



What are the associations between parenting, callous–unemotional traits, and antisocial behavior in youth? A systematic review of evidence



Rebecca Waller ^{a,*}, Frances Gardner ^a, Luke W. Hyde ^b

^a Centre for Evidence-Based Intervention, Department of Social Policy and Intervention, University of Oxford, UK

^b Department of Psychology, University of Michigan, USA

HIGHLIGHTS

- Dimensions of parenting predict CU traits in prospective longitudinal studies.
- CU traits are responsive to parenting in parent-focused interventions for AB.
- The construct of 'CU traits' as unresponsive to parenting needs revisiting.
- Future studies need better measurement approaches to assess CU traits and parenting.
- Greater precision is needed in study design to assess associations.

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ABSTRACT

A growing body of research has examined callous–unemotional (CU) traits among samples of antisocial youth. Debate surrounds the malleability of CU traits and their responsiveness to parenting and parent-focused interventions. This review examines evidence from studies that have investigated various relationships between parenting, CU traits, and antisocial behavior (AB). Studies were categorized according to five distinct research questions each addressing associations among parenting, CU traits, and AB in a different way. The results suggest that dimensions of parenting are prospectively related to changes in CU traits. Subgroups of youth with both high levels of CU traits and AB also appear to have experienced negative parenting practices. However, negative parenting is not consistently related to AB in cross-sectional studies for youth with high levels of CU traits. At the same time, parenting-focused interventions appear effective in reducing the level of AB and CU traits in youth. The findings and implications for future studies are critically discussed as they pose challenges for current etiological theories of AB.

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Abbreviations: AB, antisocial behavior; APQ, Alabama Parenting Questionnaire; APSD, Antisocial Process Screening Device; CD, conduct disorder; CP, conduct problems; CU, callous–unemotional; ODD, Oppositional Defiant Disorder; RCT, randomized controlled trial.

* Corresponding author at: Centre for Evidence-Based Intervention, Department of Social Policy and Intervention, University of Oxford, 32 Wellington Square, Oxford, OX1-2ER, UK. Tel.: +44 1865280338.

E-mail address: rebecca.waller@gtc.ox.ac.uk (R. Waller).

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1. Introduction

Antisocial behavior (AB) causes harm to individuals, families, and communities, and is costly to society (Scott, Knapp, Henderson, & Maughan, 2001). Developing well-evidenced etiological theories and identifying intervention targets are key research priorities. Developmental psychopathology research has consistently highlighted heterogeneity in the cause, development, treatment responsiveness, and long-term outcomes between subgroups of antisocial youth. In the last 15 years, there has been a focus on the presence of callous–unemotional (CU) traits among a subgroup of antisocial youth. A significant body of research has examined measurement of CU traits, associated cognitive and socioemotional characteristics, and the neurobiological and genetic profiles of antisocial youth with CU traits (Frick & White, 2008). Furthermore, it has been proposed that CU traits be included as a specifier of conduct disorder (CD) in the forthcoming edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; Frick & Moffitt, 2010), making them an important clinical target. A key debate has also focused on the malleability of CU traits. Studies have investigated whether parenting practices are related to the development of CU traits, whether parenting interventions for AB are less effective for youth who have high levels of CU traits, and whether CU traits improve following parenting interventions. This review seeks to synthesize and evaluate findings from observational and intervention studies that have investigated associations between parenting, CU traits, and AB in youth.

1.1. CU traits: overview and definitions

In adults, psychopathy refers to a complex syndrome, which includes interpersonal, affective, and lifestyle traits, and identifies more severe and violent offenders (Hare, 1991). In recent years, its downward extension to youth has been dominated by a focus on interpersonal (e.g., deceitfulness and manipulativeness) and affective (e.g., shallow affect and lack of guilt) dimensions, which have most commonly been labeled as CU traits (Frick, 2004; Frick, O'Brien, Wootton, & McBurnett, 1994). This focus is supported by research, which suggests that CU traits also designate a high-risk group of antisocial youth. For example, CU traits are associated with particularly severe patterns of AB (see Frick & White, 2008). Experimental data suggest that youth with CU traits show a neurocognitive and socioemotional profile similar to adult

psychopaths, including reduced responsivity to others' distress (Blair, Colledge, Murray, & Mitchell, 2001) and insensitivity to punishment (Blair, Colledge, & Mitchell, 2001). CU traits are also heritable (Viding, Blair, Moffitt, & Plomin, 2005), associated with differences in neural reactivity (e.g., Marsh et al., 2008), and appear moderately stable (e.g., Dadds, Fraser, Frost, & Hawes, 2005).

However, studies have typically assessed preadolescent or adolescent samples of males using cross-sectional designs. These caveats limit the generalizability of findings and make it difficult to draw conclusions about causality. Studies investigating the stability of CU traits have also tended to assess adolescent males over short time intervals, and report higher stability when the same informant is used across assessments (Andershed, 2010). In addition, when studies investigate mean-level versus individual-level stability, or behavior trajectories, there are significant fluctuations in the level of CU traits (see Fontaine, McCrory, Boivin, Moffitt, & Viding, 2011; Frick, Kimonis, Dandreaux, & Farrell, 2003). Indeed, the question of how malleable CU traits are is a key focus of this review. At the same time, research into CU traits at very young ages could help to identify children at risk of severe AB, and provide insight into risk/protective factors at a time when personality structure is still developing and may be most amenable to intervention.

1.2. Parenting: theoretical and empirical links with AB and CU traits

Research over many decades has highlighted the importance of parenting to AB development, including coercive parent–child interactions (Patterson, 1982), poor parental supervision (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998), and low positive parent–child engagement (Gardner, Ward, Burton, & Wilson, 2003). A key question, however, is whether parenting is related to the development of CU traits. In addition, while there have been many investigations into the effectiveness of intervention programs for AB in general, less is known about prevention and treatment when youth show a lack of empathy and low affective responsivity (Frick, 2001).

On one hand, children with CU traits appear less susceptible to parental socialization and discipline efforts (e.g., Oxford, Cavell, & Hughes, 2003). Specifically, CU traits are hypothesized to produce an attenuated response to punishment cues or the distress of others following behavioral transgressions. Failure to make these associations appears to

disrupt the development of empathy and moral socialization, thereby increasing the likelihood of aggressive behavior (Blair, Peschardt, Budhani, & Pine, 2006; Kochanska, 1997). On the other hand, there is evidence that parental harshness and low warmth are related to CU traits (Frick et al., 2003; Pardini, Lochman, & Powell, 2007). Harsh punishment is thought to elicit high levels of arousal, making it difficult for children to internalize parental messages about prosocial behavior (Pardini et al., 2007). In contrast, parental warmth and responsiveness may work against the development of AB by promoting empathy and prosociality, particularly in children with fearless temperaments (Kochanska, 1997). However, developing a precise understanding of how parenting, CU traits, and AB are related in youth has been hampered by studies testing markedly different research questions via different designs, in varying samples, and using a range of assessment methods. This systematic review aims to synthesize the results of studies that have investigated various associations between parenting, CU traits, and AB. Specifically the review examines several questions, including whether parenting is related to CU traits, whether parenting interventions for AB are effective for youth with CU traits, and whether there are developmental differences in the extent or type of associations between parenting, CU traits, and AB.

2. Methods

The review was based on a systematic search of eight databases, including MEDLINE, PsycINFO, and Dissertations and Theses Abstracts. The search strategy combined terms to identify studies investigating CU traits and parenting among youth: (adolescen* OR boy* OR child* OR girl* OR infant* OR juvenile* OR preadolescen* OR pre-adolescen* OR preschool* OR pre-school* OR schoolchild* OR toddler* OR teen* OR young OR youth) AND (callous* OR psychopathy OR psychopathic OR psychopath OR sociopath* OR unemotional) AND (caregiver* OR care-giver* OR famil* OR father* OR maternal OR mother* OR parent* OR paternal). No date, publication, or language restrictions were imposed. Abstracts of identified articles were screened for the following inclusion criteria: (a) presentation of data testing cross-sectional or longitudinal associations between parenting, CU traits, and AB using validated or previously published measures of parenting and CU traits; and (b) assessment of youth with an upper age range of 18 years old, from community, school, clinic, or research settings. Treatment studies meeting these criteria were retained if: (a) treatment focused on changing parenting behavior or parent-child interactions; and (b) CU traits were tested as an outcome or moderator of effectiveness. No restrictions were placed on design, except that studies relying on youth retrospective reports of parenting were excluded.

The search identified 2606 records. First, titles and abstracts of all identified records were screened. Studies were retained for further inspection if they corresponded to the aims of the review. From there, the full texts of 64 potentially relevant studies were examined to assess whether they met the inclusion criteria of the review. After inspecting these 64 papers, 34 were removed (typically, these did not assess parenting or CU traits). Several studies investigating moderation of the effectiveness of non-parenting interventions by CU traits (e.g., Waschbusch, Carrey, Willoughby, King, & Andrade, 2007) or treatment of incarcerated psychopathic youth (e.g., Caldwell, Skeem, Salekin, & Van Ryboeck, 2006) were also identified but not retained. Two studies that relied on retrospective reports of parenting by incarcerated adolescents (Edens, Skopp, & Cahill, 2008; Fritz, Ruchkin, Kaposov, & Klinteberg, 2008) were excluded because of the difficulty of obtaining reliable reports of parenting from this type of sample. The final pool of 30 studies comprised 26 different samples, and includes research published between 1997 and 2013, and one unpublished dissertation.

Table 1 summarizes study characteristics. Of 30 studies, 12 were longitudinal, 10 cross-sectional, and 8 investigated parenting interventions. All but three studies were carried out in the US, UK, or

Australia. To clarify associations between parenting, CU traits, and youth AB, five research questions were identified among studies (Fig. 1a–e): (a) Does parenting directly predict level of youth CU traits? (b) Does parenting predict youth AB at different levels of CU traits? (c) Does parenting differ between subgroups of youth categorized according to their level of AB and CU traits? (d) Do parenting interventions directly reduce the level of youth CU traits? (e) Do CU traits moderate or predict the effectiveness of parenting interventions for youth AB?

Given the distinct research questions addressed across studies, range of analytic techniques, and heterogeneous measurement approaches, meta-analysis was not feasible. Studies were therefore reviewed in a narrative synthesis according to: (a) research question; and (b) age of youth based on mean age of sample and given retained studies had an upper age range of 18 years (early childhood/preschool, 3–6 years; middle/late childhood, 7–12 years; adolescence, 13–18 years). Several studies examined more than one research question, and therefore appear in multiple sections of the review. A summary of the main findings and key limitations for each study is presented in Table 2. Studies were systematically and critically appraised for methodological limitations according to: (a) sample size; (b) type of sample (e.g., community vs. clinic-referred; male vs. female); (c) measurement of CU traits; and (d) measurement of parenting.

