

High-Quality Foster Care Mitigates Callous-Unemotional Traits Following Early Deprivation in Boys: A Randomized Controlled Trial

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Objective: Callous-unemotional (CU) traits in childhood are a developmental precursor to psychopathy, yet the origins and etiology of CU traits are not known. We examined CU traits among 12-year-old children exposed to severe early deprivation and evaluated whether a high-quality foster care intervention mitigated the development of high levels of CU traits.

Method: Participants were from the Bucharest Early Intervention Project, a randomized controlled trial of foster care for children in institutions. Children were recruited from institutions in Bucharest, Romania, along with age- and sex-matched children who were never institutionalized. Children raised in institutional settings were randomized (mean_{age} = 22 months) to either a foster care group (n = 68) or a care-as-usual group (n = 68). CU traits were assessed at age 12.75 years in available participants from the randomized trial (n = 95) and children who were never institutionalized (n = 50).

Results: Children who experienced institutional rearing as young children had significantly higher levels of CU traits in early adolescence compared to children who were

never institutionalized. Intent-to-treat analysis indicated that, among boys, CU traits were significantly lower among those who received the foster care intervention compared to those randomized to care as usual. Caregiver responsiveness to distress, but not caregiver warmth, mediated the intervention effect on CU traits in boys.

Conclusion: These findings provide the first evidence to date that psychosocial intervention can prevent the onset of CU traits. Although severe early deprivation predicted higher levels of CU traits, high-quality foster care that emphasized responsive caregiving reduced the impact of deprivation on CU trait development for boys.

Clinical trial registration information: The Bucharest Early Intervention Project; <http://clinicaltrials.gov>; NCT00747396.

Key words: callous-unemotional traits, early adversity, prevention, deprivation, foster care

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Psychopathy is characterized by callous interpersonal interactions and a lack of guilt and empathy¹ and is associated with significant societal costs.² Identifying developmental antecedents of psychopathy that could be targeted with preventive interventions,³ therefore, is of considerable interest. Callous-unemotional (CU) traits can be reliably measured in childhood and predict adult psychopathy.⁴ The development of CU traits has been linked to both genetic and environmental risk factors.^{5,6} Exposure to early-life psychosocial deprivation (neglect), in particular, is postulated as 1 pathway to the development of CU traits and psychopathy, as the lack of an available and responsive caregiver early in life may disrupt experience-expectant socialization processes related to emotional empathy development.⁷⁻⁹

The challenges that CU traits and psychopathy pose for intervention³ and the enormous societal costs associated with antisocial behavior make it imperative to develop strategies for preventing the onset of CU traits in those at increased risk. Given the association between CU traits and institutional rearing,⁸ as well as the association between poor caregiving quality and CU traits,¹⁰ we examined whether an intervention designed to improve caregiving quality in children who had experienced institutional rearing mitigated the development of high levels of CU traits. To investigate the development and possible prevention of CU traits in deprived children, we used data from the Bucharest Early Intervention Project (BEIP), the only randomized controlled trial (RCT) of foster care for young children reared in institutions—an extreme case of psychosocial deprivation. The study began in 2001 and has assessed children from infancy through age 12 years. We hypothesized that children exposed to institutional rearing would have higher levels of CU traits than those never institutionalized, consistent with previous work indicating that poor caregiving environments may be a risk factor for CU trait development; and that children who were institutionalized and then randomized to a high-quality foster



This article is discussed in an editorial by Dr. Joan L. Luby on page 972.



