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Effortful Control Mediates the Effect of Parenting Intervention on Preschool Callous-Unemotional Traits

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Abstract

Callous-unemotional (CU) traits and effortful control (EC) are two early dispositions that play a key role in developmental pathways of childhood-onset conduct problems (CP). Recently, a randomized controlled trial of an early parenting intervention (PI) with parents of preschoolers with CP, called *Hitkashrut*, indicated that these dispositions are interrelated, and can be improved following treatment. The objective of the current study was to use *Hitkashrut*'s 2-wave dataset to test a temperamentally-driven mechanism in which EC is hypothesized to mediate PI's effect on CU traits. Parents of 209 preschoolers (163 boys; 46 girls), with subclinical-clinical range CP were assigned to 14-session co-parent training groups ($n = 140$ couples), or to minimal intervention control groups ($n = 69$ couples). All participants were Jewish ranging from ultra-orthodox to secular. We employed averaged indices of pre- and post-intervention questionnaires completed by both parents. An intent-to-treat analysis showed that EC partially mediated treatment effect on CU traits, while controlling for treatment effect on CP. A nonsignificant alternative model in which CU traits mediate effect on children's EC further supported the hypothesis that change in EC preceded change in CU traits. This is the first demonstration of EC mediated treatment effect on CU traits in a randomized controlled study conducted in everyday practice settings. Overall, the results suggested that CU traits are malleable following appropriate treatment and affected by improvement in temperamental self-regulatory capacity as indicated by EC. The results suggest that preschoolers' CU traits can be improved by incorporating intervention that enhance self-regulation capabilities.

Keywords Callous-unemotional traits · Effortful control · Parenting intervention · Randomized controlled trial · Mediation

Highlights

- Effortful control (EC) mediated parenting intervention's effect on callous-unemotional (CU) traits in real-world settings.
- Preschoolers' CU traits can be improved by enhancing self-regulation capabilities.
- EC partially mediated treatment effect on CU traits, while controlling for CP.

Research has demonstrated that children with callous-unemotional (CU) traits show deficits in early conscience (i.e., a lack of empathy and concern for others, indifference toward others' feelings and lower guilt or remorse following transgressions), and deficiency of care about one's performance on important tasks (Frick & White, 2008; Kimonis et al., 2016; Waller et al., 2016). They are at risk for severe conduct problems (CP) (Hawes et al., 2017), and for the later development of psychopathy (Frick et al., 2014). Evidence also suggests that high-CU children are less responsive to parenting interventions (PI) aimed to reduce CP (Hawes et al., 2014). In addition to other causes, this poorer response to parental socialization efforts (Dadds & Rhodes, 2008) has been significantly attributed to unique temperament characteristics involved in the development of CU traits defined as fearlessness or low affiliation (Waller & Wagner, 2019; Waller et al., 2019). Although current research has strived to identify specific underpinnings of CU traits and various risk factors that are associated with their emergence during development (Glenn, 2019; Marsh et al., 2008; Moore et al., 2019), much less is known about

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their malleability following treatment (Hawes et al., 2014), and especially concerning specific treatment mechanisms. Of interest, the high stability of CU traits and evidence of their neurobiological and genetic origins are indicative of a temperamentally based conceptualization (Longman et al., 2016). Yet, to the best of our knowledge, no intervention study has hitherto examined the role of temperamental risk factors associated with CU traits. The present study addresses this lacuna by examining temperamentally-driven mechanism in which effortful control (EC) is hypothesized to mediate the effect of a PI on CU traits in early childhood, as will be elaborated shortly.

EC has been defined as "the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors" (p.129) (Rothbart & Bates, 2006). It is a temperamental self-regulatory capacity that involves attentional abilities and executive functioning capabilities, emerges in the first year of life and directs children's attention, emotions and behaviors towards voluntary activities, and is related to some aspects of executive functioning capabilities (Kochanska et al., 2000; Rothbart & Derryberry, 2002). While low-EC children tend towards impulsivity, low capability to delay gratification, emotional reactivity and characterized by reactive aggression (Frick et al., 2014; Goffin et al., 2018), high-EC is related to higher levels of prosocial behavior amongst preschoolers (Slobodskaya et al., 2020). On the other hand, high-CU traits indicate low reactivity to negative affective cues, remorselessness, and proactive aggression (Frick & Ray, 2015; Kimonis et al., 2016).

Despite the rapid pace of development during a child's early years, EC and CU traits indicate two early and stable dispositions. CU traits has been found to be stable already between ages 3–5 (Kimonis et al., 2016). In addition, deceitful-callous scores at age 3 correlate with CU scores at age 9.5 (Waller et al., 2016). Similarly, EC has found to be stable from 22 to 33 months (Kochanska & Knaack, 2003), and there is also evidence that EC levels at early childhood years (ages 3–5) are statistically and significantly associated with EC levels during middle childhood (ages 6–10) (Neppl et al., 2010). CU traits and EC play a key role in developmental pathways of childhood-onset disruptive disorders such as CP (Frick, 2012; Kochanska et al., 2009). Indeed, CU traits and EC scores amongst young children are associated with later CP. For example, Waller et al. (2016) reported a modest to moderate correlations between deceitful-callous behavior at age 3, and rule-breaking and aggressive behavior at age 9.5. Kochanska et al. (2009) reported that EC scores at ages 22–45 months were significantly associated with disruptive conduct at 73 months amongst children with low guilt. Although research has shown that both dispositions can be reliably measured in early childhood, are moderately correlated (Kimonis et al., 2016; Waller et al., 2017), and have a strong biological premise, there is growing evidence that parents affect the development of both dispositions by providing emotional support, sensitivity and warmth within the parent-child dyad (Fay-Stammbach et al., 2017; Karreman et al., 2008; Neppl et al., 2020; Pasalich et al., 2011; Spinrad et al., 2007). Consequently, it seems that targeting early intervention programs for both dispositions during a critical period in development can offset risk for later antisociality.