3. Results

3.1. Methodological limitations of included studies (see Table 2)

Within longitudinal studies, sample sizes tended to be large (8 studies with $N > 500$), whereas within cross-sectional studies, sample sizes were smaller (8 studies with $N < 200$). In several cross-sectional studies, sample sizes were very small ($N < 100$). Treatment studies also tended to have small sample sizes (7 studies, $N < 200$). The risk of reduced generalizability of findings due to small samples, particularly for cross-sectional and treatment studies, needs to be considered alongside results. Within the 12 longitudinal studies, 5 examined community samples with equal numbers of males and females, which were also reported as reflecting the ethnicity of the general population. The remaining seven studies assessed at-risk or aggressive youth, and tended to comprise majority Caucasian or African-American participants. One longitudinal study assessed only females (Kroneman, Hipwell, Loeber, Koot, & Pardini, 2011) and another, only males (Pardini & Loeber, 2008). In general, because of size and type of sample, longitudinal studies appear to have greater generalizability. Within cross-sectional studies, five were clinic-referred or aggressive samples, and were either all or majority male. Necessarily, treatment studies assessed clinic-referred or adjudicated samples, and three intervention studies were conducted using high-risk youth within community settings. Nevertheless, with one exception (Hyde et al., 2013), intervention studies assessed majority/exclusively male samples.

Across the 30 studies, 24 used the Antisocial Process Screening Device (APSD; Frick & Hare, 2002) or its predecessor, the Psychopathy Screening Device (PSD), to assess CU traits. The APSD is a 20-item measure, which includes a 6-item CU trait subscale. It has been validated across different formats, including parent and teacher rating and self-report scales. Nevertheless, there are various well-documented drawbacks of the CU trait subscale of the APSD, including the small number of items ($n = 6$), poor internal consistency of subscales, and limited range of response options ($n = 3$), which reduces the variance of scores obtained (Kotler & McMahon, 2010). Despite these limitations, the fact that so many studies used the APSD to assess CU traits enables greater comparability of results.

Of the six studies that did not use the APSD, two assessed 'deceitful-callous behavior' in the same sample of preschool children (Hyde et al., 2013; Waller, Gardner, Hyde, Shaw, Dishion, & Wilson, 2012), one assessed 'interpersonal-callousness' in adolescents (Pardini

Table 1
Characteristics of included studies.

Study	Country	Sample size	Type of sample	% female	Age range (years)	Ethnicity	Measure of parenting	Measure of CU traits
<i>Longitudinal studies</i>								
Barker et al. (2011)	UK	6673	Representative	43	2, 4 & 13	Mixed, majority Caucasian	Questionnaire (P)	6-item questionnaire, CU traits (P)
Fontaine et al. (2011)	UK	9578	Representative	53	4, 7, & 12	Predominantly Caucasian	Questionnaire (P)	3 CU items, APSD; 4 prosocial items, SDQ (T)
Frick et al. (2003)	USA	98	Aggressive	47	8–12	Mixed, majority Caucasian	APQ & questionnaire (P & Y)	6 CU items, APSD (PT & Y)
Hawes et al. (2011)	Aus	1008	Representative	47	3–10	Predominantly Caucasian	APQ (P)	3 CU items, APSD; 4 prosocial items, SDQ (P)
Kimonis et al. (2004)	USA	98	Aggressive	47	8–12	Mixed, majority Caucasian	APQ (P & Y)	6 CU items, APSD (PT)
Kroneman et al. (2011)	USA	1233	High-risk	100	7–8	Mixed, majority African-American	Questionnaire (P)	4 CU items, APSD (PT)
Larsson et al. (2008)	UK	4430	Representative	47	3–4	Predominantly Caucasian	Questionnaire (P)	3 CU items, APSD; 4 prosocial items, SDQ (T)
Muñoz et al. (2011)	USA	98	Aggressive	47	12–16	Mixed, majority Caucasian	APQ (P)	6 CU items, APSD (Y)
Pardini and Loeber (2008)	USA	506	High-risk	0	13–14	Mixed, majority African-American	Questionnaire (PY)	8 items, IC questionnaire (P)
Pardini et al. (2007)	USA	120	Aggressive	41	9–12	Mixed, majority African-American	APQ & questionnaire (P & Y)	6 CU items, APSD (PT)
Viding et al. (2009)	UK	4508	Representative	54	7, 12	Predominantly Caucasian	Questionnaire (P)	3 CU items, APSD; 4 prosocial items, SDQ (P & T)
Waller et al. (2012)	USA	731	High-risk	49	2, 3, 4	Mixed, majority Caucasian	Observed & questionnaire (P)	5 items, DC behavior questionnaire (P)
<i>Cross-sectional studies</i>								
Enebrink et al. (2005)	Swe	41	Clinic-referred	0	6–13	Predominantly Caucasian	Interviews & case records (P & A)	6 CU items, APSD (P)
Falk and Lee (2011)	USA	208	Clinic-referred	30	6–9	Mixed, majority Caucasian	APQ (P)	6 CU items, APSD (P)
Hipwell et al. (2007)	USA	990	High-risk	100	7–8	Mixed, majority African-American	Questionnaire (P)	4 CU items, APSD (PT)
Koglin and Petermann (2008)	Lux	177	Representative	50	5–7	Mixed, majority Caucasian	APQ (P)	6 CU items, APSD (P)
Loney et al. (2007)	USA	83	Representative	53	7–13	Mixed, majority Caucasian	APQ (P)	6 CU items, APSD (PT)
Oxford et al. (2003)	USA	199	Aggressive	35	8–10	Mixed, majority Caucasian	APQ (P)	6 CU items, APSD (PT)
Pasalich et al. (2011)	Aus	95	Clinic-referred	0	4–12	Predominantly Caucasian	Observed & speech samples coding (O & P)	3 CU items, APSD; 4 prosocial items, SDQ (PTY)
Vitacco et al. (2003)	USA	136	Representative	100	10–15	Hispanic	APQ (Y)	6 CU items, APSD (Y)
Wootton et al. (1997)	USA	166	Clinic-referred	24	6–13	Predominantly Caucasian	APQ (P)	6 CU items, PSD (PT)
Yeh et al. (2011)	USA	1210	Representative	52	9–10	Mixed, majority Caucasian	Parent affect questionnaire (Y)	CPS (P)
<i>Treatment/intervention studies</i>								
Hawes and Dadds (2005)	Aus	49	Clinic-referred	0	4–8	<i>nr</i>	Observed & questionnaire (O & P)	3 CU items, APSD; 4 prosocial items, SDQ (P)
Hawes and Dadds (2007)	Aus	49	Clinic-referred	0	4–8	<i>nr</i>	Observed & questionnaire (O & P)	3 CU items, APSD; 4 prosocial items, SDQ (P)
Hyde et al. (2013)	USA	731	High-risk	49	2, 3, 4, 5	Mixed, majority Caucasian	Observed & questionnaire (P)	5 items, DC behavior questionnaire (P)
Kolko and Pardini (2010)	USA	177	Clinic-referred	19	6–11	Mixed, majority Caucasian	<i>na</i>	6 CU items, APSD (T)
Kolko et al. (2009)	USA	139	Clinic-referred	15	6–11	Mixed, majority Caucasian	<i>na</i>	6 CU items, APSD (T)
McDonald et al. (2011)	USA	66	High-risk	<i>nr</i>	4–9	Mixed, majority Caucasian	Questionnaire (P)	16-item total PSD (P)
Somech and Elizur (2012)	Israel	209	High-risk	20	2–5	Predominantly Israeli	APQ-Revised (P)	3 CU items, APSD; 8 items, ICU (P)
White (2010) and White et al. (2012)	USA	134	Clinic-referred	28	11–17	Mixed, majority African-American	APQ (P & Y)	ICU (Y)

Note. For informant on measures: P, parent; Y, youth; T, teacher; PT, combination of parent and teacher; PC, combination of parent and child; O, observed; A, alternative approach. APSD, Antisocial Process Screening Device; APQ, Alabama Parenting Questionnaire; CPS, Child Psychopathy Scale; DC, deceitful-calling behavior; IC, Interpersonal Callousness; ICU, Inventory of Callous–Unemotional Traits; PCL-YV, Psychopathy Checklist–Youth Version; PSD, Psychopathy Screening Device. For longitudinal studies, age range reported for first assessment, or for age at outcome (if relevant).

& Loeber, 2008; Pardini, Obradovic, & Loeber, 2006), one used a modified version of the Child Psychopathy Scale (CPS; Lynam & Gudonis, 2005) to assess psychopathy in middle childhood (Yeh, Chen, Raine, Baker, & Jacobson, 2011), and one used a CU trait scale similar to the APSD (Barker, Oliver, Viding, Salekin, & Maughan, 2011). Several studies (e.g., Hawes & Dadds, 2005; Viding, Fontaine, Oliver, & Plomin, 2009) used three of the APSD CU trait items, and combined them with four (negatively correlating) items of the Prosocial Behavior subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). Many of these alternatives are therefore ‘home-grown’ measures comprising questionnaire items within studies that did not originally set out to

measure CU traits. Finally, White (2010)¹ assessed CU traits among adjudicated adolescents using the Inventory of Callous–Unemotional traits (ICU; Frick, 2004). Somech and Elizur (2012) also used items from the preschool ICU combined with APSD items.

¹ A peer-reviewed/published version is now available (White et al., 2012). The published version of the paper does not include analyses using parenting measures, which were included in the original dissertation (White, 2010). However, the published paper includes useful analytic approaches for examining change in CU traits and AB scores. As such, both are referenced.

