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Change trajectories for parent-child interaction sequences during parent-child interaction therapy for child physical abuse☆

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ABSTRACT

Objective: Parent-child interaction therapy (PCIT) has been found to reduce future child abuse reports among physically abusive parents. Reductions in observed negative parenting behaviors mediated this benefit. The current study examined session-by-session interaction sequences in order to identify when during treatment these changes occur and how much the trajectory varies from case-to-case.

Method: Session-by-session parent-child interaction sequences, using the Dyadic Parent-Child Interaction Coding System-II (DPICS-II) categories, were coded for 22 child welfare involved parent-child dyads undergoing PCIT for child physical abuse. A total 5,436 interactions across PCIT were coded and analyzed using growth curve analysis.

Results: At pre-treatment baseline, negative and positive parental responses were about equally likely to follow a child positive behavior. This pattern changed rapidly during PCIT, with rapid increases in positive parental responses and decreases in negative parental responses to appropriate child behavior. A quadratic growth pattern accounted for 70% of observed variance and virtually all change occurred during the first three sessions.

Conclusion: Changes in observed abusive parent-abused child interaction patterns can occur early in PCIT, a parenting intervention that involves direct coaching and practice of skills. These benefits sustained throughout treatment.

Practice implication: Prior to receiving behavioral parent training (PCIT), parents who have physically abused their children failed to match their parental response to their children's behavior. This pattern of interaction improved rapidly and substantially during the first three sessions of PCIT. The changes in the patterns of interaction also remained relatively stable for the remainder of treatment while parents continued to practice positive parental responses as well as began practicing effective discipline techniques. This suggests that use of immediate parent feedback through coaching, explicit directions to parents in how to respond to child behavior, and customization of the application of skills to the problems that arise in session are important components to effective parenting programs with physically abusive parents. Targeting these behaviors with PCIT has been found to reduce rates of recidivism, further supporting clinical application of PCIT in these cases.

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Training in parenting skills, either as a sole treatment or as a core component of a multi-component service, is a staple intervention for child physical abuse and for parents at high-risk for parent-to-child violence. In a large nationally representative sample of child welfare cases, 30% of parents were referred to parenting services or had parenting services provided to them (NSCAW Research Group, 2005). Further, comprehensive family preservation or reunification services typically include some form of parenting intervention.

Parent training involves teaching parents improved parent-child interaction skills and discipline skills. There are compelling reasons for applying this approach to parents at high-risk for parent-to-child violence. With a few exceptions, parent-to-child violence occurs in a context of child discipline and corporal punishment. Indeed, most physically abusive parents self-describe their behavior as discipline, not as child abuse. Cognitive, affective, social, and attitudinal factors associated with corporal punishment, in its extreme form, characterize physical abuse (Ateah & Durrant, 2005; Crouch & Behl, 2001; Peterson, Ewigman, & Vandiver, 1994; Straus, 2001). This is not to suggest that normative, occasional use of corporal punishment is equivalent to physical child abuse, only that the later often represents an extreme extension or distortion of the former. Abusive parents often feel that nothing short of harsh or violent discipline "works" with their children, whom they perceive, accurately or inaccurately, as having unmanageable behavior problems (Crouch & Behl, 2001).

The link between child behavior problems and harsh parenting has been demonstrated to be reciprocal and escalating, especially when families are under stress (Riggins-Caspers, Cadoret, Knutson, & Langbehn, 2003). Child behavior problems and parent-to-child violence are proposed to share a common and reciprocal developmental trajectory in Patterson's coercive cycle model (Patterson, 1976, 1982; Patterson & Reid, 1984; Urquiza & McNeil, 1996). The coercive cycle model posits that harsh discipline is reinforced by short-term child compliance, which increases a parent's reliance on harsh discipline. Because violent parenting is often inconsistent as well as aversive, children may respond by avoiding or attempting to escape parental directives out of fear and insecurity. Moreover, children may model their parents' negative behavior, further increasing children's negativity, defiance, and aggression. Child avoidance or behavior problems may in turn cue parents to increase the harshness of their discipline until the process escalates to the point of seriously violent parent-to-child behavior, particularly among at-risk parents (e.g., parents with depression, high stress, or other risk factors). The result is a hostile parent-child relationship characterized by negative parental attributions, unrealistic expectations, intolerance, inconsistent and harsh discipline, and lack of recognition or response to children's appropriate behavior. In observed interactions, abusive parents are more directive and controlling than nonabusive parents with their children (Mash, Johnston, & Kovitz, 1983), and rely far more on punitive discipline techniques (Trickett & Kuczynski, 1986). A commonly observed hallmark of these abusive relationships is the lack of positive reinforcement of appropriate child behavior (Burgess & Conger, 1978; Kavanagh, Youngblade, Reid, & Fagot, 1988).

