



Response to Time-Out Among Preschoolers with Externalizing Behavior Problems: The Role of Callous-Unemotional Traits

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Abstract

This study examined the role of callous-unemotional (CU) traits in preschoolers with externalizing behavior problems (EBP) and their response to time-out (TO). One hundred ninety preschoolers (76% boys, $M^{\text{age}} = 4.92$) with at-risk/clinically elevated levels of EBP participated in an 8-week summer treatment program (STP-PreK). Total number of minutes spent daily in TO for intentional aggression (IA) and repeated non-compliance (RNC) were recorded during the initial (T1) and final (T2) phases of the STP-PreK. After accounting for severity of EBP and levels of TO at T1, higher levels of CU traits predicted greater total levels of TO at T2. An interaction also emerged between symptoms of oppositional defiant disorder (ODD) and CU traits in predicting IA. Specifically, greater ODD symptoms predicted fewer number of IA related TO at T2, but only for children with low CU traits. Implications for treatment are discussed.

Keywords Behavioral treatment · Callous-unemotional traits · Conduct problems · Preschoolers · Time-out

Introduction

Externalizing behavior problems (EBP) such as attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD) affect 5–10% of children and adolescents and represent the most common referrals to mental health clinics [1, 2]. EBP are even more common in preschoolers, with prevalence rates ranging from 14 to 52% [3]. A percentage of these children, ranging from 7 to 25% [4, 5], also display a range of conduct problems (CP) such as aggressive, defiant, and anti-social behaviors (AB) that are known to violate the rights of others and major societal norms [6]. Multiple longitudinal studies show that at least half of preschool children with moderate to severe CP continue to show similar behaviors at school age [7–9]. Given the stability [10] and detrimental outcomes (i.e., cognitive impairments, aggression, delinquency, and emotional impairments) [11] associated with early CP, it is important to consider risk factors that influence the course of early CP.

Callous-unemotional (CU) traits have emerged as important factor in understanding the heterogeneity in emotion

dysregulation for children with EBP [12], and of particular interest to the current study, CP [13]. Children displaying CU traits are typically defined as having low levels of guilt, empathy, and caring for others. The subgroup of children with CP that display CU traits experience the most pervasive, severe, and aggressive patterns of antisocial behavior [14]. For example, children with CP exhibiting CU traits have higher rates of property delinquency (i.e., destruction of property), violent delinquency (i.e., physical altercations), and police contact than children who only have CP or CU alone [15]. Children with CP and CU traits have been shown to exhibit impairments across domains (e.g., academic, social, and behavioral) in the classroom setting [16]. Additionally, the stability of CU traits has been documented during the preschool [17], early childhood [18], and adolescent years [19, 20]. Given the relatively high stability of CU traits from childhood to adolescence [21], it is imperative to examine CU traits among younger children.

CU Traits in Preschoolers

As highlighted by Waller et al. [22], there are relatively few studies investigating CU traits in preschoolers with emerging evidence suggesting that CU traits can be identified as early as age three [23]. Early CU traits have been found to predict later ODD and CD diagnoses [24]. Even fewer studies have

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examined the role of CU traits among preschoolers with CP in terms of impairment across domains (e.g., social function, academics). For example, with regard to social functioning, Graziano et al. [25] reported that preschool children with CP can correctly identify peers who engage in behaviors indicative of CU traits and are more likely to dislike and socially reject them. In the academic domain, preschool children with CU have been found to be more likely to experience academic underachievement [26, 27]. Due to the stability and array of impairments children with CU traits experience across domains, it is crucial to intervene early to help attenuate some of their behavioral and emotional deficits.

Treatment of CP in Preschoolers

Evidence-based treatments (EBT) have been shown to be an effective way to reduce the severity of CP [28–30]. Eyberg et al. [28] proposed when selecting EBT for young children (ages 2–5), behavioral parent training (BPT) should be the first line of approach rather than medication. In BPT, negative behaviors are decreased through two key phases, which include increasing positive interactions between the parent and child, and providing consistent consequences for negative behaviors [29, 31, 32]. According to a meta-analysis conducted by Kaminski et al. [29], the first phase of treatment primarily focuses on positive interactions that are reward driven, while the second phase uses consequences or punishments, like time-out (TO), to address negative behaviors. However, relatively few studies have examined the extent to which young children with CU traits respond to specific treatment components like TO.

