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Callous unemotional traits, autism spectrum disorder symptoms and empathy in boys with oppositional defiant disorder or conduct disorder

Jarla Pijper [a,*], Minet de Wied [a], Sophie van Rijn [b], Stephanie van Goozen [b,c], Hanna Swaab [b], Wim Meeus [a,d]

[a] Adolescent Development, Utrecht University, Utrecht, The Netherlands
[b] Clinical Child and Adolescent Studies, Leiden University, Leiden, The Netherlands
[c] School of Psychology, Cardiff University, Cardiff, United Kingdom
[d] Developmental Psychology, Tilburg University, Tilburg, The Netherlands

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ABSTRACT

This study examined additive and interactive effects of callous unemotional (CU) traits and autism spectrum disorders (ASD) symptoms in relation to trait empathy, in boys with oppositional defiant disorder (ODD) or conduct disorder (CD). Participants were 49 boys with ODD/CD, aged between 7–12 years. Boys completed a questionnaire measure of empathic sadness and a broader questionnaire measure of affective and cognitive empathy. Parents and teachers reported on CU traits, and parents reported on ASD symptoms. In agreement with predictions, results reveal a negative association between CU traits and empathic sadness, particularly strong for ODD/CD boys with low levels of ASD symptoms. Results also reveal a negative association between ASD symptoms and cognitive empathy. Findings suggest that CU traits and ASD symptoms are associated with distinct empathy deficits with poor empathic sadness being more typical of CU traits than ASD symptoms.

1. Introduction

Lack of empathy is a core feature of callous unemotional (CU) traits. CU traits are closely related to the interpersonal-affective dimension of adult psychopathy, and identify a particular severe and violent subgroup of individuals with oppositional defiant disorder (ODD) and conduct disorder (CD; for a review see Frick et al. (2013)). Research suggests that ODD/CD individuals with CU traits are impaired in affective empathy (sharing others' emotions) rather than cognitive empathy (understanding others' emotions; Blair, 2013; Blair et al., 2014). This impairment has been linked to amygdala dysfunction, potentially reducing emotional responsiveness (Blair, 2013) and/or attention (White et al., 2012) to another person's distress.

Lack of empathy is also a defining feature of autism spectrum disorders (ASD; Baron-Cohen et al., 1985). Individuals with ASD show persistent deficits in social interactions and communication together with rigid and repetitive behavior (APA, 2013). Empathy problems in ASD seem to be related to aspects of cognitive empathy rather than affective empathy (Blair, 2005). The social deficits that characterize ASD have been explained by deficits in Theory of Mind (ToM; Baron-Cohen et al., 1985). ToM is conceptually linked to cognitive empathy (Baron-Cohen and Wheelwright, 2004), and involves the ability to understand that people have mental states, such as thoughts, believes and desires that are different to one's own (Baron-Cohen et al., 1985). Multiple studies have demonstrated that individuals with ASD indeed have deficits in aspects of cognitive empathy (for reviews see Boucher (2012), Hill and Frith (2003)).

Some behavioral overlap exists between CU traits and ASD, as both are linked to disruptive behaviors (Frick et al., 2013; Kaat and Lecavalier, 2013) and reduced empathic responsiveness (APA, 2013). Accordingly, it seems important to account for both conditions while studying associated empathy deficits. Until now, only four studies have done this in clinical samples. Two studies have compared empathic profiles in boys with severe conduct problems and CU traits, ASD, and controls, revealing distinct profiles: boys with CU traits showed less affective empathy, whereas boys with ASD showed less cognitive empathy (Jones et al., 2010; Schwenck et al., 2012). One study compared profiles of aggressive ASD male adolescents with high or low CU traits (Rogers et al., 2006). Both groups showed impaired cognitive empathy, those with CU traits

* Corresponding author.
E-mail address: j.pijper@uu.nl (J. Pijper).