Clinical guidance is available at the end of this article.

care intervention would exhibit lower levels of CU traits compared to those randomized to a care-as-usual condition. In addition, although CU traits are often seen as a subset of severe externalizing problems and are included as a disorder specified for conduct disorder (CD) in the *DSM-5*,¹¹ prior work has questioned whether there is an association between CU and externalizing disorders in adolescents with a history of institutional care. Therefore, an additional study aim was to examine the association of CU traits with externalizing psychopathology. Previously, we demonstrated a reduction in externalizing psychopathology for BEIP children randomized to foster care,¹² which was limited to boys. Relatedly, sex differences have been shown to be important in CU trait etiology and trajectories.¹³ Thus, we evaluated the presence of sex differences in the prevention of high levels of CU traits. In addition, we identified 2 caregiving domains that were specifically targeted for improvement by the foster care intervention as possible mediators of intervention effects. Responsive caregiving is strongly linked to moral development,¹⁴ and given that caregiver warmth and responsiveness to child distress represent distinct components of responsiveness,^{15,16} we examined each as potential active ingredients of the foster care intervention.

METHOD

Study Design and Participants

Participants were 145 children who were assessed at a mean age of 12.75 years (*SD* = 0.61 year) as part of the BEIP study.¹⁷ Of the original 136 BEIP children raised in institutions, 95 were included in

this follow-up (70%) (Figure 1). Originally, children who had been abandoned at birth and placed in state-run institutions were evaluated and then randomized to a care-as-usual group (CAUG) or a foster care group (FCG). At age 12 years, these intent-to-treat (ITT) groups comprised 47 children (26 boys and 21 girls) in the CAUG and 48 children (24 boys and 24 girls) in the FCG. Additional details about the original sample are available elsewhere.¹⁷ A total of 50 Romanian children (21 boys and 29 girls) recruited from schools in Bucharest comprised a typically developing comparison group, designated as the never-institutionalized group (NIG). Children with incomplete CU traits measurements (*n* = 4) and/or full-scale IQs below 50 or no completed IQ assessment (*n* = 15) were excluded from the present study.

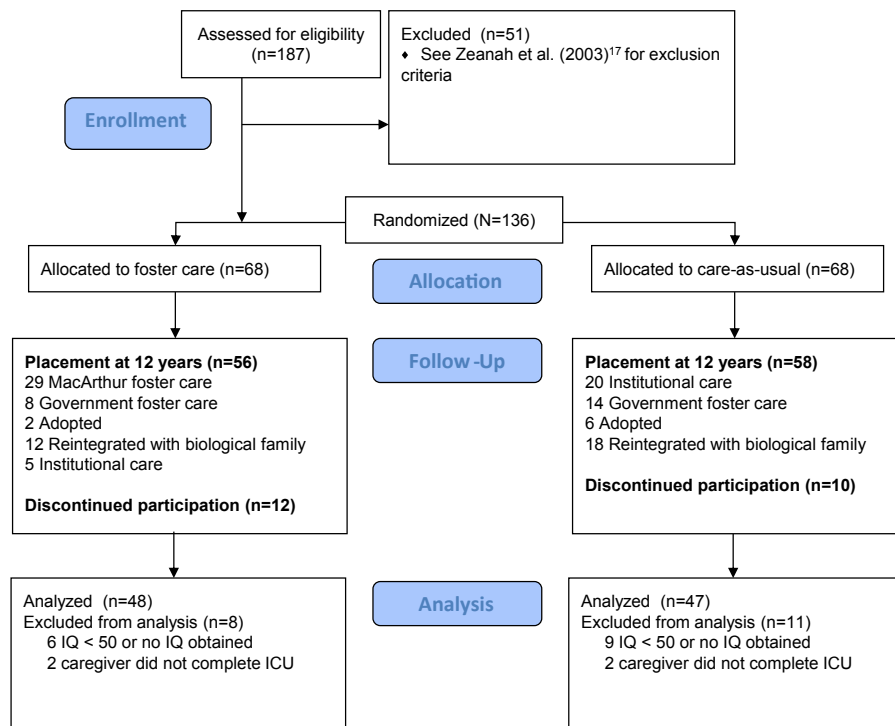
Intervention

Because foster care was extremely limited in Bucharest at the outset of the study, the investigators, with Romanian collaborators, created a foster care network.^{17,18} The foster parents were supported by BEIP social workers who received regular consultation from US clinicians. After advertising and subsequent screening, 56 foster families were selected to care for 68 children. Described more fully elsewhere,¹⁸ the foster care intervention was designed to be affordable, replicable, and grounded in findings from developmental research on enhancing caregiving quality. Importantly, a child-centered approach was emphasized, encouraging foster parents to meet the child's physical and psychological needs.

