

Emotional abilities in children with Oppositional Defiant Disorder (ODD): Impairments in perspective-taking and understanding mixed emotions are associated with high callous-unemotional traits

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Abstract

Most studies of emotion abilities in disruptive children focus on emotion expression recognition. This study compared 74 children aged 4 to 8 years with ODD to 45 comparison children (33 healthy; 12 with an anxiety disorder) on behaviourally assessed measures of emotion perception, emotion perspective-taking, knowledge of emotions causes and understanding ambivalent emotions and on parent-reported cognitive and affective empathy. Adjusting for child's sex, age and expressive language ODD children showed a paucity in attributing causes to emotions but no other deficits relative to the comparison groups. ODD boys with high levels of callous-unemotional traits (CU) ($n=22$) showed deficits relative to low CU ODD boys ($n=25$) in emotion perspective-taking and in understanding ambivalent emotions. Low CU ODD boys did not differ from the healthy typically developing boys ($n=12$). Impairments in emotion perceptiveness and understanding mixed emotions in ODD boys are associated with the presence of a high level of CU.

Keywords: oppositional defiant disorder; emotional competencies; callous unemotional traits; ambivalent emotions

Introduction

Children with oppositional defiant disorder (ODD) and conduct disorder (CD) display symptomatic difficulties in emotional functioning. These include ineffective self-regulation of negative emotions, a restricted range of emotional expression and a failure to appreciate and to respond appropriately to the emotions of others [1]. Some theories [2-4] propose that these symptoms reflect deficits in specific psychological competencies which underpin children's capacity to respond to emotional experiences, and to understand that others also have private emotions. Problems in these competencies are seen as contributing strongly to the development of the disturbed social interactions including the anti-social and defiant behaviours which are characteristic of children with disruptive behaviour disorders [2, 5].

There has been a recent emphasis on identifying deficits in emotional abilities characteristic of the subgroup of disruptive children with callous and unemotional (CU) traits. These children show cruelty, a lack of concern for others, an inability to feel guilt and impaired empathy and in the context of conduct disorder are delineated as having limited pro-social emotions [1]. Recent models of CU [6, 7] suggest that deficiencies in basic emotional abilities profoundly impact on the development of empathy and social emotions in this group. Blair [6] proposes that poor recognition of fear and distress cues is fundamental to high CU disruptive children's insensitivity to others' feelings and impoverished empathic concern. For Dadds [7, 8] deficits in high CU children's distress recognition is due to impaired attention during the perception of important emotional stimuli such as other people's eyes and facial features. Impaired attention not only impacts emotion recognition but also inhibits children's capacity to attribute mental states including emotions and intention to the other person [9] and also, more broadly, disrupts the quality of interactions between children and their parents, caregivers and peers.

The ability to accurately recognise emotion expressions contributes to the development of a number of more advanced emotional competencies which underlie the ability to identify and predict emotional reactions and experiences and to appreciate that others also have private emotional experiences. These abilities typically develop in an expected pattern during early childhood and into their first years of school continuing to advance in their complexity and intricacy [10]. According to most developmental models children move from understanding emotion “as nothing more than certain instrumental (e.g. approach-avoidance) or expressive (e.g. cry-smile) actions” [11, p. 291] to situational understandings where they make sense of emotions by knowing that certain situations or circumstances lead regularly to particular instrumental or expressive actions. Subsequently, children develop subjective and experiential understandings where they have a sense of the subjectivity of emotional experience and reflective knowledge about the role of internal states such as desire and belief in emotions [10, 12].

The competencies which reflect these stages include emotion labelling (recognising and naming basic emotions like anger, sadness, fear), emotion perspective-taking (knowing how another person might feel in specific situations), understanding of the causes of emotions (knowledge of the behavioural, situational and internal-state causes of emotions) and appreciating more complex, mixed and ambivalent emotions (knowing that different and contrasting emotions can co-occur) [10, 13-15]. As children develop, these competencies support their experience and reflective understanding of their own and others’ emotions in increasingly complex and dynamic social contexts and guide them in how to respond appropriately in these contexts. Children typically make considerable gains in emotion perspective taking and understanding the causes of emotions during the preschool years and this continues once they enter school [10, 13]. The development of a reflective understanding of mixed or ambivalent emotions continues during the primary school years so that by age 8 most children at least understand that positive and negative emotions can be elicited in the same situation [16].

The more advanced emotion competencies are considered to have critical roles in the development of moral reasoning and pro and antisocial decision making and behaviour. They are necessary for properly integrating expressive and situational information when understanding other's emotional perspective because both types of information are necessary for appreciating that another person can display one emotion but really feel a different way, that one person can feel different emotions to another person in the same situation and also that the same context can elicit competing and conflicting emotional responses within the same person [17-19]. Reflective understandings of emotions are also prerequisites for knowledge of self-focused, social emotions [18] such as embarrassment, pride, guilt and shame because these emotions are initially evoked by congruence or incongruence between the child's emotional response and the emotional response of others to the child's behaviour. By age 8 most children are beginning to experience and understand the social meaning of these later emotions as arising from violation or conformity with social standards and these emotions increasingly become the motivational drivers of children's developing prosocial responses [18, 20].