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also showed impairments in aspects of affective empathy. The fourth study examined additive and interactive effects of CU traits and ASD symptoms in relation to empathy in ODD/CD boys and girls between 3 and 9 years of age (Pasalich et al., 2014). Findings revealed negative associations between CU traits and affective empathy and negative associations between ASD symptoms and cognitive empathy. Rather unexpected, higher CU traits were also related to lower levels of cognitive empathy, and a 'double hit' of high CU traits and high ASD symptoms tended to predict the lowest levels of affective empathy. Starting from the work of Rogers and colleagues (2006), Pasalich and colleagues (2014) took these results to suggest that high levels of both CU traits and ASD symptoms may be associated with serious conduct problems and therefore also with low levels of affective empathy. Yet, based on studies suggesting that ASD individuals are actually quite sensitive (Schwenck et al., 2012), perhaps even overly sensitive to another person's distress (Smith, 2008), ASD symptoms might as well be expected to confound the "true" relationship between CU traits and affective empathy. If so, antisocial individuals with high levels of CU traits may show particularly low levels of affective empathy at low rather than high levels of ASD symptoms. By lack of empirical evidence we can only speculate about the role of ASD symptoms in the relationship between CU traits and affective empathy.

The aim of this study is to investigate additive and interactive effects of CU traits and ASD symptoms in relation to trait empathy in a clinical sample of ODD/CD boys. To the best of our knowledge this study tests the effects for the first time in boys with ODD/CD between 7 and 12 years of age. To examine the unique relationship between CU traits and empathic sadness, the current study includes a measure of empathic sadness in addition to broader measures of affective and cognitive empathy. Starting from the hypothesis that children with CU traits are selectively less emotionally responsive to distress cues (fear and sadness; Blair, 2013), we expect to find inverse relationships between CU traits and affective empathy, in particular with empathic sadness. Based on the hypothesis that children with ASD are poor in ToM (Baron-Cohen et al., 1985), we expect to find an inverse association between ASD symptoms and cognitive empathy. By lack of evidence we cannot formulate strong hypotheses about interaction effects. The work of Pasalich and colleagues (2014) suggests that the lowest levels of affective empathy could be expected in boys who have high levels of CU traits and ASD symptoms. By contrast, there is reason to expect lowest levels of affective empathy in ODD/CD boys high on CU traits but particularly *low* on ASD symptoms because ASD symptoms may confound the "true" association between CU traits and affective empathy.

2. Method

This study was approved by the Medical Ethical Committee of Leiden University Medical Centre (LUMC), and parents gave written consent prior to participation according to the declaration of Helsinki.

2.1. Participants

An initial group of 56 ODD/CD boys aged between 7–12 years were recruited via clinical health centers ($n=21$) and special education schools ($n=35$) in the Netherlands. The presence of ODD or CD, as set out by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, APA, 2000), was determined by the parent-version of the Diagnostic Interview Schedule for Children (DISC-IV; Dutch version; Ferdinand and Van der Ende, 2002). A researcher in clinical child psychopathology carried out the interview. Exclusion criteria for the sample included estimated intelligence quotient (IQ) below 70 ($n=2$), or no data on IQ ($n=3$). Estimated IQ was assessed by Dutch versions (Kort et al., 2005) of the subtests Block Design and Vocabulary of the Wechsler Intelligence Scale for Children (WISC-III; Wechsler, 1991) administered by trained students. The subtests have a correlation of 0.90 with the full-scale intelligence quotient (Sattler, 1992). Two boys were additionally excluded from the sample because of no data on CU traits ($n=1$) or ASD symptoms ($n=1$).

Our sample obtained 49 boys with ODD ($n=32$) or CD ($n=17$) with a mean age of 10.28 ($SD=1.31$). All boys had an estimated IQ in the normal range ($M=96.51$, $SD=13.01$; range 74–129). Comorbidity included attention deficit hyperactivity disorder (ADHD; $n=36$), anxiety ($n=32$) and depression ($n=8$). Mean raw ASD symptoms, measured with the Social Responsiveness Scale (SRS; Constantino and Gruber, 2005), are listed in Table 1. In total, 18 boys scored in the clinical range, 18 in the subclinical range, and 13 in the normal range of ASD symptoms. To verify ODD/CD diagnoses, we checked aggressive and externalizing problem behavior using the Dutch versions of the Child Behavior Checklist (CBCL/6–18) and Teacher Report Form (TRF/6–18; Verhulst and Van der Ende, 2013) completed by parents and teachers, respectively. All boys scored in the clinical range of aggressive ($T>65$) and externalizing problem behavior ($T>60$) on the CBCL and TRF. Twenty-three boys used psycho-pharmalogical treatment: 21 used psycho-stimulants, one used anti-psychotics, and one used both. There were no differences between boys with or without psycho-pharmalogical treatment on main study variables. Table 1 includes descriptive characteristics of the sample.