Procedure

Following a baseline assessment, children were randomly assigned to the CAUG or FCG. Because all decisions about subsequent placements were made by Romanian child protection authorities,

FIGURE 1 Group status in early adolescence for children living in Romanian institutions who were assigned to usual care or foster care (Consolidated Standards of Reporting [CONSORT] diagram). Note: ICU = Inventory of Callous-Unemotional Traits.



and because, over time, policies about the care of children in institutions changed, in the years following randomization, some children were adopted within Romania, some were returned to the parents who had abandoned them, some were placed in government foster care not originally available, and some were later readmitted to institutions because of serious behavior problems (Figure 1). Participants were assessed at ages 30, 42, and 54 months. At that point, the RCT concluded, and the local governmental authorities assumed management of the foster care network. Follow-ups have been conducted at ages 8 and 12 years.

Caregiving. The Observational Record of the Caregiving Environment (ORCE) was used to rate caregiver warmth and caregiver responsiveness to child distress. The ORCE was originally developed by the National Institute of Child Health and Human Development Early Child Care Research Network to assess caregiving quality within childcare settings.¹⁹ In the present study, children and their caregivers were videotaped during naturalistic interactions in their “home” environments at age 30 and 42 months. For children living with biological parents or foster parents, the mother was coded interacting with the child. For children living in institutions, an institutional caregiver who worked with the child regularly and knew the child well was coded interacting with the child. Trained coders rated dyads on positive regard for the child (e.g., warmth, acceptance, and respect for the child) and caregiver responsiveness to distress (e.g., speaking sympathetically, hugging, or holding the child) to obtain scores from “1” (not at all characteristic) to “4” (very characteristic) on caregiver warmth and responsiveness to distress, respectively.

CU Traits. We administered the Inventory of Callous-Unemotional Traits²⁰ (ICU) by interview to each child’s primary caregiver to obtain a measure of the child’s CU traits. This 24-item scale asks caregivers to rate each item from a scale of 0 to 3, and provides a comprehensive assessment of CU traits. The ICU was translated into Romanian, back-translated into English, and assessed for meaning at each step by bilingual research staff. For children living with biological parents or foster parents, 1 parent reported on the child’s behavior. For children living in institutions, an institutional caregiver who worked with the child regularly and knew the child well reported on the child’s behavior. The ICU had good inter-item reliability within the sample ($\alpha = 0.85$), and the total score was used as the measure of CU traits. A cutoff approach was used to identify individuals with very high levels of CU traits using a score of 36 or higher, which was 2 standard deviations from the mean in a community sample of similar-aged adolescents²¹ and also fell at the 90th percentile in this sample.

CD and Oppositional Defiant Disorder. We administered the computerized Diagnostic Interview Schedule for Children, 4th Edition (DISC-IV)²² to each caregiver to ascertain DSM-IV²³ diagnostic criteria for CD and oppositional defiant disorder (ODD) within the past year during the 12-year follow-up assessment. This structured interview probes symptom levels, duration/persistence, age of onset, and functional impairment. As with the ICU, the DISC was translated into Romanian, back-translated into English, assessed for meaning at each step by bilingual research staff, and administered to the child’s caregiver.

