitivity and warmth (Hoff & Laursen, 2019). Future research should use more diverse samples that include participants with lower SES and referred children.

6.4.2 Conclusion

The current study used observation of parent, child, and dyadic behaviours to examine the relationship between CU traits, parenting practices, and the quality of the parent-child relationship. Overall, current findings only partially support the existing literature that there is a more negative pattern of interactions between parents and children higher in CU traits. The most robust findings concerned emotional interactions between parents and children, which were less positive in high CU dyads. These effects were stronger in children with elevated CU traits indicating that the negative emotions that arise in parent-child interactions may potentially be driven by children's characteristics. Longitudinal studies are needed to confirm the direction of effects. This suggests that interventions for children with externalising problems should emphasise strategies aimed at increasing the emotional engagement of parents, especially if their child is also high in CU traits. Findings did not support the existing literature that CU traits are related to less use of parental rewards, less child responsiveness to parental reward, and poorer parent-child relationship quality. Discrepant findings could be due to the observation tasks not eliciting sufficient positive behaviours, parents altering their behaviour knowing they are being observed, or the lack of variation in this present high-SES

community sample to detect significant effects. Future should use a larger sample and create more reliable constructs by aggregating multiple measures, such as parent self-report measures, family observation, and child story stems, to investigate the relationships between CU traits, parent use of rewards, child responsiveness to rewards, and the parent-child relationship. The inclusion of methods that assess children's mental representations of parent behaviours and the parent-child allows triangulation of parent and child perspectives and behaviours.

Chapter 7
General Discussion

Early childhood is a critical developmental period for conscience and morality, which are thought to be impaired in individuals with CU and psychopathic traits. Parents are a significant influence during early childhood, and there is abundant research on parenting and CU traits. However, there is surprisingly a dearth of research examining CU traits and insensitivity to parental punishment in young children, despite punishment insensitivity being a central feature of many theories of CU traits and being implicated in the poorer response to treatment. This thesis aimed to enhance our understanding of how responsiveness to punishment and rewards relates to CU traits in young children and, ultimately, inform how interventions can be adapted for children with elevated CU traits. In this thesis, punishment is any stimulus or event perceived as aversive to the individual that decreases the likelihood of the behaviour that led to punishment re-occurring. Punishment is conceptualised broadly, ranging from parental disapproval and sanctions to distressed or fearful faces.

The first study in this thesis, described in Chapter 2, examined learning through punishment and rewards and CU traits using a novel experimental task. The second study, described in Chapter 3, explored the indirect effect of CU traits on conscience through punishment insensitivity. Parent use of punitive and non-punitive discipline was also examined in relation to punishment insensitivity and CU traits. In Chapter 4, CU traits and preference for different types of reward were explored using an experimental task. Chapter 5 describes the validation of a newly developed questionnaire measuring responsiveness to tangible and social rewards. Finally, the study in Chapter 6 explored the associations between CU traits, the parent-child relationship, and child responsiveness to social rewards using observation.

In this concluding chapter, the main findings from Chapters 2 to 6 will be summarised, followed by a discussion of the practical and clinical implications of the findings and directions for future research. This chapter concludes with a consideration of the important limitations across the studies in this thesis.

7.1 Summary of Findings

7.1.1 CU Traits are Associated with Deficits in Learning through Punishment and Reward in Young Children

In Chapter 2 of this thesis, I described the development of a novel experimental task (the Moles in Holes task) to assess learning through punishment and reward in young children. A newly developed task was needed as paradigms used in previous studies on reinforcement learning were not adequate for young children. Moreover, the artificial nature of existing paradigms may have led to mixed findings in this area. Because the target age group of this research was young children, the task had to be engaging and meaningful to ensure participants' motivation and engagement. Thus, a new task was developed with these factors in mind. Results revealed that there were no deficits in learning through reward in children higher in CU traits. They could acquire information about which stimuli would lead to reward and respond appropriately. However, CU traits were associated with deficits in learning through punishment and difficulty withholding response to stimuli that signalled punishment. Moreover, the presence of reward seemed to exacerbate this inability to process punishment cues, as performance on the task was lower in the presence of competing punishment and reward despite CU traits being unrelated to impairments in reward learning. Findings converged with parent-report measures of reward and punishment sensitivity indicating that constructs measured by the novel experimental task reflect behaviour in context. Importantly, the findings showed that deficits in punishment learning and difficulty altering behaviour in the face of punishment are already present and identifiable in children with higher CU traits by age 3. Finally, age was a significant predictor of task performance, supporting the notion that experimental tasks should be developmentally appropriate.

7.1.2 Punishment Insensitivity Plays an Important Role in Conscience and Parent Socialisation of Children with CU Traits

Numerous theoretical models of the aetiology of CU traits posit that insensitivity to punishment has detrimental effects on parent socialisation and conscience development (Blair, 2005b; Frick et al., 2014b; Waller & Wagner, 2019). Despite being proposed by many theories, no studies have tested insensitivity to parent punishment as a mechanism explaining the association between CU traits and impaired conscience. The study in Chapter 3 was the first to test this. Results showed that there was a significant indirect effect of CU traits on conscience through

punishment insensitivity. That is, CU traits were a significant predictor of punishment insensitivity, and punishment insensitivity was a significant predictor of conscience. Although findings need to be confirmed in longitudinal studies, the study provided preliminary evidence that insensitivity to punishment could be a potential mechanism explaining the association between CU traits and poor conscience.

The study in Chapter 3 also examined the moderating effect of insensitivity to punishment on parenting practices in children high in CU traits. Discipline was broken down into discrete strategies to examine the potential for differential effects of each strategy of parent discipline on CU traits. For harsh discipline, the discrete strategies included corporal punishment, psychological aggression, and deprivation of privileges. For non-punitive discipline, the discrete strategies were ignoring misbehaviour and teaching / explaining. Results revealed that parents' overall harsh discipline was not related to CU traits. When harsh discipline was broken down into distinct strategies in analyses, however, there were differential effects on CU traits. Corporal punishment was associated with lower CU traits but only in children with low to average punishment insensitivity. For children with greater punishment insensitivity, corporal punishment was associated with higher CU traits. With respect to deprivation of privileges, another dimension of harsh discipline in this study, the effect was the opposite of that of corporal punishment. More frequent parental use of privilege deprivation was related to lower CU traits in children with greater punishment insensitivity, but higher CU traits in children lower in punishment insensitivity. There was no relationship between the third dimension of harsh discipline, psychological aggression, and CU traits. In terms of non-punitive discipline, results revealed no association with CU traits. However, similar to results for harsh discipline, the distinct non-punitive strategies were differentially related to CU traits. Ignoring misbehaviour was associated with lower CU traits regardless of the level of insensitivity to punishment. Conversely, explaining and teaching rules was related to higher CU traits but only in children with greater insensitivity to punishment. Together, these findings indicate that distinct parent discipline strategies are differentially related to CU traits.

7.1.3 Young Children with CU Traits are Equally Motivated by Praise and Tangible Rewards

As reported in Chapter 3, CU traits were associated with more negative patterns of parent discipline for children with greater punishment insensitivity indicating that alternative

behaviour management strategies, such as reward-based strategies, are needed for children higher in CU traits. The study in Chapter 4 aimed to elucidate which types of rewards may be motivating for children with elevated CU traits. This study tested the two commonly used specific strategies to address child CP: praise and tangible rewards. A novel experimental task was developed to assess child responsiveness to different types of rewards, specifically tangible rewards and praise. The tangible reward was a star for every correct answer which could be traded for a toy. Stars are often synonymous with rewards and are commonly used in reward charts or token economy systems to reinforce desirable behaviour in the home by parents or in the school setting by teachers. Praise was given verbally by the experimenter (myself), for example, "That was correct. Well done." Results showed that CU traits were associated with fewer correct responses overall, indicating poorer motivation to perform well on the task. There was no difference in responsiveness to tangible reward versus praise based on the level of CU traits. Thus, it appears that young children may be responsive to all types of rewards regardless of their levels of CU traits.

7.1.4 CU Traits in Young Children are Associated with Less Preference for Parental Affiliative Rewards versus Tangible Rewards

Parenting interventions for childhood CP recommend various social rewards, not just praise. These include affection and time with the parent as well as praise. The aim of Chapter 5 was to elucidate the types of parental rewards that are motivating for young children and their relationship with CU traits. No instrument assessing child responsiveness to parental rewards currently exists. Therefore, a questionnaire assessing the motivational value of various types of rewards parents may use, the Reward Preferences Questionnaire (RPQ), was developed and validated in Chapter 5. Principal components analysis (PCA) was conducted on 13 items examining tangible rewards and social rewards, which included praise, affection, and time with parent. Two factors were identified: responsiveness to tangible rewards (four items) and responsiveness to social/affiliative rewards (nine items). The social reward items (praise, affection, time with parent) were expected to form three distinct factors, with tangible rewards as the fourth factor. However, PCA did not support a four-factor solution and all three types of social rewards loaded onto a single factor. Thus, children who respond positively to one type of social reward are also likely to respond positively to all other types of social rewards. The two subscales of the RPQ also showed good internal consistency and test-retest reliability. Expected associations between RPQ subscales and assessments of child characteristics and

behaviour, as well as parenting behaviours were found, demonstrating construct validity of the RPQ. Child responsiveness to social rewards but not tangible rewards was associated with more positive overall child adjustment providing evidence for the predictive validity of the RPQ in young children. With respect to the motivational value of parental rewards for young children high in CU traits, CU traits were uniquely associated with decreased responsiveness to social rewards using the new measure of child responsiveness to different types of rewards.

7.1.5 CU Traits are Associated with Dysfunctional Patterns of Parent-Child Interactions and Poorer Parent-Child Relationship Quality

The research in Chapter 6 of this thesis used observation to assess child responsiveness to parental rewards and the parent-child relationship in relation to CU traits. Observation of parent-child interactions can provide a more accurate representation of parent and child behaviours compared to self-report and experimental methods. Moreover, observation captures behaviour in 'real-life' contexts as well as behaviours that are difficult to quantify, such as emotional expression and quality of the parent-child relationship. Results from this study found that although the associations between CU traits and a more negative pattern of parenting were not significant, they were in the direction we expected; that is, CU traits were related to lower sensitive responding and greater coercive parenting. Moreover, these effects were significant before the effects of externalising problems were controlled for. The study in Chapter 6 also assessed children's behaviour including affection towards parents, coercive behaviours, non-compliance, and responsiveness to parent reward. Similar to findings for observed parent behaviours, the association between CU traits and child behaviours were in the direction we expected but did not reach significance, possibly due to the relatively small sample size.