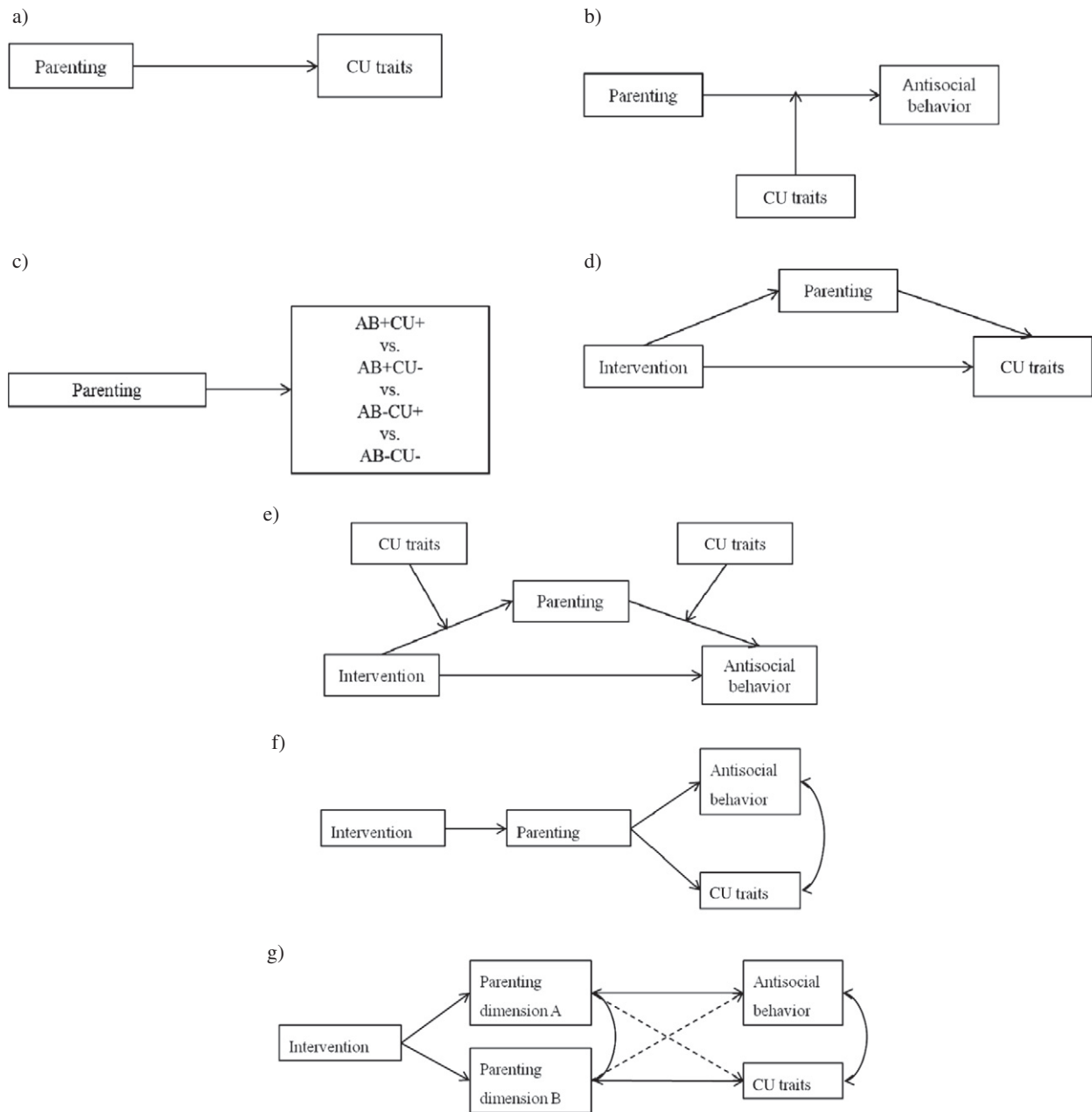


Fig. 1. Diagrammatic representations of study designs included in the review (a–e) and proposed alternative treatment designs (f & g). a) Does parenting directly predict level of youth CU traits? b) Does parenting predict antisocial behavior regardless of the level of youth CU traits? c) Does parenting differ between subgroups of youth categorized according to level or trajectory of antisocial behavior (AB) and CU traits? d) Do parenting interventions directly reduce the level of youth CU traits? e) Do CU traits predict or moderate effectiveness of parenting interventions for youth AB? f) Do parenting interventions simultaneously reduce level of youth CU traits and AB? g) Do interventions that target specific dimensions of parenting uniquely reduce level of youth CU traits versus AB?

Across all 30 studies, 23 used parent report to assess CU traits. Of these 23 studies, 13 relied solely on parent report and the remaining 10 combined parent ratings with teacher or child ratings (or both). Commonly, this approach involves summing ratings at an item level or creating a best estimate score, which combines ratings by using the higher score from reporters for each item. In an alternative approach, scores were obtained by calculating the proportion of reporters who classified the child as high on CU traits (Pasalich, Dadds, Hawes, & Brennan, 2011). The use of the best estimate approach helps incorporate multiple informants, provides a cross-context assessment of behavior, may increase validity, and is thus favored in

some studies. However while there are advantages to this approach, it also leads to loss of scale- and item-level information. Likewise, while cut-off scores are used in various studies, the validity of a 'high' versus 'low' distinction for CU traits among youth is yet to be established. To retain scale- and item-level information, future studies could also create latent variable scores, which combine parent-, teacher-, and self-reports, and could even incorporate official reports, including court records (see Trentacosta, Hyde, Shaw, & Cheong, 2009). Finally, seven of the 30 reviewed studies provided no data on the internal consistency of their CU traits' measure. Of the 23 studies that did provide Cronbach's alphas, 10 were reported as being <.70,

Table 2
Results and major risks of bias of included studies presented according to research question/design (see Fig. 1).

Study	Key findings relevant to aims of review	Main methodological limitations
<i>a) Does parenting directly predict levels of youth CU traits?</i>		
Barker et al. (2011) ^a	L Harsh parenting at age 4 predicted boys' CU traits at age 13.	Measures all parent report; no alpha reported for CU trait measure
Frick et al. (2003) ^a	L Youth and parent reports of negative parenting partially correlated with CU traits 4 years later.	Small sample size; selected to over represent youth with CP
Hawes et al. (2011)	L Parental positive reinforcement, poor monitoring/supervision, involvement predicted CU traits	Measures all parent report
Loney et al. (2007)	CS Parenting dysfunction mediated association between maternal psychopathy and CU traits	Reliance on parent report; no alphas reported
McDonald et al. (2011) ^a	L Parent psychological aggression and inconsistent parenting related to psychopathic features	Low alpha for CU trait measure (.34); measures all parent-report
Pardini and Loeber (2008)	L Poor parent-child communication predicted higher initial and final levels of CU traits	CU traits measure from archived parent-reported items; male sample
Pardini et al. (2007) ^a	L Parent-reported punishment and child-reported parental involvement predicted CU traits	Low alpha for measure of corporal punishment (.29)
Viding et al. (2009)	L Negative parental discipline predicted CU traits but not MZ twin differences in CU traits	Low alphas for measures of negative parental discipline and CU traits
Vitacco et al. (2003)	CS Poor monitoring and inconsistent discipline <i>not</i> related to CU traits	All female, Hispanic sample; youth report only; no alphas reported
Waller et al. (2012)	L Observed and parent-reported harshness (not observed positive parenting) predicted CU traits.	Low alpha for CU trait measure at ages 2 (.57) and 3 (.64)
<i>b) Does parenting predict youth AB at different levels of CU traits?</i>		
Falk and Lee (2011)	CS In 1/8 models tested, lower positive parenting predicted CD symptoms at low CU traits.	Reliance on parent report
Hipwell et al. (2007)	CS CP associated with harsh punishment and low parental warmth at low levels of CU traits	4 items only for CU trait measure; low alpha (.60); all female sample
Hyde et al. (2013) ^a	L CU traits-parenting interaction did <i>not</i> predict growth in CP from ages 2–4.	Low-moderate alpha for CU trait measure at age 3 (.64)
Koglin and Petermann (2008)	CS Inconsistent discipline associated with boys' aggressive behavior at low levels of CU traits.	Measures all parent report; no alphas reported
Kroneman et al. (2011)	L Low parental warmth predicted higher initial levels of CD/ODD and faster decreasing levels of CD/ODD over 5 years at high levels of CU traits.	Measures all comprised parent report; low alpha for measurement of CU traits (.60); female sample
Muñoz et al. (2011)	L For low CU traits group, higher parental control predicted knowledge, and higher solicitation predicted control and less knowledge led to increased parental control	Small sample; large age range; selected to over represent youth with CP; only 1 year follow-up
Pardini et al. (2007) ^a	L CU traits-parenting interactions did <i>not</i> predict AB 1 year later	Low alpha for measure of corporal punishment (.29)
Pasalich et al. (2011)	CS Maternal and paternal observed coercion related to boys' CP at low levels of CU traits. Maternal warmth related to boys' CP at high or mean levels of CU traits	Small, clinic-referred sample with large age range
Wootton et al. (1997)	CS In 3/6 interactions, ineffective and low positive parenting were related to CP at low CU traits.	Small, clinic-referred sample; large age range; parent report
Yeh et al. (2011)	CS Lower positive and higher negative parental affect predicted reactive aggression at low CU traits. Higher negative parental affect predicted proactive aggression at high or mean CU traits.	Low alphas for measurement of negative parental affect (male, .53; female, .60)
<i>c) Does parenting differ between subgroups of youth categorized according to their level of AB and CU traits?</i>		
Barker et al. (2011) ^a	L AB+CU+ versus AB-CU- group experienced harsher parenting and lower warmth. AB+CU+ versus AB+CU- group had higher maternal psychopathology, negative feelings and harsher parenting	Parent report for all measures; no alpha reported for CU trait measure
Enebrink et al. (2005)	CS AB+CU+ versus AB+CU- group experienced poorer home circumstances and more family stress	Very small, clinic-referred sample of males
Fontaine et al. (2011)	L AB+CU+ versus AB-CU- group experienced more negative parental feelings and harsh discipline. AB+CU increasing had more family and parenting risk factors	Population-based sample of twins; very small % of sample in some joint trajectory groups
Frick et al. (2003) ^a	L Stable CU+ youth had lower levels of youth-reported positive parenting and higher CP	Very small subgroups; large age range; over-selected sample for CP
Kimonis et al. (2004)	L AB+CU+ and AB-CU+ versus AB-CU- and AB+CU- group experienced lower parent-reported monitoring/supervision and youth-reported parental involvement	Small sample, large age range; over-selected sample for CP; reliance on parent report for measures
Larsson et al. (2008)	L AB+CU+ and AB+CU- groups had higher levels of negative parental feelings and harsh parental discipline at ages 3, 4, and 7. Controlling for earlier CP made this non-significant.	Population-based sample of twins; harsh parental discipline had low alpha at ages 3 (.59), 4 (.56) and 7 (.56).
<i>d) Do parenting interventions have a direct effect on the level of youth CU traits</i>		
Hawes and Dadds (2007)	T Pre- and post-treatment changes in CU traits.	No control group; very small sample; male only; all parent reported
McDonald et al. (2011) ^a	I Reductions in CU traits in treatment group and mediated through improved parenting	Low alpha for CU traits (.34); small sample; reliance on parent-report
Kolko et al. (2009)	T Reductions in CU traits shown in both treatment arms across 3-year follow-up	No control group; multiple treatment components; males only
Somech and Elizur (2012)	T Reductions in CU traits in treatment group, maintained at 1 year follow-up	Attrition; measures all parent report; male dominated sample

