



Maternal emotional intelligence and negative parenting affect are independently associated with callous-unemotional traits in preschoolers

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Abstract

Deficits in emotion intelligence (EI) are a key component of early-childhood callous-unemotional (CU) traits. Children's EI may be influenced by their mother's EI through both familial genetic and environmental mechanisms; however, no study has directly tested the role of maternal EI in the development of CU traits. This study investigated whether maternal EI had a direct relationship with children's CU traits when controlling for the potential influence of parenting affect and other psychiatric diagnoses. Mothers and their 3- to 5-year-old preschoolers ($N=200$) were recruited as part of a parent-child interaction—emotion development therapy treatment trial for preschool clinical depression and comorbid psychopathology. Using data collected prior to treatment, regression models tested whether maternal EI was related to children's CU traits, which specific aspects of maternal EI were most strongly associated with CU traits, and whether associations held after accounting for observed parenting affect. Maternal EI ($p < 0.005$), specifically the ability to understand others' emotions ($p < 0.01$), was significantly associated with children's CU traits. This relationship was specific, as maternal EI did not predict depression or oppositional defiant disorder. Both maternal EI and observed negative parenting affect were independently and significantly related to CU traits ($p < 0.05$) in a combined model. Given that maternal EI and observed negative parenting affect were independent predictors of CU traits in preschoolers with comorbid depression, findings suggest that current treatments for CU traits that focus solely on improving parenting could be made more effective by targeting maternal EI and helping mothers better model emotional competence.

Keywords Callous-unemotional traits · Early childhood · Maternal factors · Parenting · Emotional intelligence

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Introduction

Callous-unemotional (CU) traits, defined by deficits in empathy, prosociality, and guilt, are highly associated with disruptive behavior problems and cause significant harm to children, families, and societies [1, 2]. Although much of the developmental research on CU traits has focused on school-aged children and adolescents, CU traits can be reliably measured as early as 3 years old [3]. Importantly, by age 3, CU traits are distinguishable from oppositional defiant disorder (ODD) symptoms and attention-deficit behaviors [4] and uniquely predict risk for later behavior problems [5]. Children with high CU traits also appear to be less responsive to parent-child interaction treatments when they are identified later in childhood [6], underscoring the importance of identifying early risk factors for CU traits. The goal of this study was to investigate a novel early risk factor for

CU traits, maternal emotional intelligence, to inform preventative interventions and treatments for CU traits in children with comorbidities.

Emotional intelligence (EI), or the ability to think constructively about emotions and utilize emotional reasoning, has been strongly linked to CU traits [7, 8]. The construct of EI has been further categorized into four subcomponents: emotion recognition, emotion-based cognition, emotion understanding, and emotion regulation [9]. Children with high CU traits have particular deficits in recognizing and understanding emotions, with documented difficulty recognizing others' negative emotions, especially fear and sadness [7]. Relatedly, they also show reduced affect sharing, which limits their ability to understand another's distress [2]. Importantly, EI deficits emerge early as evidenced by studies showing children with high CU traits display impaired recognition of fearful faces by age 3 [8] and robust attentional deficits to others' emotional distress cues on the dot probe task in preschool [10].

Despite evidence that children with high CU have early-emerging EI deficits, no study has examined whether maternal EI predicts young children's CU traits. Behavioral genetic studies support that EI, as well as CU traits themselves, may be moderately to highly heritable [11, 12]. Moreover, maternal EI deficits may impact children's CU traits because young children learn emotion recognition skills and emotion understanding through both explicit and indirect parental emotion socialization processes [13]. Identifying maternal EI deficits as an early risk factor for children's CU traits would be critical, as maternal EI is measurable prior to children's symptom onset and could be a novel and specific early intervention target.