This consideration suggests that ODD children who display low pro-social emotions and behaviour (those with high CU traits) will show deficits in advanced emotional competencies. Beyond the basic recognition deficits, however, we know relatively little about the performance of children with disruptive disorders, including those with high CU, across the range of emotional competencies which develop during childhood. While there has been considerable investigation of the association between emotion competencies and aggressive behaviour [21], relatively few studies provide evidence about the extent and nature of emotional deficits in children diagnosed with a disruptive disorder (ODD or CD) [see 21, 22]. Overall, there is evidence for ODD related impairments in children's emotion labelling [23, 24] and for biases in

interpreting ambiguous emotions as indicating hostile intent in others [3, 25]. Consistent with the impaired emotion expression recognition models [4, 5], the strongest and most consistent evidence is for an impairment in recognition of emotion expressions in faces, voices and body posture in ODD and CD children and youth with high CU [4, 8, 22] which may be strongest for fear [4, 22]. There is also some evidence that high CU ODD school-aged children have low levels of both cognitive and affective empathy as observed by parents and teachers [7] suggesting that emotion deficits may have a continuing impact on how well high CU disruptive children show understanding of others' emotions.

It is unclear whether ODD children also have behavioural deficits in emotion labelling, understanding emotion causes, perspective taking and understanding mixed emotions or whether any deficits in these abilities are associated with presence of high CU. As children engage in more diverse interpersonal and emotional situations, such as in school, they are provided with opportunities to learn contextual information to emotional understanding and perspective-taking. There is evidence that as children develop they increasingly take this information in account in their empathic judgements and pro-social responses, successfully relying on it when emotion expressive information is not available [26, 27]. This contextual information includes the variety of terms and verbal expressions for emotions, knowledge of the various causes of emotion including internal-state causes such as desires, goals and beliefs and how these might co-occur and compete, as well as information about other's perspective on the emotion situation. While this route to the development of empathy and advanced emotion understanding may offset the impact of early emotion recognition deficits, it's not clear how well ODD children, particularly those with high CU traits, learn and use contextual cues to other's emotions. Evidence about how disruptive children perform across the range of emotional competencies could strengthen

inferences about the ongoing consequences of CU related emotion recognition deficits and help identify important targets for enhancing pro-social responding in disruptive children with and without high CU.

The current study

These considerations suggest that while ODD is related to biases in interpreting internal causes for others' emotions, deficits in emotion perspective taking, knowledge of causes of emotion and understanding mixed emotions in children with disruptive disorders may be associated with low pro-social emotions (high CU traits). These later deficits will be evident in comparisons between high CU ODD children and low CU ODD children and also when compared to other low CU children without ODD. It is unclear whether there are other child characteristics common across childhood disorders which are related to these emotion competencies deficits and which may influence differences between high CU ODD children and other groups. The current study considers the presence of persistent problematic difficulties in the regulation of emotions and child sex as possible factors which could account for or moderate these differences. Difficulties in regulation of emotions may arise from deficits in emotional abilities and represent common disordered processes which characterise childhood internalising problems such as anxiety and depression as well as disruptive disorders. Boys are more strongly represented than girls in ODD groups and also in the high CU ODD subgroup. Boys and girls also show different progress in the development of emotional competencies across early childhood [28] suggesting that being male may account for some of the emotional deficits observed in ODD and in high CU disruptive children. The current study considers these two factors alongside ODD status and high and low CU traits in between group design.

The current study examines the performance of young children in the first years of school across emotional competencies including 1) *emotion perception*, 2) *emotion perspective-taking*, 3) *understanding the causes of emotions*, and 4) *understanding ambivalent or mixed emotions* as well as their parents' ratings of their levels of 5) *cognitive and affective empathy*. By age 8 most children have progressed in each of these competencies and are beginning to experience and understand the social meaning of emotions such as guilt and shame [18, 29]. This study firstly compares children 4 to 8 years who have a diagnosis of ODD to their non-ODD peers, including a subgroup with internalising problems, across these four emotion competencies using behavioural measures, and on cognitive and affective empathy using parent's report. The study then asks whether relative deficits in emotional competencies are marked or specific for ODD children with high levels of CU. This subgroup analysis compares high CU ODD children with low CU ODD children and children without ODD across the range of emotional competencies. The effect of child sex and its interaction with ODD and CU status are also examined.

Methods

Participants

Participants were 124 children aged from 4 to 8 years and their parents recruited at two sites. Parents were referred for assessment of their child's difficult-to-manage behaviours, or recruited through schools as part of a study about how parents can enhance their children's ability to manage their emotions. Ethics approval was obtained from the relevant human ethics committee which give approval in accordance with ethical standards comparable to the 1964 Helsinki declaration and its later amendments. Full, written consent from parents was obtained.

Procedures

Screening. Parents were interviewed via telephone for suitability in terms of child's age, nature of any concerns, English spoken at home and to exclude possible autism spectrum disorder or developmental disability. An in-person assessment session was scheduled for suitable children.

A Parent Assessment Kit with parent-report instruments, Information letter and Informed Consent Form was posted to the parents to complete and bring to assessment.

Assessment Session. Separate interviews with the parent and with the child took place in adjoining rooms. A semi-structured diagnostic clinical interview, brief history-taking and developmental assessment was administered to the parent regarding their child. The child's emotional competencies were assessed using emotion competency measures. The assessment session lasted an hour and a half to two hours and was attended by mothers ($n=116$), fathers ($n=2$) or both ($n=6$).