Regarding the malleability of CU traits following PI, treatment was found to reduce CU levels within a variety of age levels (McDonald et al., 2011; Muratori et al., 2017), although in these studies, assignment to study groups was not randomized. Although randomized controlled trial (RCT) studies of EC and CU traits' responsivity to PI have been limited, especially during preschool years (Elizur et al., 2017; Hawes et al., 2014), recent studies have pointed that CU traits and EC (Chang et al., 2017; Somech & Elizur, 2012), as well as some related indices of self-regulation (Morawska et al., 2019) such as inhibitory control (Chang et al., 2014) and executive functioning (Diamond & Lee, 2011), can be changed following PI (Frick et al., 2014; Hawes et al., 2014; Waller et al., 2013). A recent study that combined data from 3 RCTs has also shown that CU traits can be reduced following brief and comprehensive formats of PI with parents of 3–12-year-olds children (Kjøbli et al., 2018). These PI training formats focused on enhancing positive parental sensitivity and responsiveness, such as praise, rewards, and positive physical contact, as well as parental skill acquisition such as problem solving, skills encouragement, discipline, and monitoring (Kjøbli & Bjørnebekk, 2013; Kjøbli et al., 2013; Kjøbli & Ogden, 2012).

Notwithstanding the unique effect of PI alone on CU traits, a recent study that examined the effectiveness of PI and an addition of a child-focused emotion recognition and understanding component, found significantly increased treatment effect on high-CU children beyond the effect of PI only (Dadds et al., 2012). The authors suggested that emotional training may be an active component of treating CP and CU children's core emotional and empathic deficits. More recently, Kimonis et al. (2019) reported significant reductions in CU traits following a new version of the Parent-Child Interaction Therapy called PCIT-CU that was planned to focus on central emotional deficits of preschoolers with CU traits. Although this study did not examine treatment mechanism, it seems that focusing on components of emotional regulation may be a valuable process of change for treating high-CU children.

Indeed, EC is a temperamental self-regulatory capacity that directs children's attention and emotions (Rothbart & Derryberry, 2002) that seems to play an important role in

the development of CU traits. We will now present some theoretical arguments and empirical findings regarding this claim. First, current theoretical models of psychopathy and CU traits such as the Sensitivity to Threat and Affiliative Reward (STAR) model (Waller & Wagner, 2019) and the Responsiveness, Emotional Attention, and Learning (REAL) model of psychopathology (Dadds & Frick, 2019) consider the role of emotional and attention-related deficits in the development of CU traits, such as reduced attention to socioemotional stimuli, emotional faces and eye gaze. Within the REAL model, for example, the temperamental construct of Emotional Attention, which is defined as one's selective attention to the socioemotional state of caregivers, is hypothesized to be negatively associated with CU traits. Furthermore, research has demonstrated that high-EC is associated with empathy-related responding, sympathy, and higher-level moral reasoning (see e.g., Eisenberg et al., 2007; Guthrie et al., 1997; Kochanska et al., 2001; Murphy et al., 1999; Valiente et al., 2004), as well as with some aspects of conscience development (Kochanska & Aksan, 2006; Kochanska et al., 1997; Stifter et al., 2009), as measured by the moral self (e.g., concerns about others' misbehavior, apology, and empathy) and children's responses following hypothetical moral dilemmas (Kochanska et al., 1997). Indeed, EC measured at 22, 33, and 45 months predicted an internalized conscience at 56 months (Kochanska & Knaack, 2003). Furthermore, High-EC is associated with prosociality (Diener & Kim, 2004; Veenstra et al., 2008), such as providing support for others, volunteering and sharing (Eisenberg et al., 2010; Lengua et al., 2007). Relatedly, a recent study showed that 4-year-olds with higher self-regulatory capabilities (e.g., attentional regulation) were more likely to act in prosocial ways (Laible et al., 2014).

Given the well-known centrality of PI and both EC and CU traits in the development of early-onset CP, it is somewhat surprising that only one study to date has examined within a single theoretical model the malleability of both dispositions and possible developmental trajectories. Using a randomized controlled trial (RCT), the researchers found that *Hitkashrut*'s PI, a preventive intervention program created for parents of 3–5 year-olds with subclinical-clinical range CP, demonstrated a decrease in EC and CU traits at post-intervention and 1-year follow-up, (Somech & Elizur, 2012). A secondary analysis found that all effects were mediated by ineffective parenting (i.e., negative/inconsistent parenting and perceived parenting inefficacy) (Elizur et al., 2017). An additional intent-to-treat analysis that used *Hitkashrut*'s 3-wave dataset has shown that both dispositions simultaneously mediated treatment effects on 1-year follow-up CP in one EC/CU mediational model (Elizur & Somech, 2018). Taken together, the results indicate the importance of effective parenting on the malleability of EC and CU, and their importance in preventive antisociality in early childhood. The aim of the current study was to uncover the exact relations between the two dispositions under investigation. More specifically, we report here an intent-to-treat analysis using *Hitkashrut*'s 2-wave dataset to examine whether PI treatment effect on posttreatment CU traits is mediated by EC.