Table 2 (continued)

Study		Key findings relevant to aims of review	Main methodological limitations
<i>e) Do CU traits moderate or predict the effectiveness of parenting interventions for youth AB?</i>			
Hawes and Dadds (2005)	T	CU traits associated with increased likelihood of ODD diagnosis after treatment.	No control group; very small sample; male only; all parent reported
Hyde et al. (2013) ^a	I	Age 3 CU traits did <i>not</i> moderate intervention effectiveness	Many children did not have existing behavior problems
Kolko and Pardini (2010)	T	Teacher reports of CU traits did <i>not</i> predict treatment outcome but parent reports of 'hurtfulness' did	No control group; majority male sample; many treatment components
White (2010) and White et al. (2012)	T	FFT effective and high CU traits had <i>better</i> outcomes, which related to changes in parenting	No control group; high attrition; low internal consistency for measures

Note. For design, L, longitudinal study; CS, cross-sectional study. APSD, Antisocial Process Screening Device; CD, conduct disorder; CP, conduct problems; DC, deceitful-callous; IC, interpersonal-callousness; FFT, Functional Family Therapy; ODD, Oppositional Defiant Disorder; PSD, Psychopathy Screening Device.

^a Study appears in two sections as analytic strategy addresses two research questions.

and, in some cases, as low as .40, which is a threat to the validity of measures and highlights the need for continued investigation of the construct of CU traits among youth samples.

In the measurement of parenting, 13 of the 30 studies assessed dimensions of parenting using the Alabama Parenting Questionnaire (APQ; Shelton, Frick, & Wootton, 1996) and in 12 of these 13 studies, parent report on the APQ was used exclusively. Two treatment studies of the same sample (Kolko & Pardini, 2010; Kolko et al., 2009) did not measure parenting, but are retained in the review because parenting was the focus of treatment modules. Among studies that did not use the APQ, parent report on a questionnaire was still the most common method. However, although commonly employed and relatively inexpensive, parent report is subject to the well-known threats to validity associated with self-report methods, including social desirability effects or difficulties interpreting the meaning of items relating to parenting constructs (e.g., time-out or proactiveness) (Morsbach & Prinz, 2006). These limitations need to be considered alongside findings of studies that relied solely on parent-reported measures. Depending on the research question, direct observation of parenting is a potentially stronger alternative, or complement, to parent-reported parenting, taking advantage of assessing naturally occurring parenting behavior, using relatively unbiased observers. In five studies, parenting was assessed via observation, which strengthens the conclusions that can be drawn about the association between parenting and CU traits, especially if used to corroborate the results obtained using parent-reported measures. Observational methods, however, are also not immune from threats to validity, including observer reactivity by parents or inadequate sampling of behavior (Gardner, 2000). As such, it may be helpful to consider the dimension of parenting being assessed, the age and type of sample, and by extension, which method is most appropriate to provide a valid assessment of parenting (i.e., whether the parenting dimension being assessed is readily observable or better assessed using youth- or parent-report). At the same time, in 11 studies, no data was provided about the internal consistency of the parenting measure, and in 14 studies, parenting measures had alphas of <.70, which undermines their validity (see Table 2). Finally, in 21 studies, parent report was used solely or in combination with other reports to construct the measure of parenting and CU traits. In only six studies was the informant for parenting and CU traits different. If parents are asked to reflect on their behavior, including implementation of different discipline strategies, and then evaluate affective/interpersonal characteristics of their child, it is unclear how ratings for one affect the other, making it difficult to interpret studies that only used parent-reported measures.

3.2. Does parenting directly predict level of youth CU traits? (Fig. 1a)

Studies addressing this research question directly tested the association between a continuous measure of parenting and continuous outcome of CU traits.

3.2.1. Early childhood/preschool (ages 3–6)

Two studies investigated the longitudinal prediction of CU traits by dimensions of parenting in preschool samples. First, Hawes, Dadds, Frost, and Hasking (2011), in a representative sample (aged 3–10 years; $N = 1008$), found that parental positive reinforcement predicted CU traits one year later. There were interactions between positive reinforcement and gender, poor monitoring/supervision and age, and between parental involvement and sex. Second, Waller et al. (2012) found that CU traits at ages 3 and 4 were predicted by observed and parent-reported harshness (at ages 2 and 3), controlling for age 2 CU traits and demographic factors in a large, high risk sample ($N = 731$).

3.2.2. Middle/late childhood (ages 7–12)

Six studies investigated the direct prediction of CU traits by parenting in middle childhood. First, Vitacco, Neumann, Ramos, and Roberts (2003) found that youth reports of poor parental monitoring and inconsistent discipline were cross-sectionally related to narcissism and impulsivity, but not to CU traits, in a community sample of Hispanic females ($N = 136$). Second, Frick et al. (2003) investigated predictors of CU trait stability over four annual assessments ($N = 98$). Selection from a community sample via stratified sampling ensured enough youth with high CU traits, although this may have meant that antisocial youth were overrepresented. CU traits at the final assessment point were partially correlated with earlier negative parenting (parent and youth report), controlling for earlier CU traits. Third, Pardini et al. (2007) investigated predictors of CU traits and AB in an aggressive sample (9–12 years old; $N = 120$) over a year. Controlling for earlier AB, parent-reported corporal punishment and child-reported parental warmth/involvement predicted CU traits one year later. There was a marginally significant interaction suggesting that children with low anxiety who reported low parental warmth showed increases in CU traits one year later. Fourth, Loney, Huntenburg, Counts-Allan, and Schmeelk (2007) found that dysfunctional parenting practices fully mediated the association between maternal psychopathic traits and child CU traits in a representative sample ($N = 83$; ages 7–14 years old). Fifth, in a longitudinal study of monozygotic twin pairs ($N = 4508$), Viding et al. (2009) found that age 7 parent-reported negative discipline predicted parent- and teacher-reported CU traits at age 12, after controlling for earlier CU traits. However, age 7 negative discipline did not predict monozygotic twin differences in CU traits at age 12, controlling for age 7 CU traits. The authors speculated that associations reflected gene–environment correlations (i.e., genes and environment provided by parents but further evoked by a child with CU traits). As such, negative parental discipline could be a non-shared environmental risk factor for AB development but not for CU traits during this age period (see Viding et al., 2005). Finally, McDonald, Dodson, Rosenfield, and Jouriles (2011) assessed the association between parenting and CU traits in the context of a randomized controlled trial (RCT) of an intervention for CP in children aged 4–9 years old ($N = 66$), recruited from domestic violence shelters. Assessments took place at baseline,

and 4, 8, 12, 16, and 20 months post-baseline. Two parenting variables (psychological aggression and inconsistency) were related to increases in psychopathic features over time (total PSD score and a CU-like subscale) and mediated reductions in psychopathic features in the treatment group.

3.2.3. Adolescence (ages 13–18)

Two studies investigated associations between parenting and CU traits in adolescence. First, Pardini and Loeber (2008) investigated predictors of CU trait stability over seven assessments in a high risk, male sample ($N = 506$). Parenting was assessed via five time 1 measures using summed child and parent reports, including poor supervision, physical punishment, and poor parent–child communication. All parenting variables were related to higher initial levels of CU traits in bivariate analyses. In a final multivariate model however, only higher CP, ADHD, and poor parent–child communication predicted higher initial CU traits, and only higher CP and poor parent–child communication predicted CU traits at the final assessment point. No parenting predictors were associated with the slope of CU traits. Second, Barker et al. (2011) assessed predictors of CU traits at age 13 within the context of large, ongoing population-based study of a twin cohort ($N = 6673$). Maternal reports of harsh parenting at age 4 were associated with higher levels of CU traits at age 13. In a significant indirect pathway, prenatal risk predicted boys' fearlessness at age 2, which was associated with higher levels of harsh parenting at age 4, and higher levels of CU traits at age 13.

3.2.4. Summary

Across all studies, a relatively consistent picture emerges across a range of developmental stages, suggesting that dimensions of parenting are associated with CU traits when the relationship is assessed directly. Of the nine studies providing evidence that parenting is related to CU traits, eight were longitudinal, and in testing for prediction by parenting, controlled for earlier CU traits or AB. As such, there is evidence that parenting is prospectively associated with CU traits, over and above earlier child-driven effects. In six studies, negative dimensions of parenting predicted youth CU traits. Specifically, harsh parenting experienced in early childhood (Barker et al., 2011; Waller et al., 2012), negative discipline (Viding et al., 2009), corporal punishment (Pardini et al., 2007) and psychological aggression and inconsistent discipline (McDonald et al., 2011) experienced in middle childhood, and poor parent–child communication in adolescence (Pardini & Loeber, 2008) all predicted higher levels of CU traits. There is also evidence that positive parenting predicts decreases in CU traits. Positive reinforcement in early childhood (Hawes et al., 2011), child-reported positive parenting (Frick et al., 2003), and child-reported parental warmth (Pardini et al., 2007) in middle childhood were associated with lower CU traits. In addition, interaction tests suggest that parental involvement is particularly important to decreases in CU traits in boys, that supervision/monitoring and positive reinforcement are more important in girls (Hawes et al., 2011), and that parental warmth has a more pronounced effect on decreases in CU traits for children with low anxiety (Pardini et al., 2007).

In light of the evidence presented above, it is challenging to interpret findings of the one study that did not find evidence for a direct association between parenting and CU traits (Vitacco et al., 2003). Interestingly, this was one of only two cross-sectional studies, and it relied on child reports of both parenting and CU traits among Hispanic females. It is difficult to generalize these findings to community or at-risk mixed gender and multi-ethnic samples. Furthermore, it is difficult to be confident about the validity of measures when relying solely on child reports of parenting, especially when the outcome is deficient affective and socioemotional experience. It is also interesting to consider the findings of Viding et al. (2009) alongside the evidence for a prospective association between negative

dimensions of parenting and the development of CU traits. While Viding and colleagues themselves present evidence for such an association in what they describe as a 'phenotypic analysis', negative discipline only predicted monozygotic twin differences in AB, not in CU traits. This pattern of results highlights the need for studies to take into account passive correlations (i.e., correlations between child behavior and the parenting environment because of a shared genetically transmitted liability) and evocative correlations (i.e., child's traits evoke poor parenting responses) when considering associations between parent and child behavior. Indeed, this conclusion is supported by the high heritability estimates obtained for the CP of children with high concurrent levels of CU traits (e.g., Viding et al., 2005).