2.2. Measures

2.2.1. Dispositional empathy

All boys completed the Empathy Index for Children and Adolescents (IECA; Bryant, 1982) and the Basic Empathy Scale (BES; Jolliffe and Farrington, 2006). Affective empathy was assessed using the 7-item empathic sadness scale of the IECA (De Wied et al., 2007), which reflects emotional responsiveness to another person's sadness (e.g., 'Seeing a (girl/boy) cry makes me feel like crying') and the 11-item affective empathy scale of the BES, which reflects emotional responsiveness to a broader range of emotions (e.g., 'Other people's feelings do not affect me'). Cognitive empathy was assessed using the 9-item cognitive empathy scale of the BES (e.g., 'I can often understand how people are feeling even before they tell me'). The original binary (yes/no) response format was employed for the IECA and a 5-point Likert scale for the BES. Consequently, a sum-score was calculated for the IECA scale (range 0–7) and mean scores for the BES scales (range 1–5). Higher scores on all scales represented higher levels of dispositional empathy. Correlations between empathic sadness and affective empathy and both scales of the BES were significantly positive. Correlation between empathic sadness and cognitive empathy (BES) was marginally significant (Table 2). Sufficient psychometric properties have been found in previous studies for the empathic sadness scale of the IECA (De Wied et al., 2007) and both scales of the BES (Jolliffe and Farrington, 2006). In the current study internal consistency was good for the empathic sadness scale ($\alpha=0.80$) and acceptable for the affective ($\alpha=0.77$) and cognitive ($\alpha=0.72$) subscales of the BES.

2.2.2. CU traits and Impulsivity/Conduct Problems

Parents and teachers completed the Dutch version (De Wied et al., 2014) of the Antisocial Process Screening Device (APSD; Frick and Hare, 2001) designed to measure psychopathic tendencies in children and adolescents. The scale includes three subscales: CU, narcissism and impulsivity. A 3-point Likert scale was used.

Following manual instructions, we combined parent and teacher ratings by taking the highest rated score on each item (Frick and Hare, 2001). We calculated a sum-score for the 6-item CU scale (range 0–12). Because the 7-item narcissism and 5-item impulsivity scales were highly correlated ($r=0.53$, $p<0.001$), we combined the scales to create an impulsivity/conduct problems (I/CP) scale (range 0–24) (Frick and Hare, 2001). Higher scores represented higher levels of CU traits and I/CP. Correlation between the CU and I/CP scale was significantly positive (Table 2). Sufficient psychometric properties have previously been found for the Dutch version of the APSD (De Wied et al., 2014). In the current study, internal consistency was acceptable for I/CP ($\alpha=0.73$) but poor for CU ($\alpha=0.58$). Poor internal consistency has more often been found for the CU scale (Pardini et al., 2003), and in this study the scale revealed good concurrent validity by showing a strong positive association with the externalizing scale of the TRF ($r=0.52$, $p<0.001$).

2.2.3. ASD symptoms

Parents completed the Dutch version (Roeyers et al., 2011) of the SRS (Constantino and Gruber, 2005). The SRS has 65 items and a 3-point response format measuring ASD symptoms. We used the total-score of all 65 items (range 0 − 195), with higher scores representing higher levels of ASD symptoms. The SRS has shown good psychometric properties in both community (Constantino and Todd, 2003) and clinical samples (Constantino et al., 2003). In the current study internal consistency was good for the total scale ($\alpha=0.93$).