Behavioral parent training programs, such as parent-child interaction therapy (PCIT), target parent-child interactions and teach specific parenting skills including decreased use of negative parenting behaviors (e.g., criticism, sarcasm, questioning, physical aggression, and attention to negative behaviors), and increased use of positive parenting behaviors (e.g., attending to positive behaviors, labeled praise, descriptions, and reflections). Consistent use of an effective step-by-step non-violent time-out procedure is emphasized for discipline. PCIT was originally developed as a parent-mediated treatment for early childhood disruptive behavior problems. It relies on direct *in vivo* coaching of parenting skills in parent-child interactions. Parents wear a wireless earphone, and the therapist coaches the parents (from behind a one-way mirror) to meet skill criteria (Hembree-Kigin & McNeil, 1995).

PCIT teaches relationship improvement skills and discipline skills via two phases of treatment—Child Directed Interaction (CDI) and Parent Directed Interaction (PDI). The two phases of PCIT can be seen as instilling a "high warmth, high control" pattern that characterizes Baumrind's authoritative parenting style (Baumrind, 1966). The CDI portion of treatment is based on attachment theory and teaches skills similar to those used by traditional play therapists with the goal to build a positive parent-child relationship. CDI skills are viewed as a necessary foundation for later application of the discipline protocol (Eyberg, 1988; Hembree-Kigin & McNeil, 1995). During the CDI phase, parents are coached to have a regular play time with their child. During this play time parents are coached to eliminate criticism, commands, and questions as well as increase their use of positive parenting strategies (i.e., use of labeled praise, reflections, imitation, and descriptions) in response to positive child behavior. Parents are coached to use selective attention in response to minor child misbehavior. The PDI portion of treatment teaches parents to monitor and apply consistent consequences to their children's behavior. During PDI, parents are taught how to (a) give behaviorally specific positively stated commands, (b) consistently follow through with specific step-by-step consequences before escalation can occur, and (c) use a detailed and behaviorally specific time-out protocol. In addition to reducing behavior problems among young children, PDI is designed to interrupt escalating coercive cycles that may lead to violence among some parents and provide a highly effective alternative to corporal punishment. The format of both phases is to start with didactic session(s) with the caregiver to teach the skills (relationship enhancement or discipline) and in subsequent sessions to coach the parent in applying the skills with their child. In randomized clinical trials of PCIT for young children with disruptive behavior disorders, both the relationship enhancement phase and discipline phase (CDI and PDI) are associated with pre-post phase decreases in observed and parental perceptions of child behavior problems (Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993).

PCIT has been found to be more effective than traditional group-based parent training approaches for reducing physical abuse recidivism among abusive parents (19% vs. 49% recidivism rates). Reductions in negative parent-to-child behaviors mediated the reduction in recidivism (Chaffin et al., 2004). Treatment related reductions in negative parent-to-child behavior were associated with sustained reductions in future physical abuse reports at an average of 2.5 years follow-up.

These findings suggest that changing parent-child interaction patterns is a central and critical feature in treating physically abusive parents.

Little is known about how these treatment-related changes occur or their pattern within and throughout treatment. For example, it is not known whether the key changes occur steadily across sessions, relatively late in treatment, or early in treatment. It is not known whether the trajectories vary only a little or a great deal from case-to-case. Different trajectories and different degrees of case-to-case variability might suggest different hypotheses or conclusions about treatment dose and the reliability and effectiveness of PCIT in accomplishing targeted interaction changes. High case-to-case variability in trajectories might suggest a need to adapt the treatment considerably depending on individual case factors.

Traditionally, parent-child interactions in PCIT sessions have been coded as frequency counts, or the sum of how many positive and negative behaviors occur, using the Dyadic Parent-Child Interaction Coding System-II (DPICS-II). Frequency counts are simple to obtain, but are less precise reflections of how parents respond to their child's behavior. Sequential interaction coding is a more precise, but more labor intensive method. Borrego, Timmer, Urquiza, and Follette (2004) used DPICS-II categories to code parent-child interaction sequences in 15 abusive and 15 nonabusive dyads. Abusive parents were reported to show higher levels of negative responses and lower levels of positive responses to child behavior, supporting the sensitivity of the sequential coding approach.

How sequentially coded parent-child interactions change across the course of a treatment designed to impact interaction patterns is the focus of the current study. It was hypothesized that the probability of a positive parental response to appropriate child behavior will increase over the course of PCIT. Second, it was hypothesized that the probability of a negative parental response to child behavior will decrease over the course of PCIT. While the discipline component (PDI) is considered essential in changing the oppositional defiant behaviors in young children, the parents' perception of and quality of relationship with the children may be more critical targets for physically abusive parents. While this cannot be fully examined in this study as PCIT was provided in the fixed sequence of CDI and PDI, the trajectory of change across the two phases of PCIT will be explored.

Methods

Participants

The present study was part of a larger randomized clinical trial (RCT) of PCIT for physically abusive parents in which families were randomly assigned (a) PCIT, (b) PCIT enhanced with additional services to address risk factors, or (c) Services As Usual (Chaffin et al., 2004). (See citation withheld for purposes for blind review for additional information regarding the larger study.) All cases were child welfare referrals for physical abuse where (a) the abused child was between the ages of 4 and 12 years, (b) the most recent physical abuse incident occurred no more than 6 months prior to enrollment, (c) the abusive parent was not also a confirmed sexual abuser, (d) both the parent and child were available for treatment, (e) no petition for termination of parental rights was pending, and (f) the abusive parent had a measured IQ of at least 70 in the pre-assessment screening.