Study Oversight

Following approvals by the institutional review boards of the 3 principal investigators (C.H.Z., N.A.F., C.A.N.), and by the local Commissions on Child Protection in Bucharest, the study commenced in collaboration with the Institute of Maternal and Child Health, the Romanian Ministry of Health. A data safety monitoring board in Bucharest reviewed the assessments for the current follow-up. Consent was obtained and signed for by each

child’s legal guardian as per Romanian law. Assent for each procedure was obtained from each of the children. Ethical considerations are discussed in some detail elsewhere.^{22,23}

Statistical Analysis

First, we compared CU traits in children who had ever been institutionalized and those who had never been institutionalized. Second, in the children with histories of institutional rearing, we examined the associations between the measures of CU traits with CD and ODD, measured dimensionally and using diagnostic status. Third, we used an ITT approach to compare CU traits in children randomly assigned to the FCG or the CAUG. Comparisons for the continuous measure of CU traits were examined using the general linear model, with Cohen’s *d* effect sizes and 95% CIs. Binary logistic regression was used to obtain odds ratios using the a priori ICU cutoff score. Moderation and moderated mediation models were tested using a bootstrapping mediation method with 1,000 resamples using SPSS software²⁴ with 95% bias-corrected and accelerated CIs. A 95% CI for the indirect effect that does not include 0 is considered statistically significant.²⁴ All tests were 2-tailed.

RESULTS

Table 1 lists descriptive statistics for the variables of interest by institutional care history, ITT groupings, and sex.

CU Traits by History of Institutional Care

CU traits were examined as a function of institutional care history by comparing children with and without a history of institutionalization using univariate analysis of variance, controlling for participant sex. Consistent with our prediction, children who experienced institutional rearing had higher levels of CU traits than the NIG ($F_{1,142} = 12.18, p < .001, d = 0.62, 95\% \text{ CI} = 0.26\text{--}0.96$). No main effect of sex was found on CU traits ($F_{1,142} = 1.15, p = .29, d = -0.17, 95\% \text{ CI} = -0.50 \text{ to } 0.15$), and the group-by-sex interaction was not significant ($F_{1,141} = 0.11, p = .75$). Using the binary approach, and after controlling for sex, institutional care history did not reach significant significance as a predictor of high CU (Wald $\chi^2[1] = 2.69, p = .10$).

Association of CU Traits With Externalizing Disorders

Within the ever-institutionalized group (EIG), we examined the bivariate correlation between CU traits, measured dimensionally, with symptom counts of CD and ODD, as well as the association between the binary CU cutoff and meeting diagnostic criteria for CD and ODD. Bivariate correlations indicated a moderate positive association with both CD and ODD symptoms ($r_{93} = 0.54, p < .001$ and $r_{93} = 0.55, p < .001$, respectively). Furthermore, using a binary approach also indicated significant association between falling above the CU cutoff and meeting diagnostic criteria for CD ($\chi^2[1] = 7.85, p = .005$) and ODD ($\chi^2[1] = 8.29, p = .004$). One half (50%) of those with a CD diagnosis and one third (33%) of those with an ODD diagnosis fell above the high CU cutoff.

CU Traits by Foster Care Intervention

A *t* test was used to examine the effect of the high-quality foster care intervention on CU traits for the FCG and CAUG using an ITT approach. The FCG did not have

TABLE 1 Descriptive Statistics of Callous-Unemotional (CU) Traits and Caregiving Qualities by Group and Sex

	NIG		EIG		FCG		CAUG		Group Differences ^a
	Boys (n = 21)	Girls (n = 29)	Boys (n = 50)	Girls (n = 45)	Boys (n = 24)	Girls (n = 24)	Boys (n = 26)	Girls (n = 21)	
CU traits	17.87 (7.96)	16.90 (7.86)	24.20 (10.89)	22.16 (9.15)	EIG boys > NIG girls, 20.38 (9.39)	22.42 (8.11)	27.74 (11.14)	21.86 (10.41)	CAUG boys > CAUG girls, FCG boys
Above CU cutoff, n (%)	1 (5)	1 (3)	9 (18)	4 (9)	EIG boys > NIG girls	1 (4)	8 (31)	3 (14)	CAUG boys > CAUG girls, FCG boys
Caregiver warmth	2.68 (0.64)	2.57 (0.76)	2.53 (0.57)	2.53 (0.74)	—	2.70 (0.64)	2.38 (0.46)	2.21 (0.66)	FCG girls > CAUG boys, CAUG girls
Caregiver responsiveness to distress	2.45 (0.82)	2.65 (0.68)	2.54 (0.67)	2.50 (0.78)	—	2.72 (0.75)	2.38 (0.75)	2.31 (0.68)	—