2.2.4. Statistical analyses

Separate hierarchical multiple regression analyses were conducted with empathic sadness (IECA), affective empathy (BES), and cognitive empathy (BES) as outcome variables. In step 1, we entered I/CP as a control variable because we were specifically interested in the association between CU traits and ASD symptoms with empathic tendencies. Because affective and cognitive empathy are related constructs (Hoffman, 2000), as supported by their positive correlations (see Table 2), we controlled for cognitive empathy when empathic sadness and affective empathy were the outcome variables. We also controlled for affective empathy (BES) when cognitive empathy was the outcome variable. In step 2, we entered CU traits and ASD symptoms as main effects. In step 3, we entered the product term CU traits X ASD symptoms to examine interactive effects. Because of potential lack of power due to our small sample size, we re-analyzed our data with bootstrap analyses by drawing 1000 resamples from our original sample using Statistical Package Software for the Social Sciences (SPSS) 22. For a 95% confidence interval 1000 resamples are recommended (Davison and Hinkley, 1997). Prior to analyses variables were standardized ($M=0$; $SD=1$). We dismantled significant interactions by testing whether slopes differed significantly from zero at low (-1 *SD*), mean (*M*) and high ($+1$ *SD*) levels of ASD symptoms (Hayes and Matthes, 2009). Analyses were repeated while controlling for ADHD and anxiety as assessed with the DISC-IV. Probabilities of all tests were two-tailed, except in regressions testing for main effects of CU traits and ASD symptoms, as earlier research consistently found negative links between CU traits and ASD symptoms and affective and cognitive empathy, respectively. Significance level 0.05 was used in all tests.

3. Results

Table 1 includes the means and standard deviations for all variables. Table 2 includes the bivariate correlations between the main study variables.

Table 1
Sample characteristics.

	ODD/CD boys ($n=49$)	
	M	*SD*
APSD		
CU	6.86	(2.29)
I/CP	14.47	(3.97)
SRS		
Total ASD	74.08	(29.28)
Low ASD	38.46	(8.85)
Moderate ASD	69.11	(8.88)
Severe ASD	104.78	(17.10)
CBCL		
Externalizing	67.61	(8.88)
Aggressive behavior	71.20	(10.63)
TRF[a]		
Externalizing	64.69	(9.68)
Aggressive behavior	67.67	(12.87)
IECA		
Empathic sadness	2.84	(2.05)
BES		
Affective empathy	3.00	(0.77)
Cognitive empathy	3.54	(0.74)

Note. APSD = Antisocial Personality Screening Device; CU = callous unemotional traits; I/CP = impulsivity/conduct problems; SRS = Social Responsiveness Scale; ASD = autism spectrum disorders symptoms; CBCL = Child Behavior Checklist; TRF = Teacher Report Form; IECA = Empathy Index for Children and Adolescents; BES = Basic Empathy Scale.

[a] $n=45$.

Table 2
Bivariate correlations between main study variables.

	1	2	3	4	5
1. CU					
2. ASD	0.21				
3. I/CP	0.53**	−0.15			
4. Empathic sadness	−0.23	0.03	−0.00		
5. Affective empathy	−0.08	0.05	−0.06	0.47**	
6. Cognitive empathy	0.02	−0.28†	0.29*	0.26	0.45**

Note. CU = callous unemotional traits; ASD = autism spectrum disorders symptoms; I/CP = impulsivity/conduct problems.
*$p<0.05$. **$p<0.01$, two-tailed.
†$p<0.05$, one-tailed.

3.1. IECA: Empathic sadness

Table 3 shows that after controlling for I/CP and cognitive empathy, the association between CU traits and empathic sadness was significantly negative. ASD symptoms were not significantly associated with empathic sadness. Interestingly, the interaction

Table 3
CU traits and ASD symptoms in relation to empathic sadness (IECA).

	Step 1		Step 2		Step 3	
	β	$R^2\Delta$	β	$R^2\Delta$	β	$R^2\Delta$
I/CP	−0.08	0.07	0.13	0.08	0.08	0.10*
Cognitive empathy	0.28		0.28		0.29	
CU			−0.34†		−0.34*	
ASD			0.20		0.15	
CUXASD					0.32*	

Note. I/CP = impulsivity/conduct problems; CU = callous unemotional traits; ASD = autism spectrum disorders symptoms.
* $p<0.05$, two-tailed.
† $p<0.05$, one-tailed.

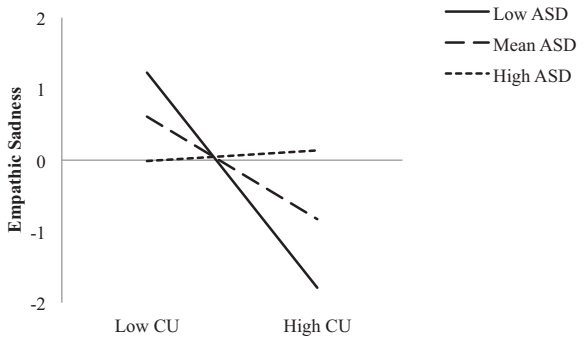

Fig. 1. Interaction between callous unemotional (CU) traits and autism spectrum disorders (ASD) symptoms predicting empathic sadness.