The present study occurred during the final 18 months of the 4 year RCT. Additional eligibility criteria for the present study consisted of (a) random assignment to one of the two PCIT conditions and (b) completion at least four taped PCIT sessions in which coding parent-child behavior was in the protocol (see below). Of the 49 families who were randomly assigned to a PCIT condition during the enrollment time period, 18 participated in too few PCIT coded sessions, 9 did not have sufficient number of codeable tapes due to inoperable equipment or inaudible tapes, and the remaining 22 were included in the study. The 22 families were compared to the 27 ineligible families on demographic characteristics, provider characteristics, risk factors, and number of previous child welfare reports. No differences were found, except included families had fewer children ($M = 2.2$, $SD = 1.2$; ineligible group had $M = 3.0$, $SD = 1.2$; $t = 2.2$, $p < .05$), and a trend that the included caregivers had lower Beck Depression Inventory scores and Child Abuse Potential Inventory scores ($p < .10$). As expected, included families completed more PCIT sessions ($t = 15.4$, $p < .01$) and had lower recidivism ($t = 16.1$, $p < .05$) given the RCT results that PCIT was associated with lower recidivism. This pattern of results is also found when comparing the 22 participants to all others randomized to a PCIT condition throughout the entire RCT.

Of the 22 participants, 77% of parents were female, and their average age was 32 ($SD = 8.1$). The abused child's average age was seven ($SD = 2.9$), and 64% were male. Fifty percent of the participants were Caucasian, 36% were African American, 9% were Native American, and 5% were Hispanic/Latino. Sixty-four percent were biological mothers of the child, 9% were biological fathers, 9% were step-fathers, and the remainder had other parenting role relationships. Many parents had past child welfare involvement and co-morbidities. Sixty-four percent of participant parents had been named as perpetrators in at least one earlier child physical abuse report and 32% in at least one earlier neglect report. All parents had engaged in physically abusive behavior toward their children of sufficient severity that it would be expected to leave bruises, welts, or marks, and 32% had engaged in seriously violent behavior that would be expected to result in severe injuries such as broken bones or lacerations requiring sutures. The parent report of child behavior problems of the identified child fell in the Average range (Behavior Assessment Scale for Children Externalizing score $M = 59.6$, $SD = 13.7$, Internalizing score $M = 50.2$, $SD = 8.3$).

Procedure

Protocol and consent procedures were IRB approved. Once consent was obtained, parents completed an intake session where parent-child interactions were observed and taped, and interviews and standardized inventories were completed. The intake was followed by a pre-treatment phase that involved a six-session orientation group designed to increase motivation for participation in PCIT. Next, parents and children received 12-14 PCIT sessions. Overall, the PCIT protocol used in this study followed the standard PCIT protocol with the exception that the number of sessions was limited, rather than continued until the caregiver reached criteria for skills. Further, modifications to the PCIT protocol were made to address special issues related to physically abusive families and to address developmentally appropriate approaches for children ages 8 to 12 years. For example, during the discipline phase, non-physical back-ups for time-out were used and strategies to prevent misbehavior were taught. For highly compliant children, where the discipline skills could not be practiced and coached *in vivo*, role-plays with therapists were used. To address developmental issues for older children, in the discipline phase behavior charts and school-behavior report cards were included. All modifications and additions to the protocol were made consistent with the overall PCIT theory model and other behavior parent training models (Chaffin et al., 2004).

Child Directed Interaction (CDI) focuses on teaching relationship enhancement skills and establishing a daily positive parent-child interaction time. For the protocol used in this study, the first CDI session was didactic in nature in which the therapist taught and modeled the CDI skills and addressed how to arrange and structure a regular play time. The child was not present for this session. During the next five sessions, therapist observed and coached the parent apply CDI skills with their child. Each CDI coaching session was similar in format where the first 10-15 min were used to discuss homework completion and any difficulties in the use of special time. This was followed by a 5 min videotaped observation of the parent using the CDI play skills with his or her child without coaching from the therapist. For this observation, parents and children sat at a table where interactive toys (e.g., Lego blocks) were provided. Parents were instructed to follow their child's lead in the play, use the play skills, and to ignore minor misbehavior. Once the observation was complete, parents were then coached for the next 30-35 min on the CDI play skills by the therapist behind the one-way mirror. Feedback was given and homework was assigned. Parents who did not meet the criteria for acquisition of these skills completed an additional CDI coaching session prior to beginning the second phase of treatment.