A wealth of empirical evidence has also shown that early-childhood CU traits are predicted by both negative (ex., harshness) and positive (ex., warmth) parenting dimensions [14, 15]. Indeed, it has been proposed that negative parenting fosters CU traits through modeling aggression and impeding the internalization of parent socialization, whereas a lack of positive parenting is thought to impair the development of empathy, prosocial behavior, and guilt [16]. However, although parenting practices and affect are a well-documented predictor of young children's CU traits, the role of maternal EI in these associations remains unstudied. There are a couple possibilities for how maternal EI, parenting practices, and child CU traits could be related. First, maternal EI might predict children's CU traits through a separate mechanism than parenting practices and thus both may be independently associated with CU traits. Alternatively, maternal EI could impact child CU traits indirectly via its influence on parenting. While studies have not directly examined this possibility, one study found

that mothers of children with higher CU traits had parenting styles that were more dismissive of their children's emotions and less accepting of emotional expression—parenting practices that could be underpinned by EI deficits [17]. Either of these explanations would point to targeting maternal EI in addition to parenting practices during therapeutic interventions [6].

The purpose of this study was to examine whether maternal EI was associated with preschoolers' CU traits and parenting in a clinical sample of children with depression and multiple other forms of psychopathology. Research increasingly supports the existence of two CU subtypes—primary and secondary CU, marked by lower and higher levels of anxiety, respectively [18]. Children with secondary CU traits experience higher rates of harsh parenting [19, 20] and depression [19, 20]. However, there is less research on CU traits in the context of depression itself. Existing studies are mixed, with some studies finding that CU traits may be associated with less depression [21], and other studies documenting greater depressive symptoms in children with elevated CU traits [22, 23]. An emerging body of research has begun to examine CU traits in samples of young children with depression. Studies have found that CU traits in preschoolers with comorbid depression predict conduct problem severity and substance use in early adulthood [24] and moderate treatment response in parent–child interaction therapy [25]. These studies, as well as the current study, are highly representative of preschoolers who typically present to clinical settings and often have more than one psychiatric disorder. For example, in a large sample of 4-year-olds, 77% of children with depression and 65% of children with ODD had multiple psychiatric diagnoses [26]. Knowledge about specific, early risk factors for CU traits in a comorbid population is critical since children with more than one psychiatric illness are at-risk for particularly poorer outcomes [27].

The current study explored two related research questions in an ecologically valid sample. First, we examined whether maternal EI predicted children's CU traits. We also examined whether specific subcomponents of maternal EI were responsible for any observed associations. Since CU traits are associated with deficits in the domains of perceiving and understanding emotions, we hypothesized that maternal EI in these specific domains would be associated with CU traits. Next, we examined whether maternal EI significantly related to children's CU traits when parenting was included in the model. Understanding the specific relationships between maternal EI, parenting, and children's CU traits in a clinical sample is critical because it informs novel early intervention targets in a young, psychiatrically ill population with comorbidities.

Methods

Participants

Participants were a subset of 3- to 6-year-old children recruited from preschools, primary care facilities and mental health clinics in the St. Louis metropolitan area for participation in a psychotherapy treatment study of Parent Child Interaction Therapy Emotion Development (PCIT-ED) with their caregivers (> 90% mothers). The Preschool Feelings Checklist (PFC) was used to identify preschoolers with depressive symptoms. Children with elevated PFC scores (≥ 3) without autism spectrum disorder or neurological disorders were invited to the lab for a comprehensive assessment. Children that met criteria for MDD or MDD not otherwise specified based on the Kiddie Schedule for Affective Disorders and Schizophrenia—Early Childhood (K-SADS-EC; [28]) and who were not currently being treated with antidepressant medications or psychotherapy were randomized after baseline assessment to either immediate PCIT-ED treatment or to a wait list control condition. Further details about study design and recruitment are reported in Luby et al. [29]. This study is a secondary analysis of observational data from the pre-treatment assessment of a randomized controlled trial of $N=196$ parent–child dyads who had both a scorable Child Behavior Checklist 1.5–5 year (CBCL 1.5–5) and MSECEIT (see *Measures*) out of 200 eligible participants. The final sample included both subjects who were ($N=164$) and were not ($N=32$) randomized into the study. The demographics of this sample, including their levels of baseline psychopathology, are displayed in Table 1. Written informed consent was obtained from mothers prior to participation in the study. All study procedures were approved by Washington University Institutional Review Board.