Note: Data are shown as mean (SD) except where noted. CAUG = carecasual group; EIG = ever-institutionalized group; FCG = foster care group; NIG = never-institutionalized group. ^aGroup differences were determined using pairwise comparisons following 4-group categorical coding and least significant differences post hoc test at $p < .05$.

statistically significantly lower CU traits than those randomized to the CAUG ($t_{93} = -1.81, p = .073, d = -0.37, 95\% \text{ CI} = -0.77 \text{ to } 0.04$). Using the CU cutoff, however, the groups significantly differed (Wald $\chi^2[1] = 6.01, p = .014$). For a CAUG child, the odds of being above the CU cutoff were 7.20 times greater than the odds for an FCG child being above the cutoff (95% CI = 1.49–34.90).

Child’s Sex as a Moderator

We examined whether the strength of the association between the intervention and CU traits was moderated by the child’s sex. Using a simple, single-step moderation analysis, we found a group-by-sex interaction ($F_{1,91} = 3.82, p = .05$). Examining the conditional effect of the intervention separately by sex revealed that among girls, the intervention effect was not significant (Estimate [Est.] = 0.56, SE = 2.94, $p = .85, 95\% \text{ CI} = -5.28 \text{ to } 6.40$). In contrast, among boys, there was a robust negative association between the foster care intervention and CU traits (Est. = -7.36, SE = 2.79, $p = .01, 95\% \text{ CI} = -12.89 \text{ to } -1.83$). A t test conducted within boys indicated a large ITT effect within this group ($t_{48} = -2.52, p = .015, d = -0.71, 95\% \text{ CI} = -1.27 \text{ to } -0.13$). This pattern was also found using the CU cutoff, such that the intervention was a significant predictor of low CU traits among boys (Wald $\chi^2[1] = 4.62, p = .028$). For a CAUG boy, the odds of being above the CU cutoff were 10.82 times larger than the odds of an FCG boy being above the cutoff (95% CI = 1.23–94.92).

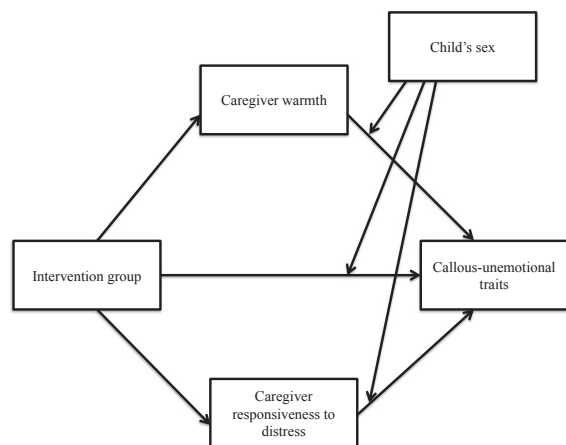
Mediation Analyses

To examine potential mediators of the intervention on CU traits, we tested a multiple mediation model of the intervention and CU traits at age 12 years with 2 caregiving domains, namely, caregiver warmth and responsiveness to child distress (Figure 2). Given that sex moderated the association between the intervention and CU traits, child’s sex was added to the model as a potential moderator of the indirect effect of each caregiving quality domain considered simultaneously. The results showed no evidence of an indirect effect of caregiver warmth at 42 months in either girls or boys (Est. = -0.73, SE = 1.54, 95% CI = -4.03 to 2.32 and Est. = 2.30, SE = 1.92, 95% CI = -0.55 to 7.45, respectively). There was, however, a significant robust indirect effect for caregiver responsiveness to distress at 42 months in boys (Est. = -2.88, SE = 1.59, 95% CI = -7.40 to -0.59), but not in girls (Est. = -0.17, SE = 0.88, 95% CI = -1.73 to 1.95). Parallel analyses using caregiving quality at age 30 months did not yield significant mediation for either caregiver warmth or responsiveness to distress.