The second half of PCIT, Parent Directed Interaction (PDI), focuses on teaching command giving skills and a behavioral discipline protocol for using time-out to obtain child compliance. The PDI phase was six to seven sessions long. The first PDI session consisted of didactic instruction with parent(s) where they were taught the discipline skills of giving behaviorally specific, positively stated commands and a specific sequence of response to child appropriate and inappropriate behavior. During the next two PDI sessions, the parents reviewed the skills with the therapist and applied both CDI skills and PDI skills with their child with step-by-step instructions and coaching. The protocol did not include observation of parent and child interactions without coaching during these first three PDI sessions. During the fourth PDI session, parents initially met with the therapist to review homework, and the parent was coached in CDI skills with the child for about 5 min. After this play time, the parent was observed, videotaped, and coded in implementing PDI with his or her child. The parent was instructed "Tell (child's name) that it is time to clean up the toys. Get him/her to put all the toys in their containers and put all the containers in the toy box". In the fifth PDI and subsequent sessions, after reviewing homework and observing parent-child interactions, most of the session was dedicated to coaching the parent in implementing PDI and maintaining CDI skills followed by information to generalize the skills to house rules and public places. The parent was always instructed to practice the CDI and PDI skills between sessions with his or her child. To examine maintenance of the CDI skills, CDI was coded in the fifth PDI session. For all subsequent sessions, PDI skills were observed as described above.

For this study, the pre-treatment observation, sessions with CDI or PDI observations, and post-treatment observation were coded. The timeline was as follows: the baseline CDI observation was taken at intake, family attended a 6-week orientation group and the CDI didactic session (no coded observations during these sessions), then five CDI sessions were observed and CDI coded. The family attended a PDI didactic session and two practice sessions, after which three to four sessions were coded. Parents were coded using PDI skills, then CDI skill, followed by two more sessions coding PDI skills. The family attended a 6-week wrap up group and then completed the post-treatment assessment in which PDI was coded. Monitored protocol adherence for the treatment intervention was 93%.

Measures

Sequential coding of the Dyadic Parent-Child Interaction Coding System II (*DPICS-II*). The DPICS-II (Eyberg, Bessmer, Newcomb, Edwards, & Robinson, 1994) is a coding system for specific structured parent-child interactions targeted by PCIT. DPICS-II includes codes for parent behaviors (e.g., commands, criticism, labeled praise, etc.) and child behaviors (e.g., noncompliance, compliance, etc.). Inter-rater reliability, test-retest reliability, and discriminant validity have been found to be high for the instrument (Robinson & Eyberg, 1981). To check coding reliability, a subset of tapes from this study was sent for off-site coding by an independent coder not affiliated with the study (i.e., a coder trained in the DPICS-II system at remote institution who was not trained or supervised by study personnel, and was not involved in any way in the present study). Correlation between study and independent off-site coders was .94 for negative parent behaviors and .84 for positive parent behaviors.

Table 1
Descriptions of coding categories for parental behavior.

Behavioral code	Description
Information description	A declarative sentence or phrase that provides information about objects or people or introduces new information.
Behavioral description	A declarative sentence which a parent is describing an action the child is completing or recently completed.
Reflection	A statement where the parent repeats or reflects back what the child has said.
Question	A descriptive or reflective comment expressed in the form of a question.
Unlabeled praise	A nonspecific verbal statement of approval on an attribute, behavior, or product of the child's activity.
Labeled praise	A specific verbal statement of approval of an attribute, behavior, or product of the child's activity.
Indirect command	A sentence which requests a child to perform a certain activity or behavior stated in question form.
Direct command	A declarative sentence which requests a child to perform a certain activity or behavior.
Criticism	A statement which criticizes a child's activity, behavior, or verbalizations.
Negative behavior	This occurs when a parent engages in a negative behavior, which does not fall into other categories such as yelling or slapping a child.
Other	This is coded when a parental behavior does not meet the criteria for other behavioral categories.
No response	This occurs when a parent does not respond behaviorally or verbally to a child's question, comment, or play.

For the present study, parent and child behaviors were coded in sequences rather than in the aggregate. A parent-child interaction sequence (trial) was defined as beginning with a child behavior, followed by parental response(s). If a parent responded to a child behavior with silence or inaction, the trial continued until the child initiated a new behavior. Each new, codable child behavior marked the beginning of a new trial. For example, if a child played quietly with toys at the table (coded as "appropriate child behavior"), this child behavior constituted the start of a trial. The parent might respond with one or more behaviors, such as a question, followed by a command, followed by a criticism. The child might then ask a question, to which the parent might respond with information. This example would be coded as two trials: appropriate child behavior → question, command, criticism; and appropriate child behavior → information description. In this example, the first trial would have three parental responses, and the second trial would have one parental response.

Because the DPICS-II has multiple categories for parent and child behaviors, the categories were collapsed into three types of child behaviors (appropriate, neutral, and inappropriate) and three types of parent behaviors (positive, neutral, and negative). DPICS parent behavior categories were classified as positive, neutral, or negative depending on whether the corresponding parenting behavior was consistent with the skills coached to increase (positive) or decrease (negative) for that phase of treatment. During the CDI observations, the following parent behaviors were classified as being positive: labeled praise, behavioral description, information description, and reflection. For CDI the following parent behaviors were classified as being negative: criticism, questions, direct command, indirect command, and no response to child appropriate behavior. During the PDI observations, the following parent-behaviors were classified as being positive: direct command, behavioral description, information description, labeled praise, and reflection. The following parent behaviors were classified as being negative: questions, criticism, and indirect commands. During both the CDI and PDI observations, the following parent behaviors were classified as being neutral: unlabeled praise and other. Child behaviors were coded depending on whether they corresponded to common behavior problems (e.g., whining, noncompliance, hitting, and throwing toys), desirable behaviors (e.g., playing nicely with toys, asking questions, complying with instructions), or neither. This is the same classification scheme used in (Chaffin et al., 2004) that found aggregate DPICS negative parent behaviors as mediators of abuse recidivism at follow-up. See Table 1 and Table 2 for a description of parent and child behaviors coded. Prior to conducting the sequential coding, the coders were trained to 90% criterion on the original DPICS-II coding system and then trained to do sequential

Table 2
Descriptions of coding categories for child behavior.