Measures

Diagnosis. The clinician-administered Diagnostic Interview Schedule for Children, Adolescents and Parents [30] was used to establish the presence of ODD and any other Axis 1 DSM-IV diagnosis. This semi-structured interview yields a multi-axis DSM-IV diagnosis and clinical severity index and has been shown to have high between clinician reliability for a diagnosis of ODD [31].

Callous-unemotional Traits. The Parent Report of the Inventory of Callous Unemotional traits (ICU0 [32] was used to assess the child's level of CU traits. ICU items are rated on a 4 point Likert scale from 0 (Not at all true) to 3 (Definitely true). This 24 item measure assesses total CU and has been shown to have good construct validity [33]. ICU has acceptable reliability across different age ranges and genders [34] and was found to good internal consistency in the present

study (Cronbach's alpha = .76). The total ICU score was used to classify children as high and low CU (HCU, LCU). Consistent with prevalence estimates of high CU in previous work [35] and the cut-offs used to classify disruptive children as high CU [36], ODD children were considered to have high CU if they scored at or above the 67th percentile on the ICU.

Child Emotional Competencies. Emotion competencies were assessed using the Denham Affective Knowledge Tests [37, 38] which are widely used and reliable (Cronbach alpha = .66 to .86) behavioural measures of Emotion perception, Emotion perspective-taking, Emotion causes, and Ambivalent or mixed emotions. The Affective Knowledge tests are administered as a semi-naturalistic child interview embedded within play with the experimenter where the child views and talks about dolls with happy, sad, angry, and fearful expressions, or takes part in enacted emotion scenarios or stories. Two raters blind to the child's diagnosis judged the child's response for emotion causes and mixed emotions with 75% of the interviews co-rated for reliability.

Emotion perception. This test taps into children's ability to recognize and label facial expressions of emotion. Children are shown dolls with detachable faces that depict happy, sad, angry, and afraid expressions in a random order. *Receptive recognition:* Children are asked to point to the correct face as the experimenter named each expression. *Expressive recognition:* Children are first asked to name each expression as the experimenter points to the faces in turn. For each labelling task, total scores ranged from 0-8 (2 points for correct labelling/recognition of emotion; 1 if valence is correct; 0 for totally incorrect). Interrater agreement for both receptive and expressive recognition was 100%.

Emotion perspective-taking. These tasks test children's knowledge of other people's feelings in two types of situations. In the *Stereotypical task*, the emotions evoked are non-equivocal, such as happiness at being given an ice cream cone or fear at having a nightmare. The

experimenter enacts 8 vignettes with the dolls used in the emotion labelling tasks, accompanied by standardized vocal and visual emotion cues. To indicate how the doll felt, the child affixes to it one of the four fabric emotion faces. The *Non-Stereotypical* task measures how well children can identify feelings in situations where the protagonist feels differently from how the child would feel in the same event. Ten vignettes are enacted by the experimenter using the same dolls as before. For each vignette 2 points are given for a correct answer, 1 point for identifying the correct valence and 0 for an incorrect answer. Total scores for each task were used. Interrater agreement for both types of emotion perspective taking was 100%.

Emotion causes task. To assess children's causal understanding of emotion in the Denham Causes Task, the experimenter presented the four dolls in turn and asked, "What made the doll feel this way?" pointing at each doll in random order. Standard probes were used to encourage children to give more than one cause for each emotion (happy, sad, angry, afraid) and to ensure that children's meanings could be understood. The procedure and child's responses are audiotaped and transcribed responses scored. Fluency of causes for each emotion is measured as the number of accurate, *independent* reasons given. Interrater correlations were: overall ($r=.84$), for happy ($r=.75$), sad ($r=.88$), angry ($r=.89$) and afraid ($r=.85$).

Ambivalent or mixed emotions task. Three vignettes that provoke *ambivalent* emotional responses, e.g., riding a bike for the first time, or anticipating the last day of school, are narrated and acted out using the dolls [39]. The child is asked to explain the co-occurrence of the two emotions. The emotion mixes are; vignette 1 happy-sad; vignette 2 happy-angry; vignette 3 excited-scared. Total scores ranged from 0-6 (2 points per vignette for explaining both emotions, 1 point for explaining only one emotion, and 0 for explaining neither emotion

correctly). Interrater correlations were: overall ($r=.90$), for vignette 1 ($r=.77$), vignette 2 ($r=.81$) and vignette 3 ($r=.85$).

Empathy. Children's empathy was assessed by the parent-report Griffith Empathy Measure (GEM) a 23-item measure with good reliability and validity [40]. GEM contains subset measures for affective and cognitive aspects of empathy [40]. One example of an affective empathy item is 'My child gets upset when he/she sees an animal being hurt'. For cognitive empathy, an example item is 'When I get sad my child doesn't seem to notice'. Mothers read each statement and rated how much they agree with it using a nine-point Likert scale that ranged from strongly disagree (-4) to strongly agree (+4) [40]. The Griffith Empathy Measure has been recognised not only for its strength in reliably capturing specific aspects of emotion understanding and sharing (Total empathy, $\alpha = .81$; Cognitive empathy, $\alpha = .62$; Affective empathy, $\alpha = .83$), but also for its validity across age and gender [40].