The few studies to date that have examined the treatment response of children with CU traits have yielded mixed findings. For example, one study showed that parents found TO to be less effective for boys who had higher CU traits [33], suggesting the boys in the study were less sensitive to punishment, regardless of parenting strategies. This may be related to emerging evidence suggesting that children with CU traits are insensitive to punishment and may be more sensitive to reward related goals [34, 35]. However, a systematic review by Waller et al. [36], found that parent-focused interventions appeared to be effective in reducing CU traits in children. For example, in the context of a behavioral family intervention based on Sanders and Dadds [37], BPT was found to be an effective treatment on reducing the level of CU traits and CP in young children [18].

In addition to BPT, multimodal interventions that target children and parents separately have also been effective in improving CP [38, 39]. For example, the Summer Treatment Program (STP) [40] is effective in reducing CPs such as aggression [41] as well as improving children's social functioning [42]. Yet it is important to note the effect of the STP on reducing CP was significantly lower among

children displaying CU traits [35, 43]. On the other hand, an abbreviated version of Coping Power [44], which is another multimodal program targeting aggression, was effective in reducing children's CP, regardless of CU traits [45]. Given the mixed findings in school-aged children with CPs, the extent to which CU traits attenuate the effectiveness of such multimodal interventions in young children, primarily preschoolers, remains unclear.

Current Study

In summary, emerging evidence points to the stability of early CU traits during the preschool period [46, 47] and significant behavioral, academic, social, and familial impairment [24–26, 36]. Very few studies have examined preschoolers with CU traits' response to established EBT for CP [48]. Given evidence with older children suggesting that CU traits are associated with a deficit in punishment sensitivity [34, 35], a clinically relevant question becomes the extent to which preschoolers with CU traits are responsive to a widely used therapeutic component, TO. Examining young children's response to TO is crucial given that TO is part of almost every EBT for CP [28, 29]. Most notably, the few studies that have examined the link between children's response to treatment in the form of TO and CU traits were done with older samples [35, 43, 46].

Hence, the current study is the first to our knowledge to examine the role of CU traits in preschoolers with CP and their response to TO. Within the context of a comprehensive multimodal Summer Treatment Program for Pre-Kinderergarteners (STP-PreK) [49] in a sample of preschoolers with EBP, we examined the extent to which CU traits (as rated by parents/preschool teachers) at pre-treatment predicted (a) baseline levels of TO during the initial phase of the STP-PreK (Time 1) and (b) change in the levels of TO from the initial to final phase of the STP-PreK (Time 2). TO was examined both in terms of total number of daily minutes during the STP-PreK as well as the number of TO due to either intentional aggression (IA) or repeated non-compliance (RNC). After accounting for demographic variables that may relate to CU traits (e.g., sex) [50, 51] as well as severity of CP [52, 53], we hypothesized that preschoolers with higher levels of CU traits would spend more minutes in TO during the initial and final phases of the STP-PreK.

Methods

Participants and Recruitment

Children and their caregivers were recruited from local preschool and mental health agencies via brochures, radio and newspaper ads, and open houses/parent workshops. Legal

guardians contacted the clinic and were directed to the study staff for screening questions to determine eligibility. Participants were required to (a) have an externalizing problems composite t-score of 60 or above on the parent ($M=64.30$, $SD=13.17$) or teacher ($M=65.31$, $SD=13.41$) BASC-2 [54], (b) be enrolled in preschool during the previous year, (c) have an estimated IQ of 70 or higher ($M=94.13$), (d) have no confirmed history of an Autism Spectrum or Psychotic Disorder, and (e) be able to attend an 8-week summer treatment program (STP) prior to the start of the next preschool or kindergarten year.

The final participating sample consisted of 190 preschool children (76% boys) with at-risk or clinically elevated levels of EBP whose parents provided consent to participate in the study. The mean age of the participating children was 4.92 years and more than half of the parents reported currently being married/living with the child's other biological parent (60%). According to the C-DISC [55], which was conducted by mental health graduate students under the supervision of a licensed psychologist, 42% percent of children met DSM-IV criteria for both ADHD and ODD while an additional 24% met criteria for ADHD-only.