While the majority of the studies in this section attempted to control for earlier child CU traits or AB, studies did not consistently control for one or both, and few studies considered in detail the effects of emerging CU traits versus AB on parenting behavior at different ages. Interestingly, one study did investigate child-driven effects on parenting. Hawes et al. (2011) tested whether CU traits directly predicted parenting over a one-year period, controlling for earlier AB. Higher levels of CU traits predicted inconsistent parental discipline across ages, decreased parental involvement in older boys, and increased corporal punishment among older children. The prediction of parenting dimensions by CU traits showed larger effect sizes than that by AB in general. As such, the results highlight the role of CU traits in conferring greater risk for the development of AB by uniquely shaping parenting. Future studies that assess whether parenting directly predicts CU traits would therefore benefit from simultaneously considering the effects of emerging CU traits on parenting. Hawes et al. (2011) provide a useful model for how to test this question. However, a more powerful analysis could involve testing cascade models in which CU traits and parenting predict each other across multiple time points, thereby enabling a clearer picture to be built up of the kinds of interactions occurring in families with a youth at risk of developing, or already showing, high levels of CU traits. It is also worth noting that a better understanding of parent–child interactions is vital for intervention, even if risk for them is underpinned by shared genetic liability. Finally, interactions between a parent and youth with high CU traits may differ with age, although future studies are needed to develop a precise understanding of associations at different ages of youth to inform intervention.

3.3. Does parenting predict youth AB at different levels of CU traits? (Fig. 1b)

Studies addressing this question investigate if associations between continuous measures of parenting and AB are moderated by youth CU traits. Specifically, an interaction term is added to regression models (parenting \times CU traits). If significant, the association between parenting and AB is tested at high versus low levels of CU traits.

3.3.1. Early childhood/preschool (ages 3–6)

Two studies assessed moderation of the association between parenting and AB by CU traits in preschool samples. First, Koglin and Petermann (2008) found a trend towards significance ($p < .10$) for the interaction between low parental involvement and CU traits predicting aggressive behavior in a representative sample of Kindergarten children ($N = 177$) assessed cross-sectionally. In addition, inconsistent discipline was related to aggression, but only for boys ($n = 89$) with low levels of CU traits. Second, Hyde et al. (2013) tested whether age 3 CU traits moderated the association between age 3 observed positive parenting and growth in child CP from ages 2–4, and found that it did not.

3.3.2. Middle/late childhood (ages 7–12)

Eight studies (six cross-sectional) investigated moderation of the association between parenting and AB by CU traits in middle/late childhood. First, [Wootton, Frick, Shelton, and Silverthorn \(1997\)](#) investigated whether a dichotomous CU trait measure moderated associations between parenting and CP among clinic-referred males ($N = 166$). CU traits were always associated with CP. Interactions between CU traits and ineffective parenting, and CU traits and positive parenting were significant. For each, associations between parenting and CP were stronger for boys with low levels of CU traits. However, it is difficult to interpret the results, as only three of six models tested included significant interaction terms. Second, [Oxford et al. \(2003\)](#) tested whether CU traits moderated associations between ineffective parenting and CP in aggressive children ($N = 199$), attempting to replicate and extend the findings of Wootton et al. Four CP outcomes were tested (two different teacher reports of externalizing behavior, parent-reported externalizing behavior, and peer-nominated aggression) using dichotomous (high vs. low) and continuous CU trait measures. CU traits were always related to CP. The interaction term between CU traits (dichotomous) and ineffective parenting was only significant in predicting peer-nominated aggression score (one of four models). The interaction term between CU traits (continuous) and ineffective parenting was a significant predictor of teacher-reported externalizing and peer-nominated aggression scores (two of four models). Despite the fact that more models than not featured non-significant interaction terms, the authors argued that the results provided partial support for CU traits moderating associations between parenting and CP.

Third, [Hipwell et al. \(2007\)](#) investigated the moderating effects of CU traits on associations between CP and parenting in girls (7–8 years; $N = 990$). In regression analysis, controlling for demographic factors and CP, CU traits were not directly related to harsh punishment or low warmth (design was different to other studies as parenting was the outcome). However, the interaction between CU traits and CP was significantly related to harsh parenting and low parental warmth. The magnitude of the association between CP and parenting decreased with increasing levels of CU traits (although remained significant in each case). Fourth, [Falk and Lee \(2011\)](#) investigated whether CU traits moderated associations between parenting and AB in children with and without ADHD (6–9 years; $N = 208$). For children with low/mean levels of CU traits, lower positive parenting was associated with parent-reported (but not teacher-reported) CD symptoms, controlling for ADHD (one of four models). There were, however, no significant interactions between negative parenting and CU traits for parent or teacher reported ODD or CD symptoms (three of four models).

Fifth, [Pasalich et al. \(2011\)](#) investigated whether CU traits moderated associations between observed parental coercion versus parental warmth (coded from speech samples) and CP in clinic-referred boys (3–10 years; $N = 95$). For mothers and fathers, coercion was related to CP in boys with low CU traits. In contrast, maternal warmth was associated with fewer CP at high/mean levels of CU traits, suggesting that warmth could be a specific buffer against the development of AB for boys with high levels of CU traits. Finally, in a large, representative sample ($N = 1210$), [Yeh et al. \(2011\)](#) found that negative and positive parental affect interacted with youth psychopathy scores to predict reactive and proactive aggression. Low levels of positive parental affect and high levels of negative parental affect were associated with higher levels of reactive aggression, but only at low levels of psychopathic traits. In contrast, higher levels of negative parental affect were associated with more proactive aggression, but only at mean or high levels of psychopathic traits. These interactions were similar whether total psychopathy score or affect subscale score (similar to CU trait scale) was used (K.C. Jacobson; personal communication, March 2012). The moderating effect of psychopathic traits on associations between parenting and AB is similar to the findings of other studies for the outcome of reactive aggression. However, the

opposite pattern of results for proactive aggression suggests that children with high levels of psychopathic traits may be more at risk of learning from negative displays of parental affect they experience, although results need replication in other samples. In particular, results need replicating given that other studies have found that positive parental affect may be more important to CP among youth with high levels of CU traits. Indeed, it is unclear why parental negative affect might be related to *proactive* aggression for youth with high levels of CU traits. Future studies are therefore needed to examine differential associations between dimensions of parenting (including parental affect) and reactive versus proactive aggression at different levels of CU traits.

Two studies investigated whether CU traits moderated longitudinal associations between parenting and AB. First, [Pardini et al. \(2007\)](#) investigated predictors of CU traits and AB in a sample of aggressive children over one year (ages 9–12 years; $N = 120$). As one of several analyses (see earlier), Pardini et al. tested the prediction of CP by interactions between various parenting dimensions and CU traits. No interaction terms were significant. Second, [Kroneman et al. \(2011\)](#) tested whether CU traits interacted with parenting to predict five-year CD/ODD symptom trajectories in girls ($N = 1233$, ages 7–8) from middle childhood to early adolescence, following-up on the cross-sectional study of [Hipwell et al. \(2007\)](#). Low parental warmth was more strongly associated with higher initial CD/ODD symptoms and faster decreasing CD/ODD symptoms for girls with high levels of CU traits. However, by year five, the interaction between low parental warmth and CU traits was no longer significant. Nevertheless, parental warmth may be important in protecting against the development of AB for girls who show high CU traits, particularly during middle childhood.

3.3.3. Adolescence (ages 13–18)

One study meeting the inclusion criteria investigated this question in adolescence. [Muñoz, Pakalniskiene, and Frick \(2011\)](#) tested bidirectional relations between dimensions of parenting (control, knowledge, and solicitation) and AB over a year, using cross-lagged panel models ($N = 98$). Of relevance to the review, multi-group moderator analysis (high vs. low CU traits) of cross-lagged models was conducted. Higher levels of parental control predicted increases in knowledge, and higher solicitation predicted increased control in the low CU trait group. Having less knowledge led to increased parental control for youth with low CU traits, whereas less knowledge led to decreased control for youth with high CU traits. This pattern of associations highlights the importance of youth characteristics (e.g., willingness to lie) to future parenting, which may contribute to increasing AB over time.

3.3.4. Summary

It has been hypothesized that youth with high levels of CU traits are less influenced by negative dimensions of parenting (including harsh discipline and coercion) because of punishment insensitivity ([Blair, Colledge and Mitchell, 2001](#)), reduced responsivity to negative stimuli ([Blair, Colledge, Murray, et al., 2001](#)), and physiological hypoarousal (e.g., [Marsh et al., 2008](#)). Despite appearing to be a well-established finding in the literature, the review suggests that evidence for CU traits moderating associations between dimensions of parenting and AB is mixed. For example, of five longitudinal studies, three found evidence of moderation by CU traits and two did not. Of the seven cross-sectional studies, five reported some moderation (but not in all models tested) and one reported moderation in different directions (association between parenting and CP was at high or low levels of CU traits depending on the dimension of parenting or AB assessed). The review therefore first challenges the highly cited notion in the field that CU traits develop independently of parenting when this study design is adopted. For example, in the two most commonly cited papers investigating the question of moderation by CU traits ([Wootton et al., 313 citations](#); [Oxford et al., 103 citations](#), November 2012), neither addresses

questions relating to the development of CU traits per se; both studies are cross-sectional and have AB as the outcome. Furthermore, in both studies, interaction terms between CU traits and parenting are more frequently non-significant.

Second, methodological caveats for studies that have investigated the question of CU traits as a cross-sectional moderator are particularly relevant to any conclusions that can be drawn. All five cross-sectional studies that found evidence for moderation by CU traits relied on parent reports of parenting and parent report as a major part of their measure of CU traits (e.g., Koglin & Petermann, 2008; Oxford et al., 2003; Wootton et al., 1997). As already outlined, it is not clear how a parent's rating of their own parenting strategies (including effective discipline, warmth, or positive parent–child interactions) might impact on their perception of their child's affective and socioemotional characteristics (and vice versa). Furthermore, several studies are limited by having low alphas for their measures of CU traits (Falk & Lee, 2011; Hipwell et al., 2007; Kroneman et al., 2011) or parenting (Pardini et al., 2007; Yeh et al., 2011). It is also difficult to generalize from studies that assessed small, clinic-based samples (Pasalich et al., 2011; Wootton et al., 1997). Methodologically stronger studies had large samples (Hipwell et al., 2007; Hyde et al., 2013) and assessed parenting versus CU traits using different methods (Hyde et al., 2013; Pasalich et al., 2011; Yeh et al., 2011) to minimize shared method variance.