Child Emotional and Behavioural problems. The Strengths and Difficulties Questionnaire (SDQ) [41], a 25-item parent report was used to characterise the general levels of child psychopathology. The SDQ provides scores on three clinical subscales (conduct problems; hyperactivity; emotional problems) and two interpersonal subscales (peer problems; pro-social behavior) as well as a total difficulties score. The questionnaire has good reliability and the individual clinical subscales show sound external validity in predicting risk to a related mental disorder and clinician rated severity of the disorder based on structured interview (Hawes & Dadds, 2004).

Child Verbal Ability. The Expressive Vocabulary Test (EVT0 [42] is an individually-administered test of expressive vocabulary. It can be completed quickly (ceiling is reached with

5 consecutive errors) and does not require the child to read, write, or give lengthy oral responses. A child's score is norm-referenced against children of the same age in months.

Demographic Information. Parents completed a brief demographic questionnaire with information about child age and education, parental age, education, employment status, and income range, marital status and number of children.

Parent Emotional Status. Parents answered the 42 item-version of the Depression, Anxiety and Stress Scale or DASS [43]. DASS assesses the severity of the symptoms of depression, anxiety or stress. Respondents used a 4-point severity/ frequency scale to rate the extent to which they have experienced each state over the past week.

Data Analysis Plan

Differences between the diagnostic groups and boys and girls on each of the emotional competencies were examined using multivariate general linear models with group and sex as fixed factors and child's age and expressive language (EVT) as covariates. Between-group differences on the two empathy constructs (cognitive; affective) were evaluated in group by sex models with child's age and expressive language ability as covariates. Our sampling resulted in a notable proportion (26%) of comparison children having an axis 1 internalising diagnoses, so the group factor included 3 groups (ODD; Anxiety diagnosis (AD); healthy typically-developing (TD)). We report the simultaneous planned contrasts on each component of the emotional competency domain when the between group effect is significant. Planned contrasts compared ODD children with TD children, ODD with AD; ODD children with all other children (TD and AD combined) and TD with AD children for each component of the domain.

A second set of analyses compared ODD children classified into high and low CU groups and the two comparison non-ODD groups (AD; TD) using multivariate general linear model with

group (HCU; LCU; AD; TD) and sex as fixed factors and child's age and expressive language ability as covariates. For significant between group effects we examined planned contrasts comparing HCU with LCU, HCU with AD, HCU with TD, LCU with AD and TD children.

Results

Demographic and Clinical characteristics

Of the 124 children formally assessed, 74 had a DSM-IV diagnosis of ODD, 33 had no diagnosis (TD) and 17 had a diagnosis other than ODD. The primary diagnoses of the Non-ODD group were anxiety disorders (12; 4 specific phobia, 3 overanxious disorder and 3 another anxiety disorder) and ADHD (5). Forty-one (55.4%) ODD children had a comorbid diagnosis of ADHD. Other secondary diagnoses for the ODD group included specific phobia (4), another anxiety disorders (7) and sleep terror (1), while the other group had secondary diagnosis of social phobia (2), overanxious disorder (1) and enuresis (2). Clinician reliability of a diagnosis based on the DISCAP interview was strong (Kappa=0.96). The majority of children come from two parent families (89.9%) and the diagnostic groups did not differ in the proportion of children from single parent families ($\chi^2=0.481$; $p=0.49$).

Table 1 provides demographic and clinical characteristics for the ODD and comparison groups and reports the results for the group effect and the pair-wise between group contrasts. There was a trend for ODD to score more poorly on expressive vocabulary than TD ($t(105)=1.79$; $p=.07$).

Comparison between ODD, TD, AD

Table 2 presents emotional competency and empathy scores by group and sex as well as the results for the group MANOVA and planned contrasts. There were no significant sex effects, or group and sex interactions controlling for child's age and expressive language ability. There was a significant between group effect only for emotion causes ($F(8,224)=2.42$, $p=.016$; partial

$\eta^2=.08$). Both ODD and AD children produced significantly fewer causes for angry than the TD children (contrast estimate=-1.269; $p=.008$; 95% CI; -2.199 to -0.399; est.=-1.782; $p=0.001$; 95% CI -3.123 to -0.441 respectively) but did not differ from one another (est.=-0.513; $p=0.405$; 95% CI -1.727 to 0.701). ODD children produced fewer causes for afraid compared to the AD children (est.=-1.224; $p=.037$; 95% CI -2.374 to -0.074) but their poorer performance relative to TD children failed to reach significance (est.=-0.834; $p=0.063$; 95% CI -1.715 to 0.046). AD children did not differ from TD children (est.=-0.390, $p=0.545$; 95% CI -1.66 to 0.88). There were no significance between group differences for emotion recognition, emotion perspective taking, mixed emotions or empathy.

Comparison between high CU ODD, low CU ODD, and comparison groups.

As only 5 girls were classified HCU these comparisons were for boys only. Twenty-two ODD boys were classified as HCU and 25 LCU. Because only 7 boys were in the AD group the analyses were undertaken using three groups (HCU, $n=22$; LCU, $n=25$; TD, $n=17$). HCU had higher severity of conduct problems than LCU on the SDQ conduct problem subscale ($t(46)=2.091$, $p=.041$). SDQ conduct problem score was included as an additional covariate in the analyses.

