

Randomized Trial of PMTO in Foster Care: Six-Month Child Well-being Outcomes

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The study's authors declare that they have no conflict of interest.

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Abstract

Objective: This study tested the effectiveness of Parent Management Training, Oregon (PMTO) model on child social-emotional well-being. **Methods:** Using a randomized controlled design and three measures of social-emotional well-being, the study investigated effectiveness of PMTO with families of children in foster care with serious emotional disturbance (SED). Participants included children (3-16 years) and parents who were randomly assigned to PMTO ($n = 461$) or services-as-usual ($n = 457$). Study condition was known to participants and assessors. Six-months after baseline, ANCOVA models examined the intervention's overall effect and time interactions using intent-to-treat analysis. Follow-up analyses identified salient predictors of well-being. **Results:** PMTO demonstrated small but significant positive effects on three primary outcomes: social-emotional functioning (Cohen's $d = .31$), problem behaviors (Cohen's $d = .09$), and prosocial skills (Cohen's $d = .09$). **Conclusion:** Results suggest that PMTO was effective at improving short-term social-emotional well-being in a high-risk population of children with SED.

Child well-being is an important goal of the U.S. child welfare system, sitting alongside the equally relevant goals of safety and permanency. While safety and permanency were prominent in the policy agendas of the 1970s through 1990s, child well-being has recently moved to the forefront of the child welfare system (Jones, LaLiberte, & Piescher, 2015; Mason, 2012). More specifically, social-emotional well-being is a particular domain of child well-being that policy makers and administrators have recently identified as especially critical to the population of children affected by maltreatment, including those in foster care (Samuels, 2011; USDHHS, 2012). Despite the well-known challenges presented by children's behavioral health problems, there is a lack of rigorous study in foster care settings to test interventions that might improve children's social-emotional well-being.

Numerous foster care studies have shown that social-emotional well-being is associated with child welfare outcomes. Even with methodological differences in design, sampling, and measurement, these studies collectively demonstrate that children's emotional and behavioral health problems are a formidable barrier to stability and permanency (Akin, 2011; Barth et al., 2007; Hurlburt, Chamberlain, DeGarmo, Zhang, & Price, 2010; Leathers, 2006; Park & Ryan, 2009). Moreover, while recent foster care trends indicated a decrease in the number of children in foster care (Samuels, 2011), deeper analyses revealed that subgroups of children continue to encounter serious barriers to timely exit from foster care. Many of these children who struggle to achieve permanence enter foster care with serious mental health problems, experience numerous placement changes while in care, and remain in care for long stays (Akin, Bryson, McDonald, & Walker, 2012). While children may enter care without emotional and behavior problems, experiences of instability in foster care have been linked with worsening emotional and behavioral health problems (D. M. Rubin, O'Reilly, Luan, & Localio, 2007). Moreover,

these child-specific issues represent only one aspect of the multiple and complex problems presented by their families. Parents of children in foster care with serious mental health problems have been found to face an assortment of risk factors, including parent mental illness, substance abuse, trauma, poverty, and domestic violence (Akin, Bryson, McDonald, & Wilson, 2013; Akin et al., 2012).

As the mental health problems of children in foster care have been well-documented during the past decade, researchers have also been building evidence on interventions to address them (Landsverk, Burns, Stambaugh, & Reutz, 2009; Pecora, Jensen, Romanelli, Jackson, & Ortiz, 2009; Romanelli et al., 2009). An expanding knowledge base on the interrelationships between neurobiological science, trauma, and health, including emotional and behavioral health, has placed greater emphasis on creating nurturing environments as a key mechanism for preventing and reducing children's emotional and behavioral problems and maximizing their healthy social-emotional functioning (Biglan, 2014; Biglan, Flay, Embry, & Sandler, 2012; Jones et al., 2015; Shonkoff et al., 2012). As such, research-supported parenting interventions are identified as a key strategy to improve outcomes among children who have experienced maltreatment, including those in foster care (Barth, 2009; Biglan, 2014; Horwitz, Chamberlain, Landsverk, & Mullican, 2010). Some of the reasons that parenting interventions are promoted include an accumulation of recent evidence on their positive effects across high-risk populations (Barth, 2009; Horwitz et al., 2010) and findings that demonstrate treatment effects reaching well beyond improved parenting skills and child problem behaviors. For example, recent studies on research-supported parenting interventions have shown long-term cascading effects, such as reductions in parental mental illness (especially maternal depression), parental substance abuse, and poverty (Barth, 2009; Patterson, Forgatch, & DeGarmo, 2010).

Despite efforts to expand and rigorously evaluate research-supported parenting interventions among children in foster care, most randomized studies have investigated interventions that targeted: (1) foster parents (Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008; Leve et al., 2012; Mersky, Topitzes, Grant-Savelle, Brondino, & McNeil, 2016; Price et al., 2008); (2) biological parents who were selected with various criteria but may or may not have had their children in foster care (e.g., confirmed physical abuse, involvement with Head Start and a history of child welfare reports) (Bernard et al., 2012; Chaffin, Funderburk, Bard, Valle, & Gurwitch, 2011; Chaffin et al., 2004; Hurlburt, Nguyen, Reid, Webster-Stratton, & Zhang, 2013); or, (3) biological parents whose children had already reunified with them (DeGarmo, Reid, Fetrow, Fisher, & Antoine, 2013; Oxford, Marcenko, Fleming, Lohr, & Spieker, 2016). Indeed, few parenting interventions have been tested with biological parents while their children were still in foster care (Linares, Montalto, Li, & Oza, 2006). Among the studies that have comprised biological parents with children in foster care, many were group-based (Webster-Stratton & Reid, 2010), which has advantages for peer support but may have disadvantages with regards to including parents with transportation barriers and/or living in rural areas. Additionally, despite studies that indicate emotional and behavioral problems are most prevalent among older children and adolescents in foster care (Burns et al., 2004; Leslie, Hurlburt, Landsverk, Barth, & Slymen, 2004), parent training interventions for biological parents of adolescents in foster care are understudied. In response to these gaps in the existing knowledge base, the present randomized trial investigated a research-supported parenting intervention that was tailored to the needs of biological families of children in foster care with serious emotional disturbance (SED). Specifically, this study examined whether the addition of individual, in-home Parent Management Training Oregon Model (PMTO) to usual foster care services would positively

influence child social-emotional well-being at 6-months follow-up among children and youth identified as SED and between the ages of 3 and 16 years.

PMTO is a behavioral parent training program that was developed at the Oregon Social Learning Center (OSLC) and disseminated by an OSLC affiliate, Implementation Sciences International, Incorporated (ISII). For more than four decades, the OSLC has researched and advanced programs that address child and adolescent antisocial behavior (Forgatch & Patterson, 2010). PMTO is one of a cadre of behaviorally-oriented programs that comes from the extensive work of the OSLC. Other OSLC examples used within foster care include Multidimensional Treatment Foster Care (Chamberlain & Reid, 1991) and KEEP (Keeping Foster Parents Trained and Supported) (Chamberlain et al., 2008). PMTO and other OSLC parenting interventions are based on social interaction learning (SIL) theory, which posits that problematic child behaviors may be addressed with parenting because parents are the agents of change for affecting improvements in their children's behaviors (Patterson, 1982). Central to PMTO is the idea that families' coercive interactions contribute toward children's problematic behaviors and that positive parenting practices enable prosocial behaviors (Forgatch & Domenech Rodríguez, 2016). Thus, PMTO focuses on enhancing positive parenting and decreasing coercive practices while making relevant adaptations for contextual factors such as family circumstances, environmental conditions, and individual factors (Forgatch & Patterson, 2010). The SIL model identifies five core parenting practices as the key mechanisms for child and adolescent adjustment and these form the basis for the PMTO content. (Additional detail is provided by Forgatch & Domenech Rodríguez, 2016). In addition to content, PMTO also specifies key components of the clinical process. The process aspect of the intervention grew from the efforts of PMTO researchers who sought effective strategies for effectively engaging parents, managing

resistance to change, and using effective teaching strategies (Forgatch & Domenech Rodríguez, 2016).