Observation also allowed an assessment of the relational aspects of parent-child interaction which are difficult to assess using self-report methods, such as warmth, tone of voice, enthusiasm, and facial and bodily expressions. Parents of children higher in CU traits displayed more negative emotions and fewer positive emotions in interactions with their children compared to parents of dyads with children lower in CU traits. A similar pattern was observed for child behaviour, such that children higher in CU traits displayed less positive affect and more negative affect in interactions with their parents. There was also less shared positive affect observed in dyads with children higher in CU traits. The association between CU traits and more negative emotions was weaker for parents than for children and only marginally

significant. These findings indicate that emotional interactions were overall less positive in high CU dyads and that this style of parent-child interaction characterised by less positive affect is potentially driven more by child characteristics than parents. Together, these findings indicate that parents and children with elevated CU traits experience less harmonious and warm interactions.

7.2 Implications and Directions for Future Research

There were several implications of the findings from the research in this thesis which will be discussed in this section.

7.2.1 Insensitivity to Punishment Affects Multiple Areas of Functioning

Despite insensitivity to punishment featuring in most theoretical models of the aetiology of CU traits and psychopathy (e.g., Blair, 2005b; Lykken, 1957; Newman, 1998; Wagner & Waller, 2019), the relationship between insensitivity to punishment and CU traits is relatively under-studied in early childhood with most experimental studies conducted in children aged 8 and older (Salekin, 2017). This is concerning as the foundations for moral development are laid down early in life, with children as young as 18 months showing empathy and caring attitudes which notably increase by the third year of life (Knafo et al., 2008). The study in Chapter 2 adds to the scant literature on CU traits and deficits in reinforcement learning in young children. Findings from this chapter using the Moles in Holes task of learning through reward and punishment showed that CU traits in young children were associated with deficits in punishment learning and difficulty altering behaviour in the face of punishment as a result (Chapter 2). Importantly, this research showed that deficits are already present and identifiable in children as young as 3 years of age. Findings were unique to CU traits with no relationships with externalising problems yet at this age, suggesting that there is a need to identify these deficits before children learn to use aggressive and disruptive behaviours as a means to achieve their goals and before such behaviours become entrenched and difficult to change.

Several theoretical models propose that insensitivity to punishment can negatively impact parent socialisation and conscience development in individuals with CU traits (Blair, 2005b; Frick et al., 2014b). However, no studies have tested insensitivity to parent punishment as a potential mechanism explaining the association between CU traits and more impaired conscience. The study in Chapter 3 was the first to examine this relationship and provided

evidence of an indirect effect of CU traits on impaired conscience through insensitivity to parental punishment. However, due to the lack of temporal precedence, it is not possible to draw conclusions about causality between the predictor, mediator, and outcome (Lemmer & Gollwitzer, 2017). Nonetheless, this study provides preliminary evidence to support further investigation of this model in a longitudinal design with a more comprehensive assessment of conscience, for example, observation of children in a task designed to elicit transgressions, puppet interviews or moral dilemma scenarios to obtain child representations of morality. Additionally, future research should consider including a broader range of potential mediators and moderators of the association between CU traits and impaired conscience, such as the quality of the parent-child relationship, exposure to antisocial peers, and genetic factors.

In addition to detrimental effects on conscience in young children with CU traits, punishment insensitivity was also shown to exacerbate negative patterns of parent discipline of parents with children with elevated CU traits. For children low in punishment insensitivity, corporal punishment was associated with lower CU traits while deprivation of privileges was related to higher CU traits. For children with greater punishment insensitivity, corporal punishment related to higher CU traits while privilege deprivation was related to lower CU traits. For non-punitive discipline, ignoring misbehaviour was associated with lower CU traits irrespective of the level of insensitivity to punishment. Conversely, explaining and teaching rules was linked to higher CU traits but only in children with greater insensitivity to punishment.

These patterns of findings indicate that the effectiveness of different types of discipline in children high in CU traits varies depending on the child's level of punishment insensitivity. For children who are more punishment insensitive, corporal punishment increases their CU traits but removal of privileges may be more effective in reducing their CU traits. A surprising finding is that explaining and teaching rules was associated with increased CU traits in children with higher levels of punishment insensitivity. Explaining and teaching is an inductive approach to discipline that focuses on addressing a child's behaviour by helping them understand the concepts of right and wrong, particularly through learning the impact of their misbehaviour on others (Hoffman, 2000). However, it may not be effective for children with high levels of CU traits due to their reduced ability to empathise and understand the feelings of others, which may limit their concern for the well-being of others (Frick & Kemp, 2021). An alternative explanation is that parents of children with higher levels of CU traits may have a tendency to avoid ignoring their child's misbehaviour and instead rely more on explaining

rules and modelling correct behaviour. This could be due to the challenges involved in socialising children who are insensitive to punishment. Alternatively, parents may find it more difficult to ignore negative behaviour in children with higher levels of CU traits due to more severe externalising problems, which may lead parents to intervene more frequently.

A notable finding from this research is that there was no relationship between CU traits and overall punitive or non-punitive discipline strategies. However, breaking down disciplinary methods into discrete strategies showed differential associations with both CU traits and punishment insensitivity indicating that simply categorising disciplinary methods as punitive or non-punitive may not be sufficient to fully understand their impact on child outcomes, including CU traits. Instead, examining specific disciplinary methods is necessary to identify which practices are most effective and which may be harmful for children with CU traits. This information can inform ways in which interventions can be tailored to the needs of children high in CU traits. These will be considered in more detail in Section 7.2.3.

While the research in this thesis sheds light on the complex interplay between parenting practices and child behaviour, future research utilising a longitudinal design is needed to clarify the direction of effect of the relationships between CU traits, insensitivity to punishment, and parent disciplinary practices. It is unclear whether the challenges in parenting children who are insensitive to punishment lead to a more negative pattern of parent discipline, if dysfunctional parenting practices inadvertently reinforce insensitivity to punishment, or both. Incorporating a genetically informed element in future research is needed to fully understand the mechanisms underlying these relationships, particularly if it is the parent rather than the child driving these effects. It is possible that both CU traits and temperamental insensitivity to punishment are passed down through intergenerational transmission. Surprisingly, evidence suggests that certain non-punitive forms of parental discipline were related to higher CU traits. Further family observational work could clarify whether this is due to poor parent implementation of these strategies or if the strategies themselves predict poor affective conscience development in children.

Overall, this research highlights the importance of recognising and understanding individual differences in children's responses to different discipline strategies, especially in those with elevated levels of CU traits. Personalised approaches to discipline that consider the specific needs and characteristics of each child are needed to promote the development of moral

conscience in children high in CU traits. The findings can inform policies and guidelines for child discipline and help parents make informed decisions about how to best support their child's development.

7.2.2 Rewards Warrant Further Investigation

In Chapter 3, reduced responsiveness to punishment in young children with CU traits was linked to less effectiveness of traditional parental discipline strategies. This finding suggests that alternative approaches are necessary to encourage prosocial behaviour and conscience, and prevent the development and persistence of CU traits. Given that CU traits appear to be unrelated to deficits in sensitivity to reward, strategies that use rewards as incentives could be an effective approach to encouraging prosocial behaviour. Chapters 4 and 5 of this thesis sought to determine which types of rewards could effectively motivate children with high levels of CU traits. The study in Chapter 4 evaluated two commonly used strategies to address child conduct problems, praise and tangible rewards, using a newly developed experimental task, the Odd One Out task. The findings indicated there was no difference in responsiveness to tangible rewards versus praise based on the level of CU traits. These results suggest that all forms of rewards, regardless of CU traits level, may motivate young children. This is in contrast to Waller and Wagner's (2019) Sensitivity to Threat and Affiliative Reward (STAR) model, which posits that CU traits are underpinned by low sensitivity to affiliative reward. This model suggests that children high in CU traits are genetically predisposed to derive less pleasure from social rewards, such as praise and affection. There is evidence that supports this claim according to parent report on questionnaires (Perlstein et al., 2022), however, research also shows that children with higher levels of CU traits are not unamenable to social affiliation such as parental warmth (Pardini et al., 2007; Pasalich et al., 2016). Findings from the study described in Chapter 4 of this thesis are in contrast to the STAR model which posits that children with CU traits would not be responsive to social rewards (Waller & Wagner, 2019). Our findings suggest that all rewards are likely to be effective in encouraging positive behaviour while children are young, possibly because they also provide positive parent attention which is still valuable to young children. The implications of these findings are that if children who are predisposed to low sensitivity to affiliation continue to receive affiliative inputs from caregivers, the risk for developing CU traits may be mitigated and that CU traits are amenable to the child's environment and to intervention.

In Chapter 5, a recently developed questionnaire, the RPQ, was utilised to evaluate children's responsiveness to parental rewards. In contrast to the findings from Chapter 4, the results of this study indicated that CU traits were associated with reduced responsiveness to parental social rewards. It is notable that CU traits were associated with lower responsiveness to parental social rewards using the RPQ but not to praise when using the experimental measure of child responsiveness to rewards. These contrasting results highlight the significance of context and the influence of the reward provider on the child's response. Praise in the experimental task was delivered by the experimenter (myself), a stranger to the child, whereas the questionnaire sought input from the parent who shares a meaningful relationship with the child. An implication of this is that the motivational value of a reward and a child's response to it can be influenced by the parent-child relationship, particularly if the child has a positive relationship with their parent. The desire to please the parent may provide the child with the motivation to behave well. Thus, while the type of reward may possess inherent motivational value, the person providing the reward and their relationship with the child may be more crucial in determining the child's response to the reward than the reward itself. As stated above, despite theory suggesting that children with CU traits would not be responsive to social rewards (Waller & Wagner, 2019), it is possible that social reward are effective in encouraging positive behaviour when provided within a positive parent-child relationship and while children are young when positive parent attention is still valuable to them.