The scores on emotional competencies and for empathy for the three groups are presented in Table 3 adjusted for the age, language ability and conduct problem severity. There were no significant between group differences for emotion perception or non-stereotypical perspective-taking. HCU showed stereotypical perspective-taking deficits relative to LCU (est=- 0.976; $p = 0.042$; 95% CI -1.914 to -0.038) but not relative to TD (est=- 0.801; $p=0.256$; 95% CI -2.20 to 0.597) while LCU did not differ from the TD children (est= 0.175; $p= .769$; 95% CI -1.538 to 1.009). HCU and LCU did not differ on the emotions causes task for any emotions while both

groups showed deficits relative to TD on emotion causes for anger (HCU v TD; $est. = -2.141$; $p = .002$; 95% CI -3.785 to -0.497; LCU v TD $est. = -1.698$; $p = .003$ 95% CI -3.098 to -0.292). HCU was poorer on the mixed emotions tasks compared to LCU ($est. = -0.642$; $p = 0.005$; 95% CI -1.081 to -0.203 happy/sad; $est. = -0.453$; $p = 0.028$; 95% CI -0.860 to -0.046 happy/angry; $est. = -0.692$; $p = 0.001$; 95% CI -1.095 to -0.289 excited/scared). HCU did not differ from the TD group on any of the 3 mixed emotions tasks ($est. = 0.221$, $p = .548$ 95% CI -0.954 to 0.512; $est. = 0.341$; $p = .315$ 95% CI -1.107 to 0.334; $est. = 0.068$; $p = .844$ 95% CI -0.752 to 0.657 respectively). While LCU and TD did not differ on the happy/sad or happy/angry mixed emotions task ($est. = 0.390$; $p = .228$ 95% CI -1.031 to 0.251; $est. = 0.122$; $p = .680$ 95% CI -0.713 to 0.468) LCU scored significantly higher than TD on the excited/scared task ($est. = 0.619$; $p = .043$ 95% CI 0.218 to 1.020). HCU had significantly lower scores on cognitive empathy compared to LCU ($est. = -7.631$; $p = 0.002$; 95% CI -12.227 to -3.035) but not on affective empathy ($est. = -9.297$; $p = 0.068$; 95% CI -18.87 to 0.272) while LCU did not differ from TD ($est. = -0.092$; $p = 0.979$ 95% CI -6.87 to 6.68; $est. = -5.099$; $p = 0.495$ 95% CI -20.98 to 9.901). HCU did not differ significantly from TD on cognitive empathy ($est. = -7.771$; $p = .06$; 95% CI -15.758 to 0.336) or affective empathy ($est. = -4.045$; $p = 0.639$; 95% CI -21.38 to 13.295).

Discussion

This study is the first to compare well defined groups of children with ODD to other children on behavioural measures of emotional competencies beyond basic emotion expression recognition abilities and to examine the specific influence of children's level of CU traits. Our findings take in account variability in emotional competencies related to sex, age and expressive language abilities. We found, firstly, that children with ODD were less fluent than typically developing children in generating causes for angry, and for afraid when compared to children with an

anxiety disorder but showed no relative deficiencies in emotion perception, emotion perspective-taking or in the ability to appreciate mixed emotions. Secondly, we found that ODD boys with high levels of CU traits have marked deficits relative to low CU ODD boys in emotion perspective-taking and understanding mixed emotions.

There are two important inferences from the between group findings for ODD children overall. First, when age and expressive language abilities are taken into account emotional competencies deficits are not characteristic of ODD children as a group. They are no less proficient at emotion perception, emotion perspective-taking and understanding mixed emotions than other children using these behaviourally based measures of these competencies. Second, expressive language predicted variability in the simple and complex emotional perspective-taking tasks independently of age indicating the importance of considering language ability when examining emotional competences in relation to behavioural and emotional difficulties. As children with disruptive behaviour often have language difficulties [44] any observed association between ODD and emotional competencies [21] might be explained by uncontrolled variability in language abilities. Both ODD and clinically anxious children showed deficits in generating causes for anger with the capacity to identify causes for afraid differentiating the two groups. The difference for afraid is due not only to a paucity for ODD children in generating causes but also to enhanced performance by the children who had an anxiety disorder. This latter finding reflects the hyper-cognising about fear situations that is typical of children with anxiety disorders [23]. Taken together the results indicate that ODD children show some general deficit in generating emotion causes which is strongest for anger. While we did not examine the attributional character of the causes generated, the results are consistent with the proposal of ODD related attributional bias

for anger and hostility which constrains the range of causes available for children with difficulties regulating anger to consider [3,4].

In the between group analyses for the boys, level of CU traits did not influence the degree to which ODD boys had deficits in generating causes for anger. The two subgroups of ODD boys did not differ on this ability and both showed a paucity relative to typical boys. The level of callous-unemotional traits did, however, moderate the performance of ODD boys on both stereotypical and more complex emotion perspective-taking tasks. While ODD boys with high CU traits were as accurate as their peers in recognising and labelling basic emotions they fell significantly below their low CU ODD peers in appreciating how another child might routinely feel in relatively straightforward emotion contexts. This result is consistent with inferences about the nature of emotion perspective-taking in high CU children [2] and with the reports of parents and teachers of low levels of empathy in these children which are replicated here for cognitive empathy [8]. Our results also show that high CU ODD boys display notable deficits when the emotion perspective-taking task involves understanding competing emotional responses. In other words, for the boys with ODD those with a high level of CU traits showed a deficiency relative to their low level CU peers in emotional perspective-taking for situations in which a person could feel more than one emotion and those emotion have competing valencies like happy and sad. On average high CU ODD boys could not provide an account of an alternate emotion in the mixed emotion contexts. These deficits in simply and more complex affective perspective taking suggest that high levels of CU traits in disruptive children are associated with a deficiency or delay in properly understanding the subjective nature of emotions and the role played by one own or other's internal states such as belief and desire in emotion experience [14].