PMTO has demonstrated its efficacy through several RCTs that comprised various populations, such as families of chronically offending youth (Bank, Marlowe, Reid, Patterson, & Weinrott, 1991), families of recently divorced mothers (DeGarmo, Patterson, & Forgatch, 2004; Forgatch & DeGarmo, 1999; Forgatch, Patterson, DeGarmo, & Beldavs, 2009), families with stepfathers and children with disruptive behaviors (Forgatch, DeGarmo, & Beldavs, 2005), Norwegian families of children with disruptive behaviors (Ogden & Hagen, 2008), and ethnic minority families in Norway with children with disruptive behaviors (Bjørknes, Kjøbli, Manger, & Jakobsen, 2012). This body of research has earned PMTO a scientific rating of 1, *well-supported*, by the California Evidence Based Clearinghouse (California Evidence-Based Clearinghouse for Child Welfare, 2015) and the designation of “Near Top Tier” by the national Coalition for Evidence-Based Policy (<http://evidencebasedprograms.org>). Overall, PMTO has shown beneficial intervention effects on parenting practices and child well-being, including the specific outcomes of noncompliance, externalizing behaviors, internalizing behaviors, delinquency, and school functioning (Forgatch & Patterson, 2010).

While PMTO has been used in child welfare settings in at least two other U.S. jurisdictions, no randomized studies to date have demonstrated PMTO’s effectiveness with biological families of children in foster care. However, other parent training programs established by the OSLC have shown promising results for foster parents caring for children in foster care and biological parents caring for children who have exited foster care to reunification. In a randomized trial with 103 families of children (5 to 12 years old) that had recently reunified after their first episode of foster care, the Pathways Home study examined an in-home parent training

intervention in comparison to post-reunification services as usual ($N = 103$). These researchers found the parenting intervention did not demonstrate a main effect on child problem behaviors; however, child problem behaviors were reduced when parents increased their use of encouragement. Additionally increases in problem behaviors were associated with foster care re-entry (DeGarmo et al., 2013). A second example of an OSLC parenting intervention is KEEP (Keeping Foster and Kinship Parents Trained and Supported). While KEEP differs from PMTO by targeting foster parents and using a group format, its curriculum is similar to PMTO's curriculum in essential parenting content. A randomized trial of KEEP with 700 families of children 5 to 12 years old showed that parent training delivered to kin and non-relative foster parents significantly reduced child behavior problems and that specific parenting practices mediated these reductions, especially for high-risk children (Price et al., 2008). A more recent randomized study of KEEP, also delivered to non-relative and kin foster parents of children 5 to 12 years old in foster care, extended the program's positive results to siblings of the focal child. This study found that a sibling nearest in age to the focal child also benefitted from the parenting intervention with significant reductions in problem behaviors (Price, Roesch, Walsh, & Landsverk, 2015).

In sum, PMTO research has demonstrated positive outcomes for children's social-emotional well-being among a variety of family and child samples. Still, additional studies are needed to determine whether it is effective when delivered in-home to biological families of children who are still in foster care. Thus, the present study aimed to test the effectiveness of PMTO on child-related proximal outcomes, children's social-emotional well-being. Specifically, our primary research question was: Do children, ages 3 to 16 years old, in foster care with SED who receive in-home PMTO improve on three proximal outcomes – social-emotional functioning, problem

behaviors, and prosocial skills – more than children and youth with SED who receive usual foster care services? In addition to testing the overall intervention effect, this study had a secondary aim to identify salient child, parent, and case characteristics that were predictive of children’s social-emotional well-being outcomes.

Project Setting

This local evaluation was part of a five-year federally-funded demonstration project known as the Permanency Innovations Initiative (PII). In 2010, the Children’s Bureau began PII through cooperative agreements with six grantees, aiming to improve permanency outcomes by targeting specific groups of children in foster care that experience the highest risk for long stays. PII’s main goals were to: a) build the implementation and evaluation capacity of public child welfare systems, and b) strengthen the child welfare evidence for reducing long-term foster care. Each of the six PII grantees worked with technical assistance providers in the areas of implementation science and evaluation to select, implement, and test a unique service strategy for improving child and family outcomes (PII-TTAP & PII-ET, 2013). PII’s systematic approach to implementation and evaluation also involved proceeding through evaluation in deliberate and thoughtful stages. Building on a results-oriented accountability framework (Testa & Poertner, 2010), grantees moved through progressive stages of explorative research (Akin et al., 2012; Bryson, Akin, Blase, McDonald, & Walker, 2014), usability testing (Akin, Bryson, Testa, et al., 2013), formative evaluation (Akin, Testa, et al., 2014), and summative evaluation. Each stage of the evaluation was viewed as a tollgate; that is, grantees were required to satisfy designated criteria before passing the tollgate and proceeding to the next stage of evaluation (PII-TAP & PII-ET, 2013). The present study describes the child outcomes of the summative evaluation conducted by local evaluators.

Locally, the project was initiated in September 2010, known as the Kansas Intensive Permanency Project (KIPP), and operated as a public-private-university partnership. The KIPP Steering Committee comprised the grant project lead, the University of Kansas School of Social Welfare; the state's public child welfare agency, the Kansas Department for Children and Families; and the state's private providers of foster care. Initially, four private community-based agencies delivered foster care services across Kansas (KVC Kansas, Saint Francis Community Services, TFI Family Services, and Youthville); however, a state contract rebidding reduced the number of providers to two in April 2013 (KVC Kansas and Saint Francis Community Services). The Steering Committee was made up of individuals in leadership positions and met twice a month for the duration of the project. Using data gathered during the exploration stage, the KIPP Steering Committee identified the project's target population, selected the intervention, and decided to implement statewide. Given the resources for implementation, the project was able to hire new child welfare staff in six strategically-located offices across the state.

Methods

Design

The study design was a post-randomized consent trial (Zelen, 1990). Post-randomized consent designs are also known as Zelen designs and characterized by participants consenting to the study after randomization and with knowledge of their group assignment prior to agreeing to study participation. One advantage of Zelen designs is its potential to reduce risk of bias in randomized trials when knowledge of the treatment may influence study recruitment (e.g., people who are enthusiastic about the treatment seek to participate) and outcomes (e.g., the treatment group's expectations may inflate benefits and the control group's disappointment and demoralization may influence results) (Hinman et al., 2014). The Zelen design may also

strengthen external validity. Theoretically, it may provide a more representative sample because an entire sample of eligible participants are included in the study, not just those that consent to randomization. Thus, the Zelen design may offer a more accurate estimate of the total impact that can be expected from an intervention being introduced on a population because it helps account for non-compliance with service plans and no-show rates into the overall estimate of an intervention's benefit (Adamson, Cockayne, Puffer, & Torgerson, 2006).

This study was conducted over a two-year period (September 2012 – September 2014) in the state of Kansas. It was preregistered with the National Institute of Health at clinicaltrials.gov (NCT02152618). The study protocol may be obtained from the first author and the data underlying the analyses will be made available on the National Data Archive on Child Abuse and Neglect. Human subjects' approval was provided by the University of Kansas Institutional Review Board. The PMTO program developer, ISII, was involved in the implementation of PMTO but did not participate in the design, conduct, analysis, or reporting of this study.