While rewards have shown to be effective in reducing CP in intervention research (Kaminski et al., 2008; Leijten et al., 2019), there can be potential negative consequences associated with reward-based strategies to managing child behaviour. Rewards can lead to children becoming overly reliant on external motivators to engage in desired behaviours and hinder intrinsic motivation (Henderlong & Lepper, 2002). Known as the ‘overjustification effect’, offering rewards for an activity or behaviour that a child already finds intrinsically rewarding can lead to a decrease in their natural interest in that activity. Warneken and Tomasello (2008) argued that young children are intrinsically motivated to help and the use of rewards in parent socialisation can undermine this motivation. Moreover, once the external reward is removed, the child may be less inclined to engage in the activity without the promise of a reward. In addition, the use of rewards can make children feel controlled and may lead to a limited sense of autonomy in children (Henderlong & Lepper, 2002; Owen et al., 2012). They may comply with parental directives solely to obtain rewards, rather than understanding the importance of the behaviour. This means rewards may not necessarily lead to long-term behaviour change or

the internalisation of values and principles. Thus, researchers have recommended the careful use of rewards to minimise these potential negative effects of reward (Henderlong & Lepper, 2002; Webster-Stratton, 2005).

Overall, these findings are a preliminary exploration into the effects of rewards on children with CU traits. To expand our understanding of effective rewards for promoting prosocial behaviour in children with CU traits, it would be valuable to investigate a wider range of reward types. Although the social rewards items on the RPQ could be categorised as parent praise, affection, and time spent with the parent, these all loaded onto a single factor in factor analysis (Chapter 5). To gain a more comprehensive understanding of effective rewards, future research should explore these reward types in further detail, using observational methods of parent-child interaction.

Further research is needed to investigate whether the effectiveness of different types of rewards varies across different developmental stages in children with CU traits. For example, younger children may be more responsive to tangible rewards, while older children may respond more to social rewards that involve increased autonomy and responsibility or even social dominance over peers (Allen et al., 2016; Foulkes et al., 2017). This could be done in conjunction with neurobiological methods that can shed light on the neural underpinnings of responsiveness to rewards especially given that imaging studies have shown age-related differences in reward and punishment sensitivity with significant developmental changes to brain systems relating to reward during adolescence (Galván, 2010; 2013). Therefore, multi-method assessments including neural measures at several time points across childhood would permit further investigation into whether reward sensitivity relates to brain maturation during this period. Furthermore, the long-term effectiveness of rewards in promoting prosocial behaviour in children with CU traits should be investigated to see whether the positive effects of rewards are sustained over time and whether they have an impact on the development and maintenance of CU traits and CP.

7.2.3 Clinical Implications for Parenting Interventions

The research in this thesis has clear implications for the treatment of childhood CP and CU traits. The National Institute for Health and Care Excellence (NICE, 2017) clinical guidelines for the treatment of childhood CP recommends parent training programmes for young children.

This section will therefore focus on the implications of the research in this thesis for parenting interventions.

Parenting interventions focus on two main components: parent-child relationship enhancement and child behaviour management strategies (Kaminski & Claussen, 2017). Child behaviour management skills that are discipline-based may be more challenging to implement with children with CP and co-occurring CU traits, given their insensitivity to punishment. Indeed, findings from the study in Chapter 2 showed that punishment learning and difficulty altering behaviour in the face of punishment were associated with CU traits in children as young as 3 years old. Notably, this finding was unique to CU traits with no relationship between punishment insensitivity and externalising problems, highlighting the importance of identifying and addressing these deficits in early childhood before children resort to using aggressive and disruptive behaviour to achieve their goals. Failure to address such behaviours early on may lead to them becoming entrenched and more difficult to change. This suggests that the early identification and treatment of CP in children high in CU traits is crucial.

The findings from this study are strengthened by the objective experimental measure of insensitivity to punishment, which means assessment of this child characteristic is not hampered by parents' own mood, recall, or social desirability biases. Additionally, the Moles in Holes behavioural experiment revealed that insensitivity to punishment and the inability to anticipate negative outcomes and avoid them can be observed in children as young as 3 years, underscoring the clinical usefulness of this task in identifying early indicators of risk for the development of CU traits. Additionally, the use of objective measures in clinical assessment can help to reduce potential biases and improve the accuracy of diagnosis and treatment planning.

The punishment insensitivity observed in children with CU traits means that traditional punishment-based behaviour management strategies are not as effective for these children. Indeed, prior studies have shown that time-out, for example, a common behaviour management technique in parenting programmes, was not as effective for children with elevated CU traits (Garcia et al., 2018; Hawes & Dadds, 2005). Therefore, the study in Chapter 3 examined which components of parent discipline may be most effective and which are ineffective for children with CU traits, considering their punishment insensitivity. Both punitive and non-punitive

disciplinary strategies were considered, the latter of which has been largely under-represented in the literature on CU traits.

This study found that the effectiveness of different types of discipline in children high in CU traits varied depending on the child's level of punishment insensitivity. For children who are more punishment insensitive, removing privileges may be effective in reducing their CU traits. A surprising finding is that explaining and teaching rules may not be effective for children with high CU traits. This approach to discipline focuses on teaching children the concepts of right and wrong and the impact of their actions on others (Hoffman, 2000), but may be limited in effectiveness for children with elevated CU traits who have reduced empathy and understanding of others' feelings, limiting their concern for others' well-being (Frick & Kemp, 2022). An alternative explanation for these discrepant findings could be the poor implementation of these strategies by parents rather than the strategy itself.

The discipline-based behaviour management strategies of parenting interventions for CP has been discussed thus far. We now consider an alternative to discipline-based methods of behaviour management: rewards. Given that CU traits appear to be unrelated to deficits in sensitivity to reward (Chapter 2), strategies that use rewards as incentives could be an effective approach to encouraging prosocial behaviour and promoting conscience development. Given the unique characteristics of CU traits, children high in these traits may not respond to typical reward strategies. For example, CU traits are associated with self-serving motivations, therefore rewards that result in personal gain for the individual may be highly valued, for instance, tangible or monetary rewards. Conversely, they may not value social rewards such as praise, given their propensity toward low affiliation. Thus, we explored child responsiveness to various types of reward using a behavioural experiment (Chapter 4), parent reports (Chapter 5), and family observation (Chapter 6).

Tangible reward and praise delivered by a neutral stranger to the child were found to be equally motivating for children irrespective of CU traits (Chapter 4). In contrast, parental praise and affection, and spending time the parent were not as valuable as tangible rewards for children higher in CU traits (Chapter 5). Despite this, parents of children higher in CU traits did not appear to use fewer social rewards than parents of children lower in CU traits (Chapter 6). Consistent with theory and research (Owen et al., 2012; Scott & Dadds, 2009), findings indicate that the person delivering the reward may be important. It is possible that the effectiveness of

rewards and a child's response to them may be influenced by the parent-child relationship, especially if the child has a positive relationship with their parent. As Thompson and Newton (2013) suggested, a positive parent-child relationship may motivate the child to behave well and please their parent. It is worth exploring in future studies whether a positive parent-child relationship could amplify the value of rewards to children and act as a driving force for children to comply and behave in a prosocial manner. If confirmed, this could reinforce the importance of interventions to strengthen the parent-child relationship as a strategy for managing CP in children with high CU traits.

A way in which parent-child relationship quality can be fostered is through increased emotional engagement from both parents and children. The study in Chapter 6 of this thesis found a more negative pattern of emotional interactions between parents and children in high CU dyads. These negative effects were more pronounced in children than in parents, suggesting that the negative emotions that arise during parent-child interactions could be influenced by the child's characteristics. Although longitudinal studies with clinical samples are needed to confirm the direction of effects in children with greater symptoms and impairment, these findings suggest that interventions for children high in CU traits could emphasise strategies aimed at increasing the positive emotional engagement of parents and children.

The findings of these studies have important implications for parenting interventions that aim to manage behaviour in children with high levels of CU traits. First, parenting interventions should consider the child's level of punishment insensitivity and tailor their approach to discipline accordingly. The study suggests that removing privileges may be effective in reducing CU traits in children with high levels of punishment insensitivity, despite being a punishment-based strategy. Second, given the deficits in empathy associated with CU traits, it may be beneficial to implement empathy training as an additional intervention strategy. This has the potential to not only increase children’s receptiveness to inductive forms of parental discipline, but also to enhance the development of conscience. Interventions targeting the emotional and empathic deficiencies underlying CU traits should be delivered during early childhood when key developmental milestones related to emotion recognition and moral development occur (Hoffman, 2000). There have already been intervention studies exploring the effectiveness of empathic-emotion recognition training for childhood CP that co-occur with CU traits, with promising results in reducing both CP and CU traits (Dadds et al., 2012; Fleming et al., 2022).

Third, prior studies have tended to test broad definitions such as ‘negative parenting’ or ‘harsh parenting’ (e.g., Pardini et al., 2007; Wagner et al., 2019). The study in this thesis breaks down these broad conceptualisations of punitive parenting into distinct techniques of corporal punishment, psychological aggression, and deprivation of privileges. Non-punitive discipline was broken down into ignoring misbehaviours and teaching and explaining. Differential associations with both CU traits and punishment insensitivity were found with each distinct method of discipline, indicating that simply categorising disciplinary methods as punitive or non-punitive may not be sufficient to fully understand their impact on CU traits. Instead, examining specific disciplinary methods is necessary to identify which practices are most effective and which may be harmful, as certain strategies may be more effective for children with CU traits. This nuanced and fine-grained analysis of parent discipline could allow interventions to be personalised, in the hope of achieving improved outcomes.

Fourth, interventions should encourage parents to actively engage and monitor their interactions with their children, to identify as many opportunities as possible to reinforce positive behaviours. Given the propensity towards self-serving motivations in individuals high in CU traits, offering consistent and meaningful rewards can serve as a useful tool to align the child's personal interests with the well-being and security of those around him or her. Finally, interventions could enhance the parent-child relationship by using strategies that improve the emotional engagement of both parents and children. Children with CU traits exhibit a reduced capacity for experiencing and expressing empathy and emotions (Frick & Kemp, 2020), which can lead to a lack of emotional connection with their parents. By enhancing emotional engagement between parents and children, interventions can help foster a more positive and supportive relationship, improving the child's emotional development and making them more receptive to social rewards such as praise and affection.

