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Randomized Trial of Parent–Child Interaction Therapy Improves Child-Welfare Parents' Behavior, Self-Regulation, and Self-Perceptions

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Objective: We conducted a large (N = 204) randomized, clinical trial to test the efficacy of parent–child interaction therapy (PCIT) on observed parenting, two key drivers of maladaptive parenting—self-regulation and social cognitions, and child behavior outcomes in a sample of child welfare-involved families. ***Method:*** Participants were randomly assigned to standard PCIT (n = 120) or services-as-usual (SAU; n = 84). The sample was characterized by low household income, significant exposures to adverse childhood experiences, and substance abuse. Intention-to-treat analyses were conducted on multiply imputed data followed by secondary per-protocol analyses. ***Results:*** Significant PCIT effects emerged on (a) increased positive parenting, reduced negative parenting and disruptive child behavior (small-to-medium intention-to-treat effects and medium-to-large per-protocol effects); (b) gains in parent inhibitory control on the stop-signal task (small-to-medium effects); (c) gains in parent-reported emotion regulation and (d) positive, affirming self-perceptions (small-to-medium effects), relative to the SAU control group. PCIT's effects on gains in parent emotion regulation were mediated by reductions in observed negative parenting. No differences in rates of parent commands or child compliance were observed across conditions. Harsh child attributions moderated treatment impact on parenting skills acquisition. PCIT parents who held harsher attributions displayed greater gains in use of labeled praises and declines in negative talk/criticism with their child, than control group parents. ***Conclusions:*** This randomized trial presents the first evidence that PCIT improves inhibitory control and emotion regulation in a child welfare parents and replicates other published trials documenting intervention gains in positive parenting and child behavior in child welfare families.

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Data for this article were drawn from a larger project that was preregistered at https://ClinicalTrials.gov. The study protocol used to collect these data has been reported in a separate published article. Findings from data collection are reported in a separate study focused on participants randomized to the intervention condition only and targeted preintervention (i.e., T1 only) assessment measures of parent sociodemographics, child attributions, indices of self-regulation (respiratory sinus arrhythmia, emotion regulation, inhibitory control), and negative parenting. The current article focuses on the entire sample randomized to intervention and control conditions and includes outcomes assessed at pre- and postintervention time points, specifically, primary outcomes of parenting behaviors, self-regulation scales, social cognitions, and children's behaviors.

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What is the public health significance of this article?
This randomized clinical trial provides evidence that child welfare-involved parents who are offered PCIT experience significant reductions in harmful parenting, increases in positive, responsive parenting, and declines in child behavior problems. Notable improvements were also observed in the self-regulation skills and positive self-perceptions of parents randomized to receive PCIT, with even greater gains experienced by those parents who engage in the intervention. These findings were observed in relation to parents in the control group who had access to child welfare services-as-usual.

Keywords: parent–child interaction therapy, child welfare, parenting, inhibitory control, emotion regulation

Child maltreatment (CM) is a serious public health problem in the United States, affecting nearly 1 million children each year (U.S. Department of Health & Human Services, Administration on Children, Youth & Families, Children's Bureau, 2019). Defined in terms of harsh physical punishment, abuse, and neglect, CM results in substantial economic burdens for the public and serious negative developmental outcomes in children, including anxiety, depression, traumatic stress disorders, early-onset conduct problems, and persistent antisocial behavior that is resistant to intervention (Assink et al., 2018; Fitton et al., 2020). Most documented cases of CM in the United States are perpetrated by parents (e.g., 77.5% in 2018; U.S. Department of Health & Human Services, Administration on Children, Youth & Families, Children's Bureau, 2019); thus, parents also represent critical targets for prevention and intervention. Parents at risk for perpetrating CM tend to be more hostile, controlling, and less affectionate with their children (Wilson et al., 2008), less confident about their parenting skills, and less skilled at using safe, effective limit-setting strategies (Borrego et al., 2004).

Parents involved in the child welfare system experience many risk factors that heighten the risk for harsh, coercive, and withdrawn parenting (e.g., exposure to early adversity, chronic stress, intergenerational substance abuse, and violence; Mulder et al., 2018; Rogosch et al., 1995; Stith et al., 2009). However, internal characteristics of the parent, such as self-regulatory ability, reactivity to threat, biased social cognitions, and mental health issues can exacerbate problematic parenting practices and risk for CM. For instance, these high-risk parents display autonomic arousal during positive parenting (i.e., lower parasympathetic tone), suggesting that more supportive forms of parenting may be physiologically taxing to maintain (e.g., Joosen et al., 2013; Skowron et al., 2013). Deficits in self-regulation are known to impede parents' abilities to provide safe, responsive care for their children (Deater-Deckard, 2014). Parents at risk for perpetrating CM also tend to hold harsh attributions about themselves and their children and believe they have little power in the parent–child relationship (Bugental, 2009; Larrance & Twentyman, 1983). Together, these findings suggest that successful interventions for CM prevention may need to address components of parent self-regulation and social cognitions while promoting positive parenting practices and healthy child development.

Parent training programs are an essential component of services provided to families in the child welfare system and are designed to improve relationship quality between parents and children, reduce negative parenting practices, prevent CM, and improve children's health and well-being (Barth, 2009; Skowron & Reinemann, 2005; Toth et al., 2013). Several parenting interventions with roots in social learning, attachment, and family systems theories have demonstrated efficacy in increasing positive, responsive parenting and reducing harsh, coercive processes in child welfare-involved families with young children, including attachment and biobehavioral catch-up (Dozier & Bernard, 2017), child–parent psychotherapy (Lieberman et al., 2005), the positive parenting program (Triple P; Sanders, 2007), and parent–child interaction therapy (PCIT; S. Eyberg, 1988; S. M. Eyberg & Funderburk, 2011). Each of these interventions is designed to target parenting practices and various internal parent characteristics that heighten the risk for CM. For example, clinical trials examining the mechanisms of attachment and biobehavioral catch-up, child–parent psychotherapy, and Triple P have documented efficacy for improving parent–child attachment processes and reducing parental stress, emotional biases, and parent anger (e.g., Bernard et al., 2015; Bernstein et al., 2019; Sanders et al., 2014). However, research has yet to investigate how PCIT affects these parent characteristics that heighten the risk for CM in child welfare-involved families. Rigorous clinical trials are needed to understand whether PCIT is also effective at modifying known internal risk factors for CM parenting (e.g., strengthening parent self-regulation), in addition to reducing coercive processes and improving child outcomes.

PCIT for Child Welfare-Involved Families

PCIT is one of several effective behavioral parent training programs originally developed for treating externalizing and oppositional disorders in children (Cooley et al., 2014; Kaminski & Claussen, 2017; Kaminski et al., 2008). In PCIT with child welfare-involved families, parents are generally identified as the primary targets for services. PCIT employs a unique, live skills-coaching approach to support parenting skills and restructure parent–child interactions (Funderburk & Eyberg, 2010). PCIT therapists engage in remote coaching to parents through a headset as they practice new skills with their child and thus provide real-time scaffolding. Beginning with a relationship enhancement phase called child-directed interaction (CDI), PCIT is designed to strengthen positive parenting, nurture warmth between parent and child, and reduce the coercive dynamics that characterize parent–child interactions in many child welfare-involved families. In the first CDI session, parents learn and role-play a set of positive parenting skills (i.e., "PRIDE" skills: labeled *P*raise, *R*eflection, *I*mitation, behavioral *D*escription, and *E*njoyment) and practice following their child's lead in the play. Parents are also coached to refrain from harsh, aversive parenting and other actions that would control the direction of the play (i.e., avoid "don't" skills). In coaching sessions, parents wear a small earpiece while practicing skills with their child, and the therapist guides and reinforces parents' efforts from an adjacent, one-way viewing room.

Weekly reports about child behavior problems and observational coding of parent–child interactions at each session's outset inform the focus of coaching each session. Brief home-based skills practice is assigned throughout treatment and reviewed at the beginning of subsequent sessions. After families achieve CDI skills criteria or complete the total available sessions, they transition into the second and final phase of PCIT focused on child management training, called parent-directed interaction (PDI). In PDI sessions, parents learn safe and effective positive discipline skills that replace inconsistent and often harsh or erratic discipline practices (S. M. Eyberg et al., 2008). Parents are coached to give clear, direct commands one at a time, give contingent praise for child compliance or a brief time-out procedure for noncompliance, follow through with each command given, and transition back to positive parenting "PRIDE" skills in between the use of commands. Numerous studies have documented that PCIT is effective in ethnically diverse families (e.g., Capage et al., 2001; Fernandez & Eyberg, 2009; Leung et al., 2015; Matos et al., 2009; McCabe & Yeh, 2009).

As implemented with child welfare-involved families, PCIT targets problem parenting and is designed to interrupt harsh, coercive interactions and strengthen positive, responsive parenting, support for child autonomy, and positive child discipline practices (Funderburk & Eyberg, 2010; Herschell & McNeil, 2005). PCIT is a cost-effective treatment for CM prevention as well (e.g., Lee et al., 2008; Title IV-E Prevention Services Clearinghouse, 2020). Meta-analysis of interventions for child welfare-involved families showed that PCIT consistently yields significant gains in positive parenting and long-term reductions in CM recidivism that are among the largest effects documented to date (i.e., $d = 1.09$; Euser et al., 2015; see also Kennedy et al., 2016; Thomas et al., 2017). Randomized clinical trials (RCTs) conducted by independent research teams in the United States (Chaffin et al., 2004, 2011) and Australia (Thomas & Zimmer-Gembeck, 2011, 2012) document that PCIT yields large improvements in observed positive parenting ($d's = 0.64–1.44$); reductions in harsh, controlling parenting ($d's = 1.00$ to 1.07); and reductions in reabuse rates in child welfare-involved families persisting up to 3 years posttreatment. Some RCTs of PCIT provide evidence that PCIT also reduces internalizing and externalizing problems in child welfare-involved children, in contrast to wait-list controls (Thomas & Zimmer-Gembeck, 2011, 2012). Chaffin et al.'s (2004) randomized trial documented significant gains in parenting and reductions in child abuse recidivism but reported no effects for PCIT on children's disruptive behavior problems. Randomized field trials of group-based PCIT for foster-care families have documented reductions in child welfare children's externalizing and internalizing problems relative to services-as-usual (SAU; J. P. Mersky et al., 2015, 2016). Thus, in addition to testing PCIT's effects on child welfare-involved parents (positive parenting skills, harsh, negative parenting behaviors, and use of effective commands), we reported intervention effects on children's behavioral outcomes in this clinical trial as well.