Participants

The sampling frame comprised children from all regions of the state who were between the ages of 3 and 16, entering or re-entering foster care, and identified as having emotional and/or behavioral problems within six months of this removal episode. Upon intake, trained caseworkers administered the Child and Adolescent Functioning Assessment Scale (CAFAS) and the Preschool and Early Childhood Functional Scale (PECFAS) (Hodges & Wong, 1996; Hodges, Xue, & Wotring, 2004) with children newly referred to foster care. All referrals to foster care were included, meaning that children may have been entering foster care for a new removal episode or re-entering from a prior removal episode. Children were identified as eligible when one of the following criteria were met: (1) for children 3-5 years old, a PECFAS

total score of 50 or higher, or a score of 20 on one subscale; (2) for children 6-16 years old, a CAFAS score of 60 or higher, or a score of 30 on one subscale; or, (3) had been identified by a Community Mental Health Center as having a serious emotional disturbance; (4) had an Individual Education Plan for an emotional or behavioral disorder; (5) had a diagnosed mental disorder, and symptoms of that disorder were contributing to a lack of stability in out-of-home care placements; (6) had a diagnosed mental disorder, a history of outpatient or inpatient mental health treatment, and was currently prescribed psychotropic medications; or, (7) had been admitted for inpatient psychiatric care within the last year.

In addition to the child-level eligibility criteria, family-level criteria included, that at the time of study: 1) the child's case plan goal must be reunification; 2) parent must reside in the service area; 3) parent may not be incarcerated for longer than three months; and 4) parent cannot have a court-order of "no contact" with the child. Each case consisted of the identified child and an identified parent which included biological parents, stepparents, adoptive parents, or other adults serving in a caregiving role. The identified parent represented the caregiver with whom the child was to reunify at the time of study enrollment. Among the 918 children allocated to the study, 102 had more than one parent seeking to reunify with them (e.g., divorced parents). For the present study, we selected the parent identified as the primary caregiver, which was defined as the parent who had spent the most time caring for the child on a daily basis. In all cases, families were offered foster care case management services regardless of study condition or study inclusion/exclusion status.

Procedures

Data coordinators employed within the foster care agencies monitored all new foster care referrals and entered data on eligible children into a secure web-based system, the Research

Electronic Data Capture (REDCap) system (Harris et al., 2009). When two or more siblings met the eligibility criteria, one child was randomly selected from the sibling group. Once children and parents were identified as eligible, a program supervisor contacted the parent to explain the study and ask for their consent to participate. As explained earlier, the supervisor and the parent were aware of study condition at the time of consent. Parents consented to the study by signing written informed consent statements. Children also assented to study participation. Parents and youth received modest financial compensation for completing the assessments at each of three data collection waves (baseline, 6-months, and 12-months). Data collection involved three data points during which: (1) pre- and post-test questionnaires were administered to parents, (2) assessments were completed by caseworkers, and (3) video-recorded family interaction tasks that involved the parent(s) and child. The present study does not include data from the video interaction task because it does not measure social-emotional well-being. Parents completed questionnaires mainly in their own homes or another community setting of their choice; however, some assessments were conducted in a private room of the foster care agency or by phone as requested by parents. Although intervention families may have completed PMTO earlier than 6 months, the questionnaires, assessments, and recorded video were completed at 6 and 12 months by intervention and comparison participants. All assessment data were entered into REDCap by a data coordinator located at the foster care agency.

Randomization

Randomization procedures were semi-automated in REDCap. At the time of the study initiation, REDCap did not have a randomization module. Therefore, a university research assistant, who was in a separate unit from the evaluation team, developed a form and file-based procedure with multiple checks to ensure fidelity to a preset randomization assignment schedule.

The preset schedule used a blocked randomization approach stratified by region and a 1:1 allocation ratio (1:1). The research assistant managing the randomization process did not recruit families or interact with program-level staff and was the only person who had access to the preset randomization schedule; thus, the allocation was concealed from all other persons until after random assignment. No blinding was used after random assignment. Allocation of cases was conducted by university research staff who were in a separate location from foster care agency staff. All randomized cases were placed into a pool of cases sorted by region, date of referral to foster care (most recent first), and study condition. Allocation was implemented when foster care agency staff contacted the university staff via email, specifying the region with a service opening. University research staff selected the most recent cases for the intervention and comparison conditions, respectively, and then made the case information available to the agency staff in a separate REDCap project. Participant recruitment and enrollment was led by trained supervisors of the foster care agencies and monitored by the project's principal investigator.

Intervention

PMTO. PMTO was delivered by the state's private contractors for foster care services across the state. These agencies were selected primarily because the project aimed to reach children and their parents early in the child's stay in foster care and the foster care agencies had the greatest access to this client population. The frontline staff were master's level practitioners, most of whom were licensed social workers, about one quarter were licensed marriage and family therapists, and the other quarter were licensed counselors. The staffing model comprised one full-time supervisor per five full-time practitioners, plus one half-time administrative support position. All staff were hired following a structured, position-specific selection protocol. Staff selection was designed in partnership with the PII technical assistance provider and ISII,

informed by principles of implementation science (Fixsen, Blase, Naoom, & Wallace, 2009), and resulted in a structured selection protocol. The selection protocol used a behavioral interview process and stressed that qualified practitioners demonstrate several important qualities and abilities (e.g., strengths orientation, collaborative and supportive, creative, flexible, reflective, open to feedback and learning, positive attitude about EBIs/research, commitment to working with challenging families, etc.). Beyond staff selection, training and coaching were important and robust components of the implementation infrastructure (Akin, Mariscal, et al., 2014). The PMTO training regimen required practitioners to participate in 8 days of pre-service training followed by 10 additional days of training over approximately 8 months. Practitioners also participated in 2 full days of in-person coaching. In addition to the initial coaching days, they received observation-based coaching twice per month in one of three formats: written feedback, live feedback via video-conference, and/or live feedback via group.

Fidelity to the PMTO model was monitored by trainers and coaches via videos of the practitioners' work with families. All PMTO sessions were video recorded, uploaded to a secure portal, and could be selected for review by coaches and/or fidelity raters. Additionally, following the program developer's guidelines, select sessions were identified for fidelity rating by a reliable PMTO fidelity team. Practitioners were rated at least quarterly until they became certified in PMTO. Fidelity was rated across five domains (knowledge, structure, active teach, process, and overall) on a 9-point scale and calculated as an average fidelity score that could range from 1 to 9. Fidelity scores were grouped into categories of needs work (1-3), adequate work (4-6), and good work (7-9). When fidelity scores were in the "needs work" range, practitioners were provided with additional coaching. Certification took an average of 22 months to accomplish and, in addition to meeting training and coaching prerequisites, required

the practitioner to submit four session videos on two specific PMTO core parenting practices (i.e., skill encouragement and effective discipline). To become certified, all four videos had to achieve a mean total fidelity score of 6 or higher with no subscale scores lower than 3. Once certified, practitioners were rated for fidelity annually.

PMTO was delivered in-home to individual families, focusing on parents as the agents of change, and delivered for up six months. The program did not require a specific number of sessions or weeks; rather, practitioners worked with families until they completed the PMTO curriculum. Families who were retained for six months but did not complete the curriculum were discharged from the program at six months. Typically, practitioners met with families twice per week for approximately 60-90 minutes per session plus a mid-week check-in that lasted for 20-30 minutes. These weekly sessions followed a three-step process. First, practitioners met with parents without children present. Second, parents were expected to practice new skills, and practitioners followed-up with the parent by phone or in-person to discuss the weekly 'homework.' Third, practitioners conducted a family session with the parents and children together, during which the parents tried newly learned skills with the practitioner present and acting as a live coach.