Behavioral code	Descriptions
Compliance	This is coded when the child complies with the parental command.
Noncompliance	This is coded when the child fails to comply with the parental command.
No opportunity	This is coded when the child is not given the opportunity to comply with the command either because the parent issues another command or issues a command that cannot be completed during session.
Appropriate behavior	This is coded when the child engages in appropriate behavior such as playing with the toys, engaging the parent in conversation, or asking questions.
Other positive	This is coded when the child engages in other positive behaviors that do not fall into the categories above.
Other negative	This is coded when the child engages in other negative behaviors such as throwing the toys or hitting the parent.
Child negative affect	This is coded when the child displays some form of negative affect such as whining or crying.

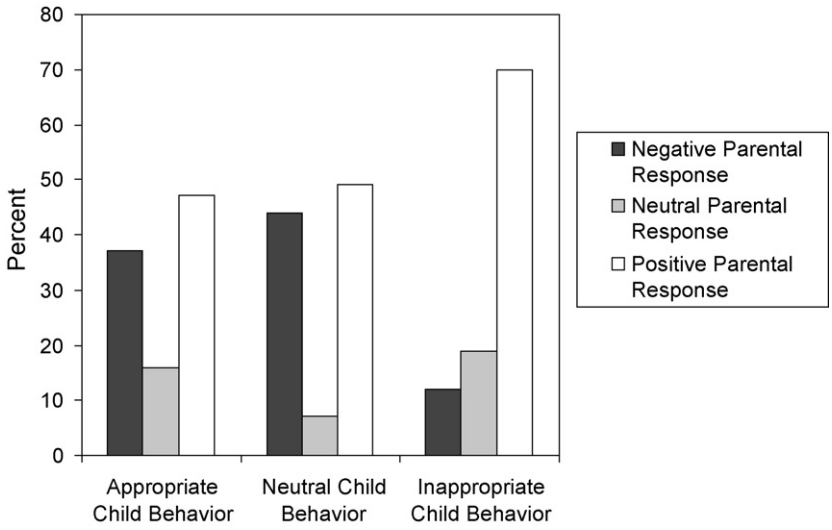

Figure 1. Parents' initial response to child behaviors, by child behavior type.

coding until they reached 90% criterion. Ten cases (72 sessions) were randomly selected to be double-coded by independent raters to check reliability. Inter-rater correlations ranged from .87 to .93. Coders independently coded the CDI and PDI tapes while blind to the specific session number.

Results

Interactions

A total of 5,436 interaction sequences were coded. The vast majority (94%) of sequences were initiated by an appropriate child behavior. On average across sessions, the children demonstrated 38 appropriate ($SD = 10.8$) and .5 ($SD = 1.4$) inappropriate behaviors, with greater frequency of appropriate and lower frequency of inappropriate behavior during the relationship enhancement phase (CDI) than the discipline phase (PDI: $t = 3.9$, $p < .01$; $t = -3.8$, $p < .01$, respectively). On average across the sessions, parents averaged 30.5 ($SD = 13.3$) positive responses and 16.7 ($SD = 9.3$) negative responses to the child's appropriate behavior.

Initial parental responses to child behavior across all sequences (i.e., the parent's first response directly after the child's behavior) are shown in Figure 1. As can be seen in the Figure, parents' first responses to *appropriate* child behaviors were almost as likely to be negative as positive. However, parents tended to use positive parenting strategies in response to *inappropriate* child behaviors (e.g., by describing and attending to the behavior). This pattern was most pronounced during the first observation, in which the parents' initial response to their child's appropriate behavior was more likely to be negative (52%) than positive (28%) or neutral (20%). No violent behavior was coded for any parent during the observed interactions. Negative parental behavior usually consisted of controlling or critical during CDI tasks responses (i.e., indirect commands, questions, or criticism) or ignoring a child's positive behavior.

Parents gave multiple responses to a single child behavior in 27% of all sequences. For the second response to child behaviors, 61% of the responses were positive, 12% were negative (mostly questions), and 27% were neutral (mostly unlabeled praises). Only 10.9% of sequences had a third parental response. Of this, 62% were positive, 12% were negative (questions), and 26% were neutral (unlabeled praise). Only 4% of sequences had a fourth parental response. More than four subsequent parental responses were rare and continued to follow the pattern of more positive parental behaviors compared to negative parental behaviors.