Study Design and Procedure

This study was approved by the university's Institutional Review Board. Children were recruited across 2 years and participated in the STP-PreK [49]. All families participated in a pre-treatment assessment prior to the start of the STP-PreK, which included completion of the ADHD, ODD, and CD modules on the C-DISC [55] and various questionnaires regarding their children's behavioral, academic, and emotional functioning. Other than receiving the intervention at either no cost via a federal grant or at a subsidized cost via a local grant, families did not receive compensation for completing the pre-treatment assessment. Similar questionnaires were also obtained from children's preschool teachers.

For this study, we were interested in examining the extent to which initial levels of parent and teacher ratings of children's CU traits were uniquely related to children's response to a component of the multimodal intervention, TO. Number of minutes spent in TO were recorded by a counselor in the STP-PreK [49]. Briefly, children were assigned TOs for the following three reasons: IA, intentional destruction of property (IDP), and RNC. Counselors followed the TO sequence used in Parent–Child Interaction Therapy (PCIT) [56].

A child would receive a TO for IA for instances of aggressive behaviors directed towards other children or staff members (e.g., hitting, spitting, biting). TOs for IDP were given for destructive behaviors towards the child's own belongings, the belonging of another person, or objects in the classroom (e.g., breaking pencil during seatwork, ripping up a classmates drawing, flipping a desk). TOs for IDP were not

examined in the following study given the low frequency of such behaviors. Finally, RNC TOs were assigned when the child failed to comply with a command after being prompted two times by a counselor or teacher. Regardless of the reason for which the TO was assigned, children were expected to serve their TO appropriately for a total of 3 min followed by a 5 s moment of silence. Serving a TO appropriately was described to the child as staying on the TO chair in the corner of the classroom, quietly. If a child's behavior did not meet the criteria necessary to end the TO (being seated and silent after the 3 min and 5 s period), the counselor monitoring the TO would actively ignore these behaviors until the child was serving the final 5 s appropriately.

Measures

CP and ADHD Symptoms

Parents and teachers completed the Disruptive Behavior Disorders (DBD) Rating Scale [57]. The DBD rating scale asks the respondent to rate on a 4-point scale ranging from 0 (*not at all*) to 3 (*very much*), the degree to which children display symptoms of ADHD, ODD, and CD. The DBD Rating Scale's responses range from 0 (*not at all*) to 3 (*very much*). Consistent with prior work [58, 59], parent and teacher ratings were combined by taking the higher of the two ratings for each item to create composites. Of note we did not examine CD given our preschool sample. Rather, our CP measure was the mean score across the ODD symptoms ($\alpha=.85$). The mean score across the ADHD symptoms was also examined ($\alpha=.92$).

CU Traits

Parents and preschool teachers completed an abbreviated version of the inventory of callous-unemotional traits (ICU) [60] consisting of 12 items identified by Hawes et al. [48] as showing similar psychometric properties to those of the full ICU. The items were rated on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*very much*) and included: seems to enjoy being mean; is cold or uncaring; lacks remorse for misbehavior; does not seem to respond or care about punishment; and uses or cons other people to get what he/she wants. Consistent with prior work examining CU traits [19], parent and teacher ratings were combined by taking the higher of the two ratings for each item ($\alpha=.84$). This method is useful when one is attempting to avoid underreporting [15] behaviors that may occur across several settings.

Measurement of Minutes in TO

Consistent with previous work [61], counselors recorded the start and end time of each TO, the reason it was assigned

(IA, RNC), and the number of minutes spent in TO for the day. For the purposes of the current study, the first 2 weeks, Time 1 (T1) were used to examine initial levels of TO. The purpose of examining TO across the first 2 weeks was to account for the “honeymoon effect.” The “honeymoon effect” suggests that clinically elevated behaviors may decline or “disappear” at the beginning of treatment, only to reemerge shortly thereafter. To examine the extent to which children responded to the TO component of the STP-PreK, we examined TO during the last 2 weeks of the STP-PreK, Time 2 (T2).