The PMTO curriculum centered on teaching parents five core parenting practices: 1) positive involvement; 2) skill building; 3) supervision and monitoring; 4) problem-solving; and 5) appropriate discipline (Forgatch & Patterson, 2010). Practitioners were guided by a pre-defined and semi-structured session outline provided by ISII (For sample session outline see: Forgatch & Domenech Rodríguez, 2016). The PMTO manual provided optional handouts, home practice assignments, and ideas for parent and family activities that corresponded to each session topic. Practitioners moved through the curriculum in a specific order, starting with easier content,

adjusting the pace to fit the families' needs, and using an iterative process to reinforce concepts throughout the treatment process. For example, an early session focused on teaching parents to give clear directions as this is a foundational parenting practice for skill building and effective discipline. The content on giving clear directions re-emerged at various relevant places in later sessions. With regards to the process, PMTO was designed to be an engaging, hands-on, active teach model that relied heavily on coaching through a strengths-orientation. The two main teaching strategies were role playing and problem-solving. Practitioners used portable whiteboards or easel charts as a tool for active teaching that provided a visual cue to parents and children. PMTO's other commonly used process skills are described by Forgatch & Domenech Rodríguez (2016).

The feature of PMTO requiring tailoring from ISII was trauma. To address pervasive trauma in both children and parents, the KIPP Steering Committee asked that the PMTO training incorporate trauma-specific content. ISII involved Dr. Abi Gewirtz, a PMTO implementer and trauma expert, in the development and implementation of the training. In brief, the PMTO training emphasized trauma content, a focus on emotion regulation, and mindfulness techniques. Besides these modifications made for the training, PMTO did not undergo any other adaptations during the course of the study.

Other aspects of intervention fidelity were defined by the site implementers and not required by ISII. Based on findings from the exploration stage that uncovered individual, family, and system level barriers to permanency, project leaders included several components (Akin, Bryson, McDonald, et al., 2013; Akin et al., 2012). To promote better engagement of parents, PMTO was delivered early in the child's episode of foster care (i.e., initiated within first 6 months). To address parent transportation problems and access in rural communities, PMTO was delivered

in-home. To ensure adequate parent-focused services, PMTO was delivered to birth parents with appropriate intensity (i.e., about two sessions per week). To promote connection and avoid emotional distancing between children and parents, PMTO emphasized regular parent/child visits (i.e., at least one per week in addition to the PMTO family session). Finally, to address system level issues related to high caseloads and high worker turnover, PMTO was structured for small caseloads (4 families per practitioner in rural areas and 6 families per practitioner in urban areas) and practitioners were provided with regular clinical and group supervision.

The KIPP's program materials are available in a manual from the first author. Inquiries for additional PMTO materials should be directed to ISII.

Service as Usual. Participants randomized to the control group received services-as-usual in the foster care agencies. These services comprised case management delivered by staff with bachelor or master's degrees in a variety of fields and with varying levels of training. The state's foster care contracts required case managers to visit children and to arrange for at least one parent-child visit per week. Additional services and treatments offered to children and parents were not standardized in relation to intensity, modality, or format; rather, they would have been individualized to each family as determined by individual case managers, supervisors, court personnel, and other ancillary service providers. Data were not collected on case management services and/or referrals to other treatments.

Sample Size

The sample comprised 918 children enrolled in the study. The study's sample size was estimated based on a desired effect size of a 10% improvement in reunification rates for children with emotional and behavioral problems. Given this desired effect size, power analyses

indicated that the study required 277 cases per group, a total sample of 554, with $\alpha = .05$ and $\beta = .20$, and assuming a baseline reunification rate of 25% (Akin, Testa, et al., 2014).

Outcomes

Outcomes of interest to the overall project were articulated prospectively by a project logic model that comprised proximal (child, parent, and family) and distal (permanency and re-entry) outcomes (Akin, Bryson, Testa, et al., 2013). The present study reports the proximal (6-month) child outcomes.

Dependent variables. Below is a description of each of the three dependent variables used to measure child social-emotional well-being.

Social-emotional functioning. Social-emotional functioning was measured using the CAFAS (ages 6-16) and the PECFAS (ages 3-5) (Hodges & Wong, 1996; Hodges et al., 2004), a caseworker-administered assessment. This measure was also used to determine study eligibility, as described above. The CAFAS provides an overall functioning score and eight subscales (School, Home, Community, Behavior Toward Others, Moods/Emotions, Thinking Problems, Self-Harm, and Substance Use). The PECFAS has seven subscales, omitting the substance use subscale. The CAFAS and PECFAS include behaviorally oriented descriptions grouped into four levels of impairment: severe, moderate, mild, and minimal. Caseworkers considered the “severe” items first and, if any of these items described the child’s behavior, a score of 30 was assigned. If none of the “severe” items were endorsed, then the caseworker examined the “moderate” items and so forth until the child’s behavior matched the items in the section. Scores were assigned in increments of 10 where 0 = minimal functional impairment, 10 = mild functional impairment, 20 = moderate functional impairment, and 30 = severe functional impairment. The total score represented a sum of the subscales and an overall level of

functioning. As established in prior research, the CAFAS is a psychometrically sound measure with satisfactory internal consistency, interrater reliability, and test-retest reliability, as well as concurrent and predictive validity (Ezpeleta, Granero, Osa, Doménech, & Bonillo, 2006; Hodges, Doucette-Gates, & Kim, 2000; Hodges, Doucette-Gates, & Liao, 1999; Hodges & Gust, 1995; Hodges & Kim, 2000; Hodges & Wong, 1996; Manteuffel, Stephens, & Santiago, 2002; Walrath et al., 2001). An early study on the psychometric properties of the CAFAS reported Cronbach's alpha from .63 to .68 (Hodges & Wong, 1996). For this study, Cronbach's alpha estimates of internal reliability were .62 and .94 for Time 1 and Time 2 CAFAS/PECFAS, respectively.

Child problem behaviors and prosocial skills. The Social Skills Improvement System-Rating Scales (SSIS) (Gresham & Elliot, 1990) were used to assess child *problem behaviors* and *prosocial skills* by administering the parent version to parents. Data collection protocols required that the caregiver had had visits with the child within the last 60 days. The SSIS provides two scores. First, it measures *problem behaviors* with a total score based on five subscales: externalizing, bullying, hyperactivity/inattention, internalizing, and Autism Spectrum. Second, the SSIS measures *prosocial skills* with a total score that comprises seven subscales: communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. Parents were asked to report how often the child displayed the behavior on a 4-point scale (N = *never*, S = *seldom*, O = *often*, A = *almost always*). Higher problem behavior scores indicate more problem behaviors, while higher prosocial skills scores indicate stronger prosocial skills. The SSIS has acceptable psychometric properties, including: high internal consistency and moderately high validity indices for both problem behavior and prosocial skills scales. Studies on non-clinical child and youth samples have reported median subscale reliabilities in the mid

.80s for the Parent Form (Gresham, Elliott, Vance, & Cook, 2011). Estimates of internal reliability were also calculated for this study. Cronbach's alpha were .85 and .82 respectively for Time 1 and Time 2 Problem Behavior scales, and .91 and .89 for Time 1 and Time 2 Prosocial Skills scales.

Covariates. Covariates were selected based on review of the existing literature (Akin, 2011; Akin et al., 2012) and include child and parent demographic characteristics and placement information. These variables were collected from the state's administrative data which are reported semi-annually to the federally-required Adoption and Foster Care Reporting System (AFCARS).