The poorer comprehension of mixed emotions in high CU boys is also consistent with evidence that better understanding of ambivalent emotions in young children is associated with higher moral orientation and more discomfort with transgression [19, 44]. As high CU boys did not show a relative deficit compared to low CU ODD boys in recognising individual emotions or in generating causes for specific emotions, our results suggest that high CU in ODD boys is associated with poorer recognition of the co-occurring and conflictual nature of salient goals of the protagonist in these emotional scenarios. This may occur either because certain type of goals described in these situations, e.g., sad because a friend is missing your party, are simply not emotionally salient for high CU boys or alternatively, because once they identify with a particular goal of the protagonist high CU ODD boys are less able to shift attention towards appreciating alternate, emotion-relevant goals during the course of the event. There is continuing debate about whether ambivalent emotional situations elicit a blended, complex emotion or result in a sequentially experiencing of discrete but competing emotions [46]. Regardless, our results highlight that disruptive boys described as showing low levels of pro-social behaviours and emotions have marked deficiencies in dealing with these more affectively ambivalent situations at a time when such contexts are becoming increasingly prevalent in children's interpersonal and emotional experience [10, 11].

Deficits in understanding ambivalent emotional context have significant implications for the development of pro-social behaviour. The experience of a conflict of goals in emotional and interpersonal contexts together with the corresponding mixed emotions and resultant negative affect are considered by various models [17, 20, 44] to be of critical importance to the development of the social emotions such as embarrassment and guilt which predict and may motivate pro-social responding [19]. While it is not possible to make inferences about high CU

ODD children's experience of negative affect in ambivalent emotion contexts from this study, their failure to appreciate the possibility of mixed and competing emotions increases the chances that they don't experience negative affect in these contexts and are less likely to learn the incongruence between their emotional experience and what is socially accepted. The deficit also suggests that high CU boys will respond inappropriately or with lack of concern to others who are feeling ambivalent or mixed emotions in these situations. As more complex social contexts become more usual, the deficit in understanding ambivalent emotions in others may play an increasing role in maintaining or worsening ineffective social interactions. For the majority of children the capacity to appreciate mixed emotions is continuing to develop during the early school years [18, 29]. Our results suggest that efforts to enhance emotional competence in these years could make use of these opportunities to improve children's understanding of mixed emotional contexts. For many boys who have persistent conduct problems enhancing their capacity to appreciate the conflicting nature of these contexts and the competing emotions which can arise may be an important step towards modifying the enduring negative impact of high callous-unemotional traits on social interactions.

While high CU ODD boys consistently scored the lowest of the three groups, we did not find significant differences in emotional competencies between them and the typically developing boys except in generating causes for anger. In these comparisons the number of boys in the typically developing group was small and with adjustments for variability in the emotional competencies associated with severity of conduct problem, age and expressive language there may not have been adequate power to detect a significant effect. The decision to control for severity of conduct problem enhanced inferences about CU specific deficits in emotion competencies in the ODD boys. Adjusting for the severity of conduct problem may have,

however, unnecessarily constrained the comparisons between high CU ODD boys and typically developing boys. A post-hoc analysis of the contrasts between high CU boys and typical boys without including severity of conduct problems as a covariate found statistically significant deficits for high CU boys for the mixed emotion tasks and for cognitive and affective empathy. At the same time, ODD boys without high levels of CU showed no relative deficits in the comparisons with typical boys except for the mixed emotions task involving the emotions of excitement and fear where they were significantly better than our group of typically developing boys. Taken together our results indicate that behavioural deficits in advanced emotion competencies important for the development of moral reasoning and pro-social responding are specific to disruptive children with high levels of CU traits.

There are a number of limitations of the current study which need to be considered. Because we recruited on the basis of parent's interest about their child's emotional development, there may be a bias in the selection of typically developing children to those with some difficulties in emotional and behavioural regulation and therefore towards those with weaker emotional competencies. At the same time identifying children with other mental disorders allowed a control for clinical status on emotional competencies and firmer conclusions about specific ODD related emotional deficiencies. This control is often absent in other comparative studies of emotional competencies in externalising children [21]. Although the validity and usefulness of the Denham tasks as behavioural measures of emotional abilities is well established in this age group [37-39], they may not have the sensitivity to detect all ODD and high CU related differences. For example, performance on the emotion perception and basic emotion perspective-taking tasks were skewed towards high scores. All the Denham emotion competency measures provide contextual and expressive cues to the emotions so these results are not directly

comparable to studies which examine high CU related deficits in recognising emotions solely from expressive cues in face and posture without contextual information. While the tasks used in the current study are important in extending current knowledge of CU related emotion abilities difficulties beyond emotion recognition, the nature of these difficulties and their impact on high CU disruptive children's emotional and social functioning will need to be replicated and clarified using a diverse range of ecologically valid measures.