Data Analytic Plan

All analyses were conducted using the Statistical Package for Social Sciences, version 20 (SPSS 20). Missing values analyses revealed that only one child was missing data across TO domains at week 8. The lack of data for this child was due to absences during the last 2 weeks of the STP-PreK. Little’s Missing Completely at Random (MCAR) test revealed the data was missing at random, $\chi^2 = 1.26$, $p = .74$. Preliminary data analyses were conducted to examine any associations between demographic variables and any outcome variables. Given the dependent variables in the current study were count variables, several assumptions for ordinary least squares (OLS) analyses were violated. First, all the outcomes had a right-skewed distribution (kurtosis range 5.50–23.04), violating the first assumption of OLS, conditional normality. Secondly, the variance for each outcome violated the assumption of homoscedasticity, such that the variances increased at different values of the predictors.

According to Cox et al. [62], Poisson regressions are optimal for analyses involving count data. Predicted outcomes are transformed with a link function (natural log), that allow the dependent and independent variables to have different metric properties. For example, for every one-unit change in our predictors (i.e., ADHD, CP, CU traits), we expected a multiplicative ($e^{b_1+b_2+b_3}$...) change in the outcomes (i.e., IA, RNC). The current study used nested over-dispersed Poisson regressions to predicted T2 TO. First, we ran an intercept only model (model 1). Model 2 included age and T1 as covariates. The following model (model 3) included ADHD, CP, and CU traits as predictors. Finally, model 4 examined interactions between ADHD, CP, and CU traits.

Results

Preliminary Analyses

Descriptive statistics for all demographic variables are presented in Table 1. Preliminary analyses revealed a small

Table 1 Descriptive variables

	<i>M</i>	<i>SD</i>	Range	<i>N</i>
Demographic variables				
Child sex (% male)	76	–	–	190
Child race (% Hispanic)	82	–	–	190
Child age	4.92	.53	3.50–6.24	190
Marital status (% married)	60	–	–	190
Behavioral measures				
DBD: ADHD	1.94	.56	.28–2.94	190
DBD: CP	1.37	.68	0–3	190
ICU: CU	1.08	.42	.08–2.17	190
Mean count (per day)				
IA: Time 1	.64	.97	0–6.22	190
IA: Time 2	.52	.98	0–8.22	189
RNC: Time 1	1.54	1.93	0–11.33	190
RNC: Time 2	.94	1.48	0–10.00	189
Total number of minutes: Time 1	9.85	16.09	0–108.00	190
Total number of minutes: Time 2	4.15	4.54	0–32.00	189

DBD disruptive behavior disorder (DBD) Rating Scale (Pelham, et al. 1998), *ICU* inventory of callous-unemotional traits (ICU; Frick 2004), *CP* conduct problems, *CU* callous-unemotional traits, *ADHD* attention-deficit/hyperactivity-impulsive disorder, *TO* time-out, *IA* intentional aggression, *RNC* repeated non-compliance

association between age and symptoms of ADHD, $r = .15$, $p < .05$, such that older children were exhibiting more behaviors associated with ADHD. Age was also negatively associated with total number of minutes at T2, such that older children were in TO for less time than younger children, $r = -.15$, $p < .05$. There were no statistically significant associations between sex and our outcome variables, $ps > .05$. Regarding our variables of interest, there was a small association between CU traits and all three domains of TO at T2, $rs = .14 - .17$, $ps < .05$. A small association between ADHD symptoms and RNC at T1 suggest that children rated as having greater symptoms of ADHD received more TO for RNC at the beginning of the STP-PreK, $r = .15$, $p < .05$. Lastly, children rated as having greater levels of CP were more likely to receive a TO for IA at T1, $r = .23$, $p < .05$.

Baseline Levels of TO

On average, children spent 9.85 minutes in TO per day during T1, $M = 9.85$, $SD = 16.09$. Paired t tests indicated that children were assigned a significant greater number of TO for RNC ($M = 1.54$, $SD = 1.93$) compared to IA ($M = .64$, $SD = .97$), $t(189) = 7.12$, Cohen’s $d = .59$, $p < .001$. After accounting for age, CP was significantly related to total number of IA at T1, Wald’s $\chi^2(1) = 4.13$, $p < .05$, suggesting children rated by parents/teachers as having higher levels of CP received more TO for IA at T1. Levels of ADHD prior to the start of the STP-PreK significantly predicted the

number of RNC TO at T1, $\chi^2(1)=4.50, p<.05$. Children rated by their parents/teachers as having higher levels of ADHD symptoms received a greater number of RNC TO at T1. ADHD, CP, nor CU traits were associated with the total number of minutes children were in TO at T1, $ps>.05$ (Table 2).