In essence, researchers have suggested a mechanism in which high-EC predisposes children to intentional regulation of negative emotional response, and consequently to the activation of subordinate response that leads in turn to the care of others and to empathic-prosocial behavior (Luengo Kanacri et al., 2013; Rothbart & Rueda, 2005). It seems that the attentional components of EC such as attentional shifting and attentional focusing function as an attentional-based flexibility system that can help children to better learn from their feelings, emotions and cognition (Rothbart & Derryberry, 2002; Sameroff, 2010), and subsequently, to internalize moral codes that affect moral behavior (Kochanska et al., 2009; Rothbart & Rueda, 2005). Furthermore, for high-CU children, the EC inhibitory capacity is a protective function that enables them to consider moral parental standards and possible consequences of misbehavior, and to exercise deliberate restraint that may offset risk for CP conferred by low-level guilt (Kochanska et al., 2009). Consistent with this proposition, Waller et al. (2017) found that high executive function at age 3 protected high-CU children from later CP at age 10. At the same time, the combination of high CU behaviors and low executive function predicted the highest level of age 10 CP. In support to this assumption, previous studies suggested that young children with comorbidity of CU traits and oppositional defiant problems (ODD) symptoms are more prone to deficits in self-regulation, specifically in attentional control (see e.g., Gartstein et al., 2012; Ezpeleta et al., 2017). A more recent study demonstrated that temperamental self-regulation as indicated by low-EC was negatively associated to CU traits and ODD-related behavioral problems in a sample of preschool children (Susa Erdogan et al., 2017). Taken together, these findings suggest that improving EC in young children may be one mechanism for promoting reduced CU traits.

A final reason for our proposed mediating mechanism lies in the theoretical premises of the intervention under examination in the current study (Somech & Elizur, 2012). As mentioned earlier, *Hitkashrut* is a group-based secondary prevention program aimed to reduce CP among preschoolers with subclinical-clinical range CP, and its objective is to improve early-onset CP and prevent the development of diagnosed disorders. The program is theoretically anchored in attachment, social interaction, and family-systems theories that employs a multimodal approach integrating both behavioral and socioemotional-

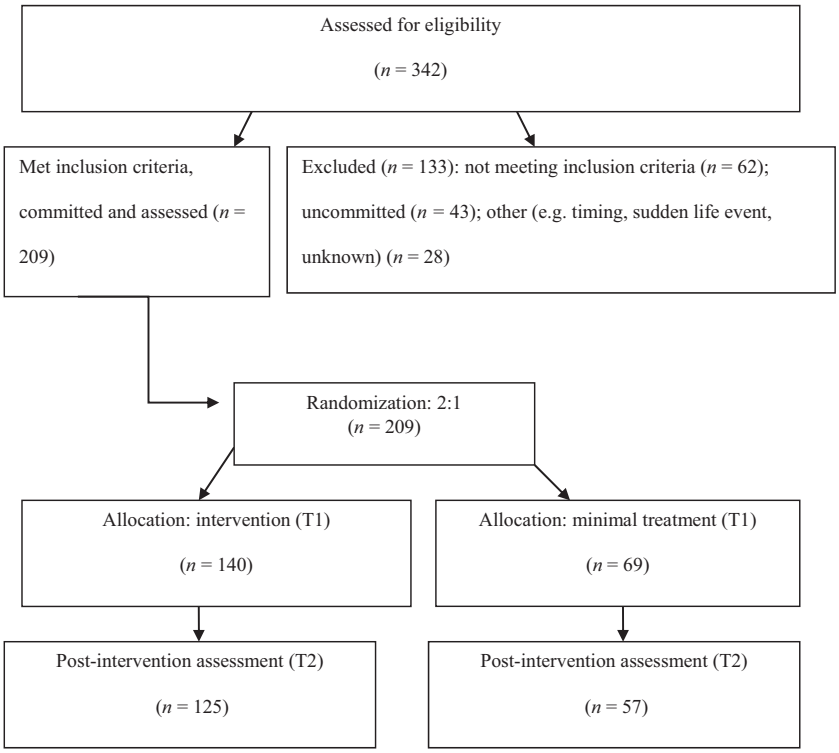

Fig. 1 CONSORT flow diagram through pre-to-post-intervention stages

focused methods to promote self-regulation and prosocial cooperativeness (Elizur et al., 2017). The core strategy is to promote young children's self-regulation and prosociality by shaping more secure, regulated, and cooperative family relationships. For example, parents are coached to use warm parental skills to enhance emotional bonding within the parent–child dyad such as child-directed play, effort-based praise, as well as reward-oriented parenting and reflective parenting from intergenerational point of view to enrich parental warmth and involvement. It is assumed that the working model of *Hitkashrut* offers children opportunities to practice, maintain, and improve predispositions to effortfully self-regulate their own emotions, cognitions and behaviors within the attachment relationships, and that this increase in the executive attention system can impact their willingness to follow parental socialization efforts and subsequently to enhance empathy and prosocial behavior. In other words, we hypothesize that improvement in the child's flexible control of attention (i.e., focusing and shifting) and his/her capability to suppress dominant response to perform subdominant one such as redirecting attention towards others' distress cues, an increase in empathic-prosocial behaviors might arise. In line with MacKinnon et al. (2007), we examined this EC mediational model with the following set of hypotheses: (a) treatment is positively associated with EC at posttreatment (*T*2) (b) treatment is negatively associated with posttreatment CU traits; (c) EC at *T*2 is negatively associated with CU traits at *T*2; and (e) EC at *T*2 mediates treatment effect on CU traits at *T*2. We used baseline (*T*1) scores to control for temporal stability of all variables. Given the 2-wave model used in the current study and since the condition that the mediator will temporally precede the outcome variable is not fulfilled to confer about the direction of causality, we also examined an alternative model in which change in CU traits is hypothesize to precede change in EC.