Parent Self-Regulation and Social Cognitions

Though the benefits of PCIT for reducing negative parenting and disruptive child behavior are well-established, significant gaps remain in our knowledge of PCIT's effects on parent self-regulation skills and harsh social cognitions—two key internal characteristics that contribute to CM parenting behavior. Deficits in self-regulation constitute a significant risk factor for problem parenting (e.g., H. J. V. Rutherford & Mayes, 2017; Skowron et al., 2013), but the impact of PCIT on these core skills is not well understood. Self-regulation includes emotion regulation—the ability to recognize and modulate one's emotional responses, and inhibitory control—the ability to inhibit one's automatic or typical responses and instead engage in a more intentional response (Gratz & Roemer, 2004; Posner & Rothbart, 2000). Strong self-regulatory capacity is essential for effective parenting in that it allows parents to intentionally choose to implement positive parenting (e.g., reinforcing prosocial behavior, selective attention, and effective limit-setting) during challenging parent–child interactions while controlling the impulse to engage in more reactive, harsh parenting approaches (e.g., yelling, physical discipline). The development and maintenance of strong self-regulation skills can be challenging, however, especially for child welfare-involved parents who experience daily psychosocial hardship and histories of traumatic stress exposures themselves (e.g., Letkiewicz et al., 2021).

We reasoned that PCIT therapists function as a crucial source of real-time regulatory support by providing parents with immediate feedback and input that helps to strengthen parents' emotion regulation and inhibitory control skills, while gains in positive parenting are achieved (Skowron & Funderburk, 2022). PCIT's unique, live-coaching format is thought to help parents lower their emotional reactivity, practice regulating their emotions, and inhibit habitual responses to typical parenting stressors during caregiving interactions. Therapists gently block harsh aversive parenting behaviors when they arise (i.e., inhibit problem parenting) and help parents to generate new, alternative positive parenting behaviors in the moment in response to their child. Further, PCIT therapists provide only the level of active support needed to scaffold the parents' skill development. Thus, therapists provide more direct, substantial support when parents' skills are low and engage flexibly with parents, yielding control to the parent when the play is going well (e.g., praising parents' spontaneously generated PRIDE skills) and stepping in to help course-correct when the parent–child interaction hits a snag (e.g., direct line-feeds if the parent is at a loss or is using many negative behaviors; Skowron & Funderburk, 2022). Recent studies have documented gains in self-reported parent emotion regulation following PCIT for child externalizing disorders (e.g., Lieneman et al., 2020; Zimmer-Gembeck et al., 2019); however, PCIT's ability to strengthen markers of emotion regulation and inhibitory control in child welfare parents is untested to date. Therefore, a second aim of this study was to test the hypothesis that PCIT effectively strengthens child welfare-involved parents' emotion regulation and inhibitory control skills (i.e., self-regulation).

A third aim of this study was to test PCIT effects on parents' social cognitions because maladaptive social cognitive processes reflect another hallmark of problem parenting (Pidgeon & Sanders, 2009). Parents at risk for perpetrating CM tend to display negative, threat-sensitive attributions about their children and attribute blame for problematic interactions to their child rather than themselves (Bugental, 2009; Bugental & Corpuz, 2019). These threat-sensitive social cognitions can lead parents to resort to negative, aversive parenting practices that heighten the risk for CM perpetration (Martorell & Bugental, 2006). Further, parents at risk for CM can be self-critical, experience parenting as less rewarding, and are less likely to initiate positive interactions with their child or to initiate a repair following a rupture (H. J. Rutherford et al., 2011; Skowron et al., 2010). We theorized that PCIT would help parents alter their

negative social cognitions by offering new, developmentally informed ways of thinking about their children's intentions and behavior and their views of themselves as parents. Further, we reasoned that parents' experiences with the live, in-the-moment, supportive coaching by PCIT therapists may help to soften parents' harsh social cognitions as well.

Finally, we tested mediation models of PCIT's effects on child-welfare parents' functioning: One in which PCIT exerts measurable gains in self-regulation that facilitate gains in parenting skills, and conversely, that gains in parenting skills would strengthen parent self-regulation. On the one hand, PCIT may promote initial gains in parental self-regulation through live therapist coaching that helps parents practice inhibitory control in the context of parenting. In this conceptual model, PCIT therapists provide an auxiliary source of in-the-moment regulatory skill for parents that enables them to utilize new parenting behaviors. As such, we hypothesized that parents' experiences of PCIT would strengthen their self-regulatory capacity and thus enable decreases in harsh, aversive parenting and increases in warm, responsive parenting. On the other hand, PCIT may promote initial gains in positive parenting skills that lead to subsequent gains in parent self-regulation skills. It may be that parents' increased success with positive parenting is experienced as highly reinforcing, with both one's child and the therapist providing frequent positive feedback, leading them to feel calmer and more confident in the context of parenting and enabling greater emotion regulation and inhibitory control skills to take hold. In this alternative model, we reasoned that parents' experiences of PCIT would strengthen their parenting skills and thus enable subsequent increases in parent self-regulation skills. We tested both mediation models to learn whether and how PCIT may impact parent self-regulation and parenting behavior outcomes.

The Present Study

The present study was designed to test three primary questions using an RCT design. First, we tested the impact of PCIT on (a) increasing positive, responsive parenting skills, (b) reducing negative parenting and (c) disruptive behavior problems, and (d) increasing child compliance relative to a child welfare SAU control condition. Second, we tested the effects of PCIT on parent self-regulation skills and harsh social cognitions—two key drivers of maladaptive parenting. We predicted that PCIT would (a) strengthen parent self-regulation skills and (b) soften parents' harsh attributions about themselves and their child, relative to parents in the SAU control group. Third, we tested mediation models whereby PCIT impacts parent self-regulation to improve parenting skills or gains in observed parenting skills account for gains in parent self-regulation. Finally, we conducted exploratory moderation analyses to determine whether parents' social cognitions moderated the effects of PCIT on outcomes.

Method

Design

This study is a National Institutes of Health-funded RCT investigating the efficacy of PCIT in a child welfare sample. Families were block-randomized to condition by child sex and age, with allocation ratio of PCIT to control group conditions at 1.5:1 to ensure that a sufficient number of families accessed the intervention. Allocation was concealed from research assistants who collected data at all assessment waves. Power analyses were conducted for tests of the intervention main effects and mediation models via Monte Carlo simulations using Mplus (Muthén & Muthén, 2002) and were specified with 500 replications and a total $N = 200$ with two conditions. Estimated power was greater than .80 to detect small main intervention effects ($f^2 = .02$) in the intention-to-treat (ITT) analyses. Power for the mediation models was estimated using the product of standardized β coefficients comprising the indirect effects (treatment condition to mediator and mediator to outcome) at greater than .80 to detect small-to-moderate mediation effects ($b = .04$), based on Cohen's (1988) standards.