between CU traits and ASD symptoms was significant, $R^2=0.26$, $F(5, 43)=2.95$, $p=0.022$. At mean (B=−0.34, $p=0.047$) to low (B=−0.70, $p=0.003$) levels of ASD symptoms the association between CU traits and empathic sadness was significantly negative. The association was not significant at high levels of ASD symptoms (B=0.03, $p=0.901$). Model's adjusted R^2 was 0.17 representing a medium effect size. Bootstrap analyses supported significant main effect of CU traits (B=−0.34, SE=0.15, bootstrapped SE=0.17 and lower limit of 90% CI=−0.63 because of one-sided test) and interaction effect between CU traits and ASD symptoms (B=0.37, SE=0.15, bootstrapped SE=0.18% and 95% CI=0.01–0.75) demonstrating limited biases between estimates. The interaction effect remained significant after controlling for ADHD (β=−0.16, n.s.) and anxiety (β=0.16, n.s.), $R^2=0.29$, $F(7,41)=2.37$, $p=0.040$, adjusted $R^2=0.17$. Fig. 1 visualizes the interactive effect by plotting simple slopes at low (−1 *SD*), mean (*M*) and high (+1 *SD*) levels of ASD symptoms.

3.2. BES: Affective empathy

Table 4 shows that after controlling for I/CP and cognitive empathy, CU traits and ASD symptoms were not associated with affective empathy. The interaction between CU traits and ASD symptoms was marginally significant, $R^2=0.33$, $F(5, 43)=4.15$, $p=0.004$ (total model). However, further analyses revealed no significant slopes at low (B=−0.29, $p=0.187$), mean (B=−0.03, $p=0.856$) or high (B=0.23, $p=0.292$) levels of ASD symptoms. Bootstrap analyses also revealed neither significant main effects nor a significant interaction. The results remained the same after controlling for ADHD (β=−0.09, n.s.) and anxiety (β=0.36, $p=.016$), $R^2=0.42$, $F(7, 41)=4.17$, $p=0.002$.

3.3. BES: Cognitive empathy

Table 5 shows that after controlling for I/CP and affective empathy, there was no association between CU traits and cognitive empathy. The association between ASD symptoms and cognitive empathy was significantly negative, $R^2=0.38$, $F(4, 44)=6.60$, $p<0.001$. Model's adjusted R^2 was 0.32 representing a medium to large effect size. Interaction between CU traits and ASD symptoms was not significant. Bootstrap analyses supported significant main effect of ASD symptoms demonstrating limited bias between estimates (B=−0.24, SE=0.13, bootstrapped SE=0.14 and lower limit of 90% CI=−0.45 because of one-sided test). Main effect of ASD symptoms remained after controlling for ADHD (β=−0.03, n.s.) and anxiety (β=−0.01, n.s.), $R^2=0.38$, $F(6, 42)=4.21$, $p=0.002$, adjusted $R^2=0.29$.

Table 4
CU traits and ASD symptoms in relation to affective empathy (BES).

	Step 1		Step 2		Step 3	
	β	$R^2\Delta$	β	$R^2\Delta$	β	$R^2\Delta$
I/CP	−0.21	0.25**	−0.18	0.03	−0.21	0.05
Cognitive empathy	0.52***		0.56***		0.56***	
CU			−0.03		−0.03	
ASD			0.19		0.15	
CUXASD					0.23	

Note. I/CP=impulsivity/conduct problems; CU=callous unemotional traits; ASD=autism spectrum disorders symptoms.
*$p<0.01$. ***$p<0.001$, two-tailed.

Table 5
CU traits and ASD symptoms in relation to cognitive empathy (BES).

	Step 1		Step 2		Step 3	
	β	$R^2\Delta$	β	$R^2\Delta$	β	$R^2\Delta$
I/CP	0.32*	0.31***	0.32*	0.07	0.33*	0.01
Affective empathy	0.47***		0.48***		0.51***	
CU			−0.06		−0.06	
ASD			−0.24†		−0.22†	
CUXASD					−0.12	

Note. I/CP=impulsivity/conduct problems; CU=callous unemotional traits; ASD=autism spectrum disorders symptoms.
*$p<0.05$. **$p<0.01$. ***$p<0.001$, two-tailed.
†$p<0.05$, one-tailed.