Method

Participants

During 2006 to 2009, kindergarten teachers referred 3–5 year-old children with CP ($n = 342$). Up to 70 kindergartens within the Ministry's Jerusalem region (Jerusalem, Modi'in, and Modi'in-Illit) participated. The Kindergartens that were chosen by Psychological Consultation Services and the Preschool Department in the Israeli Ministry of Education, represented diverse religious groups in Israel, ranging from secular to Orthodox. 133 children were excluded due to; not meeting inclusion criteria ($n = 62$), lack of commitment ($n = 43$), other (e.g. timing, sudden life event, unknown) ($n = 28$). A flow chart of participants through study stages is provided in Fig. 1.

The sample of 209 families was composed of 163 boys and 46 girls, 32–64 months at pretest ($M = 48.63$, $SD = 7.20$). Preschool teachers rated all their 3–5 year-old children on the CP subscale of the Strengths and Difficulties

Questionnaire (SDQ) (Goodman & Scott, 1999), and referred children with significant disruptive behaviors [SDQ-CP > 3 (above percentile 80 – subclinical-clinical range)]. Thus, 84.6% were in the subclinical-clinical range, with no significant difference between study groups [Treatment: $M = 5.00$, $SD = 2.87$; Control: $M = 5.22$, $SD = 2.72$]. Subsequently, the facilitators interviewed all parents, discussed the program and its requirements, stressed the need for the two caregivers' regular attendance, and screened out children with significant intellectual impairment or pervasive developmental delay, as well as unmotivated or highly conflicted parents.

The sample was composed mostly of intact families (86.6%). The 21–50 year-old mothers ($M = 33.46$, $SD = 4.76$) and 23–61 year-old fathers ($M = 36.48$, $SD = 5.99$) were born in Israel (78%), Europe (7.7%), North America (5.6%), South America (3.9%), and Africa (4.8%). All participants were Jewish of different affiliations: 19% ultra-orthodox, 20% orthodox, 23.5% traditional, and 36.5% secular. Most parents were employed or in Yeshivas (Jewish educational institutions of higher learning): 94.3% fathers, 89% mothers. Education: high-school degree (55.5% fathers, 49.3% mothers), college (14.8% fathers, 26.3% mothers), and higher degrees (18.7% fathers, 17.2% mothers). Monthly income per family: 54% low to very low (less than $2850), 39.7% average ($2850–$5700), and 6.2% high (>$5700). There were no significant group differences at baseline regarding all demographic variables, including child age (see Somech & Elizur, 2012).

Procedure

The Ministry of Education's Chief Scientist and the Hebrew University's Institutional Review Boards approved *Hitkashrut*'s RCT, and retrospectively registered the study (Clinical trial registration information –http://www.anzctr.org.au; ACTRN12612000148875). The intervention was implemented by locally employed educational psychologists in three cities who scheduled interviews with parents during which program information was provided and forms of informed consent explained and then signed by both parents. Participants were randomly allocated to intervention ($n = 140$) or to control (minimal treatment) ($n = 69$) groups using random numbers. The 2:1 assignment ratio was predicated on a preference for enabling more participants to take advantage of the intervention without a serious loss of statistical power. Potential harm to participants was minimized by implementation within the practice context of services that provided more intensive interventions or made referrals to public clinics where necessary.

Graduate psychology students made home visits to collect identical sets of questionnaires from both parents. The treatment condition was masked. All variables were assessed at *T*1 (Baseline, pre-intervention) and *T*2 (within one month post-intervention). Posttreatment assessment included 182 families (87.08%): 125 intervention (89.3%) and 57 control (82.6%). There were no significant group differences at baseline regarding all the variables. T-tests comparisons between the completers vs. noncompleters groups at T2 were all nonsignificant ($p > 0.05$) with respect to each baseline variable [EC ($t = 0.73$), CU ($t = -0.96$)].

Intervention

Two masters-level psychologists co-facilitated 14 two-hour weekly meetings with 5–7 couples. An emotionally supportive and empowering group process that combats helplessness and facilitates reconnection with feelings of parenting competence was established through psychoeducational interventions. Subsequently, the parents completed a semi-structured manualized training sequence. The intervention integrated behavior-focused contingencies and disciplinary practices by coaching effective parenting practices, together with socioemotional-focused approaches that promote children's self-regulation and prosocial capabilities (Elizur & Somech, 2018). A two-stage strategy was used to organize a coherent sequence of evidence-based common practices (Kaminski et al., 2008). The initial emphasis was on enhancing parent-child bonding and cooperation by means of positive attention and reinforcements, and on increasing positive interactions in cool nondisciplinary situations. The parents were guided to reflect on their own affective, cognitive, and behavioral aspects of parenting to increase sense of parenting efficacy. They learnt about the distinctive needs of children with self-regulation difficulties and reduced empathy and prosocial behaviors. This set the stage for improving parental ability in managing hot situations (e.g., a child's angry outburst that may trigger coercive responses), and fostering willing compliance. In the second stage, parents were taught to apply disciplinary procedure for noncompliance such as contingencies, time out, and conjoint problem solving, to promote self-regulation and cooperativeness (Elizur et al., 2017). Parental self-regulation, couple teamwork, security, and cooperation on all levels of the system (i.e., parent-child, parent-teacher, and between parents) were a continuous theme throughout the program. Table 1 presents Hitkashrut's session-by-session content. For additional details about Hitkashrut's methods and components, see Somech & Elizur (2012).