Overall, the research in this thesis highlights the need for parenting interventions to consider the individual needs and characteristics of the child rather than adopting a one-size-fits-all approach. By tailoring the intervention to the specific needs of children high in CU traits, parents may be better able to manage their child's behaviour and reduce the risk of adverse outcomes associated with high levels of CU traits. These studies need to be replicated using longitudinal designs that clarify the complex transaction relationships among the constructs of interest in this thesis. For example, it is unclear if parenting predicts punishment insensitivity

which then predicts conscience development and CU traits, or if punishment insensitivity drives changes in parenting practices which then put the child at risk for developing problems in conscience and increased CU traits. Longitudinal studies can also clarify the relationships between these constructs and rewards. Without a clear understanding of the causal relationships between variables, it is difficult to develop effective interventions that target the root causes of CU traits and CP. Moreover, further family observational work is needed to clarify whether some non-punitive forms of parental discipline related to poorer conscience were due to poor parent implementation of these strategies, or if the strategies themselves predict poor affective conscience development in children.

7.2.4 Application Across Contexts

This thesis focused on the relationship between CU traits and responsiveness to rewards and punishment in the context of parenting, but findings may also be applicable to other contexts and relationships. When children are less sensitive to punishment, it can create challenges for caregivers, such as grandparents, to discipline them effectively. Additionally, the school setting is an important context for children. In the UK, 15 hours of free childcare provision available to all families means many children are in a childcare setting from age 3 and children enter school full-time from age 4. This means children are in a preschool or school setting from a young age when morality and conscience are still developing.

CU traits and insensitivity to punishment can have a significant impact on academic and social outcomes. Students high in CU traits may engage in disruptive or off-task behaviours that interfere with their learning and academic progress (Ciucci et al., 2014). As a result, they may struggle academically and have difficulty keeping up with their peers. In the long term, students who are insensitive to punishment may continue to engage in rule-breaking behaviours, even when faced with consequences, which can increase their risk of disciplinary action, suspension, or even expulsion. There are also implications of punishment insensitivity for the teacher-child relationship (Hwang et al., 2022). Sanctions such as keeping the misbehaving child in for breaks may make the child frustrated and resentful, redirecting negative feelings towards their teacher and affecting teacher-child relationship quality (Allen et al., 2018). Insensitivity to punishment can also impact relationships with peers. Children who are less responsive to punishment may continue to bully or tease peers even after they exhibit distress or fear, which can impact their relationships with peers and their standing in the classroom (Ciucci et al.,

2014; Pardini et al., 2008). Moreover, the disruption to the classroom learning environment may cause peers to view them negatively.

Based on the findings from Chapter 3, the removal of privileges could be a useful method for addressing CU traits. Chapter 4 suggests frequent and consistent rewards provide positive attention for children and may be particularly effective for children higher in CU traits. This requires teachers to be attentive and proactive in identifying positive responses to rewards. Chapter 6 highlights the value of emotional engagement in the parent-child relationship for children with elevated CU traits, suggesting that future research should examine whether increasing positive emotional interactions between teachers and students could improve their relationship (e.g., through fun activities such as classroom games and out-of-school trips). Finally, psychoeducation may help teachers to better understand punishment insensitivity and its impact on child behaviour, for example, less concern about negative consequences in the future. Understanding that these behaviours have a temperamental basis may help them view misbehaving students in a more positive light, ultimately enhancing the teacher-child relationship, and to modify their approach to preventing and intervening when the child shows disruptive behaviour. Overall, theory and evidence to date suggest that it may be important for schools to recognise the potential impact of punishment insensitivity and provide appropriate support for both teachers and students. Effective interventions may include individualised behaviour plans and social skills training for students high in CU traits. Additionally, schools should work with families as a team to promote consistent and effective discipline strategies that can help prevent the development of punishment insensitivity and behaviour problems in the first place.

7.3 Limitations

There were a number of limitations across the studies in this thesis that should be taken into consideration. These are outlined below:

7.3.1 Cross-Sectional Design

First and foremost, the studies in this thesis were all cross-sectional which limits the ability to draw conclusions about the directionality of relationships between the variables under study. It remains unclear whether insensitivity to punishment was related to increased CU traits, if CU traits precede deficits in reinforcement learning, or whether bidirectional effects are present.

Similarly, it was not possible to determine whether CU traits led to changes in parenting, parenting led to changes in CU traits, or if this relationship is transactional. In terms of child responsiveness to reward, it was not possible to assess whether tangible or social rewards are effective in reducing CU traits and externalising problems over time, or if CU traits influence the type of rewards used by parents with their children. The behaviour of children with CP and/or CU traits may be more difficult to manage and as a result, these children may evoke more harshness from parents. Due to their lower propensity for social affiliation, children high in CU traits may also elicit less warmth from parents who may find such experiences less rewarding themselves due to shared genes (Waller & Wagner, 2019). Other parental characteristics can affect the way in which they parent their children, such as emotional health and well-being (Sanders & Morawska, 2018). Without a longitudinal design, it is not possible to determine whether CU traits led to changes in parenting, parenting led to changes in CU traits, or if parent-child effects are bidirectional. Further, imaging studies showed that there are age-related differences in reward and punishment sensitivity, and that brain systems relating to reward undergo significant developmental changes in adolescence (Galván, 2010; 2013). Thus, rewards that are effective when children are young may not be effective when they are older. A multi-method longitudinal study is needed to establish the direction of relationships between constructs of interest.

7.3.2 Low-Risk Sample

Another limitation of the studies in this thesis relates to sample characteristics. With the exception of the sample in Chapter 6, mean scores for child externalising problems and CU traits fell within the range of those previously obtained in community samples and below the range of mean scores obtained in clinical samples. Thus, the samples in Chapters 2 to 5 did not include children who experience more significant symptoms and impairment. In Chapter 6, mean scores for externalising problems and CU traits were higher than those obtained in community samples. However, due to the small sample size used in the study, there were likely true effects of the variables being investigated that were not detected as statistically significant. Post-hoc power analysis indicated that this study had a power of .52. A larger sample size would have increased the statistical power of the study, thereby improving the ability to detect significant effects.

In addition, parents were predominantly middle-class and well-educated, which could have influenced the types of discipline they used with their children. Research has shown that low-income parents often use harsher forms of discipline and show less warmth and sensitivity towards their children (Hoff & Laursen, 2019; Pinderhughes et al., 2000). Ethnicity has also been found to be a factor in the use and endorsement of different forms of discipline. For example, studies have found that African American parents are more likely to use spanking as a form of discipline (Silveira et al., 2020). Therefore, the sample in this study may not be representative of the general population and may not accurately reflect the range of discipline practices used across different socioeconomic and ethnic groups.

Moreover, findings from these studies may not generalise to clinical samples which are more likely to have more severe externalising problems and CU traits, and more extremes of parenting. The recommendations for the use of discipline methods and reward for children high in CU traits from community samples may not apply to a clinical sample. In terms of discipline, current findings suggest that ignoring misbehaviour and were related to lower CU traits but may not be an option for parents of children with severe disruptive and aggressive behaviour who are more likely to engage in activities that lead to harm to themselves or others. In terms of rewards, current findings suggest that a positive parent-child relationship may prove to be a fruitful avenue for encouraging cooperative and prosocial behaviour even in children with CU traits. However, children from clinical samples are more likely to experience troubled relationships with caregivers and it is possible that rewards from parents carry less motivational value for these children. Therefore, future research should use diverse samples that include participants with lower SES, diverse cultural backgrounds, and referred children. Although the findings of the current study may not be generalisable to clinical samples, examination of individual variation in CU traits within the general population can be beneficial in furthering our understanding before conducting more costly and resource-intensive research with clinical samples.

7.3.3 Mothers versus Fathers

The parent directly involved in this thesis's research was mostly mothers and findings may be specific to maternal behaviour only. A significant body of research has examined differences in parenting styles between fathers and mothers and their potential impact on child outcomes (Sarkadi et al., 2008). Studies have shown that mothers tend to be more involved in direct

caregiving activities and are more likely to provide emotional support, while fathers tend to be more involved in instrumental activities and are more likely to engage in physical play with their children (Cabrera et al., 2018; Yaffe, 2020). Research has also found that the parenting styles of mothers and fathers may differ in terms of warmth, discipline, and control. For example, fathers may be more likely to use physical discipline, while mothers may use more verbal or psychological forms of discipline (Lamb, 2010). Including both parents could prove beneficial in exploring the varying effects of maternal and paternal parenting behaviours on CU traits. Furthermore, the participation of both parents would facilitate an assessment of the impact of parent-child gender congruence. This would include examining the potential differences in interactions between fathers and sons, fathers and daughters, mothers and sons, and mothers and daughters, given existing theories and evidence regarding the influence of parental and child gender on child development outcomes (Feldman et al., 2013).

7.3.4 Single-Informant Bias

Although some constructs were measured using behavioural experiments (Chapters 2 and 4) and observation (Chapter 6), parents were the single informant for CU traits, externalising problems, and other variables across all studies. Parents may not always be aware of the behaviours of their children that take place outside of the home and their perceptions or memory of behaviours could be affected by biases, such as mood or functioning (e.g., stress) or a poor relationship with their child. Multiple informants (e.g., teachers, early childcare workers) are needed to capture child behaviour across a range of settings (e.g., teachers can report on behaviours in the school setting) and to triangulate child behaviour. Parents' responses may also be affected by social desirability bias. They may under-report the use of negative parenting practices and over-report positive parenting practices as a result. Observation was used in Chapter 6 to overcome such problems with self-report, but even observation is not free from bias. Knowing they are being observed, participants may have altered their behaviour due to social desirability bias, reactivity effects, demand characteristics, or a combination of these factors. Various measures were taken to enhance the ecological validity of observations and minimise potential reactivity effects. These included conducting the assessments in participants' homes, the researcher being in a separate room to avoid interacting with families during tasks, and introducing families to the recording equipment beforehand (Gardner, 1997). The objective was to ensure that participants were at ease in their

natural environment and thus more likely to display socially undesirable behaviour, such as harshness or coercion.