Analytic Strategy

The effect of the intervention was assessed using intention-to-treat (ITT) analyses, whereby all participants randomized and allocated to the intervention group were compared to all participants randomized and allocated to the comparison group on the three social-emotional well-being outcome variables. ITT analysis requires that the baseline sample and the 6-month posttest sample are analyzed at both time points. Multiple imputation was used to account for non-consented cases ($n = 272$) and attrition, and is further described below. Analyses to test the intervention effect were modeled via repeated measures analysis of covariance (ANCOVA). The ANCOVA models were estimated with the R (R Core Team, 2014) and MPlus (Muthén & Muthén, 2012) software packages. In R, we used the "lm" function from the "stats" package to fit the ANCOVAs. In Mplus, the analyses were run without any add-on packages.

The modeling process proceeded by first estimating an unconditional ANCOVA model in which the Time 2 score was predicted by its Time 1 counterpart and the intervention condition flag. Second, we sought moderation in the autoregressive effect by including the interaction

between the Time 1 score and the intervention condition flag. After assessing the overall intervention effect, a series of follow-up, exploratory analyses were conducted to identify salient predictors of the social-emotional well-being outcomes using a forward stepwise regression procedure. This stepwise procedure built off of the moderated unconditional model when there was a significant interaction between the Time 1 score and the intervention flag; otherwise, the stepwise regression model built off of the simple unconditional ANCOVA fit in the first step of the analysis process. After isolating significant covariates via the stepwise regression process, the interactions between these significant covariates and the intervention condition flag were included to produce the final fully specified model. The social-emotional well-being outcomes were standardized before fitting the ANCOVA models, so the estimated intervention effects are interpretable on a Cohen's *d* metric (i.e., as standardized mean differences in units of standard deviations of the Time 2 outcomes), and the predictive effects in the conditional ANCOVA models are interpretable in units of the outcome's standard deviations. These standardized parameter estimates constitute effect sizes for the focal research questions.

Missing data. The results reported below model the first two waves of child outcomes data but use all three waves for imputation. All CAFAS scores were fully observed at Time 1 and approximately 33% were missing due to attrition at Time 2. For the SSIS scores, 30% were missing at Time 1 due to non-consenting cases and 50% were missing at Time 2 due to non-consenting cases combined with attrition. The missing data at Time 2 were multiply imputed using the principal component auxiliary variable technique developed by Howard, Rhemtulla, and Little (2015). This technique entailed summarizing the entirety of the KIPP data (i.e., all three waves of proximal outcome measures and baseline demographic and placement data) as well as all possible two-way interactions and squared and cubed polynomial terms via a set of

principal component scores and using these component scores as predictors in the multiple imputation model. The principal component auxiliary variable method was implemented using the R package *quark* (Lang, Chesnut, & Little, 2015). The multiple imputations were created using proportional odds logistic regression as the elementary imputation method for the CAFAS items and using Bayesian linear regression as the elementary imputation method for the SSIS items, because the raw CAFAS data were ordinal and the SSIS scales were approximately normal. One hundred imputations were created using 20 auxiliary principal components as predictors (10 component scores summarizing the untransformed data and 10 component scores summarizing the two-way interactions, squared polynomials, and cubic polynomials of the raw data). Convergence of the imputation models was checked by scrutinizing the trace plots of the means and standard deviations of the imputed CAFAS and SSIS variables over iterations of the imputation algorithm. The plausibility of the final imputation estimates was supported by plotting histograms and scatterplots of the imputed versus observed CAFAS and SSIS values. These checks indicated that all imputation models converged and produced sensible imputations.

Results

Participant Flow

Figure 1 presents the participant flow. In total, 6,657 children were assessed for SED and after accounting for ineligible children ($n = 5,005$), 1,652 met the study's eligibility requirements, and were randomized to the intervention ($n = 855$) or comparison ($n = 797$) condition. Of these randomized cases, 394 of the intervention group and 340 of the comparison group were not approached primarily due to the timing and location of service openings. That is, randomized cases were placed into a pool of cases from which the most recent case was selected for a particular service area when that area had a service opening. Some cases' eligibility

expired (i.e., extended past the 6-month eligibility period) as they waited for a service opening. Among the 461 intervention cases, 360 (78.1%) consented to the study, and among the 457 comparison cases, 304 (66.5%) consented to the study. Participants lost to follow-up were specific to the measure. For the CAFAS, 113 participants in the intervention group and 173 in the comparison group were lost to follow-up because researchers were unable to contact them after multiple attempts. For the SSIS, in addition to those that did not consent to primary data collection, the intervention group lost 56 participants because researchers were unable to contact them, 19 because the parent and child were no longer in contact, and 18 because the participants refused; and, the comparison group lost 82 participants because researchers were unable to contact them, 14 because the parent and child were no longer in contact, and 11 because the participants refused. Finally, using the post-randomized consent design and an ITT approach, the total analytic sample was 918 children.

Recruitment

Following usability testing (Akin et al., 2013) and a formative evaluation (Akin, Testa, et al., 2014), participant recruitment for this summative evaluation began September 1, 2012 and concluded September 30, 2014. All six-month post-test data collection was completed by early June 2015.

Intervention Fidelity

Several core components of intervention fidelity were measured including adherence to the PMTO model, low caseloads, early intervention, treatment completion, service duration and intensity, in-home services, and parent-child contacts. Following are summary findings for each component.

Adherence to PMTO. This study's intervention group families ($n = 352$ families consented to intervention) were served by 46 practitioners, 16 of whom were certified PMTO therapists by the end of the study period. Based on the last available fidelity rating in the present study, average fidelity scores were 6.1 ($SD = 1.3$) for non-certified practitioners and 6.6 ($SD = 1.1$) for certified practitioners.

Early intervention and low caseloads. On average, families in the intervention group were enrolled in the study to receive PMTO within 54 days ($SD = 102$) of the child entering foster care. Practitioners' caseloads were monitored bi-monthly throughout the study period, were typically an average of 4 cases per practitioner, and never exceeded 6 cases per practitioner.

Treatment completion, service duration and intensity, and in-home services. Among the families that consented to receive the intervention, 73% (256 of 352) completed the PMTO curriculum within 6 months. The median number of sessions for intervention completers was 40 PMTO sessions (interquartile range = 33-51 sessions) over a median 24 weeks (interquartile range = 22-26 weeks); the vast majority of sessions occurred in-home ($Mdn = 95%$, interquartile range = 75-100%). In comparison, the median number of sessions for intervention non-completers was 9 PMTO sessions (interquartile range = 2-18 sessions) for a median 11 weeks (interquartile range = 7-17 sessions) and with most sessions delivered in-home ($Mdn = 90%$, interquartile range = 50-100%). Six families were retained for six months but did not complete the PMTO curriculum. Additional analyses for reasons that non-completers dropped out of PMTO was described by Akin and Gomi (Akin & Gomi, in press).

Randomization

To check the initial randomization, approached children ($N = 918$) were compared to non-approached children ($n = 734$) on fifteen baseline demographic and case characteristics, and

children's social-emotional functioning (CAFAS scores). These two groups of children were similar on all but two variables. First, children who were not White were more likely to be approached (65%) than children who were White (55%) ($\chi^2 = 7.08, df = 1, p = .008$). While this association was statistically significant, the effect size was very small (Cramer's $V = .07$). Furthermore, the higher proportion of non-White children in the approached group is likely due to the fact that the PMTO practitioners' caseloads were larger in urban areas where the foster care population is disproportionately Black. The second statistically significant variable was child's age ($F = 4.21, df = 1, p = .04$). Children in the approached group were younger ($M = 11.44$ years, $SD = 4.1$ years) than children in the non-approached group ($M = 11.86$ years, $SD = 4.0$ years). Like the other association, the effect size for the mean difference in child age was very small (Cohen's $d = -.12$).