Minimal intervention control group

The parents were referred for two consultation sessions. The facilitators made use of *Hitkashrut*'s key components and handouts, and when necessary referred parents to the local educational psychology service or community clinics.

Table 1 Hitkashrut's sessions and content

Sessions and content
Session 1: Getting acquainted. Initial establishment of group cohesion; presentation of the program and its purpose; alliance with parents' expectations.
Session 2&3: Play time. Parents learn: (1) effective play skills and positive parent-child interaction quality/time; (2) how to decrease negative interactions (e.g. criticism and control); (3) new parent-child communication skills; (4) how to enhance sensitivity to recognize and understand child's feelings and thoughts; (5) how to enhance awareness and sensitivity to child's needs during playtime.
Session 4: Positive attention. Parents learn: (1) how to enhance parent-child bonding with positive attention and effective praise; (2) how to attend to positive behaviors; (3) how to reinforce positively through attention and eye contact; (4) the do's and don'ts in praising.
Sessions 5&6: Positive goal setting. Parents learn: (1) how to establish consistent tangible reward program tailored to each family; (2) how to positively reinforce collaborative/prosocial acts; (3) playful and practical problem-solving with children; (4) how to reframe children's misbehavior as capabilities needed to acquire by using narrative tools such as externalization.
Sessions 7–9: Setting limits. Parents learn: (1) how to consistently and positively communicating limits; (2) when and how to ignore and distract; (3) how to use nonviolent disciplining techniques (e.g. natural/logical consequences); (4) how to establish collaboration with teachers through joint behavior management; (5) how to examine progress in the goals they set at the beginning.
Session 10: Self-regulation. Parents learn: (1) how to enhance their self-regulation capacity through imagery and relaxation; (2) anger management techniques; (3) effective strategies to improve children's emotional regulation.
Session 11: Explosive behavior. Parents learn time out and protective holding procedures.
Sessions 12&13: Co-parenting. Parents learn: (1) couple communication skills; (2) co-parenting skills; (3) how to understand intergenerational parental authority patterns.
Session 14: Closure. Review of parenting knowledge, principles and skills acquired in the program.

Training, supervision and treatment fidelity

The Psychological Services' directors selected facilitators with preschool experience and group facilitation skills. These facilitators attended a 2-day training workshop and during the course of the intervention had regular bi-weekly supervision. Newly trained facilitators were paired with experienced facilitators. The facilitators worked from a detailed manual with guidelines and materials that specified each sessions' objectives and layout, including a slide presentation, video clips, structured demonstrations, role-plays, and take-home handouts. To ensure program adherence and fidelity, each supervisory session began with a report on the implementation of the previous sessions, followed by a discussion of specific problems or issues (e.g., lateness, reservations concerning contingency management, and disrespectful spouse communication). Adherence to the manual, as scored periodically by both the facilitators and supervisor, was high. Parent attendance was high: 100% of the mothers and 86% of the fathers attended 10–14 sessions. The high attendance was apparently related to the screening procedure, the public funding of the intervention, the insistence on co-parent participation, and between-sessions telephone calls.

Measures

We used previously translated Hebrew-validated questionnaires except for the inventory of CU that was translated for the purpose of this study by two bilingual professionals using the back-translation procedure. We used 5-point Likert scales unless specified otherwise.

Effortful control

This was assessed by an 18-item 7-point version of the Child Behavioral Questionnaire (Rothbart et al., 2001) for ages 3–4. We used three scales: inhibitory control (behavior regulation; e.g., "Is good at following instructions"), attention focusing (task concentration; e.g., "When picking up toys, usually keeps at the task until it's done"), and attention shifting (moving attention from one activity to the next; e.g., "Has an easy time leaving play to come to dinner"). (Cronbach's alpha = 0.82).

Callous-unemotional traits

This was assessed by 11 commonly used items in CU traits' assessment of preschoolers (Cronbach's alpha = 0.81). There were 7 empathic-prosocial items and 4 callous items. We excluded the unemotional factor, which has low reliability and poor correlations with external correlates, and used the more psychometrically sound two-factor model that was reconfirmed with young children (Kimonis et al., 2016; Willoughby et al., 2015). There were eight items from Frick's (2004) Inventory of Callous-Unemotional traits (ICU), Parent Report (Preschool Version) (e.g., "Does not care who s/he hurts to get what s/he wants"), and three APSD for prekindergarten items from Dadds et al. (2005) community study (e.g., "Feels bad or guilty when s/he does something wrong").

