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Predictors and Outcomes of Joint Trajectories of Callous–Unemotional Traits and Conduct Problems in Childhood

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Callous–unemotional (CU) traits are associated with antisocial and delinquent behaviors in children and represent a potential risk factor for adult psychopathy. However, there is a paucity of longitudinal research that explores the development of these traits, their longitudinal association with conduct problems (CP), and their psychosocial predictors and outcomes. Using a large sample of children followed longitudinally from the Twins Early Development Study (N = 9,578), we described the joint developmental trajectories of CU traits and CP during childhood (between ages 7 and 12) and examined the child- and family-level predictors (4 years old) and concomitant outcomes (12 years old) associated with the trajectories. The developmental trajectories were characterized with teachers' ratings of CU traits and CP from ages 7 to 12. Using general growth mixture modeling, we identified four trajectories of CU traits (stable high, increasing, decreasing, and stable low) and two trajectories of CP (high and low). Compared with the children who followed a low trajectory of CU traits and CP, those who followed a high trajectory of CU traits and CP had more negative child- and family-level predictors at 4 years (including CP, hyperactivity, negative parental discipline, and chaos in the home). Children with high or increasing levels of CU traits and concomitant high levels of CP presented the most negative outcomes at 12 years (including hyperactivity, peer problems, emotional problems, and negative parental feelings). Children with high CU traits and concomitant high levels of CP in childhood should be prioritized for targeted intervention.

Keywords: callous–unemotional traits, conduct problems, joint developmental trajectories, predictors, outcomes

Callous–unemotional (CU) traits, reflecting deficits in empathy and affective processing, have been shown to characterize a subgroup of children with more severe conduct problems (CP; Blair, Peschardt, Budhani, Mitchell, & Pine, 2006; Frick & Viding, 2009) who are at greater risk of adult psychopathy (Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007). The growing evidence base in relation to this subgroup of children has resulted in its consideration as a possible subtyping index within the category of conduct disorder for the forthcoming fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (Moffitt et al., 2008). It is therefore important to determine whether different CU traits and CP trajectories are associated with distinct child- and family-level predictors and outcomes. To our knowledge, this is the first study to address this question using a group-based model (B. Muthén, 2004; Nagin & Tremblay, 2001), which permits the identification of

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distinctive developmental trajectory groups of children in a longitudinal design.

As in studies of adults (Rutherford, Cacciola, Alterman, McKay, & Cook, 1999) and adolescents (Lynam et al., 2009; Pardini & Loeber, 2008), longitudinal studies in childhood suggest that CU traits are moderately to highly stable (Barry, Barry, Deming, & Lochman, 2008; Dadds, Fraser, Frost, & Hawes, 2005; Frick, Kimonis, Dandreaux, & Farell, 2003). However, individual variability and change over time have also been reported. For instance, using cutoff points, a study based on a sample of nonreferred children followed over a 4-year period suggested possible distinct trajectories of CU traits, notably stable low, decreasing, increasing, and stable high (Frick, Kimonis, et al., 2003). This study also reported that higher levels of CP in the child, lower socioeconomic status (SES) of the family, lower cognitive abilities, and poorer quality of parenting were associated with greater stability of CU traits. Subsequent studies have shown that children exposed to lower levels of physical punishment and higher levels of parental warmth and involvement had decreases in CU traits over time (Pardini, Lochman, & Powell, 2007) and that more parental physical punishment and affiliating with antisocial peers were associated with increases in CU traits over time (Lynam, Loeber, & Stouthamer-Loeber, 2008). A recent study on treatment of childhood CP in boys showed that although the participants with the most stable and high CU traits had the poorest outcomes at follow-up, CU traits scores dropped posttreatment for a subset of the sample (Hawes & Dadds, 2007), a finding that was echoed in another recent treatment study (Kolko et al., 2009). Findings from a meta-analysis also suggest that treatment may have positive effects on youth with CU traits (Salekin, 2002).

Although existing studies have yielded important information about the stability and the change of CU traits in childhood, they also present limitations. Trajectories in previous studies were identified by means of a priori cutoff points or did not consider the concomitant levels of CP (Frick, Kimonis, et al., 2003; Hawes & Dadds, 2007). Moreover, little is known about the child- and family-level predictors and outcomes associated with stability or change of CU traits in childhood, a surprising omission in view of the salient role likely to be played by psychosocial risk factors. To address these limitations, the current study, employing a large population sample of children assessed longitudinally by their parents and teachers, aimed to (a) examine the joint developmental trajectories of CU traits and CP during childhood (between ages 7 and 12), (b) examine the child-level (e.g., hyperactivity) and family-level (e.g., parenting practices) predictors (age 4) associated with these trajectories, and (c) identify the child- and family-level outcomes (age 12) associated with these trajectories.

On the basis of extant research (Frick, Kimonis, et al., 2003; Pardini & Loeber, 2008), we expected that most children in a population-based sample would show low and stable levels of CU traits and CP, whereas a relatively small group of children would follow a high and stable trajectory of one or both patterns in childhood (i.e., between 7 and 12 years of age). We also predicted that some children would follow trajectories characterized by increasing or decreasing levels of CU traits, reflecting malleability of these traits in childhood (Frick, Kimonis, et al., 2003; Hawes & Dadds, 2007; Kolko et al., 2009; Pardini & Loeber, 2008). In line with the adult psychopathy literature, we also expected asymmetric developmental overlap between CU traits and CP (Hart & Hare, 1997). More specifically, we hypothesized that although children with high levels of CU traits would be likely to display concomitant high levels of CP, children with high levels of CP would not necessarily show equally high levels of CU traits. We further hypothesized that children with stable high levels of CU traits and CP throughout childhood would be characterized by the most negative child- and family-level predictors at 4 years of age and the most negative concomitant outcomes at 12 years of age, as compared with other children (Frick, Kimonis, et al., 2003; Lynam et al., 2008; Pardini et al., 2007).

Method

Participants

The participants were drawn from the Twins Early Development Study (TEDS), a longitudinal study of twin pairs identified from population records of twin births in England and Wales between 1994 and 1996. TEDS families are reasonably representative of Great Britain census data for families with children (Oliver & Plomin, 2007; Trouton, Spinath, & Plomin, 2002). The sample frame of the present study included 9,578 children (52.7% girls) who had teacher reports on CU traits and CP on at least two data points with respect to the 7-, 9-, and 12-year-old assessments and who had no severe medical or neurological problems. The sample was predominantly White (94.4%). At each assessment, informed written consent was obtained from every family. The consent procedure was approved by the Institute of Psychiatry and Maudsley Ethics Committee.

Measures: Trajectory Analyses

CU traits. Teachers assessed CU traits at 7, 9, and 12 years of age using a composite measure created from seven items available in TEDS (CU traits were not originally assessed with a standardized instrument in TEDS; see Viding, Blair, Moffitt, & Plomin, 2005). Three items (i.e., "does not show feelings or emotions"; "feels bad or guilty when he/she does something wrong," reverse scored; "is concerned about how well he/she does at school," reverse scored) were drawn from the Antisocial Process Screening Device (Frick & Hare, 2001) and four items (i.e., "considerate of other people's feelings," reverse scored; "helpful if someone is hurt, upset or feeling ill," reverse scored; "has at least one good friend," reverse scored; "kind to younger children," reverse scored) from the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The internal consistencies (Cronbach's alpha) for assessments at 7, 9, and 12 years of age were .73, .73, and .74, respectively.

