

Regular Article

Disentangling the relationship between callous-unemotional traits and unsupportive parenting through a developmental lens

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Abstract

Research suggests that unsupportive parenting practices are consistent but modest risk factors for children's behavioral and social problems, emphasizing the importance in identifying sources of variability in children's vulnerability. To address this research direction, this study examined children's callous-unemotional (CU) traits (i.e., affective indifference; lack of guilt or empathy), as a moderator of the associations among maternal and paternal unsupportive parenting and their externalizing symptoms. Participants included 240 mothers, partners, and their children ($M_{\text{age}} = 4.6$ years; 56% girls) from diverse backgrounds (48% Black; 16% Latinx) who took part in a longitudinal multi-method study with two measurement occasions spaced 2 years apart. Findings from structural equation modeling indicated the prospective association between observational assessments of unsupportive maternal (but not paternal) parenting and residualized changes in teacher reports children's externalizing problems over 2 years was significantly moderated by maternal reports of children's callous-unemotional traits ($\beta = -.21$, $p < .05$). Follow-up analyses of the interaction provided support for differential susceptibility. These findings highlight that children with elevated CU traits may experience diminished susceptibility to parenting, while children with lower levels of CU traits may exhibit plasticity in response to socialization environments.

Keywords: callous-unemotional traits; differential susceptibility; externalizing symptoms; parenting

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Introduction

Exposure to unsupportive parenting, characterized by difficulties tailoring responses to the emotional states, needs, and interests of children, has been shown to increase children's vulnerability to subsequent externalizing symptoms, including oppositional, hostile, and defiant behavior (Campbell et al., 2006; Vernon-Feagans et al., 2016). However, the modest magnitude nature of the risk highlights the considerable variability in the externalizing sequelae of children who experience unsupportive parenting (Nelson & Boyer, 2018; Pinquart, 2017). The heterogeneity in the associations between parenting and children's behavior problems specifically highlights the necessity of identifying moderating factors that may account for this variability. Guided by calls to better understand child characteristics that modulate the role of unsupportive parenting as a predictor of child behavior problems (Waller et al., 2013), the goal of this study was to examine whether the externalizing sequelae of unsupportive parenting varied as a function of children's callous-unemotional (CU) traits, characterized by a lack of empathy and diminished emotional responsiveness to other's emotional expressions (Frick & White, 2008; Frick & Kemp, 2021). Although the limited empirical findings in the literature provide some preliminary support for the role of CU traits as moderators (Crum et al., 2015; Falk et al., 2021;

Oxford et al., 2003; Wootton et al., 1997; Schütte et al., 2022; Pasalich et al., 2011), existing studies have predominantly used analytical approaches and cross-sectional designs that are not equipped to authoritatively delineate how CU traits precisely moderate the subsequent vulnerability children exposed to unsupportive parenting. Furthermore, studies have largely focused on maternal parenting behaviors. To address these gaps, the present study uses a longitudinal design and more precise analyses to definitively characterize the form of moderating effects of CU traits in the associations among both maternal and paternal unsupportive parenting and children's behavioral problems.

Delineating the precise form of the moderating effects of callousness

In testifying to the developmental and clinical significance of our goal to precisely characterize how CU traits are expressed as moderators of unsupportive parenting, conceptual models have highlighted a number of ways in which child characteristics may modulate the risk associated with parenting difficulties. First, a diathesis-stress model proposes that specific child attributes may serve as diatheses that potentiate or synergistically increase their vulnerability to environmental stressors (Monroe & Simons, 1991; Zuckerman, 1999). According to some CU conceptualizations, children who experience elevated levels of CU traits may be prone to exhibit more severe aggressive behaviors, violence, and conduct problems at least under some developmental or socialization conditions (Longman et al., 2016). Children with CU traits may evidence vulnerability to parenting difficulties or

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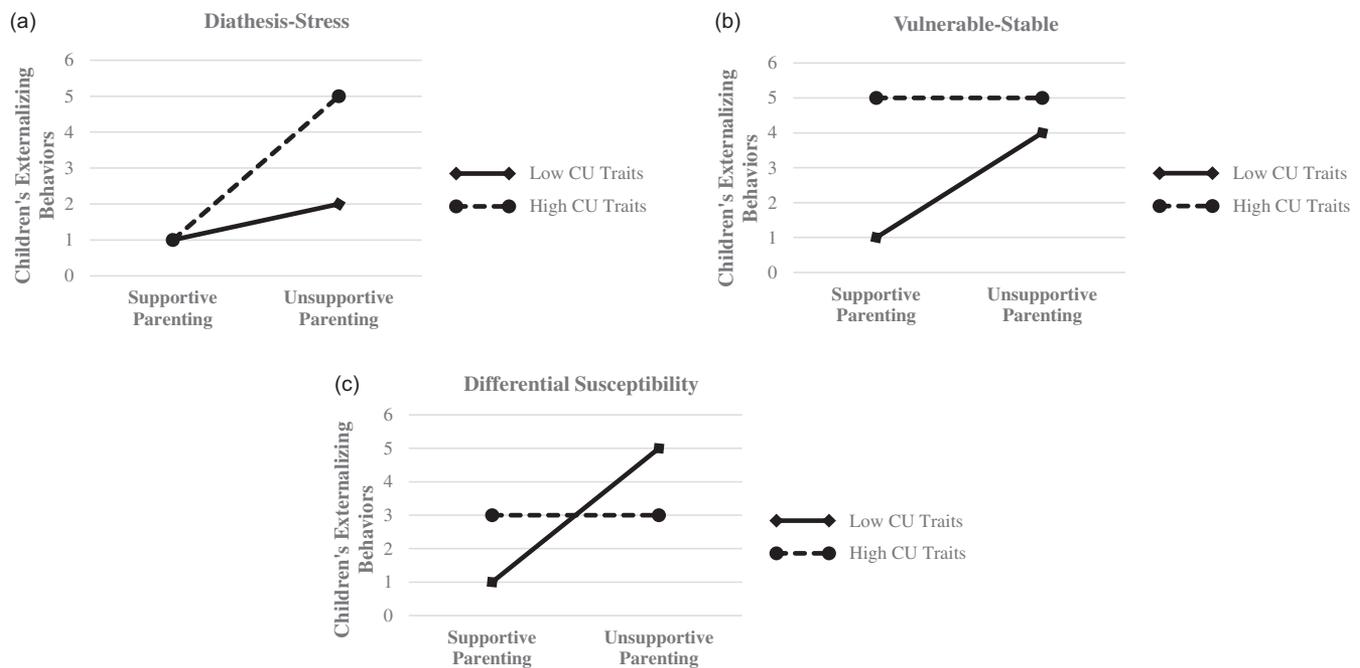