Measures

CU traits

We utilized a widely used 5-item measure of CU traits in early childhood that was first derived from factor analyses of the parent-report CBCL 1.5–5 (see supplement for full scale; [30]). Levels of CU traits in the study were normally distributed (mean = 3, range = 0–8; Fig. S1) and comparable to samples not recruited for depressive symptomatology [25]. Independent studies have demonstrated that the scale is psychometrically distinct from the ODD and ADHD scales of the CBCL and shows construct and

Table 1 Descriptive statistics ($N=196$)

Variable	Mean (SD) or frequency
1. Baseline age (years)	4.67 (0.81)
2. Sex (% female)	39.8%
3. Race (%)	
White	77.6%
Black	9.7%
Bi/multiracial	11.7%
Asian	1.0%
4. Ethnicity (% Hispanic/Latinx)	12.8%
5. CU traits	2.97 (1.90)
6. MDD diagnosis	82.7%
7. ODD diagnosis	43.3%
8. Anxiety disorder diagnosis	34.6%
9. ADHD diagnosis	23.4%
10. PTSD diagnosis	3.8%
11. Conduct Disorder diagnosis	2.7%
12. OCD diagnosis	2.7%

predictive validity in samples of preschoolers [31]. Internal consistency was $\alpha=0.65$, similar to other samples using the same scale. Importantly, children with higher levels of CU traits using this measure demonstrated lower levels of empathy, guilt, and prosocial behavior in our sample, further establishing construct validity [25].

Child psychopathology

Children's psychiatric diagnoses and severity were determined using the *K-SADS-EC* [28], a diagnostic interview in which a trained rater asks parents a series of developmentally appropriate questions to assess DSM-5 criteria for psychiatric disorders in preschoolers, which demonstrates good test–re-test reliability and construct validity [28]. The current study examined the presence or absence of MDD (82.7% of the sample) and ODD (43.3% of the sample) as covariates. Conduct Disorder (2.7% of the sample) was not included due to low prevalence of those meeting the threshold for the categorical diagnosis in the sample. Diagnoses were used instead of severity scores because only a subset of the children screened into the ODD module that assessed severity (See Supplement for a subgroup analysis controlling for severity; all results remain unchanged). Diagnostic interviews were video-taped, reviewed for rater drift, and calibrated with a master clinician for accuracy. Interrater reliability for MDD was $k=0.74$ and for all diagnoses was $k=0.88$.

Observational parent–child interaction task

Positive and negative parenting affect and behavior were coded from the Etch-A-Sketch Task, a structured observational parent–child interaction (PCI) task completed by each caregiver–child dyad [32]. The task required each dyad to work together to make their way through a maze on an Etch-A-Sketch, with the parent and child each controlling separate but interacting dials. The task was designed to induce mild stress and child negative emotions and require parent assistance for completion. The task was videotaped and all observations were coded using the Dyadic Parent–Child Interactions in Early Childhood, PCIT-ED manual [33]. To select the relevant parameters for subsequent models, we examined whether the duration of parenting affect and/or duration of parenting behavior was associated with CU traits (see Supplement). In these analysis, negative parenting affect, but not behavior, was related to CU traits. There was no relationship with positive parenting behavior or affect. Thus, we used the code for the duration of *negative parenting affect* (e.g., anger/frustration and sad/anxious/fearful/worried), divided by the length of the task to account for any variation in length of the PCI between dyads, in subsequent models. Coders blind to study hypotheses independently rated each video using Noldus Observer XT software [34]. The coders who analyzed the videos were required to achieve greater than 80% reliability with two master coders during a training period before then rating videos independently. The two master coders also rated 20% of random videos to ensure that inter-observer agreement was maintained ($k=0.82$).

Maternal emotional intelligence

Mother's emotional intelligence was measured using the MSCEIT [35], a performance-based measure of emotional intelligence for individuals aged 17 and older based on the model of emotional intelligence proposed by Mayer and Salovey with strong psychometric validity and reliability ($r=0.93$) [9, 35–37]. Respondents completed a variety of computer tasks, such as identifying emotions in faces and pictures, and comparing emotional feelings to non-emotional sensations. The tasks are scored to create an Overall Emotional Intelligence (EI) score, composed of four subscale scores: (1) *Perceiving Emotions* ($r=0.92$), which assesses an individual's abilities to recognize her own and others' emotions; (2) *Facilitating Thought* ($r=0.81$), which assesses an individual's ability to reason with emotion; (3) *Understanding Emotions* ($r=0.80$), which assesses an individual's ability to understand complex emotions; and (4) *Managing Emotions* ($r=0.84$), which assesses an individual's ability to manage and regulate her own and others' emotions (see Supplement for further details and example task descriptions). Both the Overall EI score as well as the subscale

scores are reported like traditional IQ scores in that they are positioned on a normal curve with a mean of 100 ($SD=15$) and compare individual performance to that of a normative sample. For the Overall EI score, the mean in our sample was 105 ($SD=12$) and internal consistency was $\alpha=0.82$.