7.3.5 Motivation in Cognitive Tasks

Two of the studies (Chapters 2 and 4) used experimental tasks. An important issue to consider when using experimental tasks in research on CU traits is that these traits are associated with a lack of concern for performance (Ciucci et al., 2014; DeLisi et al., 2011) yet not with impairment in IQ or ability tests (Allen et al., 2013; Fontaine al., 2008). In Chapter 2, CU traits were associated with a higher number of errors and poorer ability to discriminate between stimuli, while in Chapter 4 CU traits were associated with more errors across both reward-type conditions. It is plausible that the poorer task performance in children higher in CU traits was due to lack of motivation rather than lack of ability and not that they lack the capacity to learn. That is, they lack proclivity rather than ability. This is in line with current thinking on motivation and CU traits (Groat & Shane, 2020) and should be considered in future studies using experimental tasks with participants high in CU traits. This highlights the importance of the need for any experimental task to be engaging and for rewards meaningful and motivating to participants to capture children's true ability. The experimental tasks were designed to be presented as an age-appropriate tablet game rather than a laboratory task, with the aim of boosting engagement among younger participants. However, it is still possible that this approach still did not provide sufficient motivation.

7.4 Conclusions

In conclusion, this thesis contributes to our knowledge and understanding of how one of the key correlates of CU traits, insensitivity to punishment, can impact multiple domains of functioning including conscience, externalising problems, and parenting. Through an exploration of the motivational value of rewards as an alternative to punishment-based discipline, this thesis offers insight into how parenting interventions can be tailored to better support families and children with CU traits. Further research is needed to clarify the role of rewards in reducing CU traits and associated CP, and to investigate the genetic and neurobiological mechanisms underlying atypical responses to punishment and reward. Longitudinal multi-method genetic studies are need to obtain a more comprehensive understanding of family functioning in families with CU traits and the mechanisms underpinning them. Overall, this thesis emphasises the importance of understanding individual

differences in children's responses to different discipline and reward strategies and suggests that a personalised approach to managing children's behaviour may be necessary to promote development of moral conscience in children with elevated CU traits.

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Appendices

Appendix A: Sociodemographics Questionnaire

1. What phrase best describes your family?

   ☐ Two Parent ☐ Single Parent

   ☐ Step/Blended Family ☐ Other: _____

2. Is English the first language in your home? ☐ Yes ☐ No

3. Your child is: ☐ Male ☐ Female

4. What is your child's date of birth? _____/_____/_____ (DD/MM/YY). My child is _____ years old.

5. What is your relationship to your child?

   ☐ Mother ☐ Father ☐ Stepmother ☐ Stepfather

   ☐ Other (please specify): _____

6. How old are you? _____ years

7. What is your marital status?

   ☐ Married ☐ Single ☐ Divorced / Separated ☐ Widowed

   ☐ Living with partner ☐ Other (please specify): _____

8. How would you describe your ethnicity?

   ☐ White ☐ Asian

   ☐ Black ☐ Mixed White & Asian

   ☐ Mixed White & Black ☐ Other (please specify): _____

9. How would you describe your child's ethnicity?

   ☐ White ☐ Asian

   ☐ Black ☐ Mixed White & Asian

   ☐ Mixed White & Black ☐ Other (please specify): _____

10. What is your total family income **per month** before tax? (Please include all sources e.g. family allowance, pensions, child support, wages, overtime, etc.)

    ☐ Less than £500 ☐ £1001 - 1500 ☐ £2001 – 3000 ☐ £4001 – 6000

    ☐ £501 - 1000 ☐ £1501 - 2000 ☐ £3001 – 4000 ☐ More than £6000

11. What is your highest level of education?

- ☐ Left school before 16 years
- ☐ Left school at 16
- ☐ Further secondary; 16-18 years
- ☐ BTEC/NVQ levels 1-3
- ☐ Professional qualification without degree
- ☐ University course not completed
- ☐ Degree
- ☐ Postgraduate degree
- ☐ Other: _____

Appendix B: Strengths and Difficulties Questionnaire (SDQ)

	Not True	Somewhat True	Certainly True
1. Considerate of other people's feelings.	☐	☐	☐
2. Restless, overactive, cannot stay still for long.	☐	☐	☐
3. Shares readily with other children (treats, toys, pencils etc.).	☐	☐	☐
4. Often has temper tantrums or hot tempers.	☐	☐	☐
5. Generally obedient, usually does what adults request.	☐	☐	☐
6. Helpful if someone is hurt, upset or feeling ill.	☐	☐	☐
7. Constantly fidgeting or squirming.	☐	☐	☐
8. Often fights with other children or bullies them.	☐	☐	☐
9. Easily distracted, concentration wanders.	☐	☐	☐
10. Kind to younger children.	☐	☐	☐
11. Often lies or cheats.	☐	☐	☐
12. Often volunteers to help others (parents, teachers, children).	☐	☐	☐
13. Thinks things out before acting.	☐	☐	☐
14. Steals from home, school or elsewhere.	☐	☐	☐
15. Sees tasks through to the end, good attention span.	☐	☐	☐

Appendix C: Antisocial Process Screening Device (APSD)

		Not True	Somewhat True	Certainly True
1.	Seems motivated to do his / her best in structured activities.	☐	☐	☐
2.	Is good at keeping promises.	☐	☐	☐
3.	Feels bad or guilt when he / she does something wrong	☐	☐	☐
4.	Is concerned about the feelings of others.	☐	☐	☐
5.	Does not show feelings or emotions.	☐	☐	☐
6.	Keeps the same friends.	☐	☐	☐

Appendix D: Multidimensional Assessment Profile of Disruptive Behavior (MAP-DB)

	Never	Hardly ever	Some-times	Often	Most of the time	Always
1. Act like he/she didn't hear you when you said "no".	☐	☐	☐	☐	☐	☐
2. Deny he/she did something that was not allowed.	☐	☐	☐	☐	☐	☐
3. Act like rules don't matter.	☐	☐	☐	☐	☐	☐
4. Keep on misbehaving no matter what you do.	☐	☐	☐	☐	☐	☐
5. Act like he/she did not know right from wrong.	☐	☐	☐	☐	☐	☐
6. Not care when punished.	☐	☐	☐	☐	☐	☐
7. Refuse to apologise.	☐	☐	☐	☐	☐	☐

Appendix E: Sensitivity to Punishment and Sensitivity to Reward Questionnaire – Child Version (SPSRQ-Child)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. The good prospect of obtaining a reward motivates your child strongly to do some things.	☐	☐	☐	☐	☐
2. Your child often does things to be praised.	☐	☐	☐	☐	☐
3. Your child enjoys being the centre of attention.	☐	☐	☐	☐	☐
4. When your child is in a group, they try to stand out as the smartest or the funniest.	☐	☐	☐	☐	☐
5. When your child gets something they want, they feel excited and energised.	☐	☐	☐	☐	☐
6. Your child does a lot of things for approval.	☐	☐	☐	☐	☐
7. The possibility of obtaining social status moves your child to action even if this involves not playing fair.	☐	☐	☐	☐	☐
8. Your child generally prefers activities that involve immediate reward.	☐	☐	☐	☐	☐
9. Your child often has trouble resisting the temptation of doing forbidden things.	☐	☐	☐	☐	☐
10. Your child has a lot of difficulty ending a fun activity.	☐	☐	☐	☐	☐
11. Your child sometimes does things for quick reward.	☐	☐	☐	☐	☐
12. Your child has difficulty staying focused on their school work in the presence of an attractive alternative.	☐	☐	☐	☐	☐
13. Your child engages in risky behaviour to obtain a reward.	☐	☐	☐	☐	☐
14. Your child often refrains from doing something he/she likes in order not to be rejected or disapproved of by others.	☐	☐	☐	☐	☐
15. Your child craves excitement and new sensations.	☐	☐	☐	☐	☐

Appendix F: Reward Preferences Questionnaire (RPQ)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Your child will complete an activity to receive a toy or sweets.	☐	☐	☐	☐	☐
2. Your child looks happy when you tell him/her that they are doing a good job.	☐	☐	☐	☐	☐
3. Your child is more likely to do something if he/she receives a hug or a kiss.	☐	☐	☐	☐	☐
4. Spending time with you is a strong incentive for your child to do things.	☐	☐	☐	☐	☐
5. Your child looks happy when you tell him/her that you love him/her.	☐	☐	☐	☐	☐
6. Being praised makes your child look happy.	☐	☐	☐	☐	☐
7. Your child enjoys being given affection.	☐	☐	☐	☐	☐
8. Receiving a tangible reward (e.g., toys, stickers, sweets or pocket money) encourages your child to complete some activities.	☐	☐	☐	☐	☐
9. Praising your child moves them to action.	☐	☐	☐	☐	☐
10. The possibility of doing a fun activity with you (e.g. playing a game or going to the park) makes your child happy.	☐	☐	☐	☐	☐
11. Your child enjoys receiving tangible rewards (e.g. toys, stickers, sweets or pocket money).	☐	☐	☐	☐	☐
12. Your child is happy about doing activities that involve spending time with you.	☐	☐	☐	☐	☐
13. Your child looks happy when receiving a toy or stickers for good behaviour	☐	☐	☐	☐	☐

Appendix G: My Child Questionnaire

		Untrue						True
1.	Not particularly concerned or worried when she or he has broken a valuable object.	1	2	3	4	5	6	7
2.	May "freeze" in place when caught doing something bad.	1	2	3	4	5	6	7
3.	Will spontaneously say "sorry" after having done something wrong.	1	2	3	4	5	6	7
4.	Remembers for a long time past mishaps or instances when she or he did something wrong.	1	2	3	4	5	6	7
5.	Unless specifically asked to do so, she or he is not likely to apologize on his or her own.	1	2	3	4	5	6	7
6.	Likely to feel responsible whenever anything goes wrong.	1	2	3	4	5	6	7
7.	Likely to look remorseful or guilty when caught in middle of a forbidden activity.	1	2	3	4	5	6	7
8.	Has to be reminded to say "sorry" when she or he has done something wrong.	1	2	3	4	5	6	7
9.	Likely to become quiet and subdued after having done something wrong.	1	2	3	4	5	6	7
10.	Feels bad when reminded about past mischief or wrongdoing.	1	2	3	4	5	6	7
11.	May have trouble sleeping or poor appetite after having done something wrong.	1	2	3	4	5	6	7
12.	It is easy to bring him or her to tears when discussing something that she or he has done wrong.	1	2	3	4	5	6	7
13.	After having been naughty, seems to want reassurance that parent is no longer angry with him or her.	1	2	3	4	5	6	7
14.	Is upset by criticism.	1	2	3	4	5	6	7
15.	His or her feelings are not easily hurt by criticism.	1	2	3	4	5	6	7
16.	May continue to feel bad even if forgiven a mishap or blunder.	1	2	3	4	5	6	7
17.	On his or her own, is likely to promise not to do it again after doing something wrong.	1	2	3	4	5	6	7
18.	After having done something naughty, asks to be forgiven.	1	2	3	4	5	6	7
19.	Does not need to be reminded to say "sorry" when she or he does something bad.	1	2	3	4	5	6	7