Figure 1. (a). Graphical depiction of the diathesis-stress form of moderation (b). Graphical depiction of the vulnerable-stable form of moderation. (c). Graphical depiction of the differential susceptibility form of moderation.

family adversity due to their diminished fear and guilt (Frick et al., 2003). By extension, it is possible that CU traits may serve as a diathesis in negative rearing contexts characterized by unsupportive parenting and, as a result, increase their vulnerability to externalizing symptoms. Thus, as illustrated by Figure 1a, the link between unsupportive parenting and externalizing problems may be substantially stronger for children with high CU traits (i.e., dotted line) in comparison to their low CU trait peers (i.e., solid line).

Alternatively, a vulnerable-stable model posits that children with vulnerability attributes experience high levels of externalizing problems regardless of their level of exposure to external stressors (Luthar et al., 2000). Thus, in the context of our aims, a vulnerable-stable model would be supported if children who are high in CU traits exhibit elevated externalizing symptoms across a range of supportive and unsupportive parenting conditions. Children with CU traits have been characterized as also experiencing stable and severe patterns of aggression and impulsivity, which puts them at more risk for experiencing high levels of behavior problems even in highly supportive family or developmental contexts (Barry et al., 2000; Frick & White, 2008). As shown in Figure 1b, a vulnerable-stable model would be supported if children with CU traits (i.e., dotted line) exhibited high levels of externalizing problems regardless of their level of exposure to supportive and unsupportive parenting. Conversely, although children with low CU traits exhibit lower levels of externalizing symptoms than children high in CU across a range of rearing conditions, their sensitivity to parenting difficulties in vulnerable-stable conceptualizations is manifested in a relatively stronger association between unsupportive parenting and their externalizing symptoms.

Although much of the research has been focused on characterizing how children with high CU traits respond to variations in socialization contexts, it is also possible that experiencing low

CU traits may confer susceptibility to a wide array of parenting practices. According to differential susceptibility theory (Belsky and Pluess, 2009), children's behavioral attributes may confer broad sensitivity or plasticity across a range of supportive and adverse rearing contexts. If differential susceptibility is operating, a plausible hypothesis is that children who are low in CU traits will exhibit greater environmental sensitivity in a way that reflects significantly better functioning than their high CU counterparts in supportive family contexts but also disproportionately poorer functioning in unsupportive family contexts. Children with low levels of CU traits may specifically exhibit greater susceptibility child-rearing practices because they experience greater empathy and, in turn, heightened receptivity to social and emotional characteristics of their environments (Vetlesen, 1994). Consistent with this conceptualization, prevailing assessments of CU traits (e.g., Inventory of Callous-Unemotional Traits or ICU, Frick, 2004; Clinical Assessment of Prosocial Emotions, Frick, 2013) rely heavily on indexing variability in children's interpersonal concern and empathy. For example, half of the questionnaire items on the ICU reflect variations in empathy, caring, and emotionality rather than variability in callous, unemotional, and uncaring behaviors (e.g. "Is concerned about the feelings of others;" "When something bad happens to someone else, does s/he seem genuinely upset?"). Accordingly, children who are low CU traits also experience greater empathy and responsiveness to others' emotions (Frick & White, 2008; Frick & Kemp, 2021). Thus, as depicted by the solid line in Figure 1c, children with greater empathy or low CU may be more sensitive to variations across the whole range of parental support than their peers with high CU traits. This greater sensitivity may specifically be reflected in disproportionately higher externalizing symptoms when parents are unsupportive but also substantially lower levels of externalizing symptoms in contexts of parental support.

The state of the literature examining the moderating effects of CU traits

Although the three conceptualizations provide useful bases for more precisely characterizing how CU traits moderate the risk of adverse environments, the state of the empirical literature does not definitively favor one model over the others. For example, in supporting the operation of CU traits as a diathesis, findings from a cross-sectional study indicated that parent reports of their discipline and monitoring difficulties predicted their reports of externalizing symptoms only for children who were high in CU traits. In contrast, children with low CU traits evidenced relatively low levels of externalizing symptoms across the range of parental discipline and monitoring tactics (Crum *et al.*, 2015). However, the moderating effects of CU traits appeared to support the operation of CU as a vulnerable-stable factor in another cross-sectional investigation using a clinic-referred sample (Wootton *et al.*, 1997). More specifically, the graphical plot revealed that children with CU traits experienced higher levels of externalizing symptoms regardless of their level of exposure to parenting difficulties. In contrast, although children with low CU traits exhibited low levels of externalizing symptoms under supportive conditions, their externalizing problems appeared to increase with greater exposure to more parenting difficulties. However, because the interpretation of the findings was based solely from the visual inspection of the graphical plot rather than more definitive quantitative analyses (Roisman *et al.*, 2012; Widaman *et al.*, 2012), the conclusions about the form of the moderating effects of CU are tentative at best. In partially resolving this limitation, a cross-sectional, mono-method (*i.e.*, surveys) replication and extension of this study indicated that poor parenting was associated with problem behavior only for children with low levels of CU traits (Oxford *et al.*, 2003). In advancing the rigor in tests of CU as a moderator, the simple slope analyses and graphical plots from two recent longitudinal findings that utilized single method (*i.e.*, surveys) appeared to be broadly consistent with either the vulnerable-stable or differential susceptibility models (Falk *et al.*, 2021; Schüette *et al.*, 2022). More specifically, the results showed that parent-reported positive parental behaviors (*i.e.*, positive reinforcement, warmth, support) predicted decreases in parent-reported behavior problems only when CU traits were low. However, no additional follow-up analyses to definitively test whether the form of moderation was more consistent with the vulnerable-stable or differential susceptibility models.