CP. Teachers assessed CP ("often has temper tantrums or hot tempers"; "generally obedient, usually does what adults request," reverse scored; "often fights with other children or bullies them"; "often lies or cheats"; "steals from home, school or elsewhere") using the SDQ (Goodman, 1997). Cronbach's alphas for the assessments at 7, 9, and 12 years of age were .70, .72 and .68, respectively. The SDQ is a widely used screening instrument in the United Kingdom with well-established reliability and validity (Goodman, 2001).

Measures: Predictors

The predictors were selected from the available measures in TEDS because we hypothesized, on the basis of previous studies (Frick, Kimonis, et al., 2003; Lynam et al., 2008; Pardini et al., 2007; Pardini & Loeber, 2008), that they would be associated with high levels of CU traits and CP. The predictors reflected behavioral, cognitive, or emotional deficits in children, or difficulties within the family, and were considered as potential risk factors.

Except for SES, which was obtained from the first contact assessment prior to the child's second birthday, all child- and family-level predictors were assessed when the children were 4 years old. For each predictor, participants who scored at or above the 90th percentile were classified in the high-risk category of the predictor (with reverse scoring for cognitive abilities, prosocial behaviors, and SES). A cutoff at the top 10th percentile is relatively conservative (Dadds, Masry, Wimalaweera, & Guastella, 2008), is consistent with the threshold employed by the SDQ, and has been shown in our previous work to identify children with distinct profiles of genetic risk for CU traits (Viding et al., 2005; Viding, Jones, Frick, Moffitt, & Plomin, 2008). In addition to these predictors, we considered two cumulative indexes: (a) a child-level index was created by summing the following binary predictors: low verbal and nonverbal cognitive abilities, CP, hyperactivity, emotional problems, peer problems, and low prosocial behaviors; and (b) a family-level index was computed by summing the following binary predictors: low SES, negative parental feelings, negative parental discipline, and chaos in the home. Except for emotional problems and low prosocial behaviors (odds ratio [*OR*] = 1.1, 95% CI [0.9, 1.3], $p > .05$), the child-level binary predictors were all significantly associated among one another ($p < .01$), with *OR*s ranging from 1.3 (95% CI [1.1, 1.6]; between low nonverbal cognitive abilities and emotional problems) to 6.3 (95% CI [5.1, 7.7]; between low verbal cognitive abilities and low nonverbal cognitive abilities). Except for low SES and negative parental feelings (*OR* = 0.7, 95% CI [0.5, 1.0], $p > .05$), the family-level binary predictors were all significantly associated among one another ($p < .001$), with *OR*s ranging from 1.7 (95% CI [1.3, 2.3]; between low SES and negative parental discipline) to 5.1 (95% CI [4.3, 6.1]; between negative parental feelings and negative parental discipline).

Cognitive abilities. Verbal cognitive abilities were measured with two subscales: Expressive Vocabulary and Grammatical Complexity (Petrill, Pike, Price, & Plomin, 2004). These measures were developed for TEDS as an extension of the MacArthur Communicative Development Inventories (Fenson et al., 1994). The nonverbal cognitive skills were measured by the Parent Report of Children's Abilities (Saudino et al., 1998). The Parent Report of Children's Abilities is a two-part measure in which parents fill in a questionnaire about their children's cognitive abilities and administer an hour-long battery of cognitive tests to their children (Petrill et al., 2004). These cognitive ability measures used in TEDS have demonstrated good validity (Petrill et al., 2004).

CP, hyperactivity, emotional problems, peer problems, and prosocial behaviors. CP, hyperactivity, emotional problems, peer problems, and prosocial behaviors were assessed with parents' ratings of the SDQ (Goodman, 1997). Cronbach's alphas were .53, .75, .59, .49, and .69 for CP, hyperactivity, emotional problems, peer problems, and prosocial behaviors, respectively.

SES. An index of SES was created based on the fathers' highest educational level and occupational status and the mothers' highest educational level and occupational status, and age of mother at birth of eldest child (Petrill et al., 2004).

Negative parental feelings. We assessed negative parental feelings using a shortened version of the Parent Feelings Questionnaire (Deater-Deckard, 2000). After answering questions (e.g., "feeling very impatient with child," "being frustrated by child") about the firstborn twin, parents were then asked, "Do you feel this way more or less with your second-born twin?" (Knafo & Plomin, 2006). Four items were included in the scale. Cronbach's alpha was computed separately for the first- and second-born twins because the rating method was not identical for both. Cronbach's alpha was .80 for the firstborn twins and .83 for the second-born twins.

Negative parental discipline. Negative parental discipline was assessed with two questionnaire items adapted from a semistructured interview ("give a smack or slap" and "telling off or shouting"; Deater-Deckard, Dodge, Bates, & Pettit, 1998). After answering questions about the firstborn twin, parents were then asked, "Do you do this more or less with your second-born twin?" (Knafo & Plomin, 2006). Cronbach's alpha was computed separately for the first- and second-born twins because the rating method was not identical for both. Cronbach's alpha was .55 for the firstborn twins and .76 for the second-born twins.

Chaos in the home. The degree of chaos in the home (i.e., items reflecting disorganized, noisy household) was assessed by the parents with a short-form version of the Confusion, Hubbub, and Order Scale (Matheny, Wachs, Ludwig, & Phillips, 1995). Cronbach's alpha was .66.

Measures: Outcomes

Child- and family-level negative outcomes were assessed when the children were 12 years old. We considered a series of outcomes to better examine the overall adjustment profile of the participants in early adolescence and to test the predictive validity of the trajectory groups. For each outcome, participants who scored at or above the 90th percentile were considered as having a negative outcome. Each binary outcome was used to create two cumulative indexes: (a) a child-level index summing five outcomes (hyperactivity, emotional problems, peer problems, narcissism, and impulsivity) and (b) a family-level index summing three outcomes (negative parental feelings, negative parental discipline, and chaos in the home). The child-level binary outcomes were all significantly associated among one another ($p < .001$), with *OR*s ranging from 2.00 (95% CI [1.6, 2.4]; between hyperactivity and peer problems) to 33.8 (95% CI [28.2, 40.6]; between hyperactivity and impulsivity). The family-level binary outcomes were all significantly associated among one another ($p < .001$), with *OR*s ranging from 3.5 (95% CI [2.9, 4.3]; between negative parental discipline and chaos in the home) to 7.0 (95% CI [5.8, 8.5]; between negative parental feelings and negative parental discipline).