Responses were analyzed in terms of whether they contained *any* positive response element (54% of all sequences) and whether they contained any negative response element (43% of all sequences). Because 94% of sequences were initiated by an appropriate child behavior, growth trajectories were analyzed only for trials initiated by child appropriate behaviors. Session-by-session data were analyzed using growth models. Parental responses to appropriate child behaviors were collapsed within sessions for both positive and negative response elements, yielding two scores for each session—the percentage of appropriate child behaviors with at least one positive parental response and the percentage of appropriate child behaviors with at least one negative parental response. Initial curve fitting across sessions suggested a substantial quadratic component in the change trajectory for both positive and negative parental responses. Growth curves for both positive and negative response elements were analyzed using a random slopes and random intercept approach with HLM 5 software. Response percentages were set as dependent variables for each session, sessions and response types were nested within subjects and were modeled by response type (positive vs. negative), session number, session number squared and the interactions of session and session-

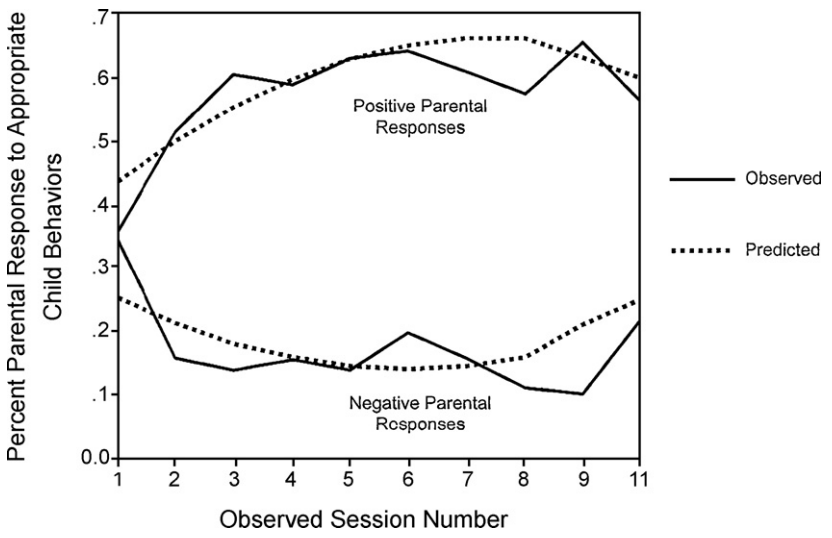

Figure 2. Observed and quadratic growth model predicted change trajectories for positive and negative parental responses to appropriate child behaviors. *Note*: (1) code CDI during pre-service intake observation; (2) code CDI during first session after CDI didactic with coaching; (3) code CDI during second session of CDI coaching; (4) code CDI during third session of CDI coaching; (5) code CDI during fourth session of CDI coaching; (6) code CDI during fifth session of CDI coaching; (7) code PDI during session after PDI didactics and two practice sessions; (8) code CDI during PDI coaching session; (9) code PDI during PDI coaching session; (11) code PDI during post-services observation.

squared with response type. The session and session-squared terms test the linear and quadratic components of change over time, and the interaction terms test whether change trajectories over time are different for positive versus negative parental responses. Both linear and quadratic change components were significant ($t = 7.90$, $p < .001$; $t = -4.32$, $p < .001$, respectively) as were their interactions with response type ($t = -7.75$, $p < .001$; $t = 7.27$, $p < .001$, respectively). The model accounted for 69% of observed variance growth over time. The observed and model-predicted change trajectories are presented in Figure 2. The 10th observation was dropped from the growth curve analyses because of the lower number of completed observations (last PDI coaching session) due to treatment attrition. The last observation was completed all subjects regardless of treatment participation because it was during the post-services assessment wave.

As seen in Figure 2, there was a sharp increase in observed positive responses to appropriate child behaviors during the first few sessions, along with a sharp decrease in observed negative responses to appropriate child behaviors. There was relatively little change after the first three sessions. In order to test the hypothesis that all change was observed during the first three sessions, a piecewise growth model was constructed with two segmented session terms using the segmented coding scheme described in Bryk and Raudenbush (1992). The first term reflected growth in the first three sessions, but not thereafter, and the second term reflected only growth after the first three sessions. These were tested using the same modeling approach described above. Both the first three sessions component and the first three sessions by type interaction term were significant ($t = 6.44$, $p < .001$; $t = -6.35$, $p < .001$, respectively), but the later session term and its interaction with type did not reach significance ($t = -.62$, $p = >.05$; $t = .863$, $p > .05$, respectively) and both coefficients were quite small. The overall model accounted for 70% of the observed variance in growth over time.

Level-one variance components for the quadratic model were examined for additional exploration of case-to-case variability in change trajectories. Variance components suggested relatively greater contributions from intercepts with relatively less variation in slope components for either the probability of positive (intercept $p = .09$; slope $p > .38$) or negative responses (intercept $p = .007$, slope $p = .02$). Individuals varied relatively more in their initial response probabilities than in the shape of their change trajectories. Variance components from the quadratic model are displayed in Figure 3.