Intervention Effects on TO

After controlling for age and T1, there were significant changes across TO domains. The average number of minutes spent in TO during T2 decreased significantly, $F(2, 186)=36.14, p<.001$, Cohen's $d=-.49$. The average number of TO assigned for RNC and IA also decreased significantly, $F(2, 186)=36.42, p<.001$, Cohen's $d=-.35$, $F(2, 187)=78.73, p<.001$, Cohen's $d=-.12$, respectively.

Overdispersed Poisson Regression Analyses

As seen in Table 3, four overdispersed Poisson regression analyses (model 1–model 4) were tested to examine the association between CU traits and TO at T2 for IA, RNC, and total number of minutes in TO. Wald's χ^2 and pseudo R^2 change for the additional predictors in each model are reported in Table 2. T1 TO (model 2) were significantly associated with T2 across all TO domains ($ps<.001$). When ADHD, CP, and CU traits were added to the analyses (model 3), CP and CU traits were uniquely associated with IA, RNC, and total number of minutes in TO. ADHD was not related to any of the outcomes in the current study ($ps>.05$).

IA at T2

The addition of ADHD, CP, and CU traits (model 3) while controlling for IA and age at T1 (model 2) accounted for 42% of the deviance. However, Wald's test revealed that only CU traits was a significant predictor of IA at T2, Wald $\chi^2(1)=4.20, p<.05$. Children with higher levels of CU traits received greater amounts of TO for IA at T2. This main effect was qualified by a significant interaction (model 4) between CP and CU traits, Wald $\chi^2(1)=4.68, p<.05$. Probing of the interaction revealed that CU traits moderated the association between levels of CP and TO for IA at T2, such that association between CP and number of IA TO at T2 was only present for children with low CU traits, Wald $\chi^2(1)=7.48, p<.01$; see Fig. 1. For every one-unit increase in CP, there was a .24 multiplicative decrease in the number of TO assigned for IA at T2. This association did not hold for children with high CU traits, Wald $\chi^2(1)=.05, p<.82$.

RNC at T2

After controlling for T1 and age (model 2), ADHD, CP, and CU traits accounted for 32% of the deviance. There was a main effect for CP and CU traits, Wald $\chi^2(1)=8.96, p<.01$, Wald $\chi^2(1)=6.03, p<.05$, respectively. Children rated by parents/teachers as having higher levels of CP before starting the STP-PreK received less TO for RNC at T2. On the other hand, children with higher levels of CU traits before the start of the STP-PreK received more TO for RNC at T2. These main effects were then probed (model 4), however there were no interaction effects ($ps>.05$).

Table 2 Correlations between study variables

	1	2	3	4	5	6	7	8	9	10	11
1. Age											
2. Sex	-.04										
3. DBD: ADHD (C)	.15*	-.11									
4. DBD: CP (C)	.00	-.03	.33**								
5. ICU: CU (C)	-.02	.03	.28**	.45***							
6. Total # Mins in TO: Time 1 (O)	-.08	-.04	.14	.13	.05						
7. Total # Mins in TO: Time 2 (O)	-.15*	-.11	.07	.09	.16*	.52***					
8. Number of RNC TO: Time 1 (O)	-.12	-.05	.15*	.06	.13	.60***	.46***				
9. Number of RNC TO: Time 2 (O)	-.08	.01	.03	-.09	.14*	.18*	.44***	.53***			
1. Number of IA TO: Time 1 (O)	-.05	-.08	.12	.23**	.18*	.42***	.37***	.44***	.28***		
11. Number of IA TO: Time 2 (O)	-.02	-.14	.13	.12	.17*	.24**	.46***	.36***	.42***	.66***	

C Combined teacher and parent report, O observed measure, DBD Disruptive Behavior Disorder Scale (DBD; Pelham et al. 1998), CP conduct problems, ICU inventory of callous-unemotional traits (ICU; Frick 2004), CU callous-unemotional traits, ADHD attention-deficit/hyperactivity-impulsive disorder

*** $p<.001$, ** $p<.01$, * $p<.05$

Table 3 Models for predicting daily TO outcomes at Time 2 (IA, RNC, Total)