Hyperactivity, emotional problems, and peer problems. Hyperactivity, emotional problems, and peer problems were assessed by the teachers with the SDQ (Goodman, 1997). One item used to create the CU traits scale (Viding et al., 2005) for the trajectory analyses between 7 and 12 years of age (i.e., "has at least one good friend," reverse scored) was not included in the peer

problems scale at age 12 to avoid overlap with our CU traits measure. Because three items (out of five items of the SDQ prosocial behaviors scale) were used to create the CU traits scale (Viding et al., 2005), we did not include the prosocial behaviors scale in our outcome analyses. Cronbach's alphas were .86, .77, and .63, for hyperactivity, emotional problems, and peer problems, respectively.

Narcissism and impulsivity. Narcissism and impulsivity were assessed by the teachers with a validated standard instrument, the Antisocial Process Screening Device (Frick & Hare, 2001; Lynam & Gudonis, 2005). Cronbach's alphas for the narcissism and impulsivity scales were .83 and .76, respectively.

Negative parental feelings. Negative parental feelings (e.g., "feeling very impatient with child," "being frustrated by child") were assessed with a shortened version of the Parent Feelings Questionnaire (Deater-Deckard, 2000; Knafo & Plomin, 2006). Four items were included in the scale. Cronbach's alpha was .75 (both twins were assessed with the same scale).

Negative parental discipline. Negative parental discipline was assessed with two questionnaire items adapted from a semi-structured interview ("give a smack or slap" and "telling off or shouting"; Deater-Deckard et al., 1998). This couplet of items had low internal consistency ($\alpha = .31$) at age 12 (both twins were assessed with the same scale). Despite the low internal consistency at this age, we included this measure in our analyses given the importance of indexing negative parental discipline in relation to CU traits and CP in early adolescence (Viding, Fontaine, Oliver, & Plomin, 2009; Wootton, Frick, Shelton, & Silverthorn, 1997).

Chaos in the home. The degree of chaos in the home (i.e., items reflecting disorganized, noisy household) was assessed by the parents with a short-form version of the Confusion, Hubbub, and Order Scale (Matheny et al., 1995). Cronbach's alpha was .59.

Analyses

The analyses proceeded in five steps. The first and second steps were informed by previous studies (Fontaine et al., 2008; Nagin & Tremblay, 2001). First, individual trajectory models were identified for CU traits and CP by means of general growth mixture models in Mplus (Version 4.2; L. K. Muthén & Muthén, 2007). General growth mixture models are designed to identify groups of individuals who follow distinct developmental trajectories. For each distinctive trajectory, the model defined the shape of the trajectory (e.g., high or increasing) and identified the proportion of the children belonging to each trajectory group. A series of models was fitted beginning with a one-trajectory model and moving to a six-trajectory model. Model selection was based on the Bayesian information criterion (BIC; Raftery, 1995), the Lo–Mendell–Rubin likelihood ratio test (Lo, Mendell, & Rubin, 2001), entropy (B. Muthén, 2004), and theoretical and empirical bases from previous studies (Frick, Kimonis, et al., 2003; Hawes & Dadds, 2007). We used the COMPLEX analysis option in Mplus (L. K. Muthén & Muthén, 2007) to account for the nonindependence of observations (i.e., twins). Missing data were managed through full-information maximum likelihood (L. K. Muthén & Muthén, 2007).

Second, a joint model of CU traits and CP was estimated. The separate models identified in the first step guided this analysis. One key output of a joint model is the proportion of children estimated to belong simultaneously to trajectories of CU traits and CP (e.g., children on the high CU traits trajectory and the high CP trajectory). Children were assigned to their most likely trajectory group according to posterior probabilities. Other key outputs are the two sets of conditional probabilities. The conditional probabilities obtained were (a) the probability of CP conditional on CU traits (e.g., the probability of high CP given high CU traits) and (b) the converse probability (e.g., the probability of high CU traits given high CP).

Regression analyses (with planned contrasts) were then used to evaluate between-group differences for each childhood predictor (Step 3) and each negative outcome (Step 4). These analyses were controlled for sex of the participants. We also examined sex interactions in separate analyses. Finally, we examined means and effect sizes (Cohen's *d*) of the cumulative indexes of childhood predictors and negative outcomes (Step 5). We tested five contrasts between the trajectory groups. The Results section provides a broader description and justification of the contrasts.

Results

Step 1: Identification of CU Traits and CP Trajectories

Boys had significantly higher levels of CU traits and CP at ages 7, 9 and 12 (see Table 1). Although sex differences were identified across scores on CU traits and CP, when estimated separately the trajectory models for CU traits and CP were similar for boys and girls in terms of the number and shape of the trajectories. The

Table 1
Callous–Unemotional (CU) Traits and Conduct Problems (CP) Summary Statistics

Age (years)	Total[a]				Boys[b]		Girls	
	M	*SD*	Skewness	Kurtosis	*M*	*SD*	*M*	*SD*
CU traits[c]								
7	3.47	3.13	0.67	0.13	4.07	3.16	2.94	2.77
9	3.08	3.91	0.80	0.32	3.75	3.97	2.47	3.48
12	2.69	3.13	0.95	0.69	3.33	3.23	2.14	2.63
CP								
7	0.68	1.57	2.58	7.91	0.90	1.75	0.48	1.28
9	0.54	1.86	3.02	10.93	0.78	2.22	0.32	1.21
12	0.59	1.66	2.99	10.73	0.82	1.88	0.38	1.21

[a] Children with missing data on all the childhood predictors examined in this study ($n = 225$) compared with children with at least one available data point ($n = 9{,}353$) had significantly higher levels of CU traits and CP at age 7 (CU traits: 4.06 vs. 3.46, $p < .01$; CP: 1.01 vs. 0.67, $p < .01$) and age 9 (CU traits: 3.76 vs. 3.06, $p < .05$; CP: 1.06 vs. 0.52, $p < .05$). At 12 years the CU traits scores did not differ, but CP scores did (CU traits: 2.86 vs. 2.69, $p > .05$; CP: 1.09 vs. 0.58, $p < .05$). Children with missing data on all the outcome measures included in this study ($n = 800$) compared with children with at least one available data point ($n = 8{,}778$) had significantly higher levels of CU traits and CP at age 9 (CU traits: 3.37 vs. 3.03, $p < .01$; CP: 0.67 vs. 0.51, $p < .01$) but not at age 7 (CU traits: 3.66 vs. 3.46, $p > .05$; CP: 0.73 vs. 0.68, $p > .05$). [b] Boys had significantly higher levels of CU traits and CP at ages 7, 9, and 12 ($p < .001$). [c] The correlations between CU traits at age 7 and CP at ages 7, 9, and 12 were .51, .30, and .24, respectively. The correlations between CU traits at age 9 and CP at ages 7, 9, and 12 were .32, .49, and .24, respectively. The correlations between CU traits at age 12 and CP at ages 7, 9, and 12 were .25, .23, and .49, respectively. All correlations were significant at $p < .001$.

trajectory models were therefore estimated for both boys and girls combined.

For CU traits, a four-trajectory model (i.e., stable high, increasing, decreasing, and stable low trajectories) was selected as the most parsimonious model (see Figure 1) on the basis of the empirical fit indices and correspondence with a priori expectations derived from previous empirical studies and theory precedence (Frick, Kimonis, et al., 2003; Hawes & Dadds, 2007).