Maternal depression

Maternal depression was measured using the Beck Depression Inventory-II (BDI-II; [38]), which is a widely used self-report questionnaire that has been validated in numerous populations, including caregivers [39] and patients with severe depression [40]. The BDI-II consists of 21 questions that are scored on a scale of 0–3 and then summed to create a total score, which was used as a control variable in subsequent analyses. Internal consistency was $\alpha=0.93$.

Data analytic plan

All analyses were conducted in SPSS statistics software version 26 (IBM Corporation, NY, USA). Children with all measures of interest at the pre-treatment time point were included in the analyses exploring predictors of CU traits. To address the first aim, a linear regression model examined maternal EI as a predictor of children's CU traits ($N=186$). Logistic regressions to predict children's ODD and MDD diagnoses were run as specificity analyses. Then, the four subscales of maternal EI were examined in a linear regression model to test which subscale(s) contributed to the relationship between maternal EI and CU traits. To address the second aim, any parenting variables that were significantly related to CU traits (see Supplement) were added into the linear regression model with maternal EI to evaluate whether maternal EI remained a significant predictor of children's CU traits when accounting for parenting ($N=172$). Every analysis controlled for children's age, sex, baseline MDD diagnosis, baseline ODD diagnosis, and maternal depression to isolate specific associations and avoid confounding results. Sample sizes varied due to missing K-SADS-EC or PCI data. Alpha (α) was set at 0.05.

Results

There were high rates of psychiatric comorbidity in this sample (Table 1). At baseline children met criteria for MDD (82.7%), ODD (43.3%), an anxiety disorder (34.6%), ADHD (23.4%), OCD (2.7%), Conduct Disorder (2.7%), and PTSD (3.8%). Full bivariate correlations among study variables, including covariates, are displayed in Table S1.

Table 2 Maternal EI predicts CU traits in preschool ($N=186$)

	<i>B</i>	Std. error	β	<i>p</i>
<i>Model 1: overall maternal emotional intelligence</i>				
MSCEIT				
Overall emotional intelligence	− 0.04	0.01	− 0.20	0.003
Covariates				
Children's age	− 0.32	0.16	− 0.13	0.05
Children's female gender	− 0.27	0.26	− 0.07	0.30
Children's MDD diagnosis	− 0.40	0.37	− 0.07	0.28
Children's ODD diagnosis	1.52	0.25	0.39	<0.0001
Maternal depression symptoms	− 0.01	0.01	− 0.05	0.48
<i>Model 2: subdomains of maternal emotional intelligence</i>				
MSCEIT				
Understanding emotions	− 0.003	0.01	− 0.19	0.007
Managing emotions	0.01	0.02	0.02	0.75
Perceiving emotions	− 0.02	0.01	− 0.12	0.10
Facilitating thought	− 0.00	0.01	− 0.01	0.94
Covariates				
Children's age	− 0.32	0.16	− 0.13	0.05
Children's female gender	− 0.24	0.26	− 0.06	0.35
Children's MDD diagnosis	− 0.33	0.36	− 0.06	0.37
Children's ODD diagnosis	1.54	0.26	0.40	<0.0001
Maternal depression symptoms	− 0.01	0.01	− 0.06	0.40

Bold values indicate statistical significance at $p < 0.05$.

MDD major depressive disorder, ODD oppositional defiant disorder

Aim 1: does maternal EI predict preschool CU traits?

Mothers with lower overall EI scores had children with higher CU traits ($\beta = -0.20$; $p = 0.003$; Table 2). The association was specific to CU traits, as maternal EI did not predict MDD ($\beta = -0.15$; $p = 0.25$; Table S2) or ODD ($\beta = 0.06$; $p = 0.54$; Table S3). In a separate model that tested each of the four EI subscales rather than overall EI scores, lower scores on the understanding emotions subscale were uniquely related to higher CU traits ($\beta = -0.19$; $p = 0.007$); no other subscale was significantly related to CU traits (Table 2).