The inconsistent and limited nature of empirical findings in the literature are also magnified by methodological limitations in the literature. First, the majority of these existing studies relied on cross-sectional designs that are unable to decipher directionality in the association between parenting and CU interactions and children's behavior problems. Second, the predominant reliance on clinical samples of children in studies examining CU as a moderator may also skew tests of the relative utility of the three conceptual frameworks. Because children in clinical samples are likely to experience disproportionately higher levels of unsupportive parenting, the studies may not be capturing the diversity of children's experiences with supportive parenting. In particular, powerful tests of differential susceptibility require the sampling of a broad array of socialization experiences to definitively determine if a purported susceptibility trait confers sensitivity to both supportive and harsh family conditions. Another limitation of the studies presented is that there has been a major focus on clinical populations which may result in the artificial favoring of one or two of the models presented. However, tests of differential

susceptibility emphasize capturing family and child functioning across a broad range of both typical and atypical conditions to avoid generating misleading conclusions about how CU traits may operate as a moderator. Third, the existing studies did not conduct a sufficient set of quantitative follow up analyses necessary to authoritatively test the comparative utility of the three conceptual models of CU moderation. Simple slope analyses at one standard deviation above and below the mean for CU traits were the only follow up analyses that were sporadically reported across three studies. However, sole reliance on simple slope analyses can produce misleading conclusions about moderation (Del Giudice, 2017; Roisman *et al.*, 2012; Widaman *et al.*, 2012).

To address these gaps, the current study will utilize a longitudinal study design that follows a community sample across two years. Furthermore, we follow up significant interaction effects with additional analyses that are designed to more precisely identify the type of moderation that is operating. Thus, in addition to following recommendations for presenting the graphical plot of the interaction across a large range of supportive and unsupportive parenting conditions (*i.e.*, ± 2 SD), we also report also utilize regions of significance (RoS) tests in place of arbitrary simple slope tests to more comprehensively identify the specific regions at which individual differences in CU traits confer susceptibility or risk (Roisman *et al.*, 2012). To further complement the RoS tests, we also utilize the proportion of interaction (PoI) index to quantitatively characterize whether the shape of the interaction. PoI specifically captures the degree to which proportional areas of the interaction are consistent with forms of moderation postulated in the diathesis-stress, vulnerable-stable, or differential susceptibility models.

The operation of CU as moderator across maternal and paternal parenting practices

Although developmental psychopathology models underscore the substantive significance of testing whether child characteristics operate selectively or generally as moderators across different rearing environments (Belsky *et al.*, 2021), studies have predominantly examined CU as a moderator of maternal parenting difficulties. To address this gap in the CU traits literature, another goal of the present study was to explore the applicability of CU traits as a moderator of the externalizing sequelae of both maternal and paternal unsupportive parenting.

Despite the emergence of multiple frameworks emphasizing the significance of paternal child-rearing for children's functioning (Jeynes, 2016; Schoppe-Sullivan & Fagan, 2020), only two studies have examined children's CU traits as moderators of paternal parenting behaviors. First, in relying on a single method (*i.e.*, parent surveys) to assess all variables, Fanti and colleagues found no evidence for the moderating role of CU traits of the association between maternal and paternal reports of their involvement and children's conduct problems over a one-year period (2014). However, because the analyses aggregated maternal and paternal parenting into a broader latent construct, it was not designed to test whether children's CU traits differentially moderated the associations among maternal and paternal parenting practices and their externalizing symptoms. In addition, the approach to measuring CU traits across both time points is inconsistent with analytic recommendations of assessing the moderator prior to or contemporaneous with the proposed predictor (*e.g.*, Goodnight *et al.*, 2006; Kraemer *et al.*, 2001). Second, a cross-sectional study specifically explored the interplay between CU traits and paternal

unsupportive parenting in the prediction of conduct problems in a clinical-referred sample of children (Pasalich et al., 2011). Although interactions between CU traits and parental warmth were significant for both mothers and fathers, the limited follow up analyses did not directly delineate the form of the moderating effects. More specifically, simple slope analyses were not significant for paternal warmth. In addition, simple slope findings for mothers indicated that lower levels of warmth were associated with more conduct problems only for children who were low in CU traits. However, both differential susceptibility and vulnerable-stabilizing models propose that children with low CU traits are more sensitive to parenting practices and follow up analyses did not examine whether the findings favored one model over the other.

The literature on fathers also does not provide a sufficient base for formulating hypotheses. On the one hand, research underscoring that maternal and paternal parenting may have similar developmental implications for children suggests that CU traits may moderate the association between unsupportive parenting and children's externalizing symptoms in similar ways for mothers and fathers (Pinquart, 2017; Steenhoff et al., 2019). On the other hand, other studies indicate that maternal unsupportive parenting is a more consistent predictor of children's externalizing symptoms than paternal unsupportive parenting (Denham et al., 2000; Lee et al., 2020). Thus, if maternal and paternal parenting operate differently as risk factors, the moderating role of CU traits may vary for mothers and fathers. Given the limited research in this area, we did not formulate hypotheses on the nature of moderation for mothers versus fathers.

The present study

In summary, the goal of this paper was to elucidate sources of heterogeneity in the modest association between unsupportive parenting and children's externalizing problems by testing children's CU traits as a moderator of the risk. Although a small corpus of studies has examined the multiplicative interplay between parenting and CU traits in predicting children's externalizing symptoms, the limited findings have yet to definitively characterize the nature of the interactions. Therefore, guided by three distinct conceptual models, a central aim of this study was to systematically examine whether any moderating effects of individual differences in CU traits were expressed in diathesis-stress, vulnerable-stable, or differential susceptibility forms. To address the relative absence of research on CU traits in models of paternal parenting, we also examined the relative role of CU traits as moderators of both maternal and paternal unsupportive parenting.