Table 2 Means (SDs), analyses of covariance of treatment effects, and effect size for study variables

Variable	Treatment		Control		*ANCOVA F*		Effect size Cohen's d
	Pre[a] *M (SD)*	Post *M(SD)*	Pre *M (SD)*	Post *M (SD)*	*df*	*F*	
Child CU traits	29.43 (5.76)	27.88 (5.41)	28.84 (4.49)	30.59 (4.71)	1206	30.25*	0.72
Child EC	4.48 (0.64)	4.70 (0.69)	4.38 (0.59)	4.33 (0.55)	1206	16.52*	0.57
Child CP	87.96 (11.36)	78.64 (11.99)	88.98 (13.30)	87.71 (11.83)	1206	31.05*	0.76

Pre = Pre-intervention, Post = Post-intervention, Sample size for ITT design: treatment, $n = 140$; control, $n = 69$. Baseline measure was used as a covariate in each case; ES = Cohen's d effect size: small (0.15–0.40); medium (0.40–0.75); large (>0.75)

*$p < 0.001$

[a]No significant differences between groups on all baseline variables

Conduct problems

The Eyberg Child Behavior Inventory is a 36-item validated measure of child behavioral problems that correlates with behavioral observations and differentiates between clinic-referred and control children (Robinson et al., 1980). We used the highly reliable Total Intensity score. Coefficient alpha for the current sample was 0.89. Using the reliable change index procedure and subsequently calculating the odds of reliable change, we found that 41.6% of the treatment group showed reliable change versus 12.3% of the control group; 56% of the treatment group did not show reliable change versus 75.4% of the control group; and 2.4% of the treatment group showed a reliable worsening versus 12.3% of the control group (OR = 5.09, 95% CI 2.14–12.11)] (Somech & Elizur, 2012).

Data Analysis

Analyses were performed using item averaged reports of parents who completed the pre and posttreatment assessments (87.08 %). We presently report the results of the intent-to treat design, which were similar to those of the completers design (Somech & Elizur, 2012). The mediational models were tested by Structural Equation Modeling (SEM) using an intent-to-treat design to avoid selection biases associated with level of treatment participation. The estimation of the models applied the maximum likelihood method with the Yuan & Bentler (2000) EM-ML imputation procedure for missing data. The imputation procedure provided a total sample of 209 respondents. As required in estimating longitudinal models, we allowed error terms for repeated measures to correlate and constrained the loadings of same indicators of parallel latent factors to be equal over time. We followed Kline's (2015) model fit recommendation to consider models with CFI and NNFI indices that exceed 0.90 and RMSEA less than 0.08 as providing reliable evidence of acceptable fit. To test mediation, we examined both the direct treatment effect on outcome and the indirect path effect; i.e., treatment effect on mediator and mediator's effect on the outcome (MacKinnon et al., 2007). We used the RMediation package to test the significance the mediated path. RMediation, which uses the distribution of the product term, provides accurate confidence limits for mediated effects that are similar to those provided by bootstrap methods (Tofighi & MacKinnon, 2011).

Table 3 Intercorrelations among study variables

Variable	2	3	4	5	6
1. Child CU traits T1	0.65*	−0.38*	−0.30*	0.30*	0.25*
2. Child CU traits T2	1	−0.39*	−0.44*	0.24*	0.43*
3. Child EC T1		1	0.65*	−0.49*	−0.47*
4. Child EC T2			1	−0.31*	−0.68*
5. Child CP T1				1	0.50*
6. Child CP T2					1

*T*1 Time 1 Pre-intervention, *T*2 Time 2 Post-intervention, $N = 209$

*$p < 0.001$

Results

Table 2 presents the means, standard deviations of the key measures at *T*1 and *T*2, as well as treatment effects and effect size. ANCOVA group comparisons at posttreatment indicated significant intervention effects on all variables. Table 3 presents the intercorrelations among study variables.

Measurement Model

EC, CU traits and CP were each indicated by two parcels following Russell et al.'s recommendations (Russell et al., 1998). Parceling is advantageous in small-sample analyses when a set of items is assumed to be unidimensional (Kline, 2015). This strategy has the advantage of creating indicators

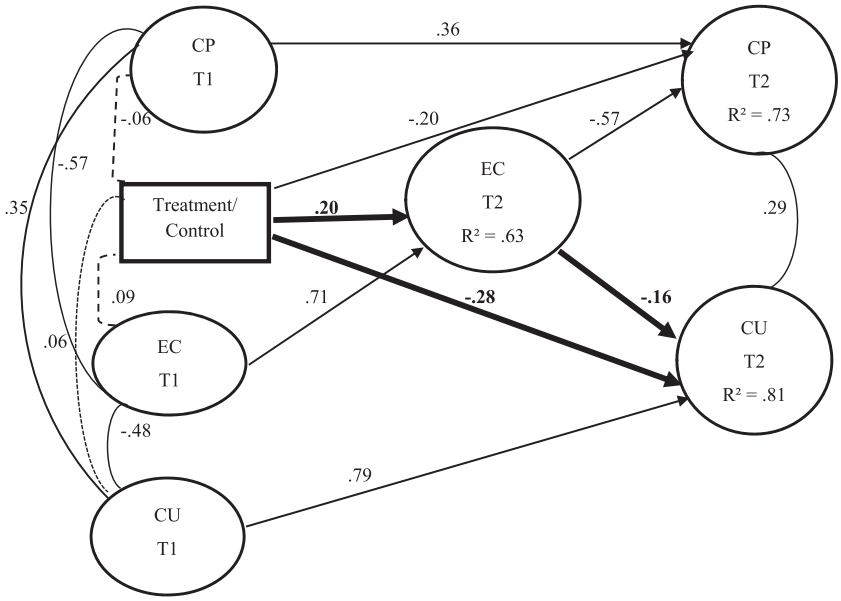

Fig. 2 Structural equation model estimating EC mediation of treatment effect on CU traits while controlling for treatment effect on CP. Note. *T*1 = Pre-intervention, *T*2 = Post-intervention. Bold arrows represent hypothesized mediational paths; full arrows represent significant paths ($p < 0.05$); dashed lines represent nonsignificant associations ($p > 0.05$). Path coefficients are standardized. In the interest of clarity, error terms are not displayed. Goodness-of-fit measures showed adequate fit to the data: NFI = 0.93, NNFI = 0.94, CFI = 0.96, RMSEA = 0.068, Yuan-Bentler Chi-square $\chi 2$ (48, $N = 209$) = 37.8, $p = 0.00$