Comparability

Table 1 presents the baseline data for the intervention ($n = 461$) and comparison groups ($n = 457$) on sixteen baseline variables, all of which were available in the child welfare administrative dataset and none of which were missing data. The two study groups were similar on all variables. Additionally, children in the intervention and comparison groups were clinically similar with regards to children's social-emotional functioning as measured by the CAFAS. The CAFAS was available at baseline without any missing data and the intervention ($M = 84.2, SD = 41.2$) and comparison groups ($M = 87.5, SD = 40.7$) did not differ on social-emotional functioning ($F(1,916) = 1.45, p = .23$).

Attrition

To analyze patterns of selective attrition, retained families were compared to families lost to follow-up on demographics, case characteristics, and baseline social-emotional functioning

scores (CAFAS), which had no missing data at baseline. First, analyses of demographic and case characteristics showed three of sixteen variables were associated with loss to follow-up on the CAFAS and loss to follow-up on the SSIS: (1) single mother families, (2) child age at first foster care episode, and (3) caregiver age at first foster care episode. Single mothers were more likely to have a 6-month follow-up CAFAS ($\chi^2(1, N = 918) = 4.72, p < .03$) and SSIS ($\chi^2(1, N = 918) = 4.98, p < .03$). Younger age of the child and younger age of the caregiver were associated with higher rates of follow-up on the CAFAS (child age, $F(1,917) = 16.65, p < .001$; caregiver age, $F(1,917) = 9.79, p = .002$) and the SSIS (child age, $F(1,917) = 19.85, p < .001$; caregiver age, $F(1,917) = 5.90, p = .02$). In addition, children with a diagnosed disability had lower follow up rates on the CAFAS ($\chi^2(1, N = 918) = 4.72, p < .03$) and Latino children had lower follow up rates on the SSIS ($\chi^2(1, N = 918) = 9.13, p < .01$). With regards to baseline social-emotional functioning scores, children retained in the study ($M = 84.6, SD = 40.3$) did not differ significantly from those lost to follow-up ($M = 88.6, SD = 42.5$) on the CAFAS ($F(1,916) = 1.83, p = .18$). Likewise, children retained in the study ($M = 84.9, SD = 40.5$) were not different than those lost to follow-up ($M = 86.8, SD = 41.6$) on the SSIS ($F(1,916) = .51, p = .48$).

Attrition was further examined by comparing the attrition rates for the intervention and comparison groups. Table 2 shows that differential attrition was identified between the intervention (completed = 75.5%) and comparison (completed = 62.1%) groups on the CAFAS ($\chi^2(1, N = 918) = 19.05, p < .001$) and the SSIS (intervention completed 57.9%, comparison completed 43.1%; $\chi^2(1, N = 918) = 20.14, p < .001$). These differential attrition rates suggest a missing at random (MAR) mechanism for the attrition (i.e., the propensity to drop out depends on measured characteristics of the families; Enders, 2010). When data are MAR, simple missing data treatments such as listwise deletion, pairwise deletion, or last observation carried forward,

will bias estimates of the intervention effect (Little & Rubin, 2014). Modern, principled missing data treatments, like the multiple imputation method used in this study, must be employed to avoid biased inferences with MAR nonresponse (Rubin, 1987). Our approach to multiple imputation adjusted for the statistically significant associations identified in the attrition analyses.

Intervention Effects

The effects of the intervention (PMTO vs. usual care) were examined using ANCOVA according to the ITT. Means and standard deviations for study outcome variables are presented in Table 2 and ANCOVA results are presented for social-emotional functioning, problem behaviors, and prosocial skills in Tables, 4, 5, and 6, respectively.

Social-emotional functioning. The unconditional ANCOVA model indicates a significant intervention effect on social-emotional functioning (Wald $\chi^2 = -4.867, p = .001$) with a small effect (Cohen's $d = .31$, 95% CIs [.19, .44]). Participants in the intervention group improved social-emotional functioning while controlling for baseline functioning. The moderated unconditional ANCOVA further suggests that there is a significant difference in the strengths of the autoregressive effects between the intervention and comparison groups such that the change in social-emotional functioning between Times 1 and 2 was 0.149 standard deviations larger for the intervention group than it was for the comparison group (Wald $\chi^2 = 2.312, p = .021$). Using the unconditional moderated ANCOVA as the baseline model, important covariates were introduced via forward stepwise regression. This model indicated that two covariates were significant. Younger caregivers at the first removal (Wald $\chi^2 = 2.811, p = .005$) and lower placement rates (Wald $\chi^2 = 2.407, p = .016$) were both associated with improved Time 2 functioning, controlling for baseline functioning levels. Finally, the interactions between the

covariates selected via stepwise regression and the intervention condition were included in a moderated conditional ANCOVA. This analysis indicated that none of the covariate effects were significantly moderated by the intervention condition.

Child problem behaviors. A second intervention effect was observed with the unconditional ANCOVA model for child problem behaviors (Wald $\chi^2 = -2.410, p = .016$), demonstrating a significant and small effect (Cohen's $d = .09$, 95% CIs [.02, .15]). As compared to participants in the comparison group, those in the intervention group significantly reduced problem behaviors while controlling for baseline problem behaviors. The moderated unconditional ANCOVA showed that there was not a significant difference in the strengths of the autoregressive effects between the intervention and comparison groups (Wald $\chi^2 = 1.543, p = .123$). Next, covariates were observed with forward stepwise regression. This conditional ANCOVA model identified five significant covariates. Significant reduction in problem behaviors was predicted by older caregiver age (Wald $\chi^2 = -2.158, p = .031$), being White (Wald $\chi^2 = -2.099, p = .036$), being non-Latino (Wald $\chi^2 = 2.362, p = .018$), having fewer placements (Wald $\chi^2 = 2.498, p = .012$), and not having prior foster care removals (Wald $\chi^2 = 3.446, p = .001$). Finally, tests of the interactions between the covariates selected via stepwise regression and the intervention condition were examined in a moderated conditional ANCOVA. This analysis revealed that one of the covariate effects was significantly moderated by the intervention condition. Participants with prior foster care removals were less likely to improve (reduce) their problem behaviors (Wald $\chi^2 = 2.340, p = .019$).

Child prosocial skills. The unconditional ANCOVA model that tested an intervention effect on prosocial skills indicated a significant and small effect (Wald $\chi^2 = -2.394, p = .017$; Cohen's $d = .09$, 95% CIs [.03, .16]). Intervention group participants were more likely to significantly

increase their prosocial skills when compared to the comparison group, while controlling for baseline prosocial skills. The moderated unconditional ANCOVA observed no significant difference in the strengths of the autoregressive effects between the intervention and comparison groups (Wald $\chi^2 = 0.739, p < .460$). Next, the conditional ANCOVA model introduced covariates via forward stepwise regression and found three significant covariates. Significant increases in prosocial skills were predicted by younger caregiver age (Wald $\chi^2 = -3.355, p = .001$), being white (Wald $\chi^2 = 3.071, p = .002$), and not having prior foster care removals (Wald $\chi^2 = -3.562, p < .001$). Lastly, the moderated conditional ANCOVA model added interactions between the covariates selected via stepwise regression and the intervention condition. This analysis showed that one of the covariate effects was significantly moderated by the intervention condition. Participants with prior foster care removals were less likely to improve (increase) their prosocial skills (Wald $\chi^2 = -2.544, p = .024$).