20.	After being scolded for some mischief, seems particularly happy when parent praises him or her for some accomplishment.	1	2	3	4	5	6	7
21.	Is not overly concerned about being forgiven after having done something naughty.	1	2	3	4	5	6	7
22.	Will spontaneously say "sorry" to a playmate or sibling when necessary.	1	2	3	4	5	6	7
23.	It is not easy to make him or her feel bad after she or he has done something wrong.	1	2	3	4	5	6	7
24.	When she or he does something wrong, seems to feel relieved when forgiven.	1	2	3	4	5	6	7
25.	Not too upset by mishaps or accidents she or he has caused, for example, spilling or breaking something.	1	2	3	4	5	6	7
26.	After doing something she or he is not supposed to do, may later check with parent to see if she or he "is good now."	1	2	3	4	5	6	7
27.	May become extra nice toward the parent after being caught doing something wrong.	1	2	3	4	5	6	7
28.	Likely to blush when caught doing something wrong.	1	2	3	4	5	6	7
29.	Wants to stay physically closer to parent after being scolded for doing something wrong.	1	2	3	4	5	6	7
30.	Avoids eye contact if she or he has done something naughty.	1	2	3	4	5	6	7
31.	May hang his or her head and look down after being naughty.	1	2	3	4	5	6	7
32.	Likely to get upset if she or he does something wrong in public.	1	2	3	4	5	6	7

Appendix H: Alabama Parenting Questionnaire (APQ)

	Never	Almost never	Sometimes	Often	Always
1. You let your child know when he/she is doing a good job with something.	☐	☐	☐	☐	☐
2. You reward or give something extra to your child for obeying you or behaving well.	☐	☐	☐	☐	☐
3. You compliment your child when he/she has done something well.	☐	☐	☐	☐	☐
4. You praise your child for behaving well.	☐	☐	☐	☐	☐
5. You hug or kiss your child when he/she has done something well.	☐	☐	☐	☐	☐
6. You tell your child that you like it when he/she helps out around the house.	☐	☐	☐	☐	☐

Appendix I: Dimensions of Discipline (DDI)

Rating scale:

0 = Never or not in the past year
1 = 1-2 times in the past year
2 = 3-5 times in the past year
3 = 6-9 times in the past year
4 = Monthly (10 to 14 times in the past year)
5 = A few times a month (2-3 times a month)
6 = Weekly (1-2 times a week)
7 = Several times a week (3-4 times)
8 = Daily (5 or more times a week)
9 = Two or more times a day

1.	Explain the rules to your child to try to prevent misbehaviour.	0	1	2	3	4	5	6	7	8	9
2.	Take away your child's pocket money, toys, or other privileges because of misbehaviour.	0	1	2	3	4	5	6	7	8	9
3.	Put your child in "time out" (or send them to their room).	0	1	2	3	4	5	6	7	8	9
4.	Shout or yell at your child.	0	1	2	3	4	5	6	7	8	9
5.	Grab or shake your child to get their attention.	0	1	2	3	4	5	6	7	8	9
6.	Give your child something else they might like to do instead of what they are doing wrong.	0	1	2	3	4	5	6	7	8	9
7.	Try to make your child feel ashamed or guilty.	0	1	2	3	4	5	6	7	8	9
8.	Deliberately not pay attention to your child's misbehaviour.	0	1	2	3	4	5	6	7	8	9
9.	Spank, slap, smack, or swat your child.	0	1	2	3	4	5	6	7	8	9
10.	Use an object such as a paddle, hairbrush, belt, etc. on your child.	0	1	2	3	4	5	6	7	8	9
11.	Hold back affection by acting cold or not giving hugs or kisses.	0	1	2	3	4	5	6	7	8	9
12.	Send your child to bed without a meal.	0	1	2	3	4	5	6	7	8	9
13.	Show or demonstrate the right thing to do to your child.	0	1	2	3	4	5	6	7	8	9
14.	Let your child misbehave so that they have to deal with the results.	0	1	2	3	4	5	6	7	8	9
15.	Give your child extra chores as a consequence.	0	1	2	3	4	5	6	7	8	9
16.	When your child behaves badly, tell them that they are lazy, sloppy, thoughtless, or some other name like that.	0	1	2	3	4	5	6	7	8	9
17.	Withhold allowance, toys, or other privileges until your child does what you want them to do.	0	1	2	3	4	5	6	7	8	9
18.	Wash the mouth of your child out with soap, put hot sauce on their tongue, or something similar	0	1	2	3	4	5	6	7	8	9
19.	Ground your child or restrict their activities outside the home because of misbehaviour.	0	1	2	3	4	5	6	7	8	9

Appendix J: Parent Feelings Questionnaire (FEEL)

	Definitely not true	Somewhat not true	Neither true nor untrue	Somewhat true	Definitely true
1. I feel impatient with my child.	☐	☐	☐	☐	☐
2. My child makes me angry.	☐	☐	☐	☐	☐
3. I am frustrated by my child.	☐	☐	☐	☐	☐
4. I feel happy about my relationship with my child.	☐	☐	☐	☐	☐
5. I feel close to my child.	☐	☐	☐	☐	☐
6. I am amused by my child	☐	☐	☐	☐	☐

Appendix K: Social Responsiveness Scale - Brief (SRS-brief)

	Not true	Sometimes true	Often true	Almost always true
1. Interprets things too literally and doesn't "get" the real meaning.	☐	☐	☐	☐
2. Clumsy, not well coordinated.	☐	☐	☐	☐
3. Avoids eye contact, or has unusual eye contact.	☐	☐	☐	☐
4. Child has difficulty making friends, even when trying his/her best to do so.	☐	☐	☐	☐
5. Has more difficulty than other children with changes in routine.	☐	☐	☐	☐
6. Obsessive, thinks or talks about the same thing over and over.	☐	☐	☐	☐
7. Regarded by other children as odd or weird.	☐	☐	☐	☐
8. Socially awkward, even when he/she is trying to be polite.	☐	☐	☐	☐
9. Has trouble keeping pace with the flow of a normal conversation.	☐	☐	☐	☐
10. Difficulty "relating" to peers.	☐	☐	☐	☐
11. Confuses cause and effect in a way that is inappropriate for his/her age.	☐	☐	☐	☐
12. Exhibits repetitive odd behaviours such as hand flapping or rocking.	☐	☐	☐	☐
13. Has difficulty answering questions directly; unintentionally talks around the subject or communicates ideas unrelated to the question.	☐	☐	☐	☐
14. Walks in between two people who are talking.	☐	☐	☐	☐
15. Inappropriately concentrates on parts of things rather than "seeing the whole picture".	☐	☐	☐	☐
16. Stares inappropriately; does not direct eye gaze toward the appropriate focus of attention.	☐	☐	☐	☐

Appendix L: Observation Coding Scheme

Code	Definition	Scoring
Parent Codes		
Sensitivity and responsiveness	Sensitivity and responsiveness / Promotion of autonomy Awareness of child's needs and sensitivity to child's verbal and non-verbal cues. Child's non-verbal cues include: if child does not know how to complete the tasks and sends clear behavioural cues (e.g., child might appear confused and look at the parent), or child may lose interest in the task. A responsive parent would be able to pick up changes in body language and/or loss of interest and will provide assistance or try to engage child in the task (e.g., ask child "Do you where to put the shape?"). Also includes autonomy-promoting behaviours and/or verbalisations that encourage the child to perform actions by himself/herself (e.g., "I know it's hard, but you can do it!"). Questions or statements that suggest and follow child behaviour and genuinely offer child a choice appropriate to their age/abilities, rather than rather than command/direct child behaviour. The parent lets the child lead the task, offering appropriate support and attempting to scaffolding as needed (e.g., if the child is stuck trying to fit a shape in the tangram	1 – *No Sensitivity and Responsiveness* – Displayed as clear pervasiveness absence of sensitivity and responsiveness. 2 – *A Little Bit of Sensitivity and Responsiveness* – Displayed as minimal examples of sensitivity and responsiveness that are low in frequency and intensity. Parent displays a few weak or modest examples of sensitivity and responsiveness during the whole interaction. 3 – *Moderate Amount of Sensitivity and Responsiveness* – Displayed as some examples of sensitivity and responsiveness that vary in intensity. The overall impression would be that this is a parent that partly shows sensitivity and responsiveness on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Sensitivity and Responsiveness* – Displayed as an overall pattern of sensitivity and responsiveness in relation to both frequency and intensity. Clear and unambiguous evidence of sensitivity and responsiveness by the parent throughout the interaction, in addition to infrequent examples that lack sensitivity and responsiveness.

	task, the parent offers assistance to the child instead of taking over the task completely).	5 – *A Lot of Sensitivity and Responsiveness* – Displayed as a presence of sensitivity and responsiveness that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Intrusiveness	Instances where the parent does not leave enough space for the child to explore and lead (e.g., the parent makes statements such as "Shall we do it like this?"), constantly 'at' the child or doing something to the child, and constantly wanting to elicit certain behaviours from the child (e.g., jumps in and asking too many probing questions in a short space of time). Parent interrupts, breaks child's flow, dictates pace, imposes suggestions/ideas, gives insufficient time to finish, changes themes frequently rather than elaborating on the child's interests, and jumps in to do too much for the child. Moderate intensity intrusiveness is not striking and such behaviour appears more directive and/or slightly overprotective rather than truly intrusive. The quality of being 'at' the child or doing something to the child is there as well. High intensity intrusiveness includes parent controlling the interaction, jumps in to do too much for the child (including physical handling), and/or showing a lack of respect for the child's wishes or on-going activities. This parent leaves no space for the child to 'return the serve' and is highly over-stimulating and/or	1 – *No Intrusiveness* – Displayed as clear pervasiveness absence of intrusiveness. 2 – *A Little Bit of Intrusiveness* – Displayed as minimal examples of intrusiveness that are low in frequency and intensity. Parent displays a few weak or modest examples of intrusiveness during the whole interaction. 3 – *Moderate Amount of Intrusiveness* – Displayed as some examples of intrusiveness that vary in intensity. The overall impression would be that this is a parent that partly shows intrusiveness on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Intrusiveness* – Displayed as an overall pattern of intrusiveness in relation to both frequency and intensity. Clear and unambiguous evidence of intrusiveness by the parent throughout the interaction, in addition to infrequent examples that lack intrusiveness. 5 – *A Lot of Intrusiveness* – Displayed as a presence of intrusiveness that is pervasive and completely unambiguous to the observer, both in intensity and frequency.