Taking into account strengths and limitations of studies, and focusing only on models that included significant interactions, there is some evidence that negative dimensions of parenting are cross-sectionally related to AB in youth with low but not high levels of CU traits. This pattern emerged for inconsistent discipline in preschoolers (Koglin & Petermann, 2008), and negative affect (Yeh et al., 2011), harshness (Hipwell et al., 2007), ineffective parenting (Oxford et al., 2003; Wootton et al., 1997) and coercion (Pasalich et al., 2011) in middle-childhood. This pattern of findings found in studies, comprising community, high risk, aggressive, and clinic-referred samples of different ages, suggests that similar mechanisms may underlie cross-sectional associations between parenting, CU traits, and AB across youth.

However, recent studies complicate the picture. First, Yeh and colleagues found that negative parental affect was associated with reactive aggression at low levels of CU traits, but proactive aggression at high levels of CU traits. This finding suggests that future studies might benefit from separating different forms of aggression when measuring AB. At the same time, the overlap between conceptualizations and measurement of proactive aggression and CU traits needs further consideration. However, a particular strength of this study is the different reporters for proactive aggression (youth self-report) versus CU traits (parent-report), reducing the risk of shared method variance. The results also suggest that there may be important etiological differences in the development of proactive versus reactive aggression that may be related to both parenting and the presence of, or overlap with, CU traits. For example, through social learning processes, children with high levels of CU traits may learn to value aggressive strategies to obtain reward following exposure to aggressive role models.

Second, while Kroneman et al. (2011) did not find evidence that harsh parenting predicted AB differently in girls with low versus high levels of CU traits, they speculated that the developmental period in which harsh parenting influences behavior is earlier than that captured by the age of their sample. This point highlights that few of the included studies made predictions about which dimensions of negative parenting may be specifically relevant at different ages. For example, parental harshness could be more important to AB development in young children, whereas poor parental monitoring may be a more salient dimension to investigate among adolescents with different levels of CU traits. Indeed, Muñoz et al. (2011) found that among adolescents with high levels of CU traits, parents with less knowledge decreased their control over time. However, other dimensions of

parenting may be important concomitants. For example, a parent who has fostered a warm relationship during early/middle childhood could be more effective in monitoring during adolescence, and it is unclear to what extent a third, unobserved variable, such as a shared genetic liability for low warmth, may better explain the associations. At the same time, the sharper increase in self-reported delinquency of youth with high CU traits reported by Muñoz et al. indicates a need for a better understanding of the strategies parents could employ to manage AB.

Finally, a less consistent picture emerges from studies that have investigated positive dimensions of parenting. Two studies suggest that low positive parenting is related to CP for youth with high CU traits (Kroneman et al., 2011; Pasalich et al., 2011). It is noteworthy that a similar pattern of results was found in these two studies that separately assessed boys and girls. The results also suggest that, in middle childhood at least, children with high levels of CU traits may be especially responsive to a parent–child relationship characterized by positive affect and warmth, which may serve to promote their emotional responding and internalization of values (Pasalich et al., 2011) and protect against the development of AB. In contrast, Yeh et al. (2011) found that lower positive parental affect was related to reactive aggression in children with low levels of CU traits. Lower levels of positive parenting were also related to CP only at low levels of CU traits in two clinic-referred samples (Falk & Lee, 2011; Wootton et al., 1997), although the methodological issues of these latter two studies make the results difficult to interpret. Finally, two studies that assessed whether CU traits moderated a *longitudinal* association between positive parenting and CP did not report significant interactions (Hyde et al., 2013; Pardini et al., 2007). Further empirical work is therefore needed to understand associations between positive dimensions of parenting and CP at varying levels of CU traits. As with negative parenting, future studies would benefit from increased precision in operationalization of parenting, and from making specific predictions about the importance of different parenting practices at different ages.

3.4. Does parenting differ between subgroups of youth categorized according to their level of AB and CU traits? (Fig. 1c)

Studies addressing this question test a variation of the moderator question outlined above. Studies create groups using cutoff scores on CU traits and AB questionnaires (although by definition, the level of AB may be high across certain samples). The most common groups created are a high AB and high CU trait group (AB+CU+), a high AB and low CU trait group (AB+CU−), and a group with low AB and CU traits (control; AB−CU−). Studies test for significant differences in parenting (assessed prospectively or cross-sectionally in relation to CU traits/AB) between groups at one time point or across time points (i.e., based on stability of CU traits/AB).

3.4.1. Early childhood/preschool (ages 3–6)

No studies have investigated this question in early childhood/preschool samples (although see Barker et al., 2011).

3.4.2. Middle/late childhood (ages 7–12)

Four studies have assessed parenting between groups of youth classified according to AB/CU traits in middle childhood. Enebrink, Andershed, and Langstrom (2005) cross-sectionally tested associations between parenting factors and CU trait group membership in clinic-referred boys ($N = 41$; AB high across sample). Parenting was assessed via interview and evaluation of case records. The AB+CU+ group ($n = 13$) was more likely to have experienced poor household circumstances and high family stress (which remained significant after controlling for ODD/CD symptoms), but did not differ on other measures (including little caregiver continuity and ineffective parenting).

However, the small size of the subsamples and cross-sectional design reduces the generalizability of the results.

In the first of three longitudinal studies, Frick et al. (2003) generated CU trait stability patterns for 98 aggressive youth. Controlling for SES and intelligence, earlier CP and youth-reported positive parenting differed between groups; the stable high CU trait group displayed higher levels of CP and lower positive parenting. Nevertheless, the small sample sizes of the groups (as small as $n = 8$) make it difficult to draw generalizable conclusions. Second, Larsson, Viding, and Plomin (2008) assessed parenting characteristics associated with AB/CU traits in a population cohort of twins ($N = 4430$). Four groups were created at age 7: CU+, AB+, AB+CU+, and AB-CU-. Children in the AB+CU+ and AB+ groups had experienced more negative parental feelings and harsher discipline at ages 3, 4, and 7 compared to those of AB-CU- and CU+ groups. The CU+ group had also experienced harsher parental discipline compared to the control group at ages 4 and 7. However, these effects disappeared after controlling for earlier CP, which suggests that the influence of negative parenting on AB development may be through child-driven effects. However, CU traits were not measured at an earlier time point (only as an outcome), so it is unclear whether CU traits versus AB in general were driving the differences in parenting found between groups.

Third, Fontaine et al. (2011) investigated associations between AB/CU trait trajectories and parenting using a population-based twin sample ($N = 9578$). Growth mixture modeling was used to select empirically a four-trajectory model for CU traits (stable high, increasing, decreasing, stable low) and a two-trajectory model for AB (high versus low). None of the sample had a AB+CU- trajectory. Seven joint AB/CU trait trajectories were identified, including AB-CU- (75%), AB-CU increasing (5%); AB+CU increasing (2%), and AB+CU+ (4%). Next, childhood predictors of trajectories were tested. Two findings are most relevant to the review. First, the AB+CU+ group had higher levels of all the negative parenting and family-level predictors (low SES and chaos in the home) compared to AB-CU-. Second, the AB+CU+ group had higher levels of family chaos versus the AB+CU increasing group. The comparison of these groups enables effects of severe AB to be controlled for as AB is high across groups. It appears that high versus increasing levels of CU traits are associated with a more negative family environment, although there were no differences for any of the parenting variables. The large proportion of youth in this sample who demonstrated changing scores across time also undermines the notion of CU traits as 'trait'-like or stable. Further, the use of sophisticated trajectory analysis, which is common to AB research in general but relatively novel in research on CU traits, is a particular strength of the study.

3.4.3. Adolescence (ages 13–18)

First, Barker et al. (2011) assessed a large birth cohort ($N = 6673$), with data collected prenatally, and at 2 and 4 years old. Cut-off scores were used to create groups at age 13, including AB+CU-, AB+CU+, AB-CU+, and AB-CU- groups. Of relevance to the review, the AB+CU+ group experienced higher levels of nearly all risk factors, including harsh parenting and low parental warmth compared to the AB-CU- group. In addition, compared to AB+CU-, the AB+CU+ group was of lower SES, and had experienced greater levels of maternal psychopathology, harsh parenting, partner cruelty towards mother, and their mother endorsing they 'did not enjoy their child'. Second, Kimonis, Frick, and Barry (2004) investigated associations between AB and having delinquent peers for youth with high versus low levels of CU traits, and whether parenting mediated associations. Parenting and CU traits were assessed in the same sample as Frick et al. (see earlier; $N = 98$) and their association with peer delinquency was tested annually for four years. High levels of CU traits were associated with more dysfunctional parenting over time, particularly in the AB+CU+ group.

3.4.4. Summary

Several interesting findings emerge from across the six studies that have assessed differences between AB/CU trait groups. First, the most compromised parenting is experienced by an AB+CU+ group. When assessed in middle childhood and compared with AB-CU-, an AB+CU+ group experienced more negative parental feelings and harsher discipline at ages 3, 4 and 7 (Fontaine et al., 2011; Larsson et al., 2008), more chaos in the home at 4 (Fontaine et al., 2011), and higher family stress and poorer household circumstances (Enebrink et al., 2005). When assessed in adolescence, an AB+CU+ group experienced harsher parenting and less warmth at ages 2 and 4 (Barker et al., 2011) and more dysfunctional parenting (Kimonis et al., 2004). Nevertheless, it is difficult to draw conclusions about the unique effect of parenting on CU traits when considering the contrast of AB+CU+ versus AB-CU-. Specifically, the findings of differences in parenting between these groups may simply represent a severity effect. Indeed, in samples where youth have high levels of AB (e.g., Enebrink et al., 2005; Frick et al., 2003), it is unclear how parenting contributes to the development of CU traits. As such, studies that investigated differences in the parenting received by AB+CU+ versus AB+CU-, or the trajectories of AB and CU traits, provide better evidence about the unique effect of parenting on CU traits. For example, Barker et al. (2011) found that their AB+CU+ group had experienced more parental risk factors compared to their AB+CU- group. Another contrast that would separate the effect of parenting on CU traits versus AB in general would be to test AB-CU+ versus AB-CU-, although the low prevalence of youth with AB-CU+ makes this difficult in practice. It is worth noting however, that many of these studies did not seek to investigate the unique effect of parenting on CU traits and assessed a variety of different risk factors in the context of existing high levels of AB. Indeed, it is important to keep in mind that different study aims, and studies adopting this design should not be conflated with those investigating direct associations between parenting and CU traits. Finally, it is not clear how meaningful a median-level or mean-level split is for categorizing youth as being high or low on CU traits, given that many studies employ a 6-item scale in the first place. While a categoric approach to classifying 'psychopathy' as present or absent among adult offenders is well established, the same approach may not be applicable to different types of samples of youth and certainly needs further study.