Summary

The focus of most empirical work examining emotional competencies in ODD children, including those with high callous-emotional traits, has been on emotion perception. Emotion perception abilities contribute to the development of a number of more advanced emotional competencies which underlie children's developing emotional understanding and their capacity to respond appropriately to their own and other's emotions. The aim of the current study was to compare performance of ODD children on more advanced emotional abilities involving emotion perspective-taking, understanding the causes of emotions and appreciating mixed emotions. The results of the current study show that a paucity in the attribution of causes to emotional experiences is the only emotional deficit which characterises ODD children as a group. Impairments in emotion perspective-taking and appreciation that conflicting emotions can co-occur is specific to ODD boys who show high levels of callous-unemotional traits. The findings have implications for theoretical understanding of the nature of emotional abilities in disruptive children with low pro-social emotions and behaviours. The findings may also contribute to programs which aim to help young children improve their understanding of emotions and their ability to respond appropriately to their own and to other's feelings.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Table 1 *Demographic and clinical characteristics of the ODD, Non-ODD and TD groups. Means are presented with SDs in parentheses.*

	ODD (n=74)	AD (n=12)	TD (n=33)	df	χ^2 or F^1	Contrasts results
Child gender (%)						
Male	63.5 (n=43)	64.7 (n=11)	51.5 (n=17)	2	1.52	<i>ns</i>
Female	36.5 (n=31)	35.3 (n=6)	48.5 (n=14)			
Age						
Child (months)	70.9 (16.8)	80.8 (17.7)	70.8 (18.9)	121	1.74	<i>ns</i>
Mother (years)	39.3 (4.4)	39.9 (5.1)	41.5 (4.3)	115	2.77	<i>ns</i>
Family annual income(%)						
\$31000-65000	14.9	12.5	3.1	12	10.59	<i>ns</i>
\$66000-99000	23.0	18.8	21.9			
\$99000+	55.4	68.8	71.9			
Not reported	6.8	0.0	3.1			
Child psychopathology						
SDQ emotional symptoms	3.33 (2.68)	3.92 (2.35)	1.72 (1.37)	118	6.31**	ODD=AD>TD ²
SDQ conduct problems	4.81 (1.75)	1.33 (1.37)	1.41 (1.39)	118	60.61**	ODD>AD=TD ³
SDQ hyperactivity	6.32 (2.9)	4.17 (2.55)	3.13 (2.22)	118	16.76**	ODD>AD=TD ⁴
ICU total	27.11 (10.16)	16.92 (4.29)	16.53 (6.79)	116	18.21***	ODD>AD=TD ⁵
EVT-2	107.89 (11.73)	111.92 (11.3)	111.82 (6.84)	121	1.68	<i>ns</i>
Mother DASS						
Depression	4.24 (7.34)	4.58 (4.98)	2.56 (3.57)	116	1.11	<i>ns</i>
Anxiety	2.99 (4.7)	2.08 (2.46)	1.66 (2.8)	116	1.27	<i>ns</i>
Stress	12.01 (7.44)	10.42 (5.90)	8.28 (4.91)	116	3.45*	ODD=Non-ODD>TD ⁶

¹ χ^2 for analyses of sex and family income. F for all other analyses. ²ODD v TD $t(113)=3.24$ $p=.002$; ODD v AD $t(113)=0.79$, $p=.43$; AD v TD; $t(113)=2.75$, $p=.007$; ³ ODD v TD $t(113)=9.86$; $p < .001$; ODD v AD $t(113)=6.86$; $p < .001$ AD v TD $t(113)=0.13$. $p=.89$; ⁴ ODD v TD $t(113)=5.47$ $p < .001$; ODD v AD $t(113)=2.56$, $p=.012$; AD v TD $t(113)=1.14$, $p=.26$; ⁵ ODD v TD $t(113)=5.44$; $p < .001$; ODD v AD $t(113)=3.66$; $p < .001$; AD v TD $t(113)=0.13$, $p=.90$; ⁶ ODD v TD $t(113)=2.62$; $p=.01$; AD v TD $t(113)=0.94$; $p=.35$; ODD v AD $t(113)=.77$, $p=.45$. SDQ=Strengths and Difficulties Questionnaire; ICU=Inventory of Callous-unemotional Traits; EVT-2=Expressive Vocabulary Test; DASS=Depression Anxiety Stress Scales.

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

Table 2 Means (SD) of emotional competencies and empathy for ODD, AD and TD groups by sex and MANOVA and contrast results.