Participants

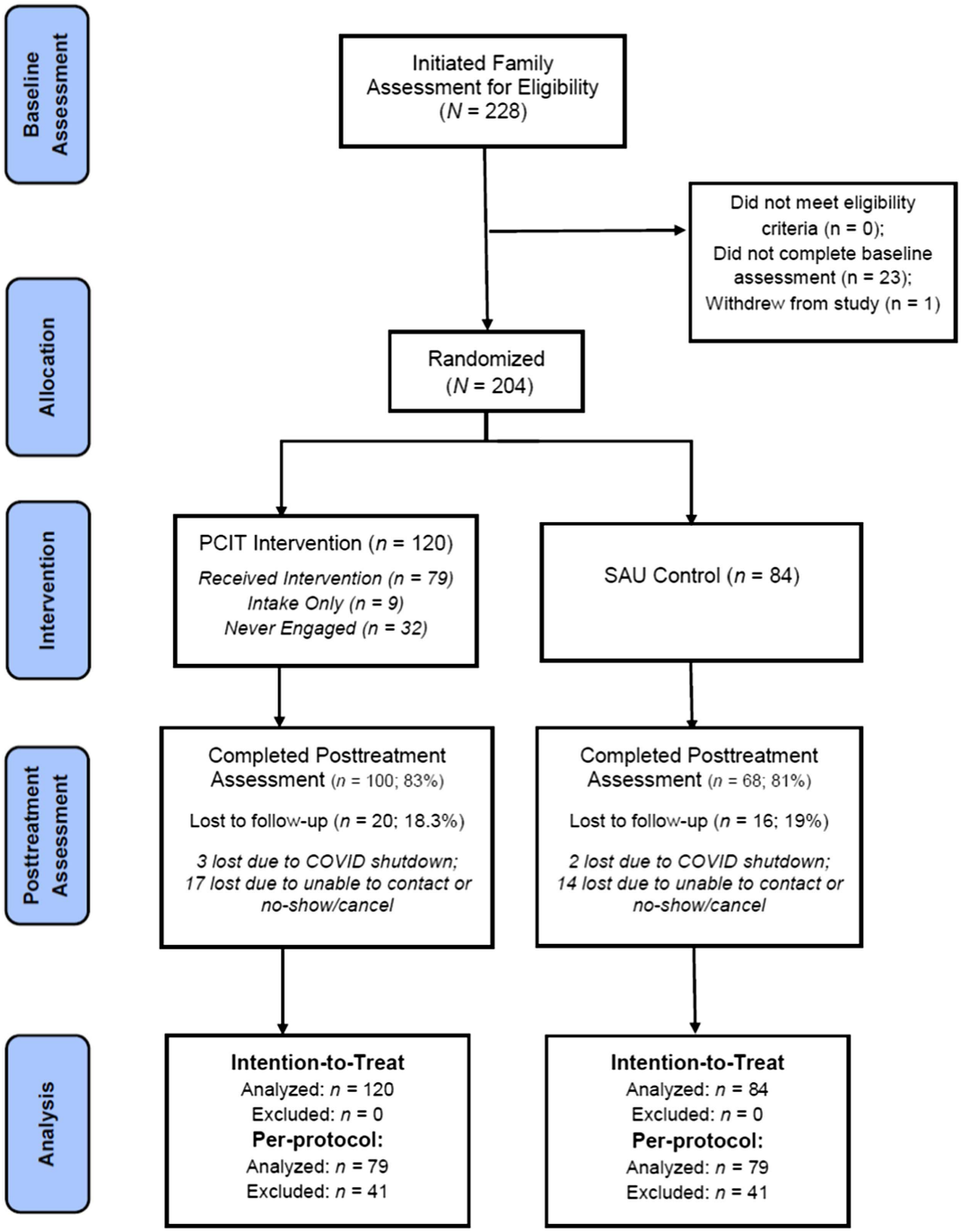
Participating parents and children were recruited through the Department of Human Services (DHS) by child welfare and self-sufficiency caseworkers. An initial phone screen was conducted by a research recruiter who introduced the study and explained the inclusion criteria: (a) parent was at least 18 years of age; (b) parent was the participating child's biological or custodial caregiver; (c) children were between 3 and 7 years old; (d) parent and child were living together at least 50% of the time; and (e) both parent and child spoke English. Parents with a history of perpetrating child sexual abuse were excluded from the study along with their children due to contraindications for PCIT services. For more information on the clinical trial procedures (see Nekkanti et al., 2020). The Consolidated Standards of Reporting Trials diagram (Moher et al., 2010) in Figure 1 shows the flow of families through the clinical trial. Of 228 families scheduled for an assessment, 204 parent–child dyads completed the pretreatment assessment and were randomized to one of two conditions: PCIT (intervention group; $n = 120$) or the control condition (services-as-usual, $n = 84$). Pretreatment socio-demographic characteristics for parents and children are presented in Table 1, where they are organized by condition. Sample-wide, parents were between ages 18 and 64 ($M = 32.3$, $SD = 6.4$), primarily biological parents of their participating child (98%), and 88.2% were mothers. Less than half (46.3%) of caregivers were employed, and 78.5% of households were living below the federal poverty line based on 2020 U.S. Department of Health and Human Services guidelines. Participating children were 3–7 years of age (sample $M = 4.8$, $SD = 1.4$ years), and 45.1% were girls. (One child turned 8 years old before a canceled assessment was rescheduled.) A majority (73.5%) of parents had experienced four or more adverse childhood experiences (ACEs $M = 5.24$, $SD = 2.69$), and most sample children (69.1%) had experienced three or more ACEs by study entry. Table 1 displays sample demographics organized by condition (i.e., control group, PCIT group, and PCIT "engagers"). Regarding the adequacy of randomization, no significant differences were observed across conditions on any pretreatment variables except marital status, with 38% of parents married or living together in the intervention group versus 24% of parents in the control group, $t(202) = 1.91$, $p = .05$.

Procedure

The sample consisted of consecutive DHS referrals from April 2016 through June 2019, who met inclusion criteria and consented

Figure 1

CONSORT Diagram Showing Flow of Participants Through the Study



Note. CONSORT = Consolidated Standards of Reporting Trials; PCIT = parent–child interaction therapy; SAU = services-as-usual. See the online article for the color version of this figure.

to enroll in the study. All study procedures were approved by the relevant institutional review boards and registered with https://clinicaltrials.gov/ (NCT02684903). Written informed consent was obtained from participating parents and from a family's caseworker in cases where DHS Child Welfare maintained legal custody. Participating parent–child dyads completed identical pretreatment and posttreatment assessments, which included dyadic interaction tasks, individual parent and child tasks, and surveys. Further information is available regarding recruitment and assessment procedures in Nekkanti et al. (2020). Midtreatment assessments were conducted with PCIT intervention families only and thus are not included in this report. Families were compensated for attending

Table 1
Pretreatment Demographic Characteristics Across Conditions (n = 204)

Demographic variable	Services as usual (n = 84)	PCIT ITT (n = 120)	PCIT engagers per-protocol (n = 79)
Parent race/ethnicity			
European American/White	73.8%	68.1%	70.9%
Multiracial/multiethnic	17.9%	22.7%	19.0%
Hispanic American/Latinx	2.4%	2.5%	3.8%
African American/Black	2.4%	1.7%	0
Asian/Pacific Islander	0	2.5%	3.8%
Native American/Alaskan Aleut	2.4%	0.8%	0
Not reported	1.2%	1.7%	2.5%
Parent age (years)	32.12 (5.82)	32.41 (6.70)	32.66 (7.13)
Annual income (dollars)	16,751.45	19,737.82	19,695.42
Marital status			
Married or living together	23.8%	38.3%	31.6%
Single	76.2%	61.7%	68.4%
Parent sex			
Male	13.1%	10.8%	10.1%
Female	86.9%	89.2%	89.9%
Education			
Less than high school	16.7%	16.7%	12.7%
High school	51.2%	48.3%	49.4%
Posthigh school education	32.2%	35.0%	38.0%
Child age (years)	4.85 (1.44)	4.70 (1.48)	4.66 (1.34)
Child sex			
Male	59.5%	51.7%	54.4%
Female	40.5%	48.3%	45.6%
Child race/ethnicity			
European American/White	58.3%	56.7%	54.4%
Multiracial/multiethnic	34.5%	38.3%	40.5%
Hispanic American/Latinx	3.6%	2.5%	3.8%
African American/Black	2.4%	0.8%	0
Asian/Pacific Islander	0	0	0
Native American/Alaskan Aleut	0	0.8%	0
Not reported	1.2%	0.8%	1.3%
Child ACEs exposures	3.7 (1.8)	3.3 (2.0)	3.6 (2.0)

Note. PCIT = parent–child interaction therapy; ITT = intention-to-treat; ACEs = adverse childhood experiences.

each assessment, reimbursed for transportation costs, and provided refreshments, rest breaks, and childcare. Participating children received a small prize. Posttreatment assessments were conducted on the same timeline across both conditions, on average at 7.84 months poststudy entry (SD = 2.34).

Intervention: Parent–Child Interaction Therapy

PCIT was delivered to families randomized to the intervention condition. Parents first learn to follow their child's lead in the play, strengthen their warm relationship with their child, and refrain from harsh, aversive parenting behaviors that control the direction of the play during the CDI phase. Next, parents learn and practice safe, effective behavior management strategies and a time-out procedure in the PDI phase. PCIT was delivered in a standard-length protocol consisting of an intake session, a maximum of nine CDI sessions (one skills teaching, eight coaching), and 11 PDI sessions (one skills teaching, 10 coach), in which no family was denied fewer than 22 PCIT sessions. On average, families received 7.20 (SD = 3.20) CDI sessions and 5.61 (SD = 5.04) PDI sessions, with 79 families engaging in at least one CDI session and 53 families engaging in at least one PDI session. PCIT was delivered by eight therapists: six doctoral-level graduate students, a licensed social worker, and a licensed psychologist. Therapist training and supervision conformed to PCIT International standards for observed practice and intervention fidelity criteria. Weekly remote consultation and live supervision of therapy sessions were provided by trainers at the University of Oklahoma Health Sciences Center. Family assignment to PCIT therapists was not randomized. analysis of variance tests of therapist effects on pre-to-post changes on all coded parenting behaviors were nonsignificant, indicating that any intervention effects on parenting were not attributable to individual differences in therapist effectiveness.

Intervention Integrity. Adherence to the intervention protocol was monitored and assessed in several ways: PCIT sessions were delivered using a manualized protocol (S. M. Eyberg & Funderburk, 2011); therapists completed session protocol checklists after each session; and 20% of session video recordings were rated by independent observers for therapist adherence to session protocols using the session protocol checklists. PCIT therapists showed a high level of adherence to the PCIT protocol: Over 95% (M = 97.5; SD = 6.0) of session components were delivered. Furthermore, interrater reliability (i.e., percent agreement) between observers' ratings of therapist adherence to session protocols was high (98%).

Services-as-Usual Control

The no-treatment control group condition represented an ecologically valid and ethical comparison condition in which

families received typical services provided by DHS child welfare. Families in the SAU control condition received a variety of in-home family visitation services, respite childcare, and other individual child counseling, parent education training, and/or individual adult therapy. All families retained full access to DHS SAU.

Measures

Assessments included in this report were collected at pre- and posttreatment. The primary intervention targets for parents were increases in positive parenting, self-regulation, and social cognitions and reductions in negative parenting, and for children were decreases in disruptive behavior problems and increased compliance. At pretreatment, parents provided demographic information about themselves and their child (i.e., age, biological sex, ethnicity), their relationship status, educational level, household income, and exposure to early adversity (Anda et al., 2010).