Because our primary focus was the joint trajectory analyses on the different levels of CU traits given high versus low levels of CP, and because of the potential statistical concerns for modeling multiple trajectories with highly skewed variables like CP (Bauer & Curran, 2003), we selected the two-trajectory model for CP (see Figure 1).

Step 2: Joint Developmental Trajectories of CU Traits and CP

Figure 1 depicts the joint trajectory model. The four trajectories of CU traits were as follows: stable high, 4.7% sample, 19.5% girls; increasing, 7.3% sample, 33.7% girls; decreasing, 13.4%

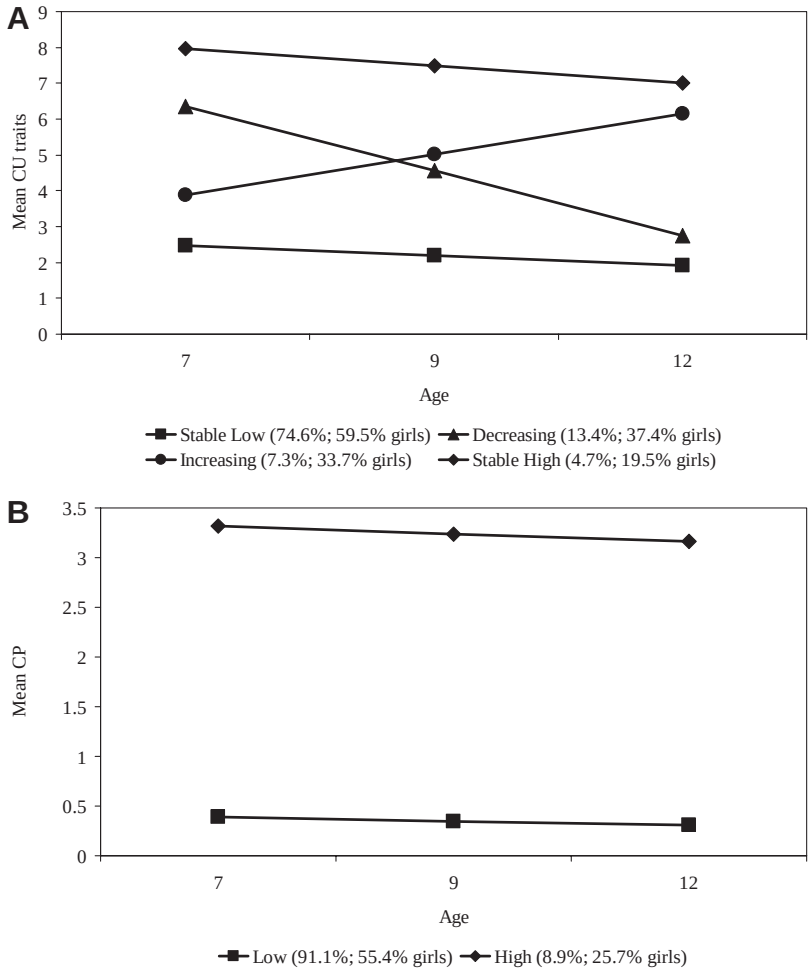

Figure 1. Developmental trajectories of callous–unemotional (CU) traits (A) and conduct problems (CP; B) between 7 and 12 years of age. For CU traits, the fit indices for the three-trajectory model were Bayesian information criterion (BIC), 98880.02; Lo–Mendell–Rubin likelihood ratio test (LMR-LRT), $p < .001$; entropy, .72; the fit indices for the four-trajectory model were BIC, 98608.76; LMR–LRT, $p < .001$; entropy, .68; and the fit indices for the five-trajectory model were BIC, 98524.31; LMR-LRT, $p < .01$; entropy, .67. Given a priori expectations derived from previous empirical studies and theory precedence (Frick, Kimonis, et al., 2003; Hawes & Dadds, 2007), a decision was made to stop at the four-trajectory model. Additional groups were mainly subdivisions of high trajectories. When performing the models using the participants with complete data (n = 2,496), the LMR–LRT rejected the three- and five-trajectory models ($p > .05$) but not the four-trajectory model ($p < .001$). For CP, the BIC steadily decreases in the one- (71763.67) to six-trajectory model (56918.71), the entropy was high for each model (>.94), but the LMR-LRT rejected the four- and six-trajectory models (ps > .05); the fit indices for the two-trajectory model were BIC, 64771.62; LMR-LRT, $p < .001$; entropy, .96. When performing the models using the participants with complete data (n = 2,496), the LMR-LRT rejected the three- and four-trajectory models (ps > .05) but not the two-trajectory model ($p < .001$).

sample, 37.4% girls; and stable low, 74.6% sample, 59.5% girls. The two trajectories of CP were as follows: high, 8.9% sample, 25.7% girls; and low, 91.1% sample, 55.4% girls.

The percentages of children estimated to belong in each joint trajectory group of CU traits and CP were the following: 74.6% (59.5% girls) low CU traits and low CP (LCU-LCP); 11.2% (38.4% girls) decreasing CU traits and low CP (DCU-LCP); 2.2% (32.6% girls) decreasing CU traits and high CP (DCU-HCP); 5.2% (34.8% girls) increasing CU traits and low CP (ICU-LCP); 2.2% (31.1% girls) increasing CU traits and high CP (ICU-HCP); and 4.4% (19.5% girls) high CU traits and high CP. Interestingly, none of the children had low levels of CU traits and high levels of CP, but a very small number of children (0.2% sample, 18.2% girls) had high levels of CU traits and low levels of CP (HCU-LCP).

Figure 2A shows the probabilities for each CP trajectory conditional on a given CU traits trajectory. Of note is the finding that children with low levels of CU traits were also certain to display low levels of CP (probability = 1). Moreover, children with high levels of CU traits were also highly likely to display high levels of CP (probability = .95). Figure 2B presents the converse sets of probabilities (i.e., each CU traits trajectory conditional on a given CP trajectory). Children with low levels of CP were also likely to display low levels of CU traits (probability = .82), but the ones with high levels of CP also had only a .50 probability to display high levels of CU traits. These findings highlight the asymmetric relationship between CU traits and CP; in other words, although high CU traits are invariably associated with CP, CP may or may not be associated with high CU traits. Additionally, Table 2 shows that all groups with high levels of CP (HCU-HCP, ICU-HCP, and DCU-HCP) had elevated levels of CP at all time points compared with the LCU-LCP. However, the degree of elevation depended on the levels of CU traits (i.e., the higher the levels of CU traits, the higher the levels of CP).