	<i>b</i>	<i>e^{bx}</i>	95% CI	Wald's χ^2	Deviance	Pseudo R ²
Number of IA at Time 2 (O)						
Model 1: intercept model	1.55	4.71	(1.28, 1.82)	129.54***	1875.62	–
Model 2: age	–.06	.94	(–.40, .28)	.12	1144.61	.39
IA: Time 1 (O)	.06	1.06	(.05, .07)	151.74***	–	–
Model 3: ADHD (C)	.33	1.39	(–.05, .72)	2.95	1084.98	.42
CP (C)	–.22	.80	(–.56, .12)	1.66	–	–
CU traits (C)	.48	1.62	(.02, .95)	4.20*	–	–
Model 4: ADHD×CU	–.12	.89	(–1.00, .76)	.07	1051.49	.44
ADHD×CP	.09	1.09	(–.49, .67)	.10	–	–
ODD×CU	.65	1.92	(.06, 1.25)	4.68*	–	–
Number of RNC at Time 2 (O)						
Model 1: intercept model	2.14	8.50	(1.92, 2.36)	349.81***	2826.44	–
Model 2: age	.02	1.02	(–.33, .38)	.02	2082.38	.26
IA: Time 1 (O)	.03	1.03	(.21, .04)	62.74***	–	–
Model 3: ADHD (C)	–.02	.98	(–.38, .35)	.01	1933.14	.32
CP (C)	–.47	.63	(–.78, –.16)	8.96**	–	–
CU traits (C)	.59	1.80	(.12, 1.06)	6.03*	–	–
Model 4: ADHD×CU	–.39	.68	(–1.26, .48)	.77	1881.75	.33
ADHD×CP	.46	1.58	(–.12, 1.04)	2.42	–	–
ODD×CU	.41	1.52	(–.24, 1.05)	1.53	–	–
Total number of minutes in TO at Time 2 (O)						
Model 1: intercept model	3.62	37.34	(3.46, 3.78)	6917.75***	6917.5	–
Model 2: age	–.24	.79	(–.47, –.01)	4.02*	5361.19	.23
IA: Time 1 (O)	.002	1.00	(.002, .003)	66.15***	–	–
Model 3: ADHD (C)	–.05	.95	(–.30, .20)	.16	5198.27	.25
CP (C)	–.02	.98	(–.24, .20)	.05	–	–
CU traits (C)	.38	1.46	(.05, .72)	5.06*	–	–
Model 4: ADHD×CU	.32	1.38	(–.20, .85)	1.45	4965.88	.28
ADHD×CP	–.07	.93	(–.44, .31)	.121	–	–
ODD×CU	.46	1.58	(.05, .87)	4.73*	–	–

P parent report, *C* combined parent and teacher report, *O* observation, *CP* conduct problems, *CU* callous-unemotional, *ADHD* attention-deficit/hyperactivity-impulsive disorder, *TO* time-out, *IA* intentional aggression, *RNC* repeated non-compliance

* $p < .05$, ** $p < .01$, *** $p < .001$

Total Number of Minutes in to at T2

Unlike the aforementioned analyses, age significantly predicted the number of minutes children were in TO at T2, Wald $\chi^2(1) = 4.02$, $p < .05$, suggesting that younger children spent more minutes in TO at T2 compared to older children. Model 3 accounted for 25% of the deviance in the model. There was a main effect for CU traits, such that higher levels of CU traits predicted more minutes in TO at T2, Wald $\chi^2(1) = 5.06$, $p < .05$. This main effect was qualified by a significant interaction between CP and CU traits, Wald $\chi^2(1) = 4.73$, $p < .05$. However, there were no differences between the simple slopes for ODD at any level of CU traits, $ps > .05$.

Discussion

Within the context of a comprehensive multimodal STP for preschoolers with EBP, we examined the extent to which CU traits predicted TO levels during the initial and final phases of the STP-PreK. First, it is important to note that children's overall levels of TO significantly decreased from T1 to T2 of the STP-PreK. Second, CU traits did not predict initial levels of TO during the STP-PreK. Rather, CU traits was associated with greater levels of TO at T2 for total number of minutes, number of IA TO, and RNC TO. We elaborate on these findings below.