Observed Parent and Child Behaviors

Dyadic Parent–Child Interaction Coding System–IV (S. M. Eyberg et al., 2013). Parent and child behaviors during the standard Dyadic Parent–Child Interaction Coding System (DPICS) dyadic interaction task (described below) were video-recorded, transcribed, and observationally coded using the well-validated Dyadic Parent–Child Interaction Coding System–IV (DPICS-IV) system. Developed specifically for PCIT, the DPICS system is highly sensitive to behaviors that are coached in PCIT and other behavioral parent training programs (Nelson & Olsen, 2018). In the context of child-led play, a *positive parenting* score was calculated as the frequency of parent behaviors that were coded PRIDE skills, namely labeled *P*raises (e.g., "I love how gentle you are being with the toy cars"), *R*eflections (e.g., child states, "my truck is red"; the parent says, "your truck is red"), and behavior *D*escriptions (e.g., while the child builds a road for her cars, the parent may say, "You are building a road!"). (Note that Imitation and *E*njoyment behaviors are highly nonverbal in nature and thus not included on the DPICS-IV.) Also drawn from child-led Play, a *negative parenting* score consisted of all negative talk/criticism, questions, and commands that occurred and was calculated as a frequency score. Next, two parenting variables assessed parents' child management skills as follows: (a) Parent *commands*, the proportion of all direct and indirect compliable commands given to child during the clean-up situation; and (b) *positive parenting during clean-up*, calculated as the number of positive "PRIDE" skills, divided by total parent behaviors, after controlling for effective commands. *Child compliance* was calculated as the proportion of all commands that the child complied with in the clean-up situation. Child compliance scores ranged from 0 to 1.0, with higher scores indicating compliance with a higher percentage of parent commands. DPICS-IV coders completed 20 hr of intensive training and met regularly to maintain interrater reliability to prevent coder drift. Transcripts and digital video recordings were used to code assessments in Noldus Observer XT. Coders were blinded to randomized condition and timing of assessment. Interrater reliability was assessed by independent coding of 20.4% of assessments by two DPICS coders, with 84% agreement at pretreatment and 83% agreement at posttreatment assessments.

Laboratory Tasks

Dyadic Parent–Child Interaction Task (S. M. Eyberg & Funderburk, 2011). Parents were provided an earpiece through which the researcher provided task instructions while parent and child were alone in the playroom to complete this standard dyadic interaction task. Three 5-min interactions use a standardized set of toys and five toy bins, dispersed throughout the playroom table and floor. In *child-led play*, parents were instructed to let their child decide what to play with and to follow their child's lead in the play. Parents chose the play focus during *parent-led play*, and in the standard *clean-up situation task*, parents were instructed to direct their child to clean up all the toys by themselves (that is, "Now please tell [child's name] that it is time to clean up the toys …"). Parent and child behaviors in this task were subjected to observational coding via the DPICS-IV described above.

Stop-Signal Task (Verbruggen & Logan, 2008). The stop-signal task (SST) is a well-validated performance-based measure used to assess parent caregivers' inhibitory control skills. The SST requires participants to respond to computer-based "go" stimuli as fast as possible and accurately withhold their response on 25% of trials for "no go" stimuli. The *stop-signal response time (SSRT)* is the index of the efficiency of the inhibitory control process or time needed to engage an inhibitory response, operationalized as the speed of the stop process estimated based on the final stop-signal delay (algorithmically adjusted time between the start of the trial and the stop signal) and adjusted for the average correct "go" time using the integration method (Verbruggen et al., 2019). Lower SSRT scores reflect faster reaction times and better inhibitory control. Caregivers completed two blocks consisting of 128 trials each (32 stop trials), for a total of 256 trials. Scores were computed separately for each block and averaged across completed blocks to create a composite measure of inhibitory control.

Survey Measures

Caregivers completed survey measures of their self-regulation skills, social cognitions of self, child, and relationship, and basic sociodemographics, including exposure to early environmental risk on the ACEs Scale (Anda et al., 2010). Due to wide variability in caregiver reading levels, surveys were completed in an interview format, while a trained researcher entered responses directly into a laptop computer.

Behavior Rating Inventory of Executive Function–Adult Version (Roth et al., 2005). Caregivers self-reported their self-regulation problems on an abbreviated version of the Behavior Rating Inventory of Executive Function–Adult Version (BRIEF-A), composed of all items on the Emotional Control, Inhibit, Shift, Self-Monitor, and Initiate problem scales. Standardized *T*-scores ($M = 50$, $SD = 10$) are obtained with higher scores on each BRIEF-A scale reflecting greater problems with self-regulation.

Social Cognitions: Parent Perceptions of Child. We used the Structural Analysis of Social Behavior–Intrex (SASB-Intrex, Benjamin, 1988, 1996) to assess the extent of harsh attributions about one's own child (i.e., perceptions of a child's transitive behavior toward their caregiver). Each item was rated on a scale ranging from 0 (*never/not at all*) to 100 (*always/perfectly*). Caregivers' responses on the Cluster 15—"strict control" and Cluster 16—"harsh, critical control" items were summed to create a

total score for SASB *Harsh Child Attributions*. The Parent Attributions Test (Bugental & Corpuz, 2019) was also used to assess the quality of caregivers' child attributions in hypothetical caregiving scenarios. Caregiver responses characterize the perceived locus of control for the quality of the interaction, attributions of responsibility (e.g., child was stubborn and resisted parent efforts; child made little effort to attend to what the parent said or did), or parent responsibility (e.g., being in a bad mood; using the wrong approach for this child). The Parent Attributions Test *child responsibility* and *parent responsibility* scores were used in this study.

Social Cognitions: Parent Perceptions of Self. The SASB-Intrex was also used to assess caregiver self-perceptions (i.e., introjects, or how parents report treating themselves), with scales of interest as follows: Self-Affirming, Self-Nurturing/Trusting, Self-Controlling, Self-Criticizing, and Self-Attacking. SASB technology has been applied pantheoretically to test a variety of questions about interpersonal functioning, psychopathology, and interventions, and scores consistently discriminate clinical and nonclinical samples on dimensions of warmth, affiliation, hostility, control, and submission (Gurtman, 2001).

Eyberg Child Behavior Inventory (S. M. Eyberg & Pincus, 1999). The 36-item Eyberg Child Behavior Inventory (ECBI) was used to assess children's disruptive behavior problems. Caregivers reported on the frequency of problem behaviors (ECBI-intensity score) and whether they considered a behavior to be problematic (EBCI-problem score). Standardized *T*-scores ($M = 50$, $SD = 10$) are reported, with higher scores reflecting more disruptive child behavior problems.

Analytic Plan

ITT superiority analyses used multiple regression with multiply imputed data to test the main effects of PCIT on parents' and children's posttreatment outcomes after accounting for pretreatment scores. ITT analysis includes all randomized participants, regardless of their level of engagement in the treatment, and thus provides a conservative test of intervention effects (Schulz et al., 2010). Per-protocol analyses were also conducted with participants who engaged in PCIT (i.e., 1+ PCIT sessions) versus all SAU control group participants, using similar multiple regression models. Next, using Kraemer et al.'s (2002) guidelines for testing mediation in clinical trials, we conducted mediation analyses on the multiply imputed data sets, with one mediator per model, in the ITT and per-protocol samples using the MEdiation and MOderation in REpeated measures designs function (Montoya & Hayes, 2017). Adapted by our team for use with imputed data sets in R, MEdiation and MOderation in REpeated measures designs uses bootstrap confidence intervals to estimate direct and indirect effects in two-time point repeated measures designs using path analytic regression. Parameter estimates for each model were pooled across imputations to provide a final estimation of indirect mediation effects. All analysis scripts are available upon written request. Finally, we tested the moderating effect of harsh child attributions on posttreatment outcomes using separate regression models and controlling for pretreatment values. Significant group-by-moderator interactions were probed with tests of simple effects at +1 *SD*, average, and −1 *SD* levels of the moderator and regions of significance.

Results

As shown in Figure 1, 83% of families randomized to PCIT (73% of treatment nonengagers, 89% of treatment engagers, and 100% of treatment completers) and 81% of those randomized to the control group returned for a posttreatment assessment. There were no significant differences between the intervention and control groups on any pretreatment variables except marital status, with 38% of parents married or living together in the intervention condition versus 24% of parents in the control condition, $t(202) = 1.91$, $p = .05$.

Missingness did not significantly vary by condition across any variables. Incomplete variables at pre- and posttreatment were imputed using the "mice" package in R (Version 3.3.0; van Buuren & Groothuis-Oudshoorn, 2011). A predictive mean matching approach was utilized for all variables except composite variables, for which passive imputation was utilized. The *quick_pred* function within the "mice" package was used to implement a predictor selection strategy. To minimize bias in imputation models due to large numbers of variables relative to sample size, variables were binned by construct and included all variables that would be in main effect, mediation, and moderation analyses. Following Graham (2009), 40 total imputations with 35 iterations each were conducted to maximize power and minimize bias. Parameters for all analyses were estimated in each of the 40 imputed data sets and pooled using Rubin's rules.

Testing Main Effects of PCIT on Outcomes

ITT superiority analyses were conducted with all 204 randomized participants ($nPCIT = 120$, $nControl = 84$), on multiply imputed data. ITT analysis is a stringent, unbiased analytic design that includes all randomized participants, regardless of their level of engagement in the treatment. To test whether partial engagement in PCIT impacted outcomes at post-treatment, secondary per-protocol analyses were conducted with 163 participants, including all those in the SAU control group ($nControl = 84$) and only those who engaged with treatment in the PCIT group ($nPCIT = 79$). Participants were included in the "engaging" group if they attended at least one PCIT session.