Step 3: Identifying the Childhood Predictors Associated With the Joint CU Traits and CP Trajectory Groups

Table 3 presents the prevalence of childhood predictors by trajectory group membership. Five contrasts that were informative with regard to joint development of CU traits and CP were tested to compare the trajectory groups on childhood predictors: (a) HCU-HCP versus LCU-LCP, (b) HCU-HCP versus ICU-HCP, (c) HCU-HCP versus DCU-HCP, (d) ICU-HCP versus LCU-LCP, and (e) DCU-HCP versus LCU-LCP. We did not perform contrasts with the HCU-LCP due to the small sample size (n = 22). Three main findings are evident from Table 3. First, relative to the LCU-LCP, the HCU-HCP (Column A) had a more compromised childhood background as indexed by higher rates of all child- and family-level predictors, except for emotional problems. Second, the HCU-HCP was significantly more likely to have low prosocial behaviors compared with the ICU-HCP (Column B) and to come from a family with high levels of chaos compared with the DCU-HCP (Column C). Third, the DCU-HCP (Column E) and to a

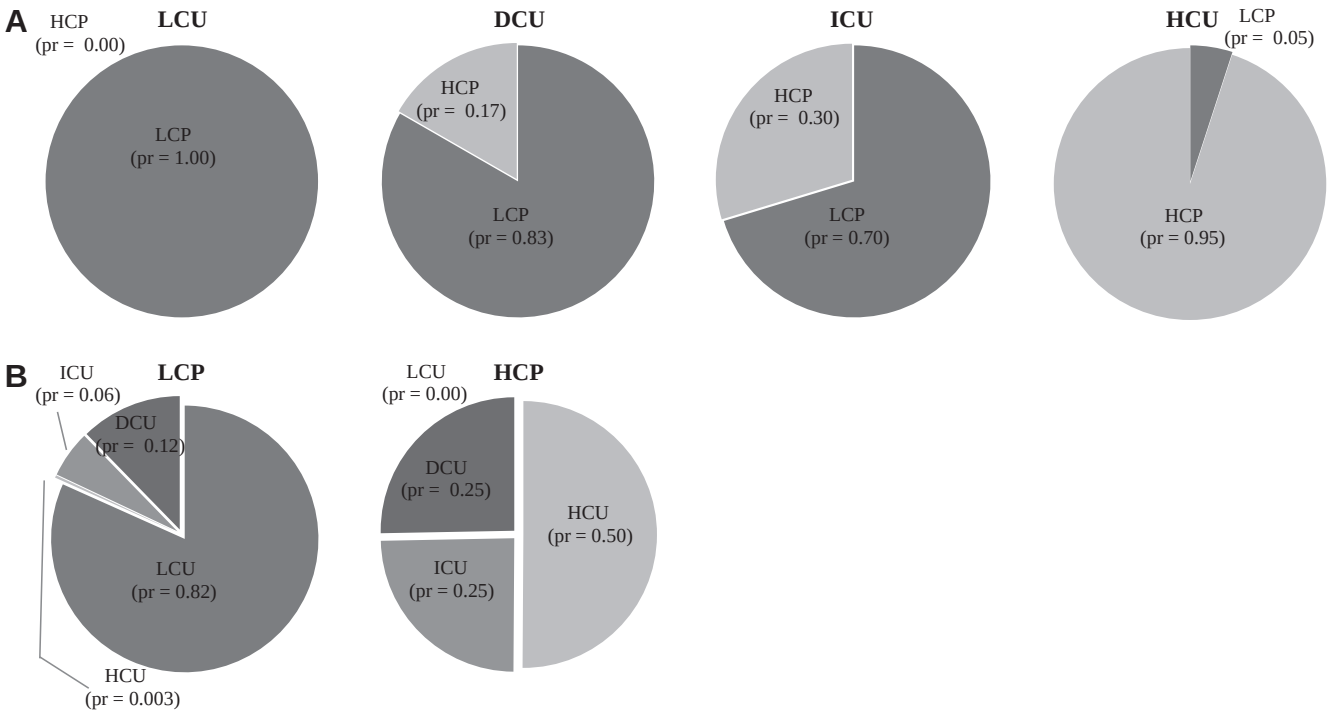

Figure 2. Probabilities of conduct problems (CP) conditional on callous–unemotional (CU) traits (A) and probabilities of CU traits conditional on CP (B). LCU = low CU traits; DCU = decreasing CU traits; ICU = increasing CU traits; HCU = high CU traits; HCP = high conduct problems; LCP = low conduct problems; pr = probability.

Table 2
Means and Standard Deviations of Callous–Unemotional (CU) Traits and Conduct Problems (CP) by Trajectory Group Membership (Between 7 and 12 Years Old)

	Trajectory group								Effect size[a]				
	HCU-HCP		ICU-HCP		DCU-HCP		LCU-LCP						
Age	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	A: HCU-HCP vs. LCU-LCP	B: HCU-HCP vs. ICU-HCP	C: HCU-HCP vs. DCU-HCP	D: ICU-HCP vs. LCU-LCP	E: DCU-HCP vs. LCU-LCP
CU traits													
7	8.00	2.25	3.54	1.34	6.89	2.08	2.51	2.11	2.52 (large)	2.41 (large)	0.51 (moderate)	0.58 (moderate)	2.09 (large)
9	7.76	3.13	4.93	2.67	4.45	2.73	2.22	2.87	1.84 (large)	0.97 (large)	1.13 (large)	0.98 (large)	0.80 (moderate)
12	7.06	2.68	6.42	1.95	2.67	1.54	1.94	2.20	2.09 (large)	0.27 (small)	2.01 (large)	2.16 (large)	0.38 (moderate)
CP													
7	3.64	2.29	2.15	1.56	4.06	1.98	0.32	0.85	1.92 (large)	0.76 (moderate)	−0.20 (small)	1.46 (large)	2.45 (large)
9	3.51	3.61	2.98	3.14	2.60	2.80	0.22	0.85	1.25 (large)	0.16 (small)	0.28 (small)	1.20 (large)	1.15 (large)
12	3.36	2.64	4.05	2.43	2.16	1.91	0.28	0.85	1.57 (large)	−0.27 (small)	0.52 (moderate)	2.07 (large)	1.27 (large)

Note. HCU-HCP = high CU traits, high CP; ICU-HCP = increasing CU traits, high CP; DCU-HCP = decreasing CU traits, high CP; LCU-LCP = low CU traits, low CP.
[a] Effect sizes (Cohen's *d*) were considered small at 0.35 or less, moderate at greater than 0.35–0.80, and large at greater than 0.80.

lesser extent the ICU-HCP (Column D) had a greater array of risk predictors, compared with the LCU-LCP.

Sex interactions were evaluated with a 2 (sex) × 2 (childhood predictor) factorial design. The interaction terms were not significant ($p > .05$), indicating that the childhood predictors did not significantly differ for boys and girls in the prediction of the trajectory group membership.