4. Discussion

This study investigated additive and interactive effects of CU traits and ASD symptoms in relation to trait empathy in ODD/CD boys between 7 and 12 years of age. In line with predictions, we found an inverse association between CU traits and empathic sadness. The negative association between CU traits and the broader measure of affective empathy was not significant, however. The finding is consistent with theory and research (Blair, 2013; Blair et al., 2014) demonstrating that ODD/CD children with CU traits are particularly less responsive to another person's distress.

As predicted, we also found an inverse association between ASD symptoms and cognitive empathy, though the association was weak. The inverse association is consistent with studies revealing impaired cognitive trait empathy in ASD adolescents (e.g., Mazza et al., 2014; Pouw et al., 2013) and studies showing ToM deficits in ASD (Boucher, 2012), as literature suggests that ToM and cognitive empathy are closely linked constructs (Baron-Cohen and Wheelwright, 2004).

Interestingly, ASD symptoms moderated the relationship between CU traits and aspects of affective empathy, significantly for empathic sadness (IECA) and marginally significant for affective empathy (BES). Hence, in contrast to findings obtained by Pasalich and colleagues (2014), our findings suggest that CU traits are inversely related to empathic sadness at *low* levels of ASD symptoms (not high). We offer four explanations to account for these differential findings. First, the interaction reported by Pasalich and colleagues (2014) was found for affective empathy, whereas our interaction was found for empathic sadness. However, given the considerable overlap between affective empathy and empathic sadness, we believe that other methodological differences between the studies offer more substantial explanations. Second, this study has a multi-informant design with parent and teacher reports of CU traits, parent reports of ASD symptoms and self-reports of empathy. This implies that our findings cannot be attributed to single reporter bias. This bias cannot be ruled out for the

findings of Pasalich and colleagues (2014), as acknowledged by the authors in the discussion of their study's limitations. Third, as previously mentioned, we used self-reports of empathy, whereas Pasalich and colleagues (2014) used parent-reports. There is evidence for low parent-child agreement regarding empathic behavior of the child (Sánchez-Pérez et al., 2014), potentially leading to differential findings. Low parent-child agreement may not be surprising as both may judge empathic behavior in different contexts. Furthermore, parents have to infer inner states from apparent behavior, while the children have to reflect on their own behavior. Last, but not least, different from the sample of Pasalich and colleagues (2014), our sample included boys meeting DSM-IV criteria for ASD ($n=11$). It has been suggested that ASD individuals are *hyper* responsive to other's feelings (Smith, 2008), as evidenced by their self-reported overstrung reactions (Rogers et al., 2007) and increased autonomic arousal to another's distress (Järvinen et al., 2015). Potential false positives for CU traits at high levels of ASD could thus confound the inverse relationship between CU traits and affective empathy. Accordingly, it is quite understandable to find lowest levels of empathic sadness in ODD/CD boys high on CU traits but low on ASD symptoms and to find no association in ODD/CD boys high on CU traits and ASD symptoms. In sum, these four differences can explain differential findings between the research of Pasalich and colleagues (2014) and our study.

Our study has some limitations. First, the CU subscale had low reliability. Low reliability, however, has a downward bias on parameter estimates (Furr and Bacharach, 2008). The effects therefore found in this study might have been stronger, but not weaker, if a more reliable measure had been available. Second, we used a small sample with limited statistical power. Third, self-report measures of empathy could have contaminated our findings, especially with regard to cognitive empathy in boys with ODD/CD and co-occurring ASD symptoms. There is evidence to suggest that children with disruptive behavior disorders have poor self-referential abilities (Pardini et al., 2006), and poor self-referential abilities, in turn, are found to be associated with poor mentalizing abilities in adults with ASD (Lombardo et al., 2007). In the current study, therefore, ODD/CD children with high levels of ASD symptoms may have had problems reporting on their empathic experiences without being aware of these problems.

In sum, findings suggest that CU traits and ASD symptoms are associated with distinct empathy deficits, and that poor empathic sadness is more typical of CU traits than ASD symptoms. Future studies should build up on our study by trying to replicate results with state measures of empathy that also assess underlying mechanisms of empathy-related responding in ODD/CD children and adolescents.

Conflict of interests

None.

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