ITT (i.e., with groups exactly as randomized; $n = 204$) and per-protocol (with treatment engagers and control group participants only; $n = 163$) approaches both utilized multiple regression analyses with multiply imputed data to test the effect of PCIT on posttreatment outcomes after controlling for pretreatment scores. Table 2 presents means and standard deviations for outcome variables at pre- and posttreatment by condition [that is, $PCIT_{(ITT)}$, $PCIT_{(per\text{-}protocol)}$, and SAU control]. Table 2 also provides the pooled parameter estimates for the ITT effect of PCIT (relative to SAU control) and the per-protocol effect of PCIT for treatment engagers relative to SAU control. Positive estimates (unstandardized *betas*) indicate that the PCIT group scored higher than control on outcome variables, and negative effects indicate that the PCIT group scored lower. Local effect sizes (i.e., Cohen's f^2) were calculated using guidelines provided by Selya et al. (2012) and represent the effect of treatment on the outcome variable after accounting for pretreatment effects. According to Cohen's (1988) guidelines, $f^2 \geq 0.02$, $f^2 \geq 0.15$, and $f^2 \geq 0.35$ represent small, medium, and large effect sizes, respectively. (For comparison, Cohen's *d* values are calculated via

Table 2

Regression Analyses Assessing the Main Effect of PCIT on Posttreatment Outcomes After Accounting for Pretreatment

	PCIT ITT $n = 120$		ITT PCIT effect				PCIT engagers (per-protocol) $n = 79$		Per-protocol PCIT effect				Services as usual control $n = 84$	
	Pre	Post					Pre	Post					Pre	Post
Outcome variable	*M* (*SD*)	*M* (*SD*)	*b*	*SE*	95% CI	f^2	*M* (*SD*)	*M* (*SD*)	*b*	*SE*	95% CI	f^2	*M* (*SD*)	*M* (*SD*)
DPICS-observed parenting														
Total talks	53.35 (21.16)	54.78 (21.43)	1.46	3.13	[−4.73, 7.64]	0.003	54.75 (21.52)	56.25 (21.81)	2.22	0.08	[−4.60, 9.03]	0.005	53.74 (19.82)	53.51 (22.40)
Positive parenting[a]														
All PRIDE skills	2.63 (2.92)	8.01 (9.61)	**5.82**	**1.16**	**[3.52, 8.11]**	**0.152**	2.86 (3.10)	10.19 (10.47)	**7.98**	**1.29**	**[5.42, 10.53]**	**0.296**	2.32 (2.32)	2.11 (2.20)
Labeled praise	0.20 (0.54)	2.18 (3.17)	**2.12**	**0.38**	**[1.37, 2.86]**	**0.184**	0.22 (0.57)	2.88 (3.43)	**2.80**	**0.41**	**[1.99, 3.60]**	**0.344**	0.29 (0.89)	0.08 (0.27)
Reflection	2.11 (2.53)	3.67 (3.99)	**2.01**	**0.53**	**[0.96, 3.05]**	**0.092**	2.24 (2.57)	4.45 (4.34)	**2.75**	**0.57**	**[1.61, 3.89]**	**0.178**	1.65 (1.97)	1.56 (1.94)
Behavior description	0.33 (0.78)	2.28 (4.41)	**1.81**	**0.54**	**[0.73, 2.89]**	**0.074**	0.41 (0.89)	2.93 (5.12)	**2.44**	**0.63**	**[1.19, 3.70]**	**0.123**	0.38 (0.74)	0.48 (0.83)
Negative parenting[a]														
All "don't skills"	23.61 (11.78)	14.82 (9.99)	**−6.98**	**1.61**	**[−10.16, −3.8]**	**0.120**	24.16 (11.92)	13.30 (9.42)	**−8.66**	**1.76**	**[−12.2, −5.16]**	**0.195**	23.62 (11.66)	21.80 (11.31)
Questions	16.88 (8.99)	9.58 (8.00)	**−4.31**	**1.10**	**[−6.48, −2.15]**	**0.095**	16.91 (8.78)	8.06 (6.93)	**−5.86**	**1.11**	**[−8.06, −3.66]**	**0.230**	15.68 (8.14)	13.52 (6.62)
Commands	5.70 (4.93)	4.15 (4.11)	**−2.44**	**0.85**	**[−4.13, −0.75]**	**0.054**	6.04 (4.86)	4.13 (4.30)	**−2.52**	**0.95**	**[−4.40, −0.64]**	**0.053**	6.96 (5.79)	6.83 (6.65)
Negative talk	1.03 (1.92)	1.20 (1.92)	−0.41	0.34	[−1.07, 0.27]	0.012	1.22 (2.07)	1.18 (1.95)	−0.44	0.37	[−1.17, 0.29]	0.013	0.98 (1.46)	1.60 (2.22)
Child management[b]														
% Commands	0.50 (0.17)	0.57 (0.42)	0.04	0.07	[−0.10, 0.19]	0.007	0.49 (0.16)	0.54 (0.35)	0.02	0.07	[−0.12, 0.16]	0.007	0.48 (0.17)	0.52 (0.27)
% PRIDE skills bet. direct commands	0.62 (0.29)	0.70 (0.31)	**0.04**	**0.01**	**[0.02, 0.06]**	**0.122**	0.63 (0.28)	0.71 (0.31)	**0.05**	**0.01**	**[0.03, 0.07]**	**0.196**	0.65 (0.27)	0.53 (0.32)
Parent self-regulation														
Stop-signal reaction time	248.25 (54.40)	237.45 (47.89)	*−16.5*	*8.35*	*[−33.1, 0.04]*	*0.029*	251.44 (58.18)	236.28 (45.33)	**−18.6**	**8.76**	**[−35.9, −1.21]**	**0.037**	252.84 (68.07)	255.16 (57.94)
Emotional control probs	53.95 (10.87)	52.72 (11.03)	**−3.27**	**1.25**	**[−5.74, −0.79]**	**0.042**	55.06 (11.38)	53.33 (10.97)	**−3.44**	**1.39**	**[−6.20, −0.69]**	**0.047**	52.57 (9.18)	54.95 (11.21)
Initiate probs	54.33 (10.95)	52.18 (10.97)	−2.86	1.49	[−5.80, 0.08]	0.025	54.51 (10.63)	52.93 (10.85)	−2.28	1.59	[−5.43, 0.86]	0.017	52.50 (10.87)	53.83 (12.46)
Inhibit probs	55.92 (9.93)	54.41 (9.81)	−1.33	1.31	[−3.93, 1.27]	0.008	55.95 (9.87)	54.33 (9.74)	−1.44	1.39	[−4.19, 1.31]	0.009	55.15 (10.27)	55.32 (9.99)
Shift probs	52.62 (9.40)	52.51 (9.54)	−0.27	1.48	[−3.20, 2.66]	0.002	53.91 (9.34)	53.26 (9.50)	−0.19	1.57	[−3.31, 2.93]	0.002	52.75 (9.45)	52.85 (10.53)
Monitor probs	52.48 (10.06)	51.35 (9.85)	−1.83	1.41	[−4.63, 0.96]	0.013	53.19 (10.57)	51.46 (9.53)	−2.16	1.49	[−5.12, 0.79]	0.018	50.93 (10.10)	52.24 (11.27)
Parent social cognitions														
About child														
SASB harsh attributions	69.67 (44.20)	62.65 (41.80)	−2.00	5.92	[−13.7, 9.70]	0.002	70.76 (44.60)	64.40 (40.47)	−0.75	6.48	[−13.6, 12.1]	0.002	73.41 (46.41)	65.94 (38.46)
PAT parent responsible	4.34 (0.68)	4.36 (0.60)	0.04	0.08	[−0.12, 0.21]	0.002	4.28 (0.68)	4.38 (0.60)	0.09	0.09	[−0.09, 0.27]	0.008	4.31 (0.83)	4.30 (0.73)
PAT child responsible	3.45 (0.52)	3.53 (0.54)	0.07	0.08	[−0.10, 0.23]	0.005	3.39 (0.52)	3.54 (0.53)	0.10	0.09	[−0.07, 0.28]	0.011	3.48 (0.53)	3.48 (0.59)
About self														
SASB self-affirm	69.50 (26.85)	72.85 (22.86)	**8.93**	**3.57**	**[1.85, 16.0]**	**0.046**	69.75 (25.27)	72.15 (22.46)	**8.16**	**3.77**	**[0.68, 15.64]**	**0.038**	71.60 (23.49)	65.07 (28.37)
SASB self-nurture	62.58 (24.99)	66.71 (21.39)	**7.95**	**2.90**	**[2.21, 13.69]**	**0.052**	62.15 (25.10)	65.43 (21.46)	**6.96**	**3.10**	**[0.81, 13.11]**	**0.041**	63.91 (22.71)	59.53 (23.85)
SASB self-control	31.08 (31.72)	35.85 (33.89)	5.02	4.50	[−3.9, 13.94]	0.010	30.38 (30.78)	35.32 (32.97)	4.78	4.89	[−4.92, 14.5]	0.009	31.93 (29.03)	31.30 (29.19)
SASB self-critical	30.25 (28.97)	27.63 (30.87)	0.50	4.15	[−7.72, 8.72]	0.002	31.01 (28.94)	28.41 (31.11)	0.87	4.46	[−7.98, 9.72]	0.002	29.83 (28.98)	26.88 (28.42)
SASB self-attack	13.17 (23.15)	17.10 (26.42)	3.71	3.17	[−2.56, 9.97]	0.009	12.91 (21.37)	17.14 (25.18)	3.99	3.29	[−2.51, 10.5]	0.011	10.40 (18.20)	11.81 (19.28)
Child behavior														
ECBI problems intensity	**56.33 (10.38)**	**51.35 (9.85)**	**−4.33**	**1.21**	**[−7.49, −1.17]**	**0.08**	**57.56 (10.65)**	**50.39 (9.94)**	**−6.00**	**1.28**	**[−9.36, −2.64]**	**0.18**	**58.61 (10.79)**	**57.01 (9.31)**
ECBI # problems	**55.74 (11.08)**	**50.43 (9.67)**	**−4.08**	**1.29**	**[−7.44, −0.71]**	**0.07**	**57.00 (11.46)**	**50.46 (9.93)**	**−4.76**	**1.42**	**[−8.47, −1.04]**	**0.09**	**58.64 (11.79)**	**56.13 (10.95)**
% Child compliance[b]	0.51 (0.68)	0.66 (0.38)	−0.06	0.06	[−0.17, 0.04]	0.01	0.41 (0.44)	0.66 (0.38)	−0.06	0.06	[−0.17, 0.06]	0.01	0.49 (0.30)	0.72 (0.26)

Note. Shorter Stop-Signal reaction times reflect greater inhibitory control. Higher scores on the Emotional Control, Initiate, Inhibit, Shift, and Monitor scales of the BRIEF-A indicate greater problems. ECBI Intensity and Number of problems are standardized *T*-scores: Higher scores indicate greater intensity and number of problematic child behaviors, respectively. Significant mean differences are in bold ($p < .05$). Mean differences at $p = .05$ are italicized. Positive effect sizes represent gains for PCIT versus control. PCIT = parent–child interaction therapy; *SE* = standard error; CI = confidence interval; PRIDE skills = number of parent Praise, Reflection, and behavior Description behaviors; ITT = intention-to-treat; DPICS = Dyadic Parent–Child Interaction Coding System; SASB = Structural Analysis of Social Behavior; PAT = Parent Attributions Test; ECBI = Eyberg Child Behavior Inventory; BRIEF-A = Behavior Rating Inventory of Executive Function–Adult Version.