We specifically examined these research questions during the transition from preschool to elementary school based on several developmental considerations. First, because parents are the predominant socialization figures in the lives of preschool children, unsupportive parenting may play a particularly salient role as a predictor of children's subsequent behavioral functioning (Landry et al., 2003). Second, CU traits are suggested to first emerge as stable individual differences during the preschool period (Waller & Hyde, 2017). Because of these differences, CU traits may be particularly potent as moderators during this developmental period because they may reflect enduring ways of responding to environmental stimuli. Finally, it is important to examine risks for children's externalizing symptoms in early childhood given that individual differences in behavior problems during this period predict long-term well-being into adolescence and adulthood (Rubin et al., 1995; Timmermans et al., 2008).

To overcome the past reliance on cross-sectional approaches to examining CU as a moderator, we specifically utilized a longitudinal design that assessed subsequent residualized change in children's externalizing symptoms. Moreover, with the exception of one study (Pasalich et al., 2011), previous work examining CU traits as moderators of parenting has relied on single method (e.g., survey measures) and informant (e.g., parent ratings, typically mothers) to assess parenting behaviors and child outcomes. By using multi-method (i.e., surveys and observations) and multi-informant (i.e., observer, mother, teacher) approach, we aim to overcome problems with common method and informant variance in previous research. Finally, because the majority of studies have used high-risk and clinic-referred samples, we aim to examine CU as a moderator in a diverse community sample to increase the generalizability of the findings and provide a more equitable test of the relative explanatory power of differential susceptibility, diathesis-stress, and vulnerable-stable models.

Methods

Participants

At Wave 1, participants included 243 mothers, partners, and their preschool children who resided in a moderate-sized, metropolitan area in the Northeastern part of the United States. Because a significant aim of this paper was to test the interplay between CU traits and paternal parenting, the three same-sex partners were excluded from our analyses, resulting in a sample size of 240 at Wave 1. Families were recruited through several organizations including universal pre-K programs, Head Start agencies, and public and private childcare providers. Data were collected as part of a larger, longitudinal study designed to explore the impact of family relationships on child adjustment. Families were eligible to participate if: (a) the mother, their partner, and the child had regular interactions with each other (i.e., averaged at least two to three per week over the year); and (b) the child was within one year of enrolling in kindergarten at the first wave of data collection.

At Wave 1, children were approximately 4.6 years old ($SD = .44$) and about half of the sample (56%) was girls. Median annual income for families was \$36,500 per year (range = \$2400–\$121,000), with the majority of families receiving public assistance (70%). The sample was racially diverse, with about half of the participants identifying as Black or African American (49%). The remainder of the sample identified as White (43%), Multiracial (6%), or another race (2%). Approximately 15% of the families were Latinx. Median education for parents consisted of a general education diploma (GED) or high school diploma. At Wave 1, almost half of the partners (49%) were married. The majority of mothers (99%) and intimate partners (74%) were the biological parents of the target child. The retention rate across the two-year period between the two measurement occasions was 91%.

Procedures

Families visited the research center laboratory for two waves of data spaced two years apart. All research procedures were approved by the Institutional Review Board at the University of Rochester under the title "Children's Development in the Family" prior to conducting the study (Approval #: 00030261). Mothers and teachers were compensated monetarily for their participation and children received small toys at each visit.

Unsupportive parenting

At Wave 1, mothers, partners, and children participated in a 10-minute family interaction task where they were instructed build a model house using LEGO blocks (Schoppe et al., 2001). Because the objective was to create a context that elicits child bids for parental support, the model house was selected to ensure that children could not successfully build the house without parental assistance. No further instructions were provided to maximize the likelihood that parents would adopt characteristic ways of interacting with their children. Using a coding system that was adapted from the Iowa Family Interaction Rating Scales (IFIRS; Melby & Conger, 2001), separate trained coders rated maternal and paternal behaviors along a 9-point continuous scale ranging from 1 (*Not at all characteristic*) to 9 (*Mainly characteristic*). To assess individual differences in supportive and unsupportive behaviors, we used three codes: warmth, sensitivity, and disengagement. Warmth was indexed by how much the parent expressed liking, appreciation, and care or concern for the child. Sensitivity assessed the degree to which the parent accurately identified and responded to the child's needs, emotional states, interests, and abilities. Finally, disengagement was defined as the extent to which the parent is emotionally unresponsive, apathetic, and withdrawn. Interrater reliability was calculated between two coders who independently overlapped on rating 20% of the videos. Intraclass correlation coefficients (ICCs) across the three codes ranged from .90 to .93 for mothers and .93 and .96 for fathers. The three codes for each parent were used as manifest indicators for the latent construct of unsupportive parenting in each of their separate models.

Callous-unemotional (CU) traits

At Wave 1, mothers completed the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004) to assess callous, indifferent, and uncaring behaviors. The ICU has demonstrated acceptable validity in previous research (Cardinale & Marsh, 2020). A recent meta-analysis also demonstrated that the ICU total score was an appropriate measure of general CU traits (Ray & Frick, 2018). The ICU total score was calculated by reverse scoring the appropriate items and summing all 24 items (e.g., "Does not show emotions"). Internal consistency for the ICU total score was .82.

Children's externalizing behaviors

At both Wave 1 and Wave 2 teachers completed the teacher version of the MacArthur Health and Behavior Questionnaire to assess child externalizing problems and social adjustment (HBQ; Ablow et al., 1999). The HBQ has demonstrated sound psychometric properties (Ablow et al., 1999), including strong test-retest reliability and discriminant validity. Externalizing symptoms were assessed by three HBQ scales: (1) Oppositional Defiance (9 items; e.g., "Has temper tantrums or a hot temper"); (2) Conduct Problems (11 items; e.g., "Lies or cheats"); and (3) Attention-Deficit/Hyperactivity Disorder (15 items; e.g., "Fidgets"). The internal consistencies for the subscales ranged between .86 and .94 ($M = .91$) across the two waves of data. The three subscales were specified as manifest indicators for the latent construct of children's behavior problems in each of the separate models.