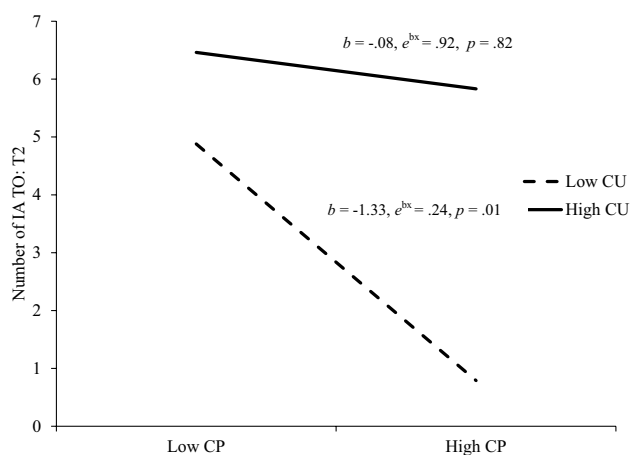


Fig. 1 CP by CU on number of IA TO assigned at T2. Analyses controlled for age, T1, IA, and ADHD. IA intentional aggression, TO time-out, T1 Time 1, T2 Time 2, CP conduct problems, CU callous-unemotional traits, ADHD attention-deficit/hyperactivity-impulsive disorder

At T1, children spent an average of 9.85 min in TO a day. However, by the end of the STP-PreK, T2, there was approximately a 58% reduction in daily number of minutes spent in TO ($M = 4.15$, $SD = 4.54$). This significant reduction speaks to the effectiveness of multimodal behavioral programs targeting children with EBP. Past studies have traditionally relied on post-treatment parent and teacher reports [63, 64] to measure treatment outcomes. For example, Hawes and Dadds [33] used parent reports to measure children's emotional reaction during TO. Additionally, classroom-based interventions have been shown to decrease externalizing and internalizing behaviors in the classroom, as reported by teachers [65]. Significantly less work has examined more objective behavioral measures within the context of treatment. To our knowledge, this is the first study that has examined more objective measures of preschoolers' disruptive behaviors by examining the amount of time they spent in TO. Due to the fact that the STP-PreK mimics the school setting, measuring the number of minutes spent in TO provides an ecologically valid measure of response to an important component of treatment, TO. By doing so, it allowed us to more accurately measure children's aggression and non-compliance within a classroom setting.

Consistent with our hypothesis, preschoolers with higher levels of CU traits, as reported by parents/preschool teachers, were less responsive to the use of TO during the STP-PreK. Specifically, even after accounting for initial levels of TO, CU traits predicted overall TO and RNC during the final phase of the STP-PreK. While there were overall decreases in the number of TO and the total number of minutes spent in TO, prior work that dichotomizes CU traits also found that children with higher CU traits did not respond to a

multimodal treatment, compared to children with no/low CU traits [66, 67]. Several mechanisms may explain the reason why children with higher levels of CU traits do not respond as well to a behavioral intervention.

Previous research shows that children and adolescents with CU traits differ in their responses to emotional cues and the possibility of consequences for their actions [68, 69]. Furthermore, research by Pardini and Byrd [70] found that children with CU traits had "deviant social schemas" that increased instrumental aggression. More importantly, significant associations revealed that children with more CU traits were less fearful towards punishment. The current study shows that even within a young preschool sample, CU traits may suggest not only an inherent oppositionality [71], but perhaps a lack of emotional reactivity [15, 72] in terms of their lack of response to threat/punishment (e.g., receiving a TO warning for RNC).

It is also important to note that an interaction emerged between CP and CU traits as it relates to IA TO. Specifically, at high levels of CU traits, co-occurring CP had no impact on number of IA TO at T2. However, at low levels of CU traits, high CP was associated with fewer IA TO whereas low CP was associated with greater IA TO at T2. This finding suggests that children with higher levels of CP (without CU traits) responded more positively to the intervention. Indeed children with ODD do quite well in PT programs like PCIT where TO is a major component [73, 74]. On the other hand, our low CP group, which ended up with higher IA TO, may be more indicative of a group of children who engage in more covert acts of CP (which would explain their lower CP rating according to parents and teachers). Indeed, studies have distinguished children with early CU traits engage in more proactive versus reactive forms of aggression [23] with some studies indicating that proactive acts of aggression have worse outcomes in life [21, 75]. Future work examining the heterogeneity in young children with EBP's treatment response may want to examine different forms of aggression to determine which ones may be more amenable to the use of TO.