[a] Coded during the child-led play. [b] Coded during the clean-up situation.

mean differences, with $d \geq 0.20$, $d \geq 0.50$, and $d \geq 0.80$ reflecting similarly small, medium, and large effects, respectively.)

Parenting Skills

As shown in Table 2, during the pretreatment 5-min child-led play interaction, child welfare-involved parents in the intervention and control groups displayed very few positive parenting skills ($n = 2.6$ and 2.3 behaviors, respectively) and a very high number of negative behaviors ($n = 23.6$ and 23.6 behaviors, respectively), amounting to a 1-to-10 ratio of positive-to-negative parenting behaviors. Positive parenting skills increased over 300% and negative behaviors declined over 60% in the intervention group across the pre- to posttreatment assessments. After accounting for pretreatment parenting behaviors, ITT and per-protocol analyses indicated significant effects of PCIT on the frequency of positive parenting PRIDE skills, $t(151) = 5.01$, $p = <.001$, $f^2 = 0.15$; $t(120) = 6.19$, $p = <.001$, $f^2 = .30$, and negative "Don't skills," $t(134) = -4.34$, $p = <.001$, $f^2 = 0.12$; $t(107) = -4.91$, $p = <.001$, $f^2 = 0.20$. Parents in PCIT used significantly more positive parenting PRIDE skills and fewer negative parenting behaviors at posttreatment than those in the SAU control. Follow-up analyses were conducted on each of the individual parenting behaviors. Across both ITT and per-protocol models, PCIT parents used significantly greater labeled praises, $t(155) = 5.61$, $p = <.001$, $f^2 = .18$; $t(126) = 6.85$, $p = <.001$, $f^2 = .34$, reflections, $t(134) = 3.79$, $p = <.001$, $f^2 = .09$; $t(117) = 4.79$, $p = <.001$, $f^2 = .18$, and behavior descriptions, $t(141) = 3.33$, $p = .001$, $f^2 = .07$; $t(112) = 3.85$, $p = <.001$, $f^2 = .12$, at posttreatment than control group parents. PCIT parents also used significantly fewer questions, $t(145) = -3.94$, $p = <.001$, $f^2 = .09$; $t(105) = -5.29$, $p = <.001$, $f^2 = .23$, and commands, $t(126) = -2.86$, $p = .01$, $f^2 = .05$; $t(123) = -2.66$, $p = <.01$, $f^2 = .05$] during child-led play but were not significantly different from control parents in the frequency of negative talks, $t(118) = -1.19$, $p = .24$, $f^2 = .01$; $t(110) = -1.19$, $p = .23$, $f^2 = .01$. No group differences in the total number of parent communications were observed during the child-led play.

Next, PCIT on parents' use of effective child management skills during the clean-up situation was examined. Across both ITT and per-protocol analyses, no significant group differences were observed at posttreatment in the proportion of parent commands used with their children, $t(75) = 0.59$, $p = .56$; $t(54) = 0.25$, $p = .80$. After considering parents' use of commands, parents in the PCIT condition displayed a significantly higher proportion of positive PRIDE skills during child management, across both ITT and per-protocol models, $t(144) = 4.48$, $p = <.001$, $f^2 = .12$; $t(121) = 5.12$, $p = <.001$, $f^2 = .20$.

Parent Self-Regulation

Inhibitory Control. The effect of PCIT on parents' stop-signal reaction time (SSRT) scores, a measure of parents' inhibitory control skill, was significant in the per-protocol model, $t(110) = -2.12$, $p = .04$, $f^2 = .04$, and marginally significant in the ITT model, $t(111) = -1.98$, $p = .05$, $f^2 = .03$. Parents in the PCIT-engager group displayed significantly lower SSRT scores indicative of faster time to engage an inhibitory response or better inhibitory control.

Emotion Regulation. Across both ITT and per-protocol analyses, parents in the PCIT condition reported significantly fewer BRIEF-A emotional control problems at posttreatment, $t(148) = -2.61$, $p = .01$, $f^2 = .04$; $t(123) = -2.47$, $p = .01$, $f^2 = .05$, than control group parents. No differences were observed between groups on self-monitoring, attentional shifting, or behavioral inhibition problems.

Parent Social Cognitions

Self-Perceptions. Relative to the control group parents, parents in the PCIT condition reported significantly greater increases at posttreatment in their SASB Self-Affirming scores, $t(107) = 2.50$, $p = .01$, $f^2 = .05$; $t(109) = 2.16$, $p = .03$, $f^2 = .04$, and their SASB self-nurture/self-protect scores, $t(119) = 2.74$, $p < .01$, $f^2 = .05$; $t(111) = 2.24$, $p = .03$, $f^2 = .04$, across both ITT and per-protocol analyses. Findings indicated that PCIT parents' self-perceptions became more self-affirming, nurturing/protecting following treatment.

Child Attributions. Table 2 shows that no significant group differences were observed in the quality of parents' attributions about their child at posttreatment, on the SASB Intrex Child ratings or Parent Attribution Test.

Child Outcomes

Disruptive Behavior. Both the ITT and per-protocol models showed that child welfare-involved children in the PCIT condition had lower ECBI child behavior problem scores at posttreatment than children in the SAU control group. Specifically, children in PCIT showed lower caregiver-reported (a) *intensity* of problem behaviors, ITT: $t(126) = -3.58$, $p = .009$, $f^2 = .08$; per-protocol: $t(109) = -4.69$, $p = .02$, $f^2 = .18$, and lower (b) *number* of behaviors considered problematic by their caregivers, ITT: $t(131) = -3.17$, $p = .04$, $f^2 = .07$; per-protocol: $t(120) = -3.35$, $p = .02$, $f^2 = .09$, than did SAU control children at post-treatment.

Compliance. No differences were observed between groups on rates of DPICS-observed child compliance to parent commands during clean-up at posttreatment across both ITT and per-protocol models, $t(112) = -1.16$, $f^2 = 0.01$; $t(112) = -1.10$, $f^2 = 0.01$. Notably as shown in Table 2, children were moderately compliant with parent commands at each timepoint across both conditions.

Testing the Mediating Effects of Parent Self-Regulation and Parenting Skills

We hypothesized that gains in parent self-regulation would partially account for PCIT's positive effects on parenting skills. Although significant main effects of PCIT on parent inhibitory control (stop-signal reaction times; SSRT) and emotional regulation (emotional control scores) were observed, changes in parent SSRT scores and emotional control scores did not explain group differences in parenting skills at outcome. Confidence intervals for estimates of indirect effects of change in parent SSRT and emotional control scores on parenting skills each included zero.

Because PCIT was designed specifically to target parenting skills, we formulated an alternative mediation model; that PCIT-driven gains in parenting skills would partially account for improvements in parent self-regulation. The mediators tested were (a) total positive parenting "PRIDE" skills during child-led play; (b) total negative parenting scores during child-led play; and (c) proportion

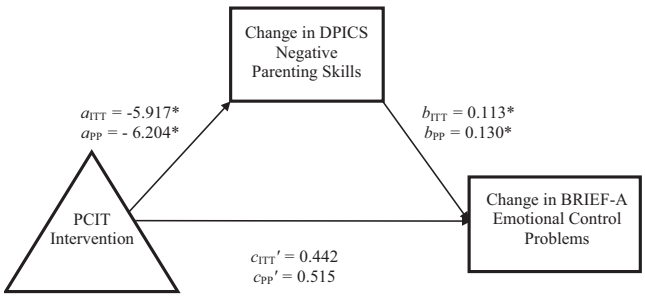
of positive parenting "PRIDE" skills during child management, given the significant intervention (i.e., main) effects observed for each. Across both ITT and per-protocol samples, reductions in negative parenting were found to mediate reductions in BRIEF-A emotional control problems (see Figure 2). The indirect effect of reduced negative parenting on emotional control problems was different from zero, with a 95% bias-corrected bootstrap confidence interval of [−1.171, −0.070], ($a \times b = -0.670$) in the ITT sample, and [−1.389, −0.109], ($a \times b = -0.807$) in the per-protocol sample. Changes in other parenting skills did not significantly mediate changes in parent self-regulation outcomes.

Exploring the Moderating Effects of Harsh Child Attributions

As shown in Figure 3, parents' harsh child attributions emerged as a significant moderator of PCIT effects on positive and negative parenting behaviors at outcome. First, the effect of PCIT on reductions in parents' negative talk/criticism scores was greater in parents who held harsher child attributions at pretreatment, in both ITT and per-protocol samples, $z(\text{ITT}) > 84.32$, $t(116) = -2.94$, $p < .01$; $z(\text{PP}) > 85.96$, $t(114) = -2.84$, $p < .01$. Regions of significance testing showed that parents in the PCIT condition with SASB harsh child attribution scores above 84.3 and 85.9 (in the ITT and per-protocol analyses, respectively) displayed significantly fewer negative talks/criticism with their child at posttreatment, compared to controls. Second, the effect of PCIT on gains in parents' use of labeled praises during child-led play also was greater in parents who reported harsher child attributions at pretreatment in the per-protocol sample, thus for parents who received PCIT sessions, $z(\text{PP}) > 2.94$, $b = .019$, $t(118) = 2.15$, $p = .03$. Regions-of-significance testing showed that PCIT-engaging parents with SASB harsh child attribution scores greater than 2.9 (i.e., representing even minimal levels of harsh attributions) used significantly more labeled praises with their child at posttreatment than control group parents, indicating effects that impact a broad range of harsh child attributions.