Data analysis plan

Prior to conducting the primary analyses, rates of missingness in the data were examined for each of the primary study variables and

covariates. The amount of missing data was modest (12.7% missing). In addition, according to Little's test, $\chi^2 = 282.91$, $df = 260$, $p = .16$ (Little, 1988), the values were missing completely at random. Therefore, following statistical recommendations for missing data that do not exceed 20%, we utilized full-information maximum likelihood (FIML) to estimate missing data and retain the full sample of eligible families ($n = 240$) for all analyses (Schlomer et al., 2010). To test our primary aims, we examined CU traits as a moderator of the relation between unsupportive parenting and children's externalizing problems using cross-lagged, autoregressive structural equation modeling (SEM) with Amos 28.0 software (Arbuckle, 2022). To examine possible differences between maternal and paternal parenting behaviors, we simultaneously examined maternal and paternal unsupportive parenting and their interactions with children's CU traits in a single SEM analysis. Multiple centered indicators were used to create latent constructs of maternal and paternal unsupportive parenting at Wave 1 and children's externalizing behaviors at Waves 1 and 2. Latent interaction terms were created for maternal and paternal parenting separately. Interaction indicators consisted of three product terms generated by multiplying each of the centered indicators of unsupportive parenting (i.e., warmth, sensitivity, disengagement) with the centered manifest measure of CU traits resulting in three product terms that were then used as the manifest indicators for the latent interaction between unsupportive parenting and CU traits.

For the structural part model, unsupportive maternal parenting, unsupportive paternal parenting, children's CU traits, and both interaction terms involving unsupportive parenting and CU traits at Wave 1 were specified as predictors of children's externalizing symptoms at Wave 2. In addition, we estimated the autoregressive path running from Wave 1 to Wave 2 externalizing symptoms to assess residualized change in children's functioning. Correlations were specified between: (a) all pairs of exogenous predictors and (b) the error terms of corresponding manifest measures of externalizing symptoms across the two waves. Preliminary analyses were also conducted for the SEM model to examine the measurement equivalence for externalizing symptoms at Waves 1 Wave 2 by comparing the model fit when the factor loadings are constrained to be equal across waves with a model where the loadings were permitted to vary freely. The free-to-vary and constrained model did not differ significantly from each other ($\Delta \chi^2 = 3.06$, $df = 2$, $p = .22$). Therefore, for the final SEM model, we utilized the more parsimonious model that constrained comparable loadings across the waves to be equal (Janssens et al., 2015).

Results

Descriptive results

Table 1 provides the means, standard deviations, and correlations among the primary variables and the covariates included in the analyses.

Primary analyses

Our primary analytic model, which is depicted in Figure 2, provided a good representation of the data, $\chi^2 (131, N = 240) = 201.18$, $p < .05$, $RMSEA = .05$, $CFI = .98$, and χ^2/df ratio = 1.54 (Kline, 2015). In support of the measurement model, the standardized loadings for the indicator variables onto their respective latent constructs were significant and high in magnitude ($p < .001$; range = .74 to .98; $M = .87$). Inspection of the structural

Table 1. Means, standard deviations, and correlations among all study variables

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
Covariates															
1. Gender	–	–	–												
Maternal Supportive Parenting (Wave 1)															
2. Warmth (R)	6.17	1.67	.09	–											
3. Sensitive (R)	6.14	2.14	.04	.75*	–										
4. Disengagement	4.58	2.08	.07	.70*	.82*	–									
Paternal Supportive Parenting (Wave 1)															
5. Warmth (R)	6.14	1.86	.05	.31*	.34*	.27*	–								
6. Sensitive (R)	6.45	2.05	–.02	.30*	.41*	.32*	.86*	–							
7. Disengagement	4.66	2.21	.00	.25*	.24*	.20*	.73*	.78*	–						
Callous-Unemotional Traits (Wave 1)															
8. CU Traits	15.67	7.19	.05	.06	.06	.07	.10	.09	.11	–					
Externalizing Behaviors (Wave 1)															
9. ODD	.31	.40	.07	.08	.13	.12	.14	.12	.16*	.26*	–				
10. CP	.14	.31	.12	.07	.09	.09	.07	.09	.15*	.36*	.80*	–			
11. ADHD	.44	.46	.10	.06	.15*	.12	.22*	.22*	.24*	.26*	.70*	.62*	–		
Externalizing Behaviors (Wave 2)															
12. ODD	.30	.44	–.03	.15	.20*	.12	.21*	.27*	.12	.20*	.42*	.46*	.31*	–	
13. CP	.16	.30	–.02	.18	.22*	.13	.17*	.27*	.17*	.15*	.37*	.38*	.25*	.80*	–
14. ADHD	.50	.52	.05	.12	.21*	.13	.16*	.22*	.21*	.21*	.35*	.37*	.42*	.64*	.71*

Note. * $p < 0.05$.

paths revealed that unsupportive paternal parenting predicted increases in children's externalizing behaviors at Wave 2, $\beta = .17$, $p < .05$, even after inclusion of the autoregressive path for externalizing behaviors ($\beta = .39$, $p < .001$). However, children's CU traits and the interaction term between paternal unsupportive parenting and CU traits did not significantly predict children's externalizing symptoms at Wave 2. Therefore, we did not conduct follow up analyses for moderation. In contrast to the pathways for paternal parenting, maternal unsupportive parenting was not a significant predictor of residualized change in children's externalizing symptoms from Wave 1 to 2, $\beta = .08$, $p = .32$. However, of direct relevance of the primary aims, children's CU traits moderated the prospective association between Wave 1 unsupportive parenting and children's externalizing symptoms at Wave 2, $\beta = -.21$, $p < .05$.

Additional follow-up analyses were conducted to more precisely characterize the way CU moderates the relationship between maternal unsupportive parenting and children's externalizing behaviors. Following recommendations for powerfully testing the differential susceptibility effects with other forms (e.g., diathesis-stress) of moderation (Roisman et al., 2012), the bounds of the plotted interaction were defined at ± 2 SD from the mean of the unsupportive maternal parenting variable and ± 1 SD from the mean of children's CU traits. As depicted in Figure 3, the graphical plot revealed a disordinal (i.e., cross-over) interaction. To further probe the interaction, regions of significance (RoS) on Z tests were conducted (Preacher et al., 2006). The results indicated that unsupportive maternal parenting was significantly related to externalizing problems only for children who were low in CU traits. More

specifically, the link between maternal parenting and externalizing symptoms was significant for children who were below -2.01 on the CU traits measure, which consisted of 42% of the children in the sample.