Discussion and Applications to Practice

This study was a randomized controlled trial of in-home PMTO versus usual care among a sample of families of children in foster care with SED. The ITT results showed significant and positive effects on three child well-being measures at post-test. Foster care case managers assessed children who had received PMTO to have increased their social-emotional functioning, and parents who received PMTO reported improvements in their children's problem behaviors and prosocial skills. While these findings would be the hypothesized outcome of a parent training intervention, they are novel because, to our knowledge, no existing studies have examined in-home parent training interventions that were delivered to biological families of children and adolescents in foster care. In fact, among the randomized studies identified in our review of parent training interventions delivered to families involved in child welfare, none

included children over the age 12 (Bernard et al., 2012; Chaffin et al., 2011; Chaffin et al., 2004; Chamberlain et al., 2008; DeGarmo et al., 2013; Dozier et al., 2008; Linares et al., 2006; Oxford et al., 2016; Price et al., 2008; Price et al., 2015). Additionally, other studies of parent training interventions with child welfare populations have seen child behavior problems change in the direction expected but have failed to demonstrate main effects of the intervention on child problem behaviors at post-test (DeGarmo et al., 2013; Linares et al., 2006; Oxford et al., 2016).

Regarding effect size, we observed very small to small effects (ranging from .09 to .31) according to Cohen's (Cohen, 1988) conventions for interpreting effect sizes. Among the three social-emotional well-being outcomes, the largest effect size was observed for social-emotional functioning, which may be important because it represents case managers' observations of children and youth, rather than parents' observations. That the largest effect size was on an indicator observed by non-parents may be consistent with prior research reporting abusive parents perceive their children's externalizing behaviors more negatively than other raters (e.g., Lau, Valeri, McCarty, & Weisz, 2006). Measures on which parents report their perceptions of frequency of child behaviors (e.g., never, seldom, often, almost always) may be relative to parents' individual experiences or subject to negative attribution. In contrast, the measure for social-emotional functioning (CAFAS) was based on compilation of information from multiple sources and largely anchored in concrete observable behaviors or consequences of problematic behavior (e.g., suspension or expulsion from school; truancy; involvement with legal system; ran away; cruel to animals; psychiatric hospitalization; placement instability; threatened to harm others).

While the effect size for social-emotional functioning may be characterized as small, the effect sizes observed on the other two outcomes were very small. Explanations for the very

small effect sizes on problem behaviors and prosocial skills are unknown. Similar studies have failed to detect differences, possibly due to small sample sizes. In fact, none of the randomized studies cited above comprised samples larger than 150 participants. Another possible reason for small effect sizes could be attributed to the nature of the emotional and behavioral health problems experienced by this target population of children in foster care. That is, this project was designed to target children and families with the most serious barriers to permanency (Akin et al., 2012), particularly children and adolescents who were viewed as having mental health problems that hinder efforts toward permanency. Affecting change in these children's behaviors may come in difficult-to-observe incremental steps that are detected as very small effects. Similarly, given abusive parents' perceptions of their children's problem behaviors, shifting their attitudes may also occur with the slightest of changes over time. Yet, another consideration is that the children in this study were living in foster care and not with their parents. Thus, the parent-child dyad had relatively limited opportunities for using newly learned skills. Future research is needed to understand whether these effects become larger once the parent and child are living together.

Beyond the significant main effects summarized above, our findings also revealed predictors of child well-being outcomes. Significant predictors included: (a) for higher social-emotional functioning: younger caregiver age and placement stability; (b) for fewer problem behaviors: older caregiver age, being White, being non-Latino, placement stability, and no prior foster care removals, and; (c) for more prosocial skills: younger caregiver age, being White, and no prior foster care removals. Additionally, the moderation analyses showed that prior removals from foster care negatively influenced the intervention effect such that the subgroup of children receiving PMTO, and who also had prior foster care removals, did not experience the

improvements in problem behaviors or prosocial skills that were observed among their peers receiving PMTO without prior removals.

Overall, our findings on caregiver age, race, and ethnicity are inconsistent across the three social-emotional well-being outcomes, and placing them in context of prior studies is limited by the lack of comparable analyses in the existing literature. However, our findings on placement stability and prior removals are consistent with at least two other related studies. First, in DeGarmo and colleagues' (2013) study of parent training delivered to biological families and their recently reunified children, results showed placement instability moderated child problem behaviors. As in the current study, a greater number of placements was associated with increases in problem behaviors. Second, Chaffin and colleagues' (2011) study of parent training delivered to child welfare involved biological families and their children, most of whom were in foster care, did not report on child behavior outcomes; however, their study indicated that prior removals predicted a shorter time to child welfare recidivism (screened-in child maltreatment reports). Each prior removal was associated with a 7% increase in recidivism. Taken together, these findings suggest that instability in foster care and a history of foster care stays may diminish the desired positive effects of parent training. To improve child social-emotional well-being, additional strategies may be required for this subgroup of children.

This study's limitations should be considered. First, generalizability of the study's results should take into account that PMTO and services-as-usual were delivered in privatized foster care system where the public child welfare agency contracts with private community-based agencies. Approximately 9 months into the 24-month summative evaluation period, the state child welfare agency rebid foster care contracts and shifted from four to two community-based agencies. Thus, for the majority of the summative period, two community-based agencies,

multiple offices across the state, employed hundreds of case managers to deliver usual foster care services and 43 Master's level clinicians to deliver PMTO. The effect of these organizational arrangements on generalizability is unknown.

A second issue related to generalizability is the study's design. A post-randomized consent design (Zelen, 1990) was used because of its advantages for enhancing generalizability. However, this design may be criticized for diluting treatment effects by including participants who did not express interest in participating in the study and, thereby, exaggerating attrition rates (Fan, 2015). The study's attrition was sizable; yet, it was managed by treating the data with appropriate and modern statistical techniques. Additionally, we view the attrition as a direct and accurate reflection of the study population and context. Our explicit reporting of attrition, which is a limitation in numerous other intervention studies (Fraser et al., 2013), is a strength of the present study and informs future research in foster care settings. In all, this study's methods illustrate the use of rigorous evaluation in real-world community based settings of child welfare and is likely to closely resemble the target population and child welfare context.

Third, although the study's sample is estimated to be an adequate size, it reflects greater variation than prior studies of parent training. Specifically, this study's sample comprised a wide age range of children and parents; varying geographic areas of both rural and urban communities; diverse child-caregiver relationships (i.e., mother, father, stepparent, etc.) and family structures; and, no study eligibility criteria for specific mental health diagnoses or conditions (e.g., conduct disorder, antisocial behaviors, externalizing, etc.). As a strength, random assignment of the sample should closely mirror the foster care population of children with mental health problems; however, greater variance in the sample may detract from the intervention's effectiveness if these characteristics are relevant to intervention effects.

A fourth limitation pertains to the study's data collection procedures. The study is strengthened by measuring social-emotional well-being from the viewpoint of parents and case managers. Still, possible limitations in data collection include the lack of blinding of researchers, parents, and foster care case managers. Logistical barriers made blinding impractical for this setting. For instance, given their responsibilities in court and case planning, it was not possible for case managers to be unaware of the treatments received by parents and children.

Fifth, while this study included a number of covariates and analyses to test for moderation effects, we may have omitted other important variables. That is, there could be important differences on unobserved characteristics that have not been included in this study's measures (e.g., parent-child attachment, readiness for change).