Aim 2: understanding the relationships between maternal EI, parenting affect, and CU traits

In a combined linear regression model, maternal EI ($\beta = -0.18$; $p = 0.01$) and negative parenting affect ($\beta = 0.15$; $p = 0.03$) were independently associated with CU traits (Table 3). In a combined model including the four subscales of maternal EI and negative parenting affect, negative

Table 3 Maternal EI and negative parenting affect predict CU traits ($N=172$)

	<i>B</i>	Std. error	β	<i>p</i>
<i>Model 1: overall maternal emotional intelligence and parenting</i>				
MSCEIT				
Overall emotional intelligence	− 0.03	0.01	− 0.18	0.01
Parenting				
Negative parenting affect	2.48	1.13	0.15	0.03
Covariates				
Children's age	− 0.33	0.17	− 0.13	0.05
Children's female gender	− 0.32	0.27	− 0.08	0.23
Children's MDD diagnosis	− 0.29	0.38	− 0.05	0.46
Children's ODD diagnosis	1.53	0.26	0.40	<0.0001
Maternal depression symptoms	− 0.01	0.01	− 0.03	0.62
<i>Model 2: subdomains of maternal emotional intelligence and parenting</i>				
MSCEIT				
Understanding emotions	− 0.03	0.01	− 0.17	0.02
Managing emotions	0.01	0.02	0.03	0.69
Perceiving emotions	− 0.02	0.01	− 0.12	0.09
Facilitating thought	− 0.00	0.01	− 0.00	0.99
Parenting				
Negative parenting affect	2.55	1.13	0.16	0.03
Covariates				
Children's age	− 0.32	0.17	− 0.13	0.06
Children's female gender	− 0.29	0.28	− 0.07	0.30
Children's MDD diagnosis	− 0.20	0.39	− 0.04	0.60
Children's ODD diagnosis	1.56	0.27	0.40	<0.0001
Maternal depression symptoms	− 0.01	0.01	− 0.04	0.52

Bold values indicate statistical significance at $p < 0.05$.

MDD major depressive disorder, ODD oppositional defiant disorder

parenting affect ($\beta = 0.16$; $p = 0.03$) and the understanding emotions subscale of maternal EI ($\beta = -0.17$; $p = 0.02$) significantly predicted preschooler's CU traits, with similar effect sizes (Table 3). No other EI subscale was significantly related to children's CU traits. As stated in the data analytic plan, all statistical models reported in the results controlled for age, gender, MDD diagnosis, ODD diagnosis, and maternal depression.

Discussion

Lower levels of maternal EI and higher levels of negative parenting affect were both independently related to higher CU traits in a sample of young children with depression and other comorbid psychopathology. More specifically, mothers with poorer abilities to understand emotions—but not

perceive, manage or facilitate emotions—had children with higher CU traits. Maternal EI was not related to children's ODD or depression diagnoses, suggesting that maternal EI may be particularly important for understanding the specific emotion processing deficits associated with CU traits (e.g., understanding and resonating with emotions; [7]), but not other forms of emotion dysregulation found in depression or ODD. To our knowledge, this study is the first to identify maternal EI as a specific risk factor for CU traits in preschoolers.

Our finding that maternal EI and negative parenting affect were independently associated with preschoolers' CU traits aligns with behavioral genetics models, which postulate that children's skill-based EI and self-awareness of emotional processing may be influenced by parental feedback, modeling, and emotional discourse [41]. This finding is also congruent with previous studies that reported correlations between other maternal-level characteristics, such as a fearless temperament or low social affiliation, and children's CU traits [42]. As the mother–child relationship is the primary setting through which young children learn emotion understanding and recognition skills and emotion socialization [13, 43], maternal EI deficits may contribute to the development of children's CU traits if mothers have difficulty modeling and teaching positive socialization skills. Notably, the association between maternal EI and children's CU traits was specifically driven by mother's ability to *understand* emotions. This finding aligns with the adolescent and adult psychopathy literature, which has documented specific deficits in emotion recognition and understanding in individuals with greater psychopathic tendencies (versus emotion management or theory of mind) [44]. Depression and ODD have not been associated with similar deficits in emotional understanding [45, 46]. Finally, given that the majority of our sample met criteria for preschool depression, future research might test whether children's depression moderates associations between maternal EI and children's CU traits in a sample that contains children with and without depression. For example, future studies might test whether maternal EI is more influential in the diathesis of CU traits in children with depression—a disorder of disrupted emotional development—than in children with externalizing disorders.