Step 4: Negative Outcomes and Joint Trajectory Groups of CU Traits and CP

Table 4 presents negative outcomes (12 years old) by trajectory group membership. The same five contrasts tested with respect to the childhood predictors were again examined. Three main findings are evident from Table 4. First, the HCU-HCP (Column A) and the ICU-HCP (Column D), relative to the LCU-LCP, had higher rates of negative outcomes at both child and family levels. Second, the DCU-HCP (Column E) also differed from the LCU-LCP on all the child- and the family-level negative outcomes (except peer problems), but less markedly. Third, the HCU-HCP had higher levels of hyperactivity problems, emotional problems, peer problems, narcissism, and impulsivity compared with the DCU-HCP (Column C). However, the HCU-HCP was differentiated from the ICU-HCP (Column B) only on one variable (i.e., peer problems).[1]

Sex interactions were evaluated with a 2 (sex) × 4 (trajectory groups: HCU-HCP, ICU-HCP, DCU-HCP, and LCU-LCP) factorial design. Significant interactions ($p \leq .05$) were identified for hyperactivity and narcissism. We interpreted within-sex and between-sex differences. Within-sex differences were found for hyperactivity. Boys and girls in the ICU-HCP were more likely than their counterparts in the LCU-LCP to have high levels of hyperactivity at 12 years of age ($OR = 14.4$, 95% CI [9.7, 21.4], $p < .001$, and $OR = 44.0$, 95% CI [25.1, 77.3], $p < .001$, for boys and girls, respectively). Between-sex differences for hyperactivity were found for LCU-LCP only. Boys in the LCU-LCP were more likely than their female counterparts to have high levels of hyperactivity at age 12 ($OR = 3.4$, 95% CI [2.7, 4.5], $p < .001$). Within-sex differences were also found for narcissism. Boys and girls in the ICU-HCP were more likely than their counterparts in the LCU-LCP to have high levels of narcissism at age 12 ($OR = 25.7$, 95% CI [16.5, 39.8], $p < .001$, and $OR = 78.4$, 95% CI

[1] Because the CU traits and CP scores and the child-level outcome measures at 12 years of age were based on teachers' ratings, there is a possibility that our findings reflect shared method variance. We selected teachers' reports on the outcome measures because teachers are familiar with a broad range of children and have expertise regarding normative child development. Better internal consistency for teacher-rated outcome measures is in line with this notion. Furthermore, studies indicate that teachers' ratings show less rater bias than typically found in parents' ratings (e.g., Nadder, Silberg, Rutter, Maes, & Eaves, 2001). However, to ensure that the associations in these analyses were not merely due to shared method variance, we examined whether similar associations would be found with the mothers' reports of the child-level outcomes. Although the strength of the associations was reduced (i.e., smaller *OR*s), the pattern of findings was maintained. This indicates that the findings were not merely due to shared method variance (data available from Nathalie M. G. Fontaine).

Table 3
Prevalence Rates of Childhood Predictors (4 Years Old) by Trajectory Group Membership (Between 7 and 12 Years Old)

						Group comparison									
		Trajectory group (% of participants)				A: HCU-HCP vs. LCU-LCP		B: HCU-HCP vs. ICU-HCP		C: HCU-HCP vs. DCU-HCP		D: ICU-HCP vs. LCU-LCP		E: DCU-HCP vs. LCU-LCP	
Childhood predictor	*n*	HCU-HCP	ICU-HCP	DCU-HCP	LCU-LCP	*OR*	95% CI[a]	*OR*	95% CI[a]	*OR*	95% CI[a]	*OR*	95% CI[a]	*OR*	95% CI[a]
Child level															
Low verbal cognitive abilities	5,956	14.9	16.4	14.5	8.7	1.6	[1.1, 2.3]	0.9	[0.5, 1.5]	1.0	[0.6, 1.8]	1.9	[1.2, 3.0]	1.6	[1.0, 2.6]
Low nonverbal cognitive abilities	6,235	13.4	12.2	14.5	8.8	1.6	[1.1, 2.3]	1.0	[0.5, 1.8]	0.8	[0.5, 1.5]	1.4	[0.8, 2.4]	1.7	[1.1, 2.8]
CP	6,435	28.2	32.7	33.1	13.3	2.3	[1.7, 3.0]	0.8	[0.5, 1.2]	0.8	[0.5, 1.1]	2.9	[2.0, 4.2]	3.0	[2.1, 4.2]
Hyperactivity	6,432	29.9	22.9	21.5	11.4	2.7	[2.1, 3.5]	1.4	[0.9, 2.2]	1.5	[0.9, 2.4]	2.0	[1.3, 3.0]	1.9	[1.2, 2.8]
Emotional problems	6,437	19.9	17.0	19.6	18.4	1.2	[0.9, 1.6]	1.3	[0.8, 2.2]	1.1	[0.7, 1.7]	0.9	[0.6, 1.5]	1.1	[0.7, 1.7]
Peer problems	6,430	28.7	23.5	30.9	19.0	1.6	[1.2, 2.0]	1.2	[0.8, 2.0]	0.8	[0.5, 1.3]	1.2	[0.8, 1.9]	1.8	[1.3, 2.6]
Low prosocial behaviors	6,438	27.6	13.7	23.9	15.8	1.6	[1.2, 2.1]	2.2	[1.3, 3.9]	1.2	[0.7, 1.8]	0.7	[0.4, 1.2]	1.4	[1.0, 2.1]
Family level															
Low SES[b]	7,334	15.9	15.0	17.4	9.4	1.9	[1.3, 2.6]	1.2	[0.7, 2.0]	1.0	[0.6, 1.6]	1.7	[1.1, 2.6]	2.0	[1.3, 3.1]
Negative parental feelings	6,467	16.2	15.1	14.4	9.8	1.6	[1.1, 2.2]	1.1	[0.6, 1.8]	1.1	[0.7, 1.9]	1.5	[1.0, 2.4]	1.4	[0.9, 2.3]
Negative parental discipline	6,478	17.9	13.5	22.6	9.1	1.9	[1.3, 2.6]	1.4	[0.8, 2.5]	0.7	[0.4, 1.2]	1.4	[0.9, 2.3]	2.6	[1.8, 3.9]
Chaos in the home	6,494	24.3	17.3	15.6	11.7	2.4	[1.7, 3.2]	1.5	[0.9, 2.5]	1.7	[1.03, 2.8]	1.5	[1.01, 2.4]	1.4	[0.9, 2.1]

Note. HCU-HCP = high callous–unemotional (CU) traits, high conduct problems (CP); ICU-HCP = increasing CU traits, high CP; DCU-HCP = decreasing CU traits, high CP; LCU-LCP = low CU traits, low CP; *OR* = odds ratio; CI = confidence interval; SES = socioeconomic status.
[a] Confidence intervals not including 1.0 indicate significance at $p \leq .05$. No formal correction was made for multiple comparisons. Analyses were controlled for sex. [b] SES was obtained from the first contact assessment (i.e., prior to the child's second birthday).