Although significant findings for children who are low in CU traits are consistent with both the vulnerable-stable and differential susceptibility models, they do not provide a direct test of whether the results favor one model over the other. Therefore, to more definitively identify the form of moderation, we calculated the Proportion of Interaction (PoI) index based on documentation of its superior accuracy in distinguishing between moderating effects proposed in different models (Del Giudice, 2017). The PoI is defined as proportion of the area of the interaction where children with low CU traits exhibit lower levels of externalizing problems than the counterparts under supportive rearing conditions. Of specific relevance to our research question, a PoI above .80 supports a vulnerable-stabilizing model of high CU traits by indicating a large proportion of the interaction reflects that children with high CU traits evidence consistently higher levels of externalizing symptoms than children low in CU traits across a broad range of parenting conditions. In contrast, PoI values falling between .20 and .80 suggest that the greater sensitivity of children with low CU traits is expressed in a differential susceptibility form (Del Giudice, 2017). More specifically, PoIs within these boundaries would indicate that children with low CU traits fare disproportionately better in supportive rearing conditions but also noticeably worse in unsupportive parenting contexts (Roisman et al., 2012). The resulting PoI of .74 falls within the range of support for differential susceptibility.

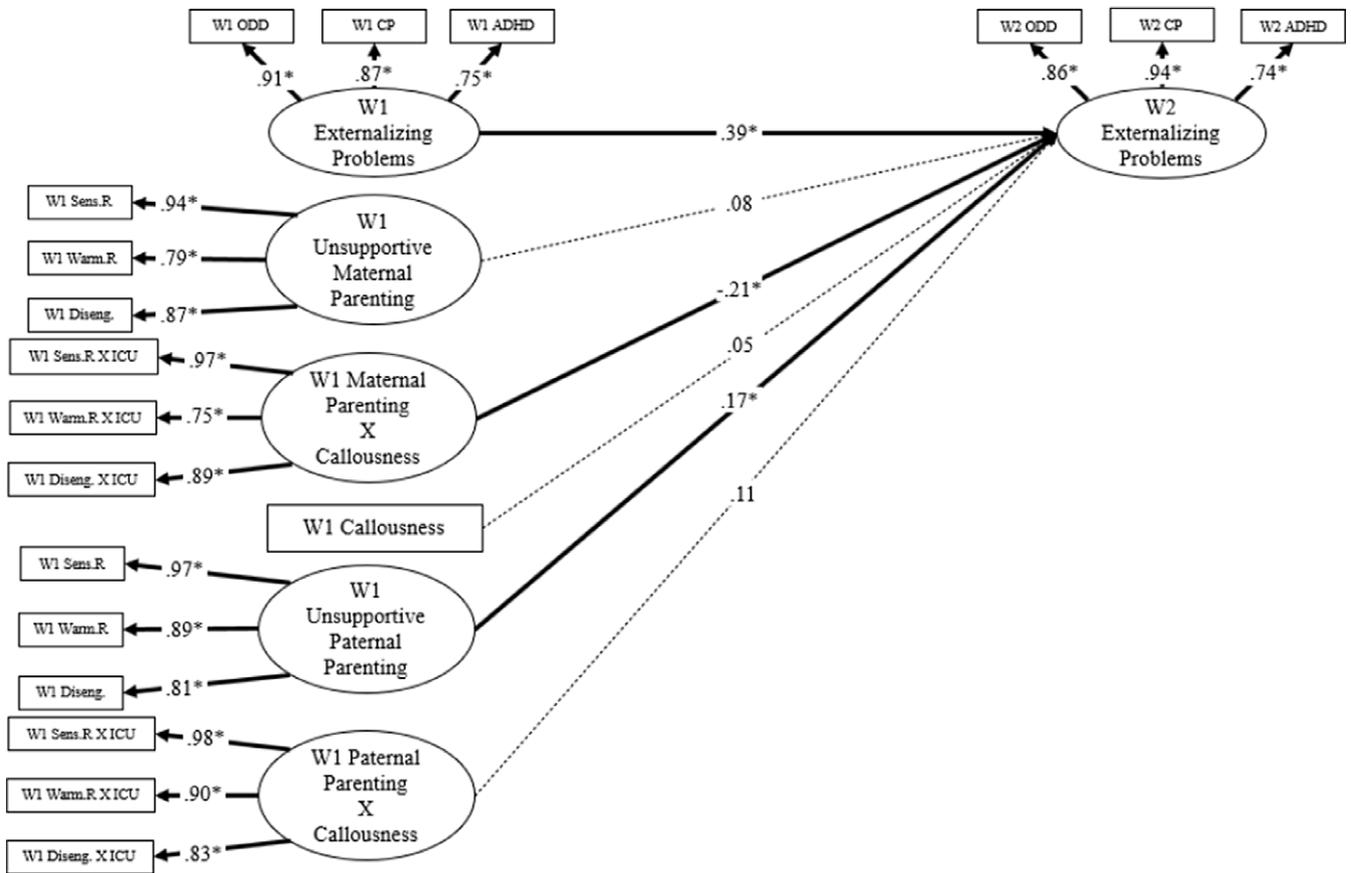


Figure 2. Structural equation model examining associations between unsupportive maternal and paternal parenting, children’s callousness, and children’s Wave 1 and Wave 2 child externalizing problems. Parameter estimates for the structural paths are standardized path coefficients. Significant covariance paths were not included for visual simplicity. Dashed lines indicate nonsignificant pathways. * $p < .05$.