that have more acceptable distribution properties, such as less skewness and better approximation to a normal distribution. In this way, the need for including unique unpredictable correlated errors among single item indicators is eliminated and Heywood effects may be prevented. Following an exploratory factor analysis using maximum likelihood extraction, we allocated items to parcels according to rank order of factor loadings (Bandalos, 2002): pairs of highest and lowest items were assigned to each parcel in order to equate average loadings. Confirmatory factor analyses showed an adequate fit to the data for the measurement model: [$\chi 2$ (45, $N = 209$) = 107.4, $p = 0.00$; NFI = 0.92; NNFI = 0.92; CFI = 0.95; RMSEA = 0.075]. All factor loadings were substantial, statistically significant, and in the expected direction.

The Mediational Models

Figure 2 presents the results of testing the EC mediational model while controlling for the more general treatment effect on CP to increase the likelihood that the mediated effect was not a result of the common variance between child CP and CU traits (Hawes et al., 2014). Consistent with the research hypotheses, all the following predictions were significant: (a) treatment was positively related to EC at *T*2; (b) treatment was negatively related to CU traits at *T*2; and (c) EC at *T*2 was negatively related to CU at *T*2. The significance of the mediational path was tested with the RMediation package by computing the distribution of the product of coefficients method using 95% confidence limits for each indirect effect (Tofighi & MacKinnon, 2011). The indirect effect that indicates mediation is significant when zero is not included within confidence limits. RMediation showed that the mediational path was significant. The indirect effect estimates are −8.42 (SE = 1.16). The confidence interval is −10.70 to −6.16. Subsequently, we examined an alternative path in which CU traits at posttreatment is hypothesized to mediate EC at posttreatment while controlling for treatment effect on CP. While the path from treatment condition had a significant negative effect on CU traits at *T*2 ($\beta = -0.32$), the path from posttreatment CU traits to posttreatment EC was nonsignificant ($\beta = -0.09$, *ns*), indicating that the alternative model is nonsignificant.

Discussion

The main goal of the current study was to examine a theoretical model in which EC is hypothesized to mediate the effect of an early PI on children's CU traits. To do so, we used *Hitkashrut*'s 2-wave dataset to examine posttreatment EC mediation of treatment effect on CU traits while controlling for the more general effect on CP. Our hypothesis was supported. Structural modeling showed that the effect of *Hitkashrut* PI on children's CU traits was partially mediated by EC. The partial mediational path suggests that the parenting program has both a direct effect on CU traits and an indirect temperament-based mediated effect. The nonsignificant alternative model in which posttreatment CU traits were hypothesized to mediate posttreatment effect on children's EC further supported the hypothesis that change in EC preceded change in CU traits. These findings are consistent with current theories on the development of CU traits, and with previous studies that demonstrated the role of self-regulation capability on

moral development and conscience, as well as with empirical findings regarding the link between EC and low guilt.

Overall, the results suggested that CU traits among young children with CP are malleable following appropriate treatment and affected by improvement in temperamental self-regulatory capacity as indicated by EC. Indeed, previous studies have shown that CU traits and EC are interrelated, influenced by parenting and can be improved following PI (Elizur et al., 2017). Yet, to the best of our knowledge, this is the first longitudinal intervention study with preschoolers at-risk for early-onset CP to demonstrate that PI can reduce children's CU traits by strengthening their self-regulatory competencies. Furthermore, the study provides the first RCT-based evidence for EC mediated effect on CU traits while controlling for the more general treatment effect on CP. It seems that children's early dispositions of caring for one another, their tendency to show guilt and remorse after transgressions and empathy on the one hand (the absence of which indicates CU traits), and their ability to perform effortfully self-regulated activities on the other, are interwoven. More specifically, the results provided evidence that, in the early years of life, where the child's personality is still developing, changes in children's temperamental characteristics are potential pathways through which CU traits in young children can be reduced.

Our findings are in accordance with recent theories that underline the link between the flexibility level of attentional and emotional systems to the development of CU traits, such as the Sensitivity to Threat and Affiliative Reward (STAR) model (Waller & Wagner, 2019) and the REAL model (Dadds & Frick, 2019). As suggested within the REAL model (Dadds & Frick, 2019), when the child's temperamental propensity to attend to socioemotional cues increases (i.e., Emotional Attention), the child becomes more conscious to the distress in his/her caregivers, or to cues to possible punishment. This increases the child's ability to learn prosocial emotions of guilt and empathy (Frick et al., 2014). Following this suggestion, it is likely that EC may affect CU traits through attentional/emotional-based mechanisms that involve the processing of information, the altering of attention from high emotional arousal to neutral feelings, and the intentional inhibition of emotions and behaviors (Eisenberg et al., 2011; Rueda, 2012). Improving self-regulation skills across the early childhood period seems to enable children with CU traits to better maintain attention on other aspects of their social environment, such as parental caring and socialization efforts. In line with the STAR model, for these children, the top-down self-regulation may increase attention focusing on positive parental affiliative reward mechanisms such as vocal and facial expressions of concern for others' distress, positive affect and eye contact, and consequently decrease levels of CU traits (Kimonis et al., 2019; Waller & Wagner, 2019). Furthermore, it is also reasonable to assume that EC, which affects the modulation of emotion (Rueda, 2012), may serve as a sort of compensation mechanism for the shallow affective response following transgressions that characterizes children with high levels of CU traits (Frick & White, 2008). Lastly, it seems that the flexibility mechanism of children's emotional/attentional systems enable children with CU traits to better learn through their inner and outside world, and consequently to improve deficiency in concerns for others' distress, empathy capabilities, etc. (Dadds et al., 2006; Sameroff, 2010).