	over-protective. There may be an arbitrary ('no apparent reason') quality to this parent's intrusiveness.	
Positive affect	General positive mood: positive facial expressions, bodily gestures, tone of voice & expression of genuine enthusiasm and pleasure. This is in relation to parent's general positive mood in addition to how parent interacts and responds to child. Positive comments should only be considered as evidence of positive effect if they are said with warmth and/or enthusiasm. This includes but is not limited to the following: • Positive facial & bodily expressions – e.g., happy face, giggles, smiles, laughs, clapping of hands etc. • Tone of voice – e.g., presence of enthusiasm and pleasure, conveying happiness. This includes singing, humming, jokes and funny remarks. • Expressed enjoyment of child's company – e.g. "It is always fun spending time with you."	1 – *No Positive Affect* – Displayed as clear pervasiveness absence of positive affect. *This does not indicate negative affect, only that the parent does not display any positive affect.* 2 – *A Little Bit of Positive Affect* – Displayed as minimal examples of positive affect that are low in frequency and intensity. A few weak or modest examples of positive affect during the whole interaction. 3 – *Moderate Amount of Positive Affect* – Displayed as some examples of positive affect that vary in intensity. The overall impression would be that this is a parent that partly shows positive affect and partly shows neutral/flat affect. 4 – *A Fair Amount of Positive Affect* – Displayed as an overall pattern of positive affect in relation to both frequency and intensity. Clear and unambiguous evidence of positive affect by the parent throughout the interaction, in addition to infrequent examples of neutral affect. This is a parent that does not need to be driven in order to show signs of happiness throughout the interaction. 5 – *A Lot of Positive Affect* – Displayed as a presence of positive affect that is pervasive and completely unambiguous to the observer, both in intensity and frequency.

Negative affect	General negative mood: negative facial expressions, bodily gestures, tone of voice & lack of enthusiasm. This is in relation to child's general negative mood in addition to how child interacts and responds to parent. This includes but is not limited to the following: • Negative facial & bodily expressions – e.g., frowning, angry faces, avoiding interaction with child, 'huffing and puffing'. • Tone of voice – e.g., cold, flat, mocking, sarcasm, irritation, hostility, impatience. • Lack of enthusiasm – e.g., lacks enthusiasm, is disinterested and/or detached. • Comments expressing lack of pleasure felt or negative feelings – e.g. "This is boring." • Discouraging comments to child – e.g. "I don't think you can read very well."	1 – *No Negative Affect* – Displayed as clear pervasiveness absence of negative affect. This does not indicate positive affect, only that the parent does not display any negative affect. 2 – *A Little Bit of Negative Affect* – Displayed as minimal examples of negative affect that are low in frequency and intensity. Displays a few weak or modest examples of negative affect during the whole interaction. 3 – *Moderate Amount of Negative Affect* – Displayed as some examples of negative affect that vary in intensity. The overall impression would be that this is a parent that partly shows negative affect and partly shows neutral/flat affect. 4 – *A Fair Amount of Negative Affect* – Displayed as an overall pattern of negative affect in relation to both frequency and intensity. Clear and unambiguous evidence of negative affect by the parent throughout the interaction, in addition to infrequent examples of neutral affect. This is a parent that does not need to be driven in order to show signs of irritability and detachment during the course of interaction. 5 – *A Lot of Negative Affect* – Displayed as a presence of negative affect that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Affection	There must be examples of close proximity with the child in a manner which is considered as caring and loving. Parent's intentional	1 – *No Affection* – Displayed as clear pervasiveness absence of affection.

	and overt expression of feelings of closeness, care, and fondness for child. Parent should appear comfortable and/or genuine with displays of affection. This includes but is not limited to the following: • Affectionate words – e.g., verbal statements expressing love, encouraging remarks ("I know you can do it!"). • Active affectionate physical contact – e.g., kissing, cuddling, hugging, and patting. • Passive affectionate physical contact – e.g., sits with child on lap. Unless accompanied by verbal or physical affection, displays of warmth (e.g., smiling, warm facial expression) should not be counted as Affection, but covered under Positive Affect or Shared Positive Affect.	2 – *A Little Bit of Affection* – Displayed as minimal examples of affection that are low in frequency and intensity. Parent displays a few weak or modest examples of affection during the whole interaction. 3 – *Moderate Amount of Affection* – Displayed as some examples of affection that vary in intensity. The overall impression would be that this is a parent that partly shows affection on occasions and lacks expression of affection on other occasions. 4 – *A Fair Amount of Affection* – Displayed as an overall pattern of affection in relation to both frequency and intensity. Clear and unambiguous evidence of affection by the parent throughout the interaction, in addition to infrequent lack of expression. This is a parent that does not need to be driven in order to show signs of affection to child during the course of interaction. 5 – *A Lot of Affection* – Displayed as a presence of affection that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Physical coercion	Use of negative physical force to direct child's behaviour (e.g., physical aggression, holding child to prevent an action/behaviour). Low intensity physical coercion includes taking task items away. Moderate intensity physical coercion includes holding child to prevent action/behaviour or forceful physical behaviour (e.g., pulling	1 – *No Physical Coercion* – Displayed as clear and pervasive absence of physical coercion. 2 – *A Little Bit of Physical Coercion* – Displayed as minimal examples of physical coercion that are low in frequency and intensity. Parent displays a few weak or modest examples of physical coercion during the whole interaction.

	child away from camera if child attempts to play with it). High intensity physical coercion includes physical aggression inflicted with intent to cause pain (e.g., slap, smack, pinch, forcefully grabbing child's arm).	3 – *Moderate Amount of Physical Coercion* – Displayed as some examples of physical coercion that vary in intensity. The overall impression would be that this is a parent that partly shows physical coercion on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Physical Coercion* – Displayed as an overall pattern of physical coercion in relation to both frequency and intensity. Clear and unambiguous evidence of physical coercion by the parent throughout the interaction, in addition to infrequent examples that lack expression of physical coercion. This is a parent that does not need to be driven in order to show physical coercion during the course of interaction. 5 – *A Lot of Physical Coercion* – Displayed as a presence of physical coercion that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Verbal coercion	Use of verbal instructions and directives that specify behaviour requested of child. Tone of voice is harsh, commanding, forceful and/or hostile. Includes: • Direct commands – e.g., "Put that down", "Stop that right now", "Do that", "Don't do that". • Permission statements and rules/prohibitions – e.g. "You may not get off the chair", "You have to sit still while we complete the task".	1 – *No Verbal Coercion* – Displayed as clear pervasiveness absence of verbal coercion. 2 – *A Little Bit of Verbal Coercion* – Displayed as minimal examples of verbal coercion that are low in frequency and intensity. Parent displays a few weak or modest examples of verbal coercion during the whole interaction. 3 – *Moderate Amount of Verbal Coercion* – Displayed as some examples of verbal coercion that vary in intensity. The overall

	• "If… then" statements/warnings – statements that also state a consequence that will follow child's compliance or non-compliance to the requested behaviour – e.g. "If you don't sit still, I will smack you"). Low intensity verbal coercion includes minimally coercive directives delivered in mildly commanding manner (e.g., "Be good"). Moderate intensity verbal coercion includes mildly coercive threats/warnings, direct commands (e.g., "Sit on your chair quietly"), snapping back at child, raising voice that has not escalated to yelling. High intensity verbal coercion includes yelling, threats of separation and/or physical aggression. Nature of interaction is threatening/frightening.	impression would be that this is a parent that partly shows verbal coercion on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Verbal Coercion* – Displayed as an overall pattern of verbal coercion in relation to both frequency and intensity. Clear and unambiguous evidence of verbal coercion by the parent throughout the interaction, in addition to infrequent examples that lack expression of verbal coercion. This is a parent that does not need to be driven in order to show verbal coercion during the course of interaction. 5 – *A Lot of Verbal Coercion* – Displayed as a presence of verbal coercion that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Praise and approval	Verbal or non-verbal cues that express praise, approval or appreciation of child or child's behaviour in regard to current task or past, present, and future events. Praise can be global (e.g., "Good boy" and "Well done") or descriptive that specifically describes positive child behaviour (e.g., "You did a great job solving that puzzle!"). Non-verbal approval can be a nod or gesture of approval such as a thumbs up. Low to moderate praise includes global praise, non-verbal gesture of approval (e.g., smile, 'thumbs-up').	1 – *No Praise* – Displayed as clear pervasiveness absence of praise. 2 – *A Little Bit of Praise* – Displayed as minimal examples of praise that are low in frequency and intensity. Parent displays a few weak or modest examples of praise during the whole interaction. 3 – *Moderate Amount of Praise* – Displayed as some examples of praise that vary in intensity. The overall impression would be that this is a parent that partly shows praise on occasions and fails to do so on other occasions.