Timing of Foster Care Placement

We examined whether age when the child was placed in the BEIP-sponsored foster care was a predictor of CU traits. No association between placement age and CU traits was found (Wald $\chi^2[1] = 0.01, p = .93$). In addition, age of placement did not interact with sex to predict CU traits in the foster care group.

FIGURE 2 Proposed multiple mediation of caregiver warmth and caregiver responsiveness to distress as mediators of the association between intervention group and callous-unemotional traits, moderated by child's sex.



DISCUSSION

As predicted, we found higher levels of CU traits in children who experienced severe deprivation compared to children who had never been institutionalized. CU traits were recently studied in relation to conduct disorder in a sample of previously institutionalized Romanian children adopted into families in the United Kingdom,²⁵ but no comparison was made between those with prior institutional care and individuals who were never institutionalized. Nevertheless, psychosocial deprivation has been found by others to be associated with psychopathy or CU traits in a number of populations.^{6,26-28} Thus, our findings are consistent with other work demonstrating psychosocial deprivation as a risk factor for CU traits, but also extend previous research through the use of an RCT to causally examine the effect of a high-quality foster care intervention on CU traits.

Importantly, we report that high-quality foster care mitigated the development of high CU traits in 12-year-old children with a history of severe deprivation in early life. Although the intervention effect was limited to boys, this is the first demonstration that high CU traits can be prevented in children. Individual differences in CU traits are thought to be at least moderately heritable,⁵ but environmental contributions to high levels of CU trait development are supported by several observational studies linking experiences of childhood maltreatment to psychopathy and related constructs.^{6,8,9} Given the potential for gene-by-environment interactions, it is possible that the intervention mitigated heritable risk for high levels of CU. With nearly 700,000 victims of child maltreatment in the United States in 2013,²⁹ and the enormous societal costs of psychopathy,² these results provide an urgent impetus for intervening early with children who have experienced psychosocial deprivation.

Lack of responsive caregiving is a notable characteristic of institutional settings as well as children who are psychosocially neglected.³⁰ Given the established connection of

caregiver responsiveness to distress and caregiver warmth to empathy development,^{15,31} we examined 2 aspects of responsive caregiving as potential active ingredients in the foster care intervention that might reduce the subsequent likelihood of developing high levels of CU traits. Previously, we found that children in the FCG experienced significantly higher caregiving quality compared to children in the CAUG at both 30 and 42 months of age.³⁰ Here, we observed that increased caregiver responsiveness to child distress, specifically, explained the effect of the intervention in predicting lower levels of CU traits in boys. Responsiveness to child distress is conceptually distinct from parental warmth, and although responsiveness to distress and warmth are both important for socialization,¹⁶ caregiver responsiveness to distress may be more specifically linked to empathy,¹⁵ and greater responsiveness to distress is associated with greater social competence³² and self-regulation³³ in children. Our findings add to a growing body of literature indicating that these aspects of positive parenting represent different socialization domains and require different skills.^{15,34}

Foster parents in the BEIP intervention were encouraged to meet both the physical and psychological needs of their children,¹⁸ which may be a model for improving extant foster care that too often fails to meet children's needs beyond instrumental care (e.g., food, shelter, clothing).³⁵ Increases in caregiver responsiveness to distress, rather than warmth—which was also found at higher rates in the intervention group's interactions with their primary caregivers—appears to be responsible for the positive outcomes in CU traits observed in this intervention. This finding may inform current recommendations to target parental warmth in efforts to reduce levels of CU traits.³⁶