Table 4
Prevalence Rates of Negative Outcomes (12 Years Old) by Trajectory Group Membership (Between 7 and 12 Years Old)

Negative outcome	*n*	Trajectory group (% of participants): HCU-HCP	ICU-HCP	DCU-HCP	LCU-LCP	A: HCU-HCP vs. LCU-LCP *OR*	A: 95% CI[a]	B: HCU-HCP vs. ICU-HCP *OR*	B: 95% CI[a]	C: HCU-HCP vs. DCU-HCP *OR*	C: 95% CI[a]	D: ICU-HCP vs. LCU-LCP *OR*	D: 95% CI[a]	E: DCU-HCP vs. LCU-LCP *OR*	E: 95% CI[a]
Child level															
Hyperactivity	6,435	56.1	57.6	34.7	5.2	16.7	[12.8, 22.0]	0.9	[0.6, 1.3]	2.2	[1.5, 3.3]	20.8	[14.6, 29.6]	7.9	[5.5, 11.4]
Emotional problems	6,425	22.9	24.4	15.7	9.2	3.2	[2.4, 4.3]	1.0	[0.6, 1.5]	1.7	[1.03, 2.8]	3.4	[2.3, 4.9]	1.9	[1.3, 2.9]
Peer problems	6,435	33.4	23.3	11.0	7.2	5.9	[4.5, 7.8]	1.7	[1.1, 2.6]	4.4	[2.4, 7.9]	3.6	[2.5, 5.2]	1.5	[0.9, 2.5]
Narcissism	6,405	68.5	74.9	36.5	6.8	25.0	[19.1, 32.7]	0.8	[0.5, 1.2]	3.8	[2.5, 5.6]	36.9	[25.3, 53.8]	7.0	[4.9, 9.9]
Impulsivity	6,392	69.6	75.0	43.9	6.2	26.1	[19.7, 34.5]	0.7	[0.5, 1.1]	2.8	[1.9, 4.1]	40.1	[27.1, 59.3]	9.9	[6.9, 14.1]
Family level															
Negative parental feelings	6,510	24.9	20.7	16.9	9.5	2.9	[2.2, 4.0]	1.3	[0.8, 2.1]	1.6	[1.0, 2.7]	2.4	[1.6, 3.5]	1.8	[1.2, 2.8]
Negative parental discipline	6,508	46.0	51.2	42.4	28.4	1.9	[1.5, 2.5]	0.8	[0.6, 1.2]	1.2	[0.8, 1.8]	2.4	[1.8, 3.4]	1.7	[1.2, 2.5]
Chaos in the home	6,506	20.1	22.6	20.5	10.1	2.1	[1.5, 3.0]	0.9	[0.5, 1.4]	1.0	[0.6, 1.7]	2.5	[1.7, 3.7]	2.2	[1.4, 3.5]

Note. HCU-HCP = high callous–unemotional (CU) traits, high conduct problems (CP); ICU-HCP = increasing CU traits, high CP; DCU-HCP = decreasing CU traits, high CP; LCU-LCP = low CU traits, low CP; *OR* = odds ratio; CI = confidence interval.
[a] Confidence intervals not including 1.0 indicate significance at $p \leq .05$. No formal correction was made for multiple comparisons. Analyses were controlled for sex.

[39.1, 157.2], $p < .001$, for boys and girls, respectively). Between-sex differences for narcissism were found for LCU-LCP only. Boys in the LCU-LCP were more likely than their female counterparts to have high levels of narcissism at age 12 ($OR = 1.8$, 95% CI [1.4, 2.2], $p < .001$).

Step 5: Cumulative Indexes of Childhood Predictors and Negative Outcomes and Joint Trajectory Groups of CU Traits and CP

The means and corresponding effect sizes (Cohen's *d*) of the child- and family-level cumulative indexes of childhood predictors and negative outcomes are displayed in Tables 5 and 6, respectively. For the childhood predictor indices, the effect sizes were small to moderate. However, by the time the outcome data were collected, larger effect sizes were found particularly at the child level.

Discussion

In this study we have explored the development of CP and CU traits by identifying joint developmental trajectories. This has allowed us to (a) explore how CU traits and CP are related across development, (b) identify whether there are early predictors associated with different trajectories, and (c) characterize the outcomes of each trajectory at the level of child and family functioning. These findings extend our understanding of the development of CU traits and CP in four key ways.

First, these findings highlight the asymmetrical relationship between CU traits and CP in children, which is in line with the adult literature on psychopathy (Hart & Hare, 1997). Children with high levels of CU traits were highly likely to display high levels of CP; by contrast, children with high levels of CP were only moderately likely to display high levels of CU traits. This finding is consistent with a recent study in which psychopathic personality in adolescence was found to be predictive of antisocial behavior in adulthood, whereas antisocial behavior in adolescence was unrelated to subsequent psychopathic personality (Forsman, Lichtenstein, Andershed, & Larsson, 2010). Our findings are important, as they suggest that there might be a continuity of the asymmetrical relationship between psychopathic traits and antisocial behavior from childhood to adulthood. More longitudinal cohort studies are needed to better delineate the developmental association between psychopathic traits and antisocial behavior throughout the life course.

Second, we documented that only a small proportion of children followed a HCU-HCP trajectory (around 4%). Other children (around 4%) with high levels of CP had unstable levels of CU traits (increasing or decreasing pattern) from 7 to 12 years of age. This pattern of change across development highlights the fact that the levels of these traits may vary during development.

Third, to our knowledge this is the first study that has employed a group-based analysis (B. Muthén, 2004; Nagin & Tremblay, 2001) to model the joint developmental trajectories of CU traits and CP and that has examined the relationships between those trajectories and early childhood predictors as well as negative outcomes in early adolescence. This approach has robustly demonstrated that children who were in the HCU-HCP not only had more negative child- and family-level predictors at 4 years of age

Table 5
Means and Standard Deviations of the Cumulative Indices of Childhood Predictors by Trajectory Group Membership and Corresponding Effect Sizes

		Number of childhood predictors								Effect size[a]				
		HCU-HCP		ICU-HCP		DCU-HCP		LCU-LCP						
Cumulative index	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	A: HCU-HCP vs. LCU-LCP	B: HCU-HCP vs. ICU-HCP	C: HCU-HCP vs. DCU-HCP	D: ICU-HCP vs. LCU-LCP	E: DCU-HCP vs. LCU-LCP
Child level	6,438	1.65	1.54	1.38	1.36	1.59	1.61	0.97	1.37	0.47 (moderate)	0.19 (small)	0.04 (small)	0.30 (small)	0.41 (moderate)
Family level	6,511	0.74	0.99	0.60	0.86	0.67	0.83	0.40	0.84	0.37 (moderate)	0.15 (small)	0.08 (small)	0.24 (small)	0.32 (small)

Note. HCU-HCP = high callous–unemotional (CU) traits, high conduct problems (CP); ICU-HCP = increasing CU traits, high CP; DCU-HCP = decreasing CU traits, high CP; LCU-LCP = low CU traits, low CP.
[a] Effect sizes (Cohen's *d*) were considered small at 0.35 or less, moderate at greater than 0.35–0.80, and large at greater than 0.80.