	High intensity praise includes global praise with explicit gesture of positive affect (e.g., smile, 'high five', clapping) and/or descriptive praise.	4 – *A Fair Amount of Praise* – Displayed as an overall pattern of praise in relation to both frequency and intensity. Clear and unambiguous evidence of praise by the parent throughout the interaction, in addition to infrequent examples that lack expression of praise. This is a parent that does not need to be driven in order to show praise during the course of interaction. 5 – *A Lot of Praise* – Displayed as a presence of praise that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Child Codes		
Positive affect	General positive mood: positive facial expressions, bodily gestures, tone of voice & expression of genuine enthusiasm and pleasure. This is in relation to child's general positive mood in addition to how child interacts and responds to parent. Positive comments should only be considered as evidence of positive effect if they are said with warmth and/or enthusiasm. This includes but is not limited to the following: • Positive facial & bodily expressions – e.g., happy face, giggles, smiles, laughs, clapping of hands etc. • Tone of voice – e.g., presence of enthusiasm and pleasure, conveying happiness. This includes singing, humming, jokes, and funny remarks.	1 – *No Positive Affect* – Displayed as clear pervasiveness absence of positive affect. *This does not indicate negative affect, only that the child does not display any positive affect.* 2 – *A Little Bit of Positive Affect* – Displayed as minimal examples of positive affect that are low in frequency and intensity. Child displays a few weak or modest examples of positive affect during the whole interaction. 3 – *Moderate Amount of Positive Affect* – Displayed as some examples of positive affect that vary in intensity. The overall impression would be that this is a child that partly shows positive affect and partly shows neutral/flat affect. 4 – *A Fair Amount of Positive Affect* – Displayed as an overall pattern of positive affect in relation to both frequency and

		intensity. Clear and unambiguous evidence of positive affect by the child throughout the interaction, in addition to infrequent examples of neutral affect. This is a child that does not need to be driven in order to show signs of happiness throughout the interaction. 5 – *A Lot of Positive Affect* – Displayed as a presence of positive affect that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Negative affect	General negative mood: negative facial expressions, bodily gestures, tone of voice & lack of enthusiasm. This is in relation to child's general negative mood in addition to how child interacts and responds to parent. This includes but is not limited to the following: • Negative facial & bodily expressions – e.g., frowning, angry faces, pulling, slapping and avoiding interaction with parent. • Tone of voice – e.g., mocking, sarcasm, irritation, hostility, impatience. Lack of enthusiasm – e.g., child is disinterested and/or detached, make critical or rejecting comments.	1 – *No Negative Affect* – Displayed as clear pervasiveness absence of negative affect. *This does not indicate positive affect, only that the child does not display any negative affect.* 2 – *A Little Bit of Negative Affect* – Displayed as minimal examples of negative affect that are low in frequency and intensity. Child displays a few weak or modest examples of negative affect during the whole interaction. 3 – *Moderate Amount of Negative Affect* – Displayed as some examples of negative affect that vary in intensity. The overall impression would be that this is a child that partly shows negative affect and partly shows neutral/flat affect. 4 – *A Fair Amount of Negative Affect* – Displayed as an overall pattern of negative affect in relation to both frequency and intensity. Clear and unambiguous evidence of negative affect by the child throughout the interaction, in addition to infrequent

		examples of neutral affect. This is a child that does not need to be driven in order to show signs of irritability and detachment during the course of interaction. 5 – *A Lot of Negative Affect* – Displayed as a presence of negative affect that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Affection	There must be examples of close proximity with the parent in a manner which is considered as caring and loving. Child's intentional and overt expression of feelings of closeness, care, and fondness for parent*)*. Child should appear comfortable and/or genuine with displays of affection. This includes but is not limited to the following: • Affectionate words – e.g., verbal statements expressing love, praise, or friendship. • Active affectionate physical contact – e.g., kissing, cuddling, hugging, and patting. • Passive affectionate physical contact – e.g., sitting on parent's lap. Unless accompanied by verbal or physical affection, displays of warmth (e.g., smiling, warm facial expression) should *not* be counted	1 – *No Affection* – Displayed as clear pervasiveness absence of affection. 2 – *A Little Bit of Affection* – Displayed as minimal examples of affection that are low in frequency and intensity. Child displays a few weak or modest examples of affection during the whole interaction. 3 – *Moderate Amount of Affection* – Displayed as some examples of affection that vary in intensity. The overall impression would be that this is a child that partly shows affection on occasions and lacks expression of affection on other occasions. 4 – *A Fair Amount of Affection* – Displayed as an overall pattern of affection in relation to both frequency and intensity. Clear and unambiguous evidence of affection by the child throughout the interaction, in addition to infrequent lack of expression. This is a child that does not need to be driven in order to show signs of affection to parent during the course of interaction.

	as Affection, but covered under Positive Affect and Shared Positive Affect.	5 – *A Lot of Affection* – Displayed as a presence of affection that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Coercive behaviour	Examples of physical aggression from the child or verbalisations and demands delivered with harsh tone of voice towards the parent. This includes but is not limited to the following: • Physical coercion – e.g., snatching tangram pieces or Etch a Sketch from parent, pushing/pulling parent, kicking, pinching etc. directed at parent. Verbalisations and demands delivered from the child with harsh tone of voice towards the parent.	1 – *No Coercive Behaviour* – Displayed as clear pervasiveness absence of coercive behaviour. 2 – *A Little Bit of Coercive Behaviour* – Displayed as minimal examples of coercive behaviour that are low in frequency and intensity. Child displays a few weak or modest examples of coercive behaviour during the whole interaction. 3 – *Moderate Amount of Coercive Behaviour* – Displayed as some examples of coercive behaviour that vary in intensity. The overall impression would be that this is a child that partly shows coercive behaviour on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Coercive Behaviour* – Displayed as an overall pattern of coercive behaviour in relation to both frequency and intensity. Clear and unambiguous evidence of coercive behaviour by the child throughout the interaction, in addition to infrequent examples that lack expression of coercion. This is a child that does not need to be driven in order to show coercive behaviour during the course of interaction.

		5 – *A Lot of Coercive Behaviour* – Displayed as a presence of coercive behaviour that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Non-compliance	Any instance when child deliberately does not follow specific parental instruction after a lapse of 5 seconds. This includes when a child ignores a parental request or command. Child may also behave in a manner which is difficult or disruptive in response to parental request or command. Note: When verbal non-compliance is observed wait until the lapse of 5 seconds to see if child's actions differ from child's words and actions reflect compliance. Even if child says 'no' to parent when a request is given, if child then starts to carry out the command, then this is not considered as non-compliance.	1 – *No Non-compliance* – Displayed as clear pervasiveness absence of non-compliance. 2 – *A Little Bit of Non-compliance* – Displayed as minimal examples of non-compliance that are low in frequency and intensity. Child displays a few weak or modest examples of non-compliance during the whole interaction. 3 – *Moderate Amount of Non-compliance* – Displayed as some examples of non-compliance that vary in intensity. The overall impression would be that this is a child that partly shows non-compliance on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Non-compliance* – Displayed as an overall pattern of non-compliance in relation to both frequency and intensity. Clear and unambiguous evidence of non-compliance by the child throughout the interaction, in addition to infrequent examples that lack expression of non-compliance. This is a child that does not need to be driven in order to show non-compliance during the course of interaction.

		5 – *A Lot of Non-compliance* – Displayed as a presence of non-compliance that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Responsiveness to reward	The extent to which the child is responsive (both verbally and non-verbally) towards parent's reward. This could be praise or non-verbal approval (e.g., nods, affection, high-five) from the parent. Low intensity responsiveness to reward would be non-verbal cue, such as smiles. High intensity responsiveness to reward would be enthusiastic physical or vocal response to reward.	1 – *No Reward Responsiveness* – Displayed as clear pervasiveness absence of responsive behaviour despite parents' approval. 2 – *A Little Bit of Reward Responsiveness* – Displayed as minimal examples of reward responsiveness that are low in frequency and intensity. Child displays a few weak or modest examples of reward responsiveness during the whole interaction. 3 – *Moderate Amount of Reward Responsiveness* – Displayed as some examples of socially responsive behaviour that vary in intensity. The overall impression would be that this is a child that partly shows reward responsiveness on occasions and fails to do so on other occasions. 4 – *A Fair Amount of Reward Responsiveness* – Displayed as an overall pattern of reward responsiveness in relation to both frequency and intensity. Clear and unambiguous evidence of reward responsiveness by the child throughout the interaction. 5 – *A Lot of Reward Responsiveness* – Displayed as a presence of reward responsiveness that is pervasive and completely unambiguous to the observer, both in intensity and frequency.
Dyadic Synchrony		

Joint attention	Attentiveness to each other's comments and actions. Parent and child have joint focus of attention. This may involve the use of eye contact or gestures to direct the other's attention towards objects. Responding to this involves following the direction of gaze and gestures. Thus, this requires social understanding and intent. High intensity joint attention refers to the dyad attending to the same part of each task, e.g., for the tangrams task both are searching for the same piece or same part that completes the puzzle, whereas low intensity refers to the dyad attending to the task but different parts of it. For the Etch a Sketch task, joint attention is more "forced" as parents and children were explicitly told they must work together to complete the task. However, children's attention can still wander especially when they become bored. Joint attention is achieved in this case when the parent guides the child's attention back to the task and the child responds accordingly.	1 – *No joint attention*. Parent and child are attending to different things throughout the task. 2 – *A little bit of joint attention*. The dyad attend to the same thing on occasion, but this behaviour is seen in less than half of the time taken to complete the task, and intensity is generally low. 3 – *Moderate joint attention*. Parent and child attend to the same thing for roughly half of the task or attend to the same thing for quite a lot of the task, but with low intensity. 4 – *Quite a lot of joint attention*. The dyad attends to the same thing for most of the task, and the same page for much of the time whilst reading. 5 – *A lot of joint attention*. Parent and child attend to the same thing throughout the task, with them looking at the same points in the book for most of the time
Shared positive affect	Parent and child display positive state similarity and enthusiasm. Appropriate positive affect matching, reciprocity, or complementary behaviour (e.g., if child smiles at parent, parent smiles back or pats head). Level of enjoyment displayed by parent and child during the	1 – *No shared positive affect/joint enjoyment.* An atmosphere of neutrality pervades. 2 – *A little bit of shared positive affect/joint enjoyment.* Behaviour is observed occasionally or is of low intensity.

	interaction regardless of whether enjoyment is about the task or not. Enthusiastic comments, contribution to keep activity going.	3 - *Moderate shared positive affect/joint enjoyment.* Behaviour is observed some of the time or is of moderate intensity. Smiling may be present, but the person would not be described as 'beaming'. 4 – *A fair amount of shared positive affect/joint enjoyment.* Quite a lot of smiling and enthusiasm is displayed, and intensity is frequently high. 5 – *A lot of shared positive affect/joint enjoyment.* Parent and child express positive affect towards each other and both express enjoyment of the task through their body language, words laughter and the pitch of their voice, such that the behaviour is pervasive throughout the task.