	ODD			AD			TD			df	Wilk's λ	F
	Male (n=47)	Female (n=27)	Total (n=74)	Male (n=7)	Female (n=5)	Total (n=12)	Male (n=17)	Female (n=16)	Total (n=33)			
Emotion perception										4, 220	0.937	1.82
Expressive	7.02 (1.13)	7.11 (1.34)	7.05 (1.20)	6.71 (1.50)	6.60 (0.55)	6.67 (1.16)	7.41 (0.80)	7.19 (0.98)	7.30 (0.88)	2, 111		2.71
Receptive	7.91 (0.35)	8.15 (1.63)	8.00 (1.02)	8.00 (0.01)	7.40 (0.90)	7.75 (0.62)	7.82 (0.53)	7.94 (0.25)	7.88 (0.42)	2, 111		1.09
Emotion perspective-taking										4, 216	0.995	0.13
Stereotypic	14.54 (1.89)	14.89 (3.24)	14.89 (2.46)	15.29 (0.96)	15.80 (0.46)	15.50 (0.80)	15.19 (0.99)	15.19 (1.17)	15.19 (1.06)	2, 109		0.24
Non-stereotypic	17.43 (2.00)	17.59 (5.06)	17.49 (3.42)	17.29 (0.76)	19.40 (0.55)	18.17 (1.27)	18.19 (1.56)	18.00 (1.86)	18.09 (1.69)	2, 109		0.13
Emotion causes										8, 212	0.861*	2.05*
Happy	2.91 (2.00)	4.30 (3.55)	3.42 (2.73)	4.00 (1.73)	6.60 (6.69)	5.08 (4.44)	4.44 (3.03)	5.20 (4.13)	4.81 (3.56)	2, 109		1.80
Angry	2.17 (1.59)	3.44 (2.59)	2.64 ^a (2.09)	2.86 (0.69)	3.40 (2.79)	3.08 ^b (1.78)	4.13 (2.80)	4.13 (3.36)	4.13 ^{a,b} (3.03)	2, 109		4.00**
Sad	2.17 (2.01)	3.89 (2.67)	2.80 (2.40)	3.14 (1.35)	3.00 (2.24)	3.08 (1.68)	3.44 (2.63)	3.80 (2.83)	3.62 (2.69)	2, 109		1.06
Afraid	1.66 (1.65)	2.63 (1.76)	2.01 ^a (1.74)	2.71 (0.95)	6.00 (7.65)	4.08 ^a (4.96)	2.75 (2.21)	3.47 (2.36)	3.10 (2.27)	2, 109		3.53*
Mixed emotions										6, 210	0.89	1.98
Happy/sad	0.87 (0.86)	1.35 (0.89)	1.04 (0.90)	1.57 (0.79)	1.60 (0.89)	1.58 (0.79)	1.06 (0.93)	1.40 (0.91)	1.23 (0.92)	2, 107		0.28
Happy/angry	1.24 (0.85)	1.42 (0.9)	1.31 (0.87)	1.86 (0.38)	1.40 (0.89)	1.67 (0.65)	1.38 (0.72)	1.60 (0.74)	1.48 (0.72)	2, 107		0.39
Excited/scared	1.43 (0.81)	1.65 (0.75)	1.51 (0.79)	2.00 (0.01)	1.40 (0.89)	1.75 (0.62)	1.31 (0.87)	1.47 (0.83)	1.39 (0.84)	2, 107		1.37
Empathy										4,204	0.943	1.50
Cognitive	4.40 (7.68)	6.76 (6.89)	5.28 (7.43)	7.71 (8.18)	9.80 (7.43)	8.58 (7.60)	9.06 (4.99)	8.14 (3.23)	8.65 (4.25)	2, 102		2.25
Affective	0.36 (14.79)	5.76 (6.85)	2.37 (12.65)	11.43 (9.16)	9.60 (14.40)	10.67 (11.05)	5.88 (8.38)	7.36 (6.22)	6.55 (7.40)	2, 102		1.98

Note. For all MANOVAs, design is Intercept + language + age + sex + Diagnostic Group + sex*Diagnostic Group. ^{a,b} Means with identical superscripts are significantly different in pair-wise between group contrasts * $p < .05$. ** $p < .01$.

Table 3 Means (SE) on measures of emotional competencies and empathy for the HCU, LCU, and TD and contrast results adjusted for child age, EVT and SDQ conduct problem severity.

	HCU (n=22)	LCU (n=25)	TD (n=17)	Planned contrast		
				HCU v LCU	HCU v TD	LCU v TD
Emotion perception						
Expressive	6.76 (0.66)	7.10 (0.22)	7.37 (0.29)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Receptive	7.87 (0.10)	7.91 (0.08)	7.92 (0.11)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Emotion perspective-taking						
Stereotypic	14.15 (0.40)	15.12 (0.32)	14.95 (0.44)	<i>p</i> =0.042	<i>ns</i>	<i>ns</i>
Non-stereotypic	17.88 (0.43)	17.41 (0.34)	17.54 (0.48)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Emotion causes						
Happy	2.52 (0.53)	3.55 (0.43)	3.99 (0.60)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Angry	1.71 (0.45)	2.23 (0.37)	4.66 (0.63)	<i>ns</i>	<i>p</i> =.002	<i>p</i> =.003
Sad	1.98 (0.53)	2.79 (0.43)	2.86 (0.59)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Afraid	1.45 (0.41)	1.87 (0.33)	2.71 (0.46)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Mixed emotions						
Happy/sad	0.63 (0.18)	1.24 (0.15)	0.85 (0.26)	<i>p</i> =.005	<i>ns</i>	<i>ns</i>
Happy/angry	1.01 (0.17)	1.47 (0.14)	1.35 (0.24)	<i>p</i> =.028	<i>ns</i>	<i>ns</i>
Excited/scared	1.12 (0.17)	1.81 (0.14)	1.19 (0.24)	<i>p</i> =.001	<i>ns</i>	<i>p</i> =.043
Empathy						
Cognitive	-0.67 (1.80)	6.96 (1.50)	7.05 (2.93)	<i>p</i> =.002	<i>ns</i>	<i>ns</i>
Affective	-4.81 (3.87)	4.34 (3.24)	-0.76 (6.31)	<i>ns</i>	<i>ns</i>	<i>ns</i>

Note. For all contrasts, design is Intercept + language + age + CP severity + Diagnostic Group