Figure 2

Decreased Negative Parent Mediates Increases in Parent Emotional Regulation



Note. The associations between PCIT and changes in negative parenting (a), change in emotional control problems as a function of changes in negative parenting (b), and the direct association between PCIT and changes in emotional control problems (c) are presented for both intention-to-treat (ITT) and per-protocol (PP) samples. The indirect effect of reductions in negative parenting on reductions in emotional control problems is quantified by $a \times b$ product. DPICS = Dyadic Parent–Child Interaction Coding System; PCIT = parent–child interaction therapy; BRIEF-A = Behavior Rating Inventory of Executive Function–Adult Version.

* $p < .05$.

Clinical Significance

Table 2 presents Cohen's f^2 effect sizes and confidence intervals for the effects of PCIT on posttreatment outcomes, after accounting for the effect of pretreatment scores, for both ITT and per-protocol samples. Effects for positive parenting skills were small-to-medium in the ITT sample and medium-to-large in the per-protocol sample (i.e., includes families who engaged in at least one session of PCIT vs. control). Likewise, effects for negative parenting ("do not skills") and positive parenting PRIDE skills during child management were small-to-medium in the ITT sample and medium-to-large in the per-protocol sample. Nonsignificant main effects on the parenting behaviors of negative talks and commands were negligibly small. With respect to parent self-regulation outcomes, significant main effects on SST inhibitory control skills and reductions in BRIEF-A emotional control problem scores were similar in magnitude, in the small-to-medium range. Intervention effects on parents' self-perceptions were also similar across both ITT and per-protocol samples in the small-to-medium range. Size of the PCIT intervention effects on reductions in the intensity and number of child problem behaviors reported by caregivers were medium in the ITT and per-protocol samples, on par with the strength of effects reported in other published studies (e.g., Thomas & Zimmer-Gembeck, 2012).

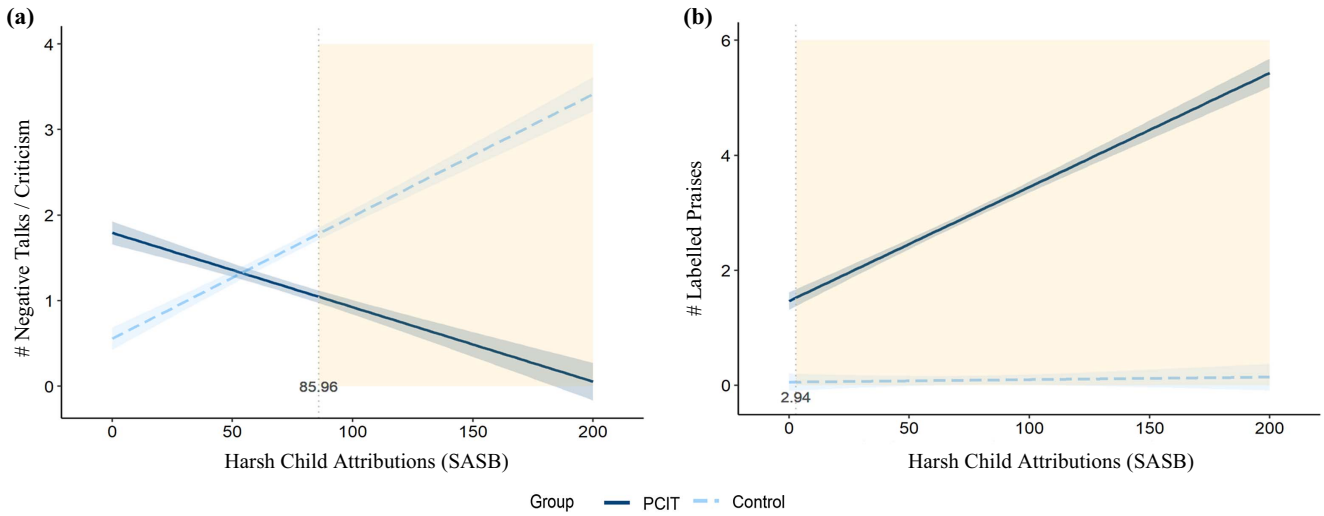
Discussion

Results from this randomized trial provide the first evidence that PCIT improves parent inhibitory control and emotion regulation skills, and positive self-perceptions in a sample of child welfare-involved families. Parents randomized to PCIT showed improved performance on the SST, a commonly used performance measure of inhibitory control, and self-reported greater emotion regulation skills on the BRIEF-A, relative to members of the SAU control group receiving DHS services-as-usual. These findings support the notion that standard, time-limited PCIT, with its live-remote coaching format, strengthens caregivers' inhibitory control and emotion regulation skills during parenting skills practice with their young children (e.g., Skowron & Funderburk, 2022). In this study, child welfare-involved parents learned to regulate their emotions and be more selective about how they directed their attention and managed their behavior following the behaviorally based parenting intervention. Further, parents who received PCIT achieved gains in both performance and self-report measures of regulation, suggesting that parents had an increased awareness that they were better regulated following treatment.

Moreover, this RCT provided independent replication of PCIT's beneficial effects on the parenting skills and children's behavioral health in child welfare-involved families (e.g., Chaffin et al., 2004, 2011; Thomas & Zimmer-Gembeck, 2011, 2012). Consistent with these other published RCTs, parents in the PCIT condition achieved significant gains in positive parenting and reductions in negative parenting during free play relative to parents in the SAU control condition. Notably, parents who received PCIT displayed a threefold increase in their warm, responsive parenting skills and

Figure 3

Interactions Between Condition (PCIT, Control) and Moderator (Pretreatment Harsh Child Attribution Scores) in the Per-Protocol Analyses Predicting DPICS-Coded (a) Parent Negative Talk/Criticism and (b) Labeled Praise Behaviors at Posttreatment



Note. Vertical dotted lines denote the value of the moderator (*X*-axis) at which interactions are significant. Shaded areas show the regions of significance. SASB = Structural Analysis of Social Behavior; PCIT = parent–child interaction therapy; DPICS = Dyadic Parent–Child Interaction Coding System. See the online article for the color version of this figure.

cut their negative parenting behaviors by half at posttreatment. Parents in PCIT also showed more PRIDE skills usage during child management interactions (i.e., clean-up situation) than did parents in the control condition. Likewise, parents of children receiving PCIT reported significant decreases in disruptive behavior problems compared with children in the SAU control group, in line with other PCIT studies with child welfare-involved families (Thomas & Zimmer-Gembeck, 2011, 2012). Both the ITT and per-protocol analyses documented significant medium-to-large effects, with greater gains observed among families that engaged in some treatment.

Together, these findings suggest that PCIT may prevent the escalation of coercive parent–child processes by strengthening parents' authoritative parenting skills (i.e., warm, responsive engagement, and positive responsiveness when engaged with their child) while decreasing their reliance on harsh and noncontingent responding (Lorber et al., 1984; Patterson, 2002; Smith Slep et al., 2018). Harsh parents tend to focus more on their children's problem behavior and miss their positive bids for attention and prosocial behavior (Bugental & Corpuz, 2019; Lunkenheimer et al., 2017). Through real-time coaching, PCIT is designed to help parents attend to and reinforce child behavior that they want to see more of and use more developmentally sensitive, alternative parenting behaviors. Parents learn a small set of positive parenting skills in CDI and a predictable discipline structure in PDI that helps them to engage in more positive, contingent responding to their children's prosocial bids for attention and correct the tendency to micromanage their child during smooth interactions or to shift unpredictably between harsh control and inaction. PCIT therapists are trained to scaffold positive parenting skills in CDI sessions. For example, therapists may initially feed parents the exact words of labeled praise to deliver to their child if needed. Over time, they may merely suggest possible child behaviors to praise and eventually just notice and reinforce parents' independent use of praise with their child. In later PDI sessions, therapists coach parents in typical child management scenarios, helping them to stay calm and consistent and to use predictable responses to child defiance or noncompliance while inhibiting less helpful responses and instead using their positive parenting skills (Skowron & Funderburk, 2022). The acquisition of the new parenting skills taught in PCIT provides parents with nonviolent alternatives that help to prevent escalating coercive interactions between parent and child (Hakman et al., 2009; Leijten et al., 2019).

Changes in parent self-regulation were not found to mediate the gains in observed parenting. Instead, mediation tests revealed that PCIT decreased parents' use of negative talk and criticism with their children, which in turn strengthened parents' emotion regulation skills. These findings lend weight to the growing evidence that emotion regulation processes continue to evolve well into adulthood and play an important role in parenting (e.g., H. J. V. Rutherford et al., 2015). During PCIT sessions, therapists regularly provide contextual feedback to parents, where they comment on the observed effect of parents' skills in the room, thereby increasing parents' awareness of how their behavior directly impacts their child and making space for the child's developing autonomy. For example, a parent may start to intervene when a child is dumping out a toy box (e.g., "Stop! Don't be rough …"). The therapist might intervene ("Let's wait; it seems like she's just exploring …"). If the child continues with typical play, the coach directs the parent's attention to the appropriate behavior ("Now she's playing nicely; you could praise that.") Through this simple sequence, the therapist defuses the parent's anticipation of conflict in controlling the child's play, replacing it with recognition of the child's appropriate behavior. Withholding the harsh response allows the parent to relax

control; there is no need to escalate. Acquisition of these new parenting skills may help to relieve parents of making poor, in-the-moment decisions during emotionally charged exchanges with their child and help them to intersperse their demands for cooperation with warm, positive support for their child's autonomy. This approach, as well as the preplanned, calm discipline sequence that is overlearned for managing child behavior, may serve to dissipate the parent's physiological and emotion activation and to strengthen their capacity for emotion regulation (Wells et al., 2020). Thus, it may be that through PCIT, parents experience more predictability during caregiving exchanges (e.g., Ugarte & Hastings, 2023), and/or gain insight into the positive effect their newly learned skills have on their relationship with their child and their child's behavior (e.g., Grienenberger et al., 2005). There is evidence from the literature on parent emotion regulation and caregiving to suggest either of these may reflect a mechanistic pathway for parents to feel confident, calm, and more emotionally regulated with their child. Likewise, as their parents become more predictable and contingent interactive partners through treatment, children learn that following directions is not overly demanding or punishing, and they become more pleasant and reinforcing interactive partners as a result. A very typical example often seen toward the end of PCIT treatment occurs when the parent gives a small initial command to pick up toys (e.g., "Please put the fire truck in the box") only to have their child engage in cleaning up all the other toys while the parent uses only PRIDE skills to support their child's efforts, with no further demands needed (e.g., Kochanska et al., 1995). Through these successful exchanges, parents' new skills are reinforced, both by the therapists' positive feedback and the child's cooperation.