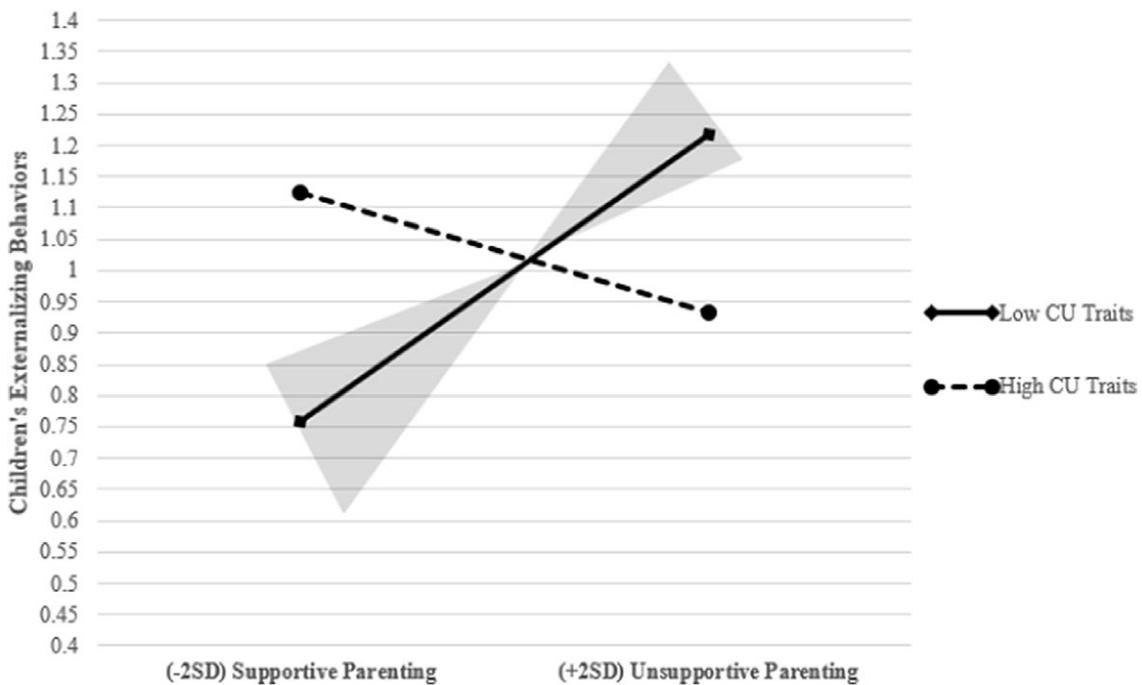


Figure 3. A graphical plot of the interaction between maternal unsupportive parenting and children’s callousness at Wave 1 predicting children’s externalizing behaviors at Wave 2. Unsupportive parenting is plotted at +2 SDs and children’s CU traits is plotted at +1 SD. Regions of significance are denoted by the gray shaded areas.

Discussion

To address our primary aim of identifying sources of variability in the externalizing sequelae of children experiencing parenting difficulties, we examined children's CU traits as a moderator of associations among maternal and paternal unsupportive parenting and children's externalizing problems. Utilizing a longitudinal, multi-method, and multi-informant design, the results indicated that moderating effects of CU traits in the prospective association between unsupportive parenting and children's externalizing problems were only significant for mothers. Follow up analyses specifically showed that the association between unsupportive maternal parenting and children's behavior problems was significantly stronger for only children with relatively low levels of CU traits. Consistent with differential susceptibility theory (Belsky & Pluess, 2009), children who evidenced lower CU traits exhibited higher externalizing symptoms when experiencing unsupportive maternal parenting, but also displayed lower levels of externalizing symptoms when mothers were highly supportive.

Low CU traits as a susceptibility factor

Consistent with prior research, the findings of the present study provide support for the moderating role of CU traits on the association between unsupportive maternal parenting behaviors and children's behavior problems (Crum et al., 2015; Wootton et al., 1997; Falk et al., 2021; Oxford et al., 2003; Schüette et al., 2022). More specifically, we found that children's CU traits moderated the relationship between unsupportive maternal parenting and residualized changes in their externalizing symptoms over a two-year period. In advancing the existing knowledge base, our multi-method longitudinal approach authoritatively delineated, for the first time, the form of the moderating effects of CU traits. Comprehensive follow up tests and evaluations of the graphical plot specifically provided consistent support for the differential susceptibility model and the designation of children's low CU traits as a susceptibility factor. First, the graphical plot in Figure 3 depicted a disordinal or cross-over interaction consistent with differential susceptibility theory. Second, unsupportive parenting was only a significant predictor of children's behavior problems for children with low levels of CU. In contrast, children with high CU traits exhibited moderate levels of externalizing symptoms across a range of supportive and unsupportive parenting practices. Finally, the PoI value of .74 fell within the bounds of support (between .20 and .80) for differential susceptibility over other models. The proportional areas of the interaction specifically reflected that children with low CU traits evidenced relatively low levels of externalizing problems when mothers were supportive but also noticeably higher levels of externalizing symptoms when mothers were unsupportive. Thus, in support of differential susceptibility theory (Belsky & Pluess, 2009), the findings were consistent with the hypothesis that low CU increases susceptibility to both supportive and harsh conditions.

Our results beg the question of why low CU traits may serve as a susceptibility factor in the association between unsupportive parenting and children's externalizing symptoms. As a plausible explanation, it is possible that the high levels of affective empathy experienced by children in low CU traits reflect high sensitivity to both supportive and adverse socialization contexts. Definitions and measures of CU traits largely capture variability in children's levels of affective empathy (Frick & Kemp, 2021), characterized by emotional reactivity to "another's emotional state or condition that is congruent with the other's emotional state or situation"

(Eisenberg & Strayer, 1990, p. 5). Consistent with its theorized role in sensitizing children to environmental experiences, greater empathy is associated with heightened attunement to other's emotional expressions and displays (Denham, 1998). The high propensity to experience affective empathy for children who are low in CU traits may increase their susceptibility to a wide range of socialization environments through emotion contagion processes. Emotion contagion refers to the process through which individuals are metaphorically "infected by" emotions in interpersonal contexts through reflexively experiencing the affect expressed by others (Hatfield et al., 1994; Schoenewolf, 1990). Thus, for children with low CU traits, high empathy and emotion contagion susceptibility in harsh, unsupportive socialization contexts may increase their vulnerability to externalizing problems by magnifying their hostility, emotional volatility, and negative responses to others (Chikovani et al., 2015; Smith & Rose, 2011). Conversely, when children are exposed to supportive, warm parenting contexts, affective empathy and emotion contagion processes of children with low CU traits may increase their positive, cheerful emotions and, in turn, substantially diminish their externalizing symptoms (Hastings et al., 2000).