Our findings are also in line with research linking EC and children's prosocial behavior and moral/conscience development (Kochanska et al., 1997; Lengua et al., 2007; Rothbart, 2007; Rothbart & Bates, 2006; Slobodskaya et al., 2020; Stifter et al., 2009), as well as with empirical studies demonstrating the preventive role of EC on later development of disruptive behaviors caused by low guilt (Rothbart et al., 1994). As noted by Kochanska et al. (2009): "…for children who are not guilt prone and who do not experience the intense anxiety when tempted to transgress, effortful control may become the alternative inhibitory mechanism" (p. 323). As suggested by the authors, for high-CU child enhanced EC may serve as a restraining force for his/her uninhibited drive for misbehaviors caused by low guilt, which activates self-conscious contemplation of probable later consequences and consideration of past parental requests and demands. In addition, as proposed by Eisenberg et al. (2010), it is likely that elevated levels of EC affect prosocial behavior and moral development through mechanisms underlying the processing of emotional information, the flexibility of attention from negative to positive emotional cues, and the deliberate inhibition or activation of behavior (Rothbart et al., 2011).

Of interest, the results are compatible with the working model of *Hitkashrut* that focuses on reducing CP by means of promoting children's self-regulation capabilities and early dispositions related to moral development through strengthening positivity (e.g., warmth, support, and guidance) and consistency in the parent-child attachment (Elizur et al., 2017). Indeed, previous research revealed that targeting within the parent-child dyad related aspects of EC is an "active ingredient" for treating High-CU children (McDonald et al., 2011; Salekin, 2010), in that increased parental sensitivity and involvement might enable children with high CU traits to improve their attentional system towards parental caring, and consequently to enhance affiliative behaviors, such as emotional contagion, empathy and prosocial behavior (Viding & McCrory, 2019).

Limitations and Implications

The study has some limitations. First, although the results of the current study supported our hypothesis, the research's pre-post mediational design, in which the mediator and outcome were measured at the same time, does not allow for conclusive assumptions regarding causality between EC and CU traits (Kazdin, 2007). A 3-wave design would have supported the validity of the hypothesized mechanism, and allowed for conclusive assumptions regarding causality. Second, all measures were assessed by parent reports. It is possible that expectancy effects and shared method variance inflated the associations between variables. To increase confidence in the findings, it would have been useful to include observer reports. Third, since the Eyberg questionnaire to assess children's CP has no valid Israeli norms and no normative mean has been defined, it was not possible to conclude that the treatment led to a significant decrease below clinical range. Fourth, although program adherence was regularly monitored in supervisory sessions, we did not use scales or observation-based data to assess fidelity. It should also be noted that the generalization of our findings to other populations such as highly dysregulated children with diagnosed psychopathologies, as well as families with less education or single-parent families, is limited. Since the *Hitkashrut* program was tested with an all-Jewish sample, and under favorable conditions such as high participations of fathers and the participation of both parents in a 14-session program, the results may also not apply to other ethnic groups or to less motivated families. Thus, future research within more diverse samples is needed.

Notwithstanding the limitations, the current report presents an original examination of the interplay between early parenting intervention, and two early dispositions that play a pivotal role in developmental pathways of childhood-onset disruptive disorders (Frick, 2012; Kochanska et al., 2009). The findings show for the first time, in a RCT conducted in a real-world public service settings, that early intervention can affect CU traits, and that EC mediates this effect. The implication of this is that CU traits are a flexible developmental phenomenon. They are not exclusively hereditary and certainly not deterministic. Rather, they gradually emerge during development, and can be altered through early parenting interventions aimed at increasing key aspects of children's self-regulation abilities. These parenting intervention programs should encourage warm and supportive parental practices, for example; attending to positive behaviors, expressing high levels of positive emotion, reflecting child's play, ignoring and distracting, and appropriately using the "art" of effective praise (e.g. effort-based praise; descriptive and specific praise). They should train parents to; follow the child's emotional needs during quality time/playtime, consistently reinforce more regulated behavior, and support their child in stressful situations (Neppl et al., 2020; Valiente et al., 2004). At the same time, in view of the study's methodological limitations, the support of the mediational model is but a first step toward a more detailed and precise elucidation of the process by which change comes about. Further empirical exploration of this mechanism may provide innovative directions for the prevention and treatment of CP and CU traits. A plausible implication of this finding for future PI designed for children with elevated levels of CU traits is to incorporate interventions in preschool years that promote children's EC and their more general self-regulation capabilities. Future research can test whether this strategy fulfills the expectation of achieving long-term effect on early conscience development in subgroups of children with high-CU and/or low-EC profiles.

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Compliance with Ethical Standards

Conflict of Interest The author declares no competing interests.

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