Furthermore, the finding that mothers who displayed greater negative parenting affect during the parent–child interaction task had children with greater CU traits is consistent with the prior literature documenting associations between negative parenting and CU traits in young children [14, 15, 47]. However, mothers' positive parenting affect did not significantly predict children's CU traits in this study, which contrasts with previous studies that find evidence of associations between low levels of positive parenting and CU traits [48]. While this discrepancy may be due to methodological differences, the fact that the majority of children

in this study had concurrent MDD could help explain why negative and not positive parenting affect predicted children's CU traits. Young children with MDD who are already prone to negative affect themselves may be particularly sensitive to their mother's negative affect [49]. Additionally, children with secondary CU traits are more likely to experience harsh parenting [19], which may help explain why greater negative parenting affect contributed to higher CU traits in a sample of children with comorbid internalizing disorders. Future research should examine the possibility that negative parenting affect is more central to the diathesis of CU traits in children with co-occurring depression than children without this comorbidity.

While this study had many strengths including the measurement of maternal EI and observed parenting affect, there were also limitations. First, the current study's sample was enriched for preschool depression, though the sample contained a large proportion of children with externalizing disorders and other psychopathology. Future studies should examine whether the current findings generalize to young children displaying high levels of CU traits without comorbid depressive symptoms. On the one hand, it is unclear whether our findings would generalize to traditionally studied samples of children with high CU (i.e., who have co-occurring conduct problems). On the other hand, the current study's findings may not be unique to children with depression given the high comorbidity between internalizing and externalizing disorders documented in our sample and in the literature generally. Second, as few fathers were included in this study, it was not possible to examine maternal vs. paternal differences. Including this comparison would have been ideal as fathers may be more likely to experience EI deficits than mothers, given that CU traits are more common in men. However, prior studies have found that maternal but not paternal emotional discourse influenced the development of CU traits [17], and studies have also found that in general mothers may play a more central role in socializing young children's emotion understanding than fathers [50]. Third, our parent-reported measure of CU traits did not assess some features that are core to the CU traits construct, such as low empathy and lack of concern about one's own performance, and had weaker internal consistency. However, the internal consistency in our sample was similar to that found in other samples using this measure [51] and our CU traits measure has previously been correlated with lower levels of empathy, guilt, and prosocial behavior [25]. Finally, we could not examine whether the PCIT-ED intervention improved mother's EI, as the maternal EI measurement was only included at the baseline time point (as like IQ it is thought to be a stable trait). Prior work has shown that PCIT-ED decreased CU traits in this sample [25]; future studies could test whether improvements in mother's emotion understanding partially explains this symptom improvement.

Our findings may have significant intervention implications for young children at-risk for developing CU traits with comorbid mood disorders. Many parent–child interaction therapies aim to address parenting styles and affect rather than parent-level factors and may be improved by also targeting maternal emotional skills. Notably though, both PCIT-ED and a treatment developed specifically to reduce CU traits, PCIT-CU, include modules that help parents teach emotional skills to their children [25, 52]. While it remains to be seen whether these modules also help improve maternal EI, the combination of these modules with parenting changes may help account for the success of parent–child interaction therapies in improving CU traits in young children [25, 52]. As such, future studies should investigate whether targeting maternal EI strengthens the effect of parent–child interaction therapies for children with CU traits, potentially moderated by the CU variant (i.e., primary vs. secondary CU traits). This avenue of research may help improve treatments for young children with CU traits, especially those with comorbid disorders.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s00787-022-02074-8>.

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Data availability Data available upon request.

Declarations

Conflict of interest The authors have no conflicts of interest to declare.

Ethical approval All study procedures were approved by Washington University Institutional Review Board.

Informed consent Written informed consent was obtained from mothers prior to participation in the study, including consent to participate and consent to publish.

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