Discussion

The results underscore several key conclusions. First, physically abusive parents demonstrate rapid and substantial in-session change in their responses to appropriate child behaviors during PCIT. Initial parental responses to child appropriate behavior were about as likely to be negative as to be positive. As predicted, parents demonstrated increases in positive parental responses as well as decreases in negative (undesirable) parental responses to appropriate child behavior. These changes occurred during the first three sessions of treatment and then remained relatively stable for the remainder of treatment. These results are consistent with previous PCIT research that documented change in the interactional style of parents with increases in positive parenting and decreases in negative behaviors (Borrego, Urquiza, Rasmussen, & Zebell, 1999; Eyberg, Boggs, & Algina, 1995; Hembree-Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993). This rapid change may be due to the structure of PCIT in which beginning with the first coaching session, the therapist provides high-rate immediate feedback to the parent, directing the parent to respond positively and to avoid the negative parental behavior to every appropriate child

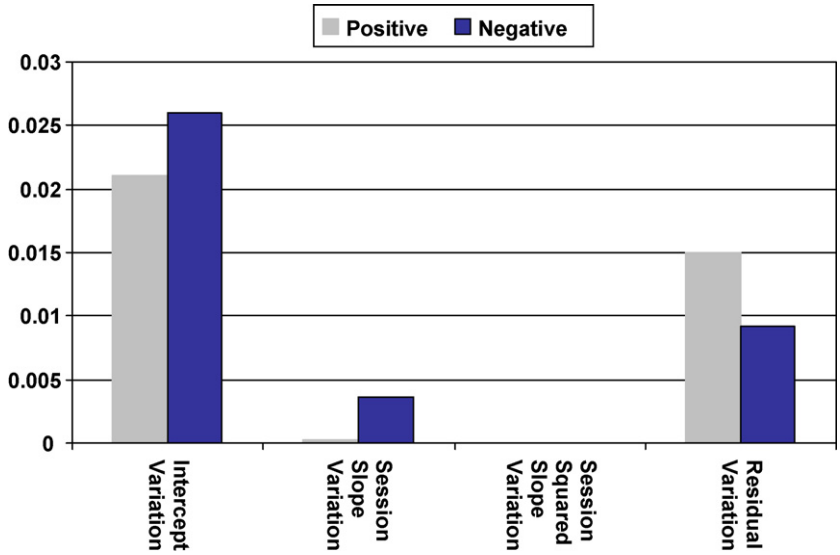

Figure 3. Quadratic model variance components.

behavior. Also, during the live coaching, the therapist is able to tailor the application of the skills to the problems that arise during the session, increasing acquisition of skills (Herschell, Calzada, Eyberg, & McNeil, 2002). Within three sessions, many parents are mastering these skills sufficiently to demonstrate their changed interactions during the uncoached observation portions of the session. Variability across the parents impacted their initial rates of parenting behaviors, but not the trajectory of change.

These results are particularly encouraging given that changes in these same DPICS-coded parent behaviors were found to mediate PCIT treatment effects for reducing physical abuse recidivism. These results support that these interaction change trajectories are related to important, long-term child welfare outcomes. The findings of this study extend previous work in two main ways. First, because sequential coding was used, rather than cumulative coding, it is clear that much of the reduction in negative parent behavior during PCIT is due to reductions in negative parental responses to appropriate child behaviors. Negative parental responses were common in the sessions despite the fact that children rarely had inappropriate behavior. Thus, negative parent behavior among abusive parents, which appears to be an important mediator for recidivism, did not appear to be driven primarily by actual child misbehavior. Instead, this suggests that parental perceptions of their child's behavior (which may or may not be accurate) likely plays a significant role in influencing parental response.

Another interesting finding of the study is the relative absence of child negative behavior during the clinic observations. The participants in this PCIT trial were selected due to the behavior of the parent (physically abusive behaviors) rather than of the child. Although physically abused children tend to have greater externalizing behaviors, the children were not specifically selected for the presence of disruptive behavior disorders. The intake Externalizing Scores on the BASC were on the high end of the Average range. Further, the inclusion of older children reduced the likelihood of overt behavior problems in the clinic. Indeed, clinicians in the trial noted lower overt behavior problems in the clinic than what is seen in preschool children with disruptive behavior disorders undergoing PCIT. The play observations in the clinic, in which the child lead play activities, were less likely to illicit misbehavior than parent lead commands given in the home environment (e.g., Cerezo, D'Ocon, & Dolz, 1996). Indeed the rates of child negative behavior significantly increased during the discipline component observation. Thus, limited presenting problems of the child, child's age, and observation format could account for the relative absence of negative child behaviors. Despite the limited child negative behavior in the clinic, observed changes in the parental behaviors during these tasks mediated future physical abuse reports in the parent study (Chaffin et al., 2004). Future studies including observations in the home environment with tasks requiring child compliance to parent commands would expand understanding of changes in parent-child sequences of behavior with training, particularly understanding parent's response to child's misbehavior.