Table 6
Means and Standard Deviations of the Cumulative Indices of Negative Outcomes by Trajectory Group Membership and Corresponding Effect Sizes

		Number of childhood predictors								Effect size[a]				
		HCU-HCP		ICU-HCP		DCU-HCP		LCU-LCP						
Cumulative index	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	A: HCU-HCP vs. LCU-LCP	B: HCU-HCP vs. ICU-HCP	C: HCU-HCP vs. DCU-HCP	D: ICU-HCP vs. LCU-LCP	E: DCU-HCP vs. LCU-LCP
Child level	6,434	2.50	1.44	2.55	1.21	1.41	1.36	0.35	0.76	1.87 (large)	−0.04 (small)	0.78 (moderate)	2.18 (large)	0.96 (large)
Family level	6,514	0.91	1.04	0.95	1.02	0.80	0.95	0.48	0.92	0.44 (moderate)	−0.04 (small)	0.11 (small)	0.48 (moderate)	0.34 (small)

Note. HCU-HCP = high callous–unemotional (CU) traits, high conduct problems (CP); ICU-HCP = increasing CU traits, high CP; DCU-HCP = decreasing CU traits, high CP; LCU-LCP = low CU traits, low CP.
[a] Effect sizes (Cohen's *d*) were considered small at 0.35 or less, moderate at greater than 0.35–0.80, and large at greater than 0.80.

compared with the children in the LCU-LCP, but also presented important child- and family-level negative outcomes at age 12. We would note that the HCU-HCP were characterized by poor child-level outcomes at age 12, even when compared with the DCU-HCP, suggesting that the pattern of early child-level risk factors shared by both groups is not solely responsible for accounting for the later problems displayed by the HCU-HCP. Furthermore, despite having the least family-level risk of all the HCP groups at age 4, the ICU-HCP reported equivalent levels of family-level negative outcomes to the HCU-HCP at age 12. These data suggest that we were able to capture meaningful trajectories that differ in their predictors and outcomes. In addition, our findings suggest that the trajectory groups exhibit similar relationships with the predictor and outcome variables in boys and girls (we only found within-sex differences at age 12 for hyperactivity and narcissism for the ICU-HCP vs. LCU-LCP comparison and between-sex differences for hyperactivity and narcissism in the LCU-LCP).

Fourth, a small group of children with stable high levels of CU traits and low levels of CP was found (less than 0.5%). Although this finding is interesting and potentially relevant for understanding the relationship between CU traits and CP, because only a small number of children were in this trajectory group, we did not perform any contrast analyses that included these children. Cleckley's (1976) original conceptualization of psychopathy highlighted that the core psychopathy traits can be present in individuals who do not show antisocial behavior. However, most of the existing research concerns psychopathic individuals with high levels of antisocial and criminal behavior, and research with children suggests that high levels of CU traits that are not originally accompanied with CP may nonetheless be associated with later developing CP (Frick, Cornell, Barry, Bodin, & Dane, 2003). It remains to be seen whether this is the case for our sample at a later time point. At the very least, our findings in this large community sample suggest that it is rare to have stable high levels of CU traits without having stable high levels of CP as well. Our findings also showed that none of the children with high levels of CP had consistently low levels of CU traits, suggesting that children with CP usually have elevated levels of CU traits (increasing, decreasing, or stable) compared with their peers without CP.

This study is characterized by a number of important strengths, including the use of a large population-based sample of children followed longitudinally, different raters (i.e., parents and teachers), and a group-based approach to examine the joint longitudinal development of CU traits and CP. Moreover, given that the trajectory model selection was based on theoretical and empirical bases, we were able to externally validate the trajectory groups in light of expectations regarding childhood predictors and outcomes. However, a number of limitations should also be noted. First, although our study investigated the joint developmental trajectories of CU traits and CP during an important period of childhood (i.e., between 7 and 12 years of age, where we had CU traits data), studies examining a longer period are required. Second, the assessment of CU traits was not performed with a standardized instrument. However, it is worth noting that teacher ratings on this scale have good internal consistency. Its validity has been demonstrated by positive associations with CP and hyperactivity (Viding et al., 2005, 2008; Viding, Frick, & Plomin, 2007) and by the finding that this scale can differentiate an etiologically distinct group of children with CP (Viding et al., 2005, 2008). Additionally, it has been shown that CU traits can be successfully measured with a combination of Antisocial Process Screening Device and SDQ items (Dadds et al., 2005). Third, the CU traits and CP scores and the child-level outcome measures at age 12 were based on teachers' ratings, raising the possibility that our findings were partly influenced by shared method variance. Although the strength of the associations was reduced with the mothers' reports of the child-level outcomes (i.e., smaller *OR*s), the patterns of findings were maintained, suggesting that the findings were not merely due to shared method variance. Fourth, the contrast analyses between the trajectory groups were performed with trajectory group membership (i.e., assignment to groups according to the posterior probabilities of each individual's most likely group membership). Although this approach is clinically significant, it is worth noting the potential uncertainty in trajectory assignment and the fact that individuals do not necessarily follow the predicted trajectory of their group without any variations. This emphasizes the importance of considering the trajectory groups as approximations of the developmental course of behavioral problems (Odgers et al., 2007). Fifth, our study employed a population-based sample of children from the United Kingdom. Replications are needed with groups from various backgrounds to examine the generalizability of the findings. Sixth, our study was based on a sample of twins who are known to differ from singletons in a number of ways, including increased rate of obstetric complications (Rutter, 2006). To control for this, we excluded twins with obstetric complications from our analyses. Seventh, given the small number of participants in some of the trajectory groups, notably the HCU-HCP, it was not possible to conduct reliable and meaningful genetic analyses on the trajectory group membership. Finally, as we have already highlighted, a small number of the predictor and outcome measures had low internal consistencies; the findings presented here therefore require replication.

A number of implications for intervention and prevention should be noted. Our data provide the first longitudinal evaluation of the joint development of CU traits and CP and highlight that a combination of stable high levels of CU traits and CP indexes a particularly risky developmental pathway. Our findings suggest that early identification based solely on the severity of CP may not reliably capture the children who exhibit high levels of CU traits. Our study thus highlights the importance of CU traits in identifying a particularly high-risk group within the broader population of children with CP. Our data indicate that at age 4 the children with high levels of both CU traits and CP are likely to be hyperactive, show few prosocial behaviors, and live in a chaotic home environment. This is consistent with previous studies on CU traits (Frick, Kimonis, et al., 2003; Lynam et al., 2008; Pardini et al., 2007; Vizard, Hickey, & McCrory, 2007). For example, a study reported increased mental health problems, experiences of childhood abuse, and poor boundary setting in the parents of children with CU traits, all factors consistent with a chaotic family environment (Vizard et al., 2007). The findings reported here contribute to an emergent picture of early factors that can inform clinical estimations of risk at the toddler stage and guide intensive systemic interventions for this age group.

In middle childhood, our data indicate that many children with CP have levels of CU traits that are unstable (decreasing or increasing). Children with increasing levels of CU traits from ages 7 to 12 (ICU-HCP) fare particularly badly in terms of outcomes.

They notably had levels of poor family functioning comparable to those children with a high stable pattern of CU traits (HCU-HCP). In view of the potential malleability of these CU traits and their possible amelioration by treatment (Hawes & Dadds, 2007; Kolko et al., 2009; Salekin, 2002), it is sensible that children with elevated CU traits in middle childhood should be targeted for systemic and child-based interventions.

Delineating more precisely the developmental association between CU traits and CP requires longitudinal cohort studies that provide comprehensive measurement of child, family, school, and peer factors. The findings presented here contribute to a growing evidence base that points to the utility of considering CU traits as a possible subtyping index or additional symptom dimension of conduct disorder for the forthcoming fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (Moffitt et al., 2008).

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