3.5. Do parenting interventions directly reduce the level of youth CU traits? (Fig. 1d)

Studies addressing this question test whether interventions that change parenting practices have a direct effect on the level of youth CU traits.

3.5.1. Early childhood/preschool (ages 3–6)

Somech and Elizur (2012) conducted an RCT to test the effectiveness of a parenting intervention for parents of children at risk of CP (intervention, $n = 140$; control, $n = 69$). Assessments took place pre-intervention, post-intervention, and at one year follow-up. Intervention effects were found on CP and CU traits both in an intention-to-treat analysis and when focusing only on families who completed treatment. The intervention components were drawn from other well-evidenced parenting programs, and the RCT design is a strength, although high attrition in both groups (intervention, $n = 96$; control $n = 29$ at one year follow-up) was a substantial weakness. Finally, reductions in CU traits were mediated through improvements in parental practices and distress (Y. Somech, personal communication, July 2012).

3.5.2. Middle/late childhood (ages 7–12)

First, Hawes and Dadds (2007) assessed the effect of a manualized parenting program on CU traits in boys with ODD or CD (4–8 years; $n = 49$). Pre- and post-treatment changes were found in the level of

CU traits, and a subset of the sample showed marked reductions in CU traits. When boys were classified according to pre- and post-treatment levels of CU traits as stable-low, unstable, or stable-high, the stable-high group showed more severe levels of CP at follow-up regardless of initial CP. Furthermore, while the frequency of parents implementing strategies, including time-out, did not differ between groups, parents rated time-out as less effective for stable-high boys. However, assessment of parenting relied on single-item questions and subgroup sample sizes for these analyses were very small. Finally, the study was not an RCT so there was no comparison group, which makes it difficult to interpret results. Second, Kolko et al. (2009) investigated treatment effects (community- vs. clinic-delivered) on CU traits among children with CD/ODD (6–11 years; subsample of Kolko & Pardini, 2010, see later). Treatment comprised seven personalized components, including parent management training. Assessments were pretreatment, post-treatment, and various follow-ups (6, 12, 24, 36 months). Children in both arms of the intervention demonstrated reductions in rates of CD/ODD and teacher-reported CU traits across the 3-year follow-up. Third, McDonald et al. (2011) conducted an RCT to test whether a manualized parenting intervention for CP reduced CU traits (4–9 years, $N = 66$). Families were recruited from domestic violence shelters and followed up at 4, 8, 12, 16, and 20 months. Greater reductions were found for general psychopathic features of children in the intervention group versus control group, over and above effects on CP. Results were similar using a combined CU trait/narcissism scale versus total psychopathy score. Reductions in psychopathy were mediated by improvements in mothers' harsh and inconsistent parenting.

3.5.3. Adolescence (ages 13–18)

No studies have addressed this question in adolescent samples.

3.5.4. Summary

Very few studies of interventions directly targeting CU traits in youth exist. Fewer still have investigated treatment of CU traits using parenting interventions. This is in contrast to the large evidence base supporting the effectiveness of parenting interventions for youth AB in general (Piquero, Farrington, Welsh, Tremblay, & Jennings, 2009). First, the review therefore points to the need for more empirical evaluations of the effect of parenting interventions on youth CU traits. Of the four studies that did assess the effect of parenting interventions, all four demonstrated that across samples of children from early and middle childhood, CU traits are responsive to intervention. Second, the review highlights the need for studies to adopt an RCT design when investigating the effect of parenting interventions on CU traits (e.g., McDonald et al., 2011; Somech & Elizur, 2012). An RCT design enables stronger conclusions to be drawn about the effects of changing parenting practices on child behavior. Indeed, improvements in parenting mediated intervention effects on CU traits in early (Y. Elizur, personal communication, July 2012) and middle childhood (McDonald et al., 2011). As such, there is support for the notion that CU traits show malleability and responsivity to changes in parenting practices.

At the same time, more creative randomized trial designs are needed, in order to test the effects of parenting interventions on both CU traits and AB. Potential alternative study designs are shown in Fig. 1. For example, interventions that target parenting could produce simultaneous improvement in CU traits and AB (controlling for their overlap, and pre-treatment levels) (Fig. 1f). Alternatively, improvement in specific aspects of parenting (e.g., parental warmth versus proactiveness) might be uniquely related to improvements in CU traits versus general AB respectively. Furthermore, treatment studies may need to consider the effect of unique reciprocal associations between different dimensions of parenting and child CU traits versus general displays of AB (Fig. 1g). Intervention research to test these and other alternative designs should be guided by risk factor and observational research (i.e., Fig. 1a and b), considering the type of

sample/level of existing AB (i.e., community versus adjudicated), age of the sample (which might also be related to level of CP/entrenched AB), and most appropriate parenting dimension to assess. Finally, studies could investigate whether changes in CU traits versus AB mediate changes in the other. Specifically, study designs are needed to investigate whether targeting AB has a collateral effect on CU traits, or vice versa.

3.6. Do CU traits predict or moderate effectiveness of parenting interventions for AB? (Fig. 1e)

Studies addressing this question test whether youth with high levels of CU traits benefit less from parenting-focused interventions for AB, or if it is harder for parents to change their own/youth behavior in the presence of high levels of CU traits.

3.6.1. Early childhood/preschool (ages 3–6)

Hyde et al. (2013) investigated whether early signs of CU traits reduced the effectiveness of the Family Check Up (Dishion et al., 2008), a brief, tailored parenting intervention combined with motivational enhancement, for early CP in a preschool sample. Hyde et al. modeled three continuous interactions, testing whether CU traits moderated (i) the link between treatment and CP growth from ages 2 to 4, (ii) the link between treatment group and improvements in positive parenting, and (iii) the link between improvements in positive parenting and CP growth. While CU traits predicted CP growth from ages 2–4, there was no interaction between CU traits and intervention. Specifically, CU traits did not moderate the effectiveness of intervention on changes in parenting nor the effectiveness of changes in parenting on improvements in child CP, nor the overall direct intervention effect on child CP. This very thorough longitudinal analysis (interactions were tested continuously and dichotomously, within and cross informant) increases the validity of the results, and suggests that personalized and tailored parenting-focused interventions may be effective in targeting early-starting CP in very young children, regardless of early manifestations of CU traits.

3.6.2. Middle/late childhood (ages 7–12)

First, using the same sample as their 2007 study, Hawes and Dadds (2005) investigated whether CU traits predicted treatment outcomes for 4–8 year-old boys with ODD or CD ($n = 49$). Treatment was a manualized parent-training intervention, which comprised a 1.5-hour assessment session, and nine weekly sessions. Higher levels of CU traits were associated with increased likelihood of an ODD diagnosis at follow-up, controlling for pre-treatment ODD. Observed implementation of different parenting strategies did not contribute significantly to models. However, the small sample size and lack of a control group make these results difficult to interpret. Indeed, without a control group, this study can only be considered to have adopted a predictor rather than a moderator design. Second, Kolko and Pardini (2010) assessed outcomes of 139 children receiving treatment for AB, and included 38 'treatment as usual' children in the analysis as a comparison condition. CD and ODD symptoms were assessed following diagnostic interviews with both the parent and child, which clinicians used to rate the presence of symptoms. A categorical variable of CU traits was created based on teachers endorsing the presence of four of the six APSD CU trait items. Pre-treatment CD was the strongest predictor of persistent CD and, interestingly, CU traits did not predict treatment outcome. The pattern of results was the same using the six-item CU trait subscale of the APSD. Interestingly, higher teacher-reported total APSD score was associated with lower CD symptoms controlling for demographic covariates and pre-treatment levels of CD, suggesting that this flexible, modular-based intervention was successful in targeting the general psychopathic features of children with early-onset AB (CU traits in combination with narcissism and impulsivity). At the same time, in a separate analysis, pre-treatment levels of the ODD dimension of

'hurtfulness' (described by Stringaris & Goodman, 2009), predicted post-treatment CD diagnosis and symptoms, and higher levels of parent-reported externalizing behavior.

This finding highlights the complexity of evaluating related dimensions of child problem behavior within treatment studies. For example, it might be that demonstrating 'hurtfulness' (i.e., being spiteful, vindictive, or proactively aggressive) is an indicator of those children with ODD who are more likely to go on to develop CD. As such, 'hurtfulness' might better be conceptualized as a symptom of CD. However, ODD 'hurtfulness' has also been shown to be related to parent-reported callousness (Stringaris & Goodman, 2009), and it undoubtedly has conceptual overlap with the construct of CU traits. To add further to the complexity, it also appears that the informant for child behavior also needs careful consideration. For example, the lack of significant prediction of post-treatment CD by teacher reports of CU traits using the CU trait subscale of APSD reported by Kolko and Pardini (2010) raises questions about how best to incorporate teacher reports to assess these behaviors (e.g., best-estimate informant, latent variable approach; see section on measurement). Alternatively, shared method variance may account for the associations found between pre-treatment levels of the ODD 'hurtfulness' dimension and later CD symptoms (i.e., both were derived from parent/child reports following diagnostic interviews).

3.6.3. Adolescence (ages 13–18)

White (2010) and White, Frick, Lawing, and Bauer (2012) tested if youth-reported CU traits predicted the effectiveness of Functional Family Therapy among an adjudicated sample ($N = 134$), although there was no control group. CU traits were associated with higher pre-treatment behavior dysfunction and violence. However, youth with high levels of CU traits showed the most improvement in response to treatment using both change score analysis and evaluating the relative proportion of youth with high and low levels of CU traits that showed reliable change in problem behavior. CU traits were also not related to lower treatment participation or dropout. Finally, there were interesting interactions between reporters for parenting measures and treatment responsiveness. For example, when youths reported experiencing more negative parenting, those with high levels of CU traits showed greater improvement in interpersonal relations and disruptive behavior. In contrast, if parents reported on their negative parenting, increases were associated with reduced improvement in social problems and disruptive behavior for youth with high CU traits. White (2010) speculated that the differential findings might be contingent on the meaning of negative parenting to the reporter. Taken in conjunction with the non-prediction of treatment outcomes found by Kolko and Pardini (2010) using teacher-reported CU traits, the review again highlights the need for improved methods to assess parenting versus CU traits. Finally, improvements in positive parenting were related to AB outcome in the same way at high versus low levels of CU traits.