Social learning theory offers a complementary explanation for the mechanisms that may underpin the greater susceptibility of children with low CU traits (Bandura, 1973). According to the theory, children vicariously learning from adult-modeled displays of emotion. As part of this modeling process, children are posited to develop schemas or cognitive scripts that serve as guides for organizing emotions and behaviors in subsequent interpersonal contexts (Denham et al., 1997; Grusec, 1994). Thus, it is possible that the high emotional attunement and sensitivity of children who are low in CU traits (i.e., high in empathy) may be rooted in their greater tendency to engage in vicarious learning in socialization settings. Under unsupportive rearing conditions, the greater salience of modeling processes may facilitate the development of cognitive scripts for enacting antagonistic, unfriendly, and aversive behaviors that underpin externalizing problems (Grusec, 2019). By contrast, in contexts of supportive, sensitive, and responsive displays of maternal parenting, the stronger vicarious learning tendencies of children with low CU traits may promote prosocial scripts that organize cooperative and amicable behaviors that substantially decrease externalizing symptoms (van Ijzendoorn, 1997). Therefore, modeling processes and the development of scripts for enacting behavior may be a key process underlying the susceptibility to both positive and harsh rearing conditions experienced by children who are low in CU traits or high in empathy.

Environmental specificity

The pattern of findings in the present paper also indicated that CU traits was a selective moderator of maternal parenting. Thus, although unsupportive paternal parenting significantly predicted children's subsequent externalizing symptoms, CU did not moderate this association. Our findings share some overlap with the results of the only other study to examine the interplay between CU traits and unsupportive behaviors in both mothers and fathers separately (Pasalich et al., 2011). More specifically, although the cross-sectional findings in this investigation indicated that CU traits moderated associations between supportive parenting and child externalizing problems for mothers and fathers, follow up analyses failed to identify how CU traits moderated paternal parenting. At this early stage of research, replication is needed before systematically formulating possible explanations for why

CU traits may specifically moderate maternal unsupportive parenting. Consistent with this cautionary note, it is possible that CU traits may modulate paternal parenting practices in other socialization contexts that are not captured by our assessment battery. Our measurement approach likely assessed multiple facets of parenting functions that reflected variations in support in guided learning (e.g., teaching the child strategies for building the LEGO house) and reciprocity (e.g., acting as a cooperative playmate that strengthens affiliative bonds). Parenting measures that are specifically designed to capture more circumscribed child-rearing domains may yield significant moderator findings for fathers. For example, in the context of domain-specific model of parenting (Grusec & Davidov, 2010), the moderating role of CU traits may be more pronounced for fathers in tasks or settings that more precisely capture support in either guided learning (e.g., tasks that elicit individual differences in teaching strategies) or reciprocity (e.g., free play settings) contexts. By extension, CU traits may assume greater salience as a moderator of paternal behaviors in contexts that evoke individual differences in child-rearing strategies for managing child misbehavior (i.e., control module) or protecting the child from harm (e.g., protection module).

Limitations, future directions, and conclusions

The findings from this study should be interpreted in the context of several limitations. Although the racial and socioeconomic diversity of our sample of children and families may increase generalizability of our findings, the degree to which our results are applicable to more specific subpopulations of children (e.g., clinic-referred samples, economically affluent families) is not yet clear. Second, the primary variables (i.e., maternal and paternal parenting, children's callousness and psychological adjustment) were each derived from a single informant. Relatedly, because we only collected maternal reports of CU traits, the lack of father reports of CU traits in our study is a limitation. For example, it is possible that father appraisals of their children's CU traits may moderate the association between their unsupportive parenting practices and children's externalizing symptoms. However, relative to the reliance on single methods and informants in previous research, it is also important to note that our rigorous use of multi-methods and multi-agent approach across the variables was designed to minimize mono-informant and mono-method variance in the analyses. Third, expanding assessments of child outcomes beyond our focus on externalizing symptoms is a next critical step in determining whether the moderating effects of CU traits are domain-specific (i.e., selective to externalizing problems) or domain-general (e.g., consistent across multiple domains of child functioning) (Belsky et al., 2021). Fourth, although this is one of the first longitudinal papers to systematically identify CU traits as a moderator of parenting difficulties, a central step of future research is to delineate the processes that mediate or account for the susceptibility experienced by children with low CU traits. For example, assessments of cognitive schema or emotion contagion processes may provide important insights into how and why exhibiting low CU traits confers susceptibility to both supportive and unsupportive socialization environments.

Despite these limitations, this study aimed to systematically examine and disentangle the role that children's CU traits may play in the relationship between parenting and later children's outcomes by using a longitudinal, multi-method, multi-informant design. Extending previous work, the results from this study indicated that unsupportive parenting significantly predicted

children's externalizing behaviors only for children with lower CU traits. In accordance with differential susceptibility theory (Belsky & Pluess, 2009), the findings indicated that children with low CU traits exhibited disproportionately greater externalizing problems when exposed to maternal unsupportive parenting and considerably lower externalizing symptoms in contexts of high maternal support. In highlighting the potential translational implications of our findings, previous clinical efforts have focused on implementing interventions to increase supportive parenting specifically for children with elevated CU traits to optimize their developmental outcomes (Hawes & Allen, 2016; Sawrikar & Dadds, 2018). However, our findings emphasize that interventions geared towards improving supportive parenting might be more effective in cases where children exhibit low CU traits and high levels of empathy. An important and complementary direction for future research may include additional studies that examine whether interventions designed to increase supportive parenting are more efficacious in reducing the externalizing symptoms of children with CU traits (Agazzi et al., 2020; Donohue et al., 2021a, Donohue et al., 2021b). If replicated across different methodological approaches, our findings indicating that children who have low CU traits and supportive mothers are at lowest risk and may be leveraged toward the development of intervention modules that reduce children's CU traits while also enhancing supportive parenting.

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