In the present study, virtually all change occurred during the first three sessions of PCIT. Despite this, it would be inappropriate to conclude that three sessions is sufficient to reduce recidivism risk, given that parents in this study typically completed all or most of the protocol. In a relationship where positive interactions are rare or the parent tends not to perceive the child's appropriate behaviors, it is perhaps not surprising that several sessions of intensive coaching to promote and recognize positive interactions could make remarkable changes. In fact, similar changes in Eyberg Child Behavior Inventory (ECBI) Intensity Scores have been reported in a subsample of families from the larger study that overlaps with the current sample (Balachova, Chaffin, Funderburk, & Silovsky, 2008). ECBI Intensity Scores, which represent parent's perceptions of how frequently child inappropriate behaviors occur, showed a sharp decline in the first three sessions, followed by a gradual decrease through the remainder of PCIT. However, ECBI Problem Scores, which represent whether the parent perceives the

negative behaviors as problematic, did not show the same steep decline. Problem Scores showed a gradual decline over the course of PCIT, suggesting that learning specific discipline techniques might be necessary to help physically abusive parents feel confident that they can manage their child's behavior problems.

Although rapid changes occurred in session, generalization of these changes to home and community settings may have required the additional sessions. Parents face more behavior management challenges at home or in the community versus what can be captured in a limited amount of time in a controlled clinical setting. Also, change in the early sessions may be partly due to the six-session motivational orientation module that parents completed prior to beginning PCIT. Future studies should attempt to determine whether or not these changes in the early sessions were due to the motivational orientation module, the didactic session prior to coaching, or the actual coaching sessions. However, the findings are encouraging about the prognosis for achieving substantial changes with a relatively compact intervention, even among cases with multiple past child welfare reports.

A third finding is that there is not tremendous case-to-case variability in this within treatment change trajectory. The piecewise model accounted for 70% of observed variability in change trajectories. Parent varied more in their initial response probabilities than in the shape of their change trajectories. The modest variability might suggest that the PCIT model does not require a great deal of adaptation to accommodate case-to-case variations in skill acquisition rates.

The baseline (i.e., pre-treatment) pattern of interaction sequences found in this study is particularly concerning. Prior to PCIT, abusive parents were more likely to respond to an appropriate child behavior with a negative than with a positive response, suggesting that parents did not reinforce positive behavior in their children. These findings are consistent with previous research (Burgess & Conger, 1978; Kavanagh et al., 1988; Tuteur, Ewingman, Peterson, & Hosokawa, 1995). Further, parents in the study primarily provided positive responses to their child's negative behavior when they occurred. Consistent with the coercive cycle model (Patterson, 1976, 1982; Patterson & Reid, 1984; Urquiza & McNeil, 1996), this pattern may reflect over-attention to (and reinforcement of) inappropriate child behaviors and under-attention to (and extinguishing of) appropriate child behaviors. Speculatively, this pattern might suggest one contributory mechanism for the association between physical abuse and childhood disruptive behavior disorders.

A number of strengths and limitations should be borne in mind in considering these findings. Strengths include the fact that the variables examined in this study were drawn from clinical trial data that linked treatment changes to future long-term child welfare outcomes, supporting the validity and importance of the variables studied. Also, the measures used are based on direct behavioral observations, rather than self-report, and the coding system used reflected sequences rather than simple summations of behaviors. The limitations include the fact that parent-child interactions were sampled from a fairly artificial context in which the parent was asked to do specific behaviors, and all parties were aware they were being observed and taped. How representative these clinic behaviors are of more naturalistic parent-child interactions is unknown. Indeed, higher rates of child inappropriate behaviors have been found in observational data of abusive parent-child interactions in their homes (e.g., Cerezo & D'Ocon, 1999). Future studies examining the trajectory of change with high-risk families using home-based observations are needed.

The videotaped coding for this study was done in a manner to fit the planned observation of parent's skills already part of the PCIT protocol. Because of this, the intervals between the coded sessions were variable. Future research of weekly observations would facilitate more closely examining the trajectory of change. Observing multiple weeks of parent-child interactions before receiving parenting skills didactics, post-didactics, prior to any therapist's coaching, and post-coaching would facilitate dissentingly the impact of didactics and coaching. Also, it is important to note that interaction sequences were coded in the simplest stimulus-response format, and may not capture some of the more nuanced aspects of the parent-child relationships, such as escalating or de-escalating processes. The interactions chosen for this study were parent's responses to child behaviors. Child responses to parental behaviors and changes in these interactions over the course of treatment were not examined and should be examined in future research. Finally, the present study examined a small fairly homogeneous sample of physically abusive parents, thus creating possible generalizability issues. It is unknown whether or not similar results would be obtained if a larger more diverse sample was used, as the present sample was somewhat lower risk than the entire sample (fewer children, trend for lower depression) of the RCT. It is also unknown whether or not change would be as rapid in treatment with parents who have numerous risk factors (e.g., higher levels of depression) who are raising children demonstrating clinically significant behavioral issues.

In sum, the study offers added support for the applicability of PCIT to physically abusive parents. Parents appear able to make key changes rapidly in PCIT and on a predictable schedule. These changes are maintained across the course of treatment. Also, it is important to note that these findings were obtained with actual child welfare cases, suggesting that the benefits of the intervention model can be generalized to real-world cases.

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