3.6.4. Summary

Across the four studies that investigated the effectiveness of parenting interventions for AB, there is evidence that in different types of samples, ages of youth, and types of intervention (prevention vs. targeted interventions), CU traits are not a moderator of effectiveness. Stronger evidence for this comes from larger studies that included a control group (e.g., Hyde et al., 2013; Kolko & Pardini, 2010). As such, while Hawes and Dadds (2005) is an oft-cited study (130 citations, November 2012), it is not replicated by two studies that are more recent, and the findings are limited by a small sample and non-RCT design. As a result, it is not known how CU traits relate to the CP of a control group, as this was not tested. Indeed, comparison with the more recent analyses of White et al. (2012) highlights that especially without a control group, the way that data is analyzed influences interpretation of results. Specifically, given that CU traits are generally associated with higher AB, it is perhaps unsurprising that if

CU traits are considered as a predictor of treatment effectiveness (Hawes & Dadds, 2005), they are associated with poorer outcomes. As such, while youth with high levels of CU traits may benefit equally from an intervention, the results suggest they do 'worse.' In contrast, White et al. (2012) used change scores, controlling for starting levels of CU traits. Using this approach, the high CU traits group appears to benefit most, although this may be because they had the most range to improve. Both studies demonstrate that without a control comparison group, the extent to which starting point is taken into account influences results. Indeed, across reviewed studies, analytic approach appears to be strongly related to findings, and should be considered alongside the conclusions of studies.

Various other methodological and theoretical issues should be considered in relation to these four studies. First, it is not clear across studies which intervention components are associated with reductions in CP. For example, the protocols of Kolko and Pardini (2010) enabled youth to receive pharmacotherapy, which may be an important component of change to reduce CU traits (Waschbusch et al., 2007) and parenting was not assessed. Similarly, while parenting was measured using observed and parent-report methods, Hyde et al. did not report how their flexible intervention was personalized for families. As such, future studies are needed to investigate moderated mediation – whether processes mediating intervention change in AB are similar for youth with high versus low levels of CU traits. Future analyses from RCTs could also use multi-group models to assess whether the same mechanisms of change operate among youth with high versus low levels of CU traits (see Hyde et al., 2013). Third, all four studies highlight the need for continued evaluation of how measurement approaches and use of different informants across measures relates to results. For example, White (2010) found a different pattern of results depending on whether parent or youth reports of parenting were used and Kolko and Pardini (2010) found that teacher-reported CU traits did not predict CD/ODD outcomes (whereas parent-reported 'hurtfulness' did). Future studies are needed to investigate the use of and best way to combine reports from alternative informants (including parents and teachers, combined using a best-estimate or latent variable approach) to predict AB.

4. Discussion

4.1. Integration across studies

This review enables several conclusions to be drawn about the state of the evidence about associations between parenting and youth AB and CU traits. First, there is consistent evidence showing a prospective association between dimensions of parenting and increases in CU traits, in each development stage. Furthermore, studies that have investigated positive dimensions of parenting suggest that a focus on positive affective dimensions may be of particular relevance to the development or prevention of CU traits (e.g., Kroneman et al., 2011; Pardini et al., 2007; Pasalich et al., 2011). Second, when children show high levels of CU traits, parental discipline and harshness do not appear to be cross-sectionally related to AB. This does not preclude, however, the role that parenting plays in the development of CU traits over time. Indeed, one possibility is that because youth with high CU traits typically appear to have higher levels of AB, the lack of a cross-sectional association with parenting may emerge as a statistical artifact. Specifically, because there may be little variability within AB for youth with high CU traits to correlate with parenting, it may appear that they are not related (see Hyde et al., 2013). Third, across different ages, youth with AB and CU traits appear to have experienced particularly compromised parental rearing environments. Fourth, while CU traits are associated with more severe AB, parenting-focused intervention programs appear effective in reducing youth CU traits. Finally, the review does *not* support the notion that CU traits reduce the effectiveness of interventions for AB. Indeed,

personalized or flexible treatments benefit antisocial youth (Kolko & Pardini, 2010; White, 2010) and reduce CP in younger children (Hyde et al., 2013; McDonald et al., 2011). These findings challenge the focus on CU traits as unchangeable 'traits'. They appear to be shaped by parenting and amenable to treatment, though more research is needed to identify which aspects of parenting are most robustly related to decreases in AB in the presence of CU traits. This conclusion is in direct contrast to much of the clinical 'lore' and descriptions of CU traits commonly found in the literature. The existing message that CU traits are not malleable or a target for treatment is potentially harmful to youth and not consistent with empirical findings. Indeed, as noted above, although several studies have gained much attention and citations within this field, their results are not necessarily consistent with the greater weight of the literature (published more recently in larger, better-designed studies).

The review also draws attention to several methodological issues, which are relevant to future studies and models of AB development. First, there is a need for greater clarity in how studies frame their research question (Fig. 1) and how sample type relates to findings. Indeed, different study questions are often conflated when they are cited. CU traits are commonly referenced as developing 'independently' of parenting, based on cross-sectional moderation studies that do not address questions of development. At the same time, an understanding of the development of CU traits in a community sample using a prospective longitudinal design may not be beneficial when considering parenting strategies for older antisocial youth with varying levels of CU traits. Furthermore, treatment evaluations need to be suitably powered to enable moderator analyses that test whether youth with CU traits respond differentially to parenting interventions. Finally, greater clarity is needed to explain how the research question being tested informs about associations between parenting, CU traits, and AB, including an evaluation of how sample type and age is related to findings.

Second, there is significant variation in measurement approaches. A key limitation of many reviewed studies is the low internal consistencies for measures of CU traits and parenting, which affects the results in various ways. Low alphas may reduce the likelihood that studies are able to detect significant associations, or suggest that improved assessment methods are required. However, the fact that many studies showed an association between parenting practices and changes in youth CU traits also calls into question the very construct of 'CU traits' in youth, and its stability at younger ages. Further, no studies have demonstrated a prospective association between childhood CU traits and psychopathy in adulthood. Finally, CU traits appear responsive to the key environmental factor of parenting in both passive longitudinal and experimental treatment designs. Therefore, there is a need for continued evaluation of the construct of CU traits and the language of classification used to denote subgroups of antisocial youth in this comparatively new area of research.

Third, the reliance on parent report to assess both parenting and CU traits highlights the need for future studies to seek alternative measurement approaches, including the use of best-estimate scores for CU traits versus latent variables that combine reports from multiple informants. Five reviewed studies incorporated observed measures of parenting (e.g., Pasalich et al., 2011; Waller et al., 2012), which reduces shared method variance and the risk that a parent's judgments of their own child will affect how they report on their own parenting skills, or vice versa. At the same time, however, even the use of observed measures of parenting does not get around the fact that associations between parenting and child behavior might be driven by a third, unobserved variable (such as a shared genetic liability for CU features or lack of warmth). Developing more sophisticated methodological and measurement approaches to assess genetic/environment correlations is a key research priority in this field of study. Future studies would also benefit from considering the dimensions of parenting that are particularly relevant to the development of CU traits versus AB in general, and how this might differ between

different samples of youth of different ages. For example, positive parental affect may mitigate the developmental pathway of fearlessness, CU traits, and AB in early childhood, whereas parental monitoring and control may be more important to reduce AB in adolescence. Example approaches to investigate more precise associations between dimensions of parenting and AB include age/gender moderator analyses (Hawes et al., 2011), differential prediction of proactive versus reactive aggression (Yeh et al., 2011), and inclusion of related constructs or developmental precursors of CU traits in models, such as fearlessness (Barker et al., 2011; Kochanska, 1997).

Fourth, there is a need for studies to consider child effects. Few studies examined reciprocity between youth CU traits and AB, or how youth behavior is reciprocally related to parenting over time (exceptions include: Hawes et al., 2011; Larsson et al., 2008; Muñoz et al., 2011). Indeed, risk factor analyses involves controlling for potentially confounding variables, including earlier AB. Across included studies, there was some consistency in covariates included in models (commonly gender and SES) although few studies provided justification for this. Indeed, future studies should be as transparent as possible about the effects of controlling for various covariates (including earlier CU traits) on results. Cross-lagged panel models may be a useful analytic strategy to disentangle evocative effects between parenting, CU traits, and AB in both risk factor and treatment studies (Muñoz et al., 2011; see Fig. 1g). Further, including covariates, such as measures of parental psychopathic traits, to act as proxies for gene–environment correlations between parent and child may enable models to control for these associations even in non-genetically informative designs (e.g., Loney et al., 2007).

4.2. Limitations

There are several limitations to the review, which should be considered alongside the results. First, while the search strategy was carefully constructed, it could not identify relevant, potentially non-significant, but unpublished findings. Second, when there are many study variables, as may be the case with the larger longitudinal studies included in the review, there remains the risk of selective reporting, such that only the 'interesting' results receive attention. It is unclear how this form of bias impacts on what is known about associations between parenting and CU traits. However, there is considerable evidence from evaluations in other fields (e.g., Eisner, 2009) suggesting that this kind of selective reporting might be a considerable source of bias. Third, the heterogeneity of identified studies did not allow for meta-analysis of results, although the classification of studies according to research question aimed to clarify associations.

4.3. Conclusions and future directions

The review identified 30 studies that have investigated associations between parenting, youth CU traits, and AB, addressing one of five different research questions. There was consistent evidence for a prospective association between parenting and CU traits, in both longitudinal and intervention studies, which demonstrates that these behaviors are not immutable and has implications for the concept of 'CU traits' as a subtyping approach for antisocial youth. Indeed, the use of 'CU behaviors', 'CU tendencies', or 'interpersonal callousness' (Pardini et al., 2006) are terms that may better recognize the instability and responsivity to the social environment of this set of affective and socioemotional characteristics. Further support for the responsivity of CU traits to parenting comes from treatment studies, which show that CU traits improve following parent-focused intervention for AB and do not moderate intervention effectiveness. However, the most effective interventions appear to be those with inbuilt flexibility, which enable personalization of treatment components and take into account affective processing characteristics of youth. Finally, the next step in treatment research is likely to involve

multi-arm RCTs to dismantle effective interventions, and examine whether specific aspects of interventions or targeting specific dimensions of parenting works best for CU traits versus general AB, and any reciprocal associations between outcomes.

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