There were some limitations to the current study that need to be acknowledged. First, a TO was assigned based on a hierarchy such that a child could exhibit two behaviors, but only the most severe would be recorded as the reason for the TO. For example, if a child was instructed to return to his or her seat and received a TO warning for not complying, but then pinched a child as he or she was running around, he or she would be assigned a TO for IA, rather than RNC. This system could potentially reduce the average number of daily minutes a child spent in TO for non-compliant behaviors; however, it was very successful in capturing aggressive behaviors towards peers and staff. Second, although all teachers and counselors in the STP-PreK were trained in the operational procedures of assigning TO and were supervised

on a daily basis, it was not feasible to video record the classroom to more accurately capture the recordings of the TO. The in-vivo nature of the TO data collection may have also resulted in some children exhibiting behaviors which should have been resulted in TOs but were missed by a counselor (although given the high number staff to student ratio (1:3) in each classroom this is unlikely to have happened at significant rate). Lastly, another limitation was the cultural homogeneity of the current sample (82% Hispanic/Latino), due to the geographical location. Although such cultural homogeneity may be a strength due to the fact that Hispanic/Latino children are the fastest growing group of children in the United States [76], it is important to be cautious when generalizing the current study's findings to other cultural/racial groups.

In sum, total number of TO for aggressive and non-compliant behaviors significantly decreased over the course of our multimodal summer treatment intervention. However, our findings highlight that children with higher levels of CU traits experienced lower reductions in TO across the intervention. This is the first study, to our knowledge, to directly observe preschooler's response to a widely used treatment component (i.e., TO) and is consistent with past work showing that children with CU traits are less sensitive to punishment [14, 67]. In terms of implications, it is first important to note that most schools do not have the personnel and training to conduct TOs in the classroom. When viewed in conjunction with our finding that children with higher levels of CU traits did not respond as well to TO, alternative behavioral management strategies should be considered. Taking into account children with EBP's reward sensitivity [77, 78], several school-based intervention programs have been successful in reducing CP in the classroom, regardless of CU traits [79, 80]. Lastly, future intervention studies should examine the extent to which existing behavioral management and social-emotional curriculum are effective in not simply reducing CP but also in promoting children's empathetic and prosocial behaviors.

Summary

Externalizing behavior problems (EBP) such as attention-deficit/hyperactivity disorder (ADHD), ODD, and CD affect a substantial number of children and adolescents. EBP are even more present in preschool children. More recently, a subset of children with EBP have been identified as having CU traits. Children with CU traits are typically defined as having low levels of guilt, empathy, and caring for others. Several studies have identified these early antisocial behaviors in children as young as 3 years old. Longitudinal studies have found that children with CP and early CU traits continue to exhibit various functional impairments (i.e.,

academic, social, and behavioral) across development. For example, children with CP and CU traits have higher rates of aggressive behaviors as well as juvenile delinquency into adolescence.

While several EBT have shown to be successful in the reduction of CP, there is still mixed evidence at the effectiveness of these EBTs for children with CP and CU traits. More specifically, several studies have examined which components of treatment may be associated with behavioral improvements in children with CP and CU traits. Therefore, the current study sought to examine the role of CU traits, as reported by parents/preschool teachers, on the levels of time-out (TO) during an 8-week comprehensive multimodal STP for Pre-Kindergarteners (STP-PreK). TO is a crucial treatment component that is found in almost every EBT for CP. The current study examined TO at the initial phase/Time 1 (first 2 weeks; T1) and the final phase/Time 2 (last 2 weeks; T2) of the STP-PreK. We examined the total number of minutes children spent in TO, the number of IA, and RNC TO children received during the initial and final phase of the STP-PreK.

This study found that even after accounting for initial levels of EBP, CU traits were not associated with any TO outcomes at T1. However, CU traits and CP were significant predictors of IA at T2. After probing a significant interaction, we found that low CU traits moderated the association between CP and number of IA at T2. CU traits were also positively associated with the number of RNC as well as the total number of minutes spent in TO at T2. These findings suggest that preschoolers with a more pure ADHD or CP presentation seems to be more responsive to the TO component of treatment compared to preschoolers with a more comorbid ADHD/CP + CU traits presentation. Future work should examine other behavioral management strategies (rewards versus TO) that may help reduce impairments associated with CP and CU traits, while increasing prosocial and empathetic behaviors.

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