No main effects were observed on parents' use of commands or rates of child compliance to commands in the context of child management interactions, contrary to our predictions. These null findings are consistent with other published studies of PCIT in child welfare-involved families (Kennedy et al., 2016) but diverge from others showing that PCIT reliably increases child compliance when presenting concerns, include clinical elevations in disruptive child behavior (e.g., Bagner & Eyberg, 2007; Bagner et al., 2010; Graziano et al., 2018). PCIT with child welfare families focuses on parenting problems as the primary referral concern, and reducing child noncompliance has not been a central goal of treatment. Child welfare-involved families tend to present with a host of parenting difficulties, including harsh control, low warmth, and disengagement (e.g., Skoranski et al., 2022; Wilson et al., 2008); thus, it may be that the development of warm, responsive parenting is of the greatest importance for positive outcomes in PCIT with the families as observed here rather than compliance training per se. Further tests are needed to learn whether simple increases in positive parenting (PRIDE) skills that strengthen the warm parent–child relationship can increase the likelihood of willing or committed compliance and other prosocial child behaviors (Kochanska et al., 2001; Shawler & Funderburk, 2018). Alternatively, for families that present with child-focused disruptive behavior problems such as oppositional behavior and for whom harsh, aversive parenting is not a salient issue, it may be that learning more effective use of direct commands is critically important for reducing child behavior problems. In both cases, the theoretical concept that underlies authoritative parenting, the notion of balancing warm nurturance and clear expectations, holds true.

Further, regarding parent commands, the DPICS system codes caregiver use of direct or indirect commands and specifies whether the child is given an opportunity to comply. However, the DPICS coding system does not include a rating of how easy or challenging a given command may be for the child to comply with (e.g., "eat some candy" or "give all your candy to your brother" would be coded the same—each as a direct command), nor does it track mutual cooperation that reduces the need for directives or reductions in parental control in support of the child's appropriate autonomy. PCIT therapists are taught to help parents progress from giving simple, low-challenge commands over time to using more challenging "real-life" commands with their child (S. M. Eyberg & Funderburk, 2011; Shawler & Funderburk, 2018), though this is not something that is measured in the DPICS coding system nor is it an explicitly stated condition of meeting PDI skills criteria. For example, in early PDI coaching sessions, parents practice giving simple commands that demand less from their child ("Please hand me a crayon *from the box*") and progress over time to giving more challenging commands that have real-world salience for effective parenting, for example, to share ("Please hand me the blue crayon *that you're using*"), to clean up ("It's time to go, please put all the crayons back into the box"), and to transition from one activity to another ("Please put your coat on"). Thus, whereas the number and type of commands used by parents did not differ in the PCIT versus control group following treatment, and data were not available to assess whether there were group differences in the extent to which parents progressed in giving effective, real-world commands for their children to follow or child willingness to continue cooperating without being given additional commands to do so. Future clinical trials need to assess the level of challenge in parent commands over time to learn whether PCIT facilitates parents' successful progression from low-challenge "practice" commands as the child and parent learn the behavior management strategies to the use of naturalistic, real-world commands. New approaches to tracking child compliance with parent commands that are interspersed with praise for prosocial behavior are also needed to map nonlinear and dynamic transactions in the context of positive discipline exchanges.

Also contrary to our predictions, no group differences were observed in the quality of parents' attributions about their children at posttreatment. Given that standard PCIT did not modify the quality of child-welfare parents' attributions, novel modifications to PCIT that address trauma symptoms may be needed to effectively soften child-welfare parents' harsh attributions about their children over the course of treatment (e.g., Gurwitch & Warner-Metzger, 2022). However, parents' harsh child attributions did emerge as a significant moderator of PCIT effects on two aspects of parenting. Parents in PCIT who reported higher harsh child attributions at study entry displayed the greatest posttreatment reductions in negative talk/criticism behaviors and the greatest gains in the use of labeled praise during free play with their children. In other words, parents who perceived their children in more negative, threat-sensitive ways appeared to gain the most in PCIT with respect to observed improvements in parenting, as compared to parents in the control condition. Parents who received PCIT also reported viewing themselves in more self-affirming and self-nurturing ways following treatment, compared to control group parents. Though PCIT is a behavioral parent training intervention at its core, the experiences that come with more positive parent–child interactions and live supportive coaching from PCIT therapists in sessions may

contribute to parents' increasing benevolent self-care that supports gains in safe, responsive parenting (M. T. Greenberg & Turksma, 2015). It is encouraging that the effects of PCIT in this study were most powerful for parents who presented with harsh attributions of their child. It would be easy to assume that these parents would have a poor prognosis for treatment, but in reality, they showed the greatest improvements in responsive parenting.

This study documented that PCIT facilitated change in parent self-regulation, observed parenting, parents' self-attributions, and disruptive behavior problems, and that gains in observed parenting mediated parent self-regulation outcomes. Though the findings contribute new knowledge to the search for causal mechanisms of change in PCIT, independent replication with additional time points of assessment at follow-up is needed to establish the causal effects of the mediators on parent emotion regulation outcomes. Further, given the study sample was composed primarily of mothers, findings from the present study may be generalized with confidence to mothers only. We recommend that future clinical trials focus on engaging and testing PCIT's effectiveness specifically with fathers. Next step research using intensive repeated measures designs (Bamberger, 2016) or component (Ahn & Wampold, 2001) and task analysis designs (L. S. Greenberg, 2007) can facilitate better understanding of the session-by-session change processes in PCIT that enable gains in parents' function and CM risk reduction over time.

PCIT induced changes in child-welfare parents' self-regulation; however, it is unknown to what extent these gains may generalize to other disorders for which self-regulation deficits are also a core feature. Poor performance on the SST is correlated with drug abuse and psychopathology (Lipszyc & Schachar, 2010; Monterosso et al., 2005), highly comorbid conditions in child welfare-involved parents. The fact that PCIT facilitated significant gains in parents' SST inhibitory control performance may encourage new avenues of inquiry into whether PCIT may serve as an effective adjunct to treatment for parents with substance use and other comorbid disorders for which regulatory skill deficits play a central role. Previous intervention research also has linked gains in inhibitory control skills, assessed on the SST, with specific patterns of change in neural mechanisms in the adult brain (e.g., Berkman et al., 2014). Further study is needed to identify which neural pathways may be impacted by PCIT and whether they signal lasting changes that lower the risk of CM. Neuroimaging measures may uncover effects that are not easily discernible through parent surveys and behavioral performance measures, and thus further help to explicate process-level neural mechanisms related to parenting and risk for CM (H. J. V. Rutherford & Mayes, 2017).

Several study limitations should be considered. Our definition of treatment engagement was based on participation in a single session or more of PCIT for inclusion in the per-protocol analyses conducted and thus produced more conservative estimates of treatment effects than a higher number of sessions would have. Here, PCIT achieved reductions in several risk factors for CM; however, its effects on preventing new CM events through 1-year follow-up need to be tested. Further, the number of participating families identifying as Black, Indigenous, Latinx, Asian/Pacific Islander was not large enough to enable well-powered subgroup analyses. Collaborations between different research teams could combine data sets across RCTs and enable rigorous subgroup analyses (e.g., Brown et al., 2013). And although PCIT's efficacy has been documented in diverse samples, more empirical research is needed to understand the mechanisms of action in PCIT, including the extent to which they converge and diverge across families with diverse ethnic/racial identities. Despite these limitations, the study included a large sample of child welfare-involved families and retained a high percentage of families through posttreatment assessments in both the PCIT and control conditions. Analyses confirm that random assignment was adequate in terms of equating across conditions.

This study engaged a high-risk sample of child welfare-involved families characterized by limited economic resources, housing instability, and high exposure to adversity, with the majority (75%) of parents reporting 4+ ACES exposures in their own childhood. Findings may therefore generalize to other child welfare families with similarly high levels of economic and social adversity. Families were referred directly from DHS child welfare, and novice PCIT therapists delivered the intervention. Although cost–benefit analyses support the underlying economics for PCIT implementation in child welfare settings (Lee et al., 2008), a few elements of service delivery were supported with additional resources in this RCT, thus potentially limiting generalizability. For example, PCIT therapists were trained by certified PCIT international trainers and received live and asynchronous supervision from expert trainers in the delivery of the intervention to families. Further, the study was well-resourced through federal funding, enabling family compensation for participating in assessments and support for transportation to and childcare during sessions.

In conclusion, self-regulation deficits and maladaptive social cognitions are important contributors to maladaptive parenting and risk for CM, as well as family violence and other forms of psychopathology. Findings from this study underscore PCIT's substantial positive effects on safe, effective parenting skills and provide new evidence of beneficial effects on parents' inhibitory control and emotion regulation, and feelings of self-competence in parents involved in the child welfare system.

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