Why the intervention was effective in mitigating the level of CU traits in boys but not girls is not clear, although it parallels findings that this high-quality foster care intervention reduced externalizing symptoms in boys but not girls at age 12 years.¹⁰ Correlational work has found a stronger association between maternal sensitivity and internalizing symptoms at age 3 years for boys than for girls,³⁷ indicating that boys may be more influenced by differences in caregiver sensitivity. Sex differences have also been found for CU traits, of which boys often have higher levels than girls.^{13,38} In this sample of children, however, there were no sex differences at age 12 years in regard to CU traits. Although sex differences have been noted in the heritability and trajectory of CU traits and psychopathy,^{13,39} previous research has not examined potential sex differences in intervention effectiveness on CU traits.⁴⁰⁻⁴²

An additional finding of interest was the moderate and positive levels of agreement between CU traits and both dimensional and diagnostic measures of externalizing psychopathology. Findings from the English and Romanian Adoption Study²⁵ indicated that high levels of CU traits were not significantly associated with CD, leading the authors to speculate that psychopathy exists outside the context of CD and should be diagnosed independently. It should be noted, however, that their study did find a

significant association between CU traits and ODD. Our findings of a significant association are in line with work regarding CU in noninstitutionalized samples in which CU is correlated with, yet still separable from, CD and ODD.⁴³ Delineating the role of CU in relation to traditional conceptualizations of psychopathology remains an important area for future research.

Several limitations of the current study should be acknowledged, including the use of a single time point and reporter to measure CU traits. Measuring initial levels of CU as well as the trajectory of CU traits over time would bolster findings of the effect of the caregiving environment on CU changes longitudinally. In addition, given that there are no normed scores or cutoffs for the ICU, our cutoff was based on an empirically determined cut-point (2 SDs above the mean) provided from a study using a community sample of individuals 13 and 14 years old.²¹ Although this bolsters the likelihood that the high levels of CU observed in our sample are clinically meaningful, we are unable to compare the results directly to other populations using different cut-points. Future work would benefit from the use of multimodal/multiple informant approaches in the assessment of level of CU traits, as well as in the identification of potential biomarkers for CU in this population of children with a history of institutional rearing. In addition, our approach focused on caregiving quality measured most proximally (age 42 months) to the assessment of CU traits (age 12 years). It may be that the role of caregiver responsiveness to distress at this age is particularly important, as follow-up tests indicated that the same models of caregiving quality at age 30 months did not demonstrate the same indirect effect of caregiver responsiveness to distress in mediating the association between the intervention and CU traits at age 12 years in boys. Further examinations of the role of potential sensitive periods for caregiving quality remain essential, although our age of placement analyses did not indicate that exposure to a foster family at specific ages predicted levels of CU. Finally, although participants were randomized into the FCG and CAUG, it is unclear whether the groups differed at baseline in genetic risk for CU traits, or whether the caregivers for children in each group may differ in their perceptions of CU traits, given the

different commitment levels that may have existed between the informants and the children. It is possible that differences between the caregiver reporters in each group may provide an alternative explanation for the findings, such that foster caregivers may be less willing to indicate that their child has high levels of CU than would a caregiver who has less commitment.

In conclusion, the results of this RCT support the benefit of a high-quality foster care intervention in mitigating high levels of CU traits in boys exposed to severe psychosocial deprivation associated with institutional rearing. Given the public health concerns associated with psychopathy, effective preventive interventions early in life are essential. Our results point to the importance of one specific component of the intervention—namely, encouraging sensitive responding to children's distress—as responsible for CU trait reduction. Clinical interventions to enhance sensitive and responsive parenting, particularly for children who experienced deprivation in early life, may be effective in the prevention or reduction of CU traits. *ε*

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CG Clinical Guidance

- We found higher levels of callous-unemotional (CU) traits, a precursor to psychopathy, in 12-year-old children with histories of institutional rearing compared to children who had never been institutionalized.
- Removing children from institutions and placing them in high-quality foster care at an average of 22 months led to significant reductions in CU traits at age 12 in boys but not in girls with histories of institutional rearing.
- Interventions promoting caregiver responsiveness to distress might be an effective intervention strategy for preventing the onset of CU traits, particularly for boys.

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