Finally, this study, like many studies in foster care settings, was constrained in controlling the services and supports that could be received by children and parents. Despite our inability to fully account for the numerous other treatments and supports that may have been received by these children and families, we have no reason to believe that they would have been distributed differentially across the study conditions. Indeed, one objective of this study was to learn whether a family-focused parenting intervention would be effective in a foster care setting regardless of the mental health treatments provided to children and youth. Thus, the study's intervention did not include child- or youth-specific components beyond those provided in usual foster care services (e.g., referral to mental health treatment by a community provider).

In summary, the PMTO intervention demonstrated evidence of effectiveness in improving child social-emotional well-being among a population of children and youth in foster care with serious emotional and behavioral problems. This study contributes to the child welfare evidence

base by conducting an effectiveness trial of an existing intervention, independent of the intervention developer. These results extend the evidence for parenting interventions to this unique setting and new subpopulation. In line with the study's aims to build knowledge that is most applicable to real world child welfare settings and find effective interventions for children who face the most serious barriers to achieving positive child welfare outcomes, it, unlike many other existing studies, included the most vulnerable and challenging-to-serve families.

Moreover, this study addressed a major gap in the existing evidence base by investigating a parenting intervention with biological parents of children in foster care. In all, the study findings suggest that parenting interventions can have a modest but positive effect on children's well-being even while the children are not living with their parents and are living in foster care.

Further research is needed to replicate these findings and test whether the intervention affects longer term outcomes.

References

- Adamson, J., Cockayne, S., Puffer, S., & Torgerson, D. J. (2006). Review of randomised trials using the post-randomised consent (Zelen's) design. *Contemporary Clinical Trials, 27*(4), 305-319.
- Akin, B. A. (2011). Predictors of foster care exits to permanency: A competing risks analysis of reunification, guardianship, and adoption. *Children and Youth Services Review, 33*(6), 999-1011. doi:10.1016/j.chilyouth.2011.01.008
- Akin, B. A., Bryson, S., McDonald, T. P., & Wilson, C. (2013). *A Case Example of the ACYF's Well-Being Framework: The Kansas Intensive Permanency Project (KIPP)*. Washington, DC: U.S. Department of Health and Human Services, Administration for Children Youth and Families, Children's Bureau
- Akin, B. A., Bryson, S. A., McDonald, T. P., & Walker, S. (2012). Defining a target population at high risk of long-term foster care: Barriers to permanency for families of children with serious emotional disturbances. *Child Welfare, 91*(6), 79-101.
- Akin, B. A., Bryson, S. A., Testa, M. F., Blase, K. A., McDonald, T. P., & Melz, H. (2013). Usability testing, initial implementation, and formative evaluation of an evidence-based intervention: Lessons from a demonstration project to reduce long-term foster care. *Evaluation and Program Planning, 41*(0), 19-30.
doi:<http://dx.doi.org/10.1016/j.evalprogplan.2013.06.003>
- Akin, B. A., & Gomi, S. (in press). Non-completion of evidence-based parent training: An empirical examination among families of children in foster care. *Journal of Social Service Research*.

Akin, B. A., Mariscal, S. E., Bass, L., McArthur, V. B., Bhattarai, J., & Bruns, K. (2014).

Implementation of an evidence-based intervention to reduce long-term foster care: Practitioner perceptions of key challenges and supports. *Children and Youth Services Review, 46*(0), 285-293. doi:<http://dx.doi.org/10.1016/j.chilyouth.2014.09.006>

Akin, B. A., Testa, M. F., McDonald, T. P., Melz, H., Blase, K. A., & Barclay, A. (2014).

Formative evaluation of an evidence-based intervention to reduce long-term foster care: Assessing readiness for summative evaluation. *Journal of Public Child Welfare, 1*-29. doi:10.1080/15548732.2014.939250

Bank, L., Marlowe, J. H., Reid, J. B., Patterson, G. R., & Weinrott, M. R. (1991). A comparative evaluation of parent-training interventions for families of chronic delinquents. *Journal of Abnormal Child Psychology, 19*(1), 15-33.

Barth, R. P. (2009). Preventing child abuse and neglect with parent training: Evidence and opportunities. *Future of Children, 19*(2), 95-118.

Barth, R. P., Lloyd, E. C., Green, R. L., James, S., Leslie, L. K., & Landsverk, J. (2007).

Predictors of placement moves among children with and without emotional and behavioral disorders. *Journal of Emotional and Behavioral Disorders, 15*(1), 46-55.

Bernard, K., Dozier, M., Bick, J., Lewis-Morrarty, E., Lindhiem, O., & Carlson, E. (2012).

Enhancing attachment organization among maltreated children: Results of a randomized clinical trial. *Child development, 83*(2), 623-636. doi:10.1111/j.1467-8624.2011.01712.x

Biglan, A. (2014). *A Comprehensive Framework for Nurturing the Well-being of Children and Adolescents*. Washington, DC: U.S. Department of Health and Human Services, Administration for Children Youth and Families, Children's Bureau Retrieved from http://www.acf.hhs.gov/sites/default/files/cb/wp1_comprehensive_framework.pdf

- Biglan, A., Flay, B. R., Embry, D. D., & Sandler, I. N. (2012). The critical role of nurturing environments for promoting human well-being. *American Psychologist, 67*(4), 257-271.
- Bjørknes, R., Kjøbli, J., Manger, T., & Jakobsen, R. (2012). Parent training among ethnic minorities: Parenting practices as mediators of change in child conduct problems. *Family Relations, 61*(1), 101-114.
- Bryson, S. A., Akin, B. A., Blase, K. A., McDonald, T. P., & Walker, S. (2014). Selecting an EBP to reduce long-term foster care: Lessons from a university–child welfare agency partnership. *Journal of Evidence-Based Social Work, 11*(1-2), 208-221.
doi:10.1080/15433714.2013.850325
- Burns, B. J., Phillips, S. D., Wagner, H. R., Barth, R. P., Kolko, D. J., Campbell, Y., & Landsverk, J. (2004). Mental health need and access to mental health services by youths involved with child welfare: A national survey. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*, 960.
- California Evidence-Based Clearinghouse for Child Welfare. (2015). Parent Management Training Oregon Model. Retrieved from <http://www.cebc4cw.org/program/the-oregon-model-parent-management-training-pmto/>
- Chaffin, M., Funderburk, B., Bard, D., Valle, L. A., & Gurwitch, R. (2011). A combined motivation and parent-child interaction therapy package reduces child welfare recidivism in a randomized dismantling field trial. *Journal of Consulting and Clinical Psychology, 79*(1), 84-95. doi:10.7037/a0021227
- Chaffin, M., Silovsky, J. F., Funderburk, B., Valle, L. A., Brestan, E. V., Balachova, T., . . . Bonner, B. (2004). Parent-Child Interaction Therapy with physically abusive parents:

- Efficacy for reducing future abuse reports. *Journal of Consulting and Clinical Psychology*, 72(3), 500-510. doi:10.1037/0022-006X.72.3.500
- Chamberlain, P., Price, J. M., Leve, L. D., Laurent, H., Landsverk, J. A., & Reid, J. B. (2008). Prevention of behavior problems for children in foster care: Outcomes and mediation effects. *Prevention Science*, 9(1), 17-27. doi:10.1007/s11121-007-0080-7
- Chamberlain, P., & Reid, J. B. (1991). Using a specialized foster care community treatment model for children and adolescents leaving the state mental hospital. *Journal of Community Psychology*, 19(3), 266-276.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed. ed.). Hillsdale, NJ:: Lawrence Erlbaum Associates.
- DeGarmo, D. S., Patterson, G. R., & Forgatch, M. S. (2004). How do outcomes in a specified parent training intervention maintain or wane over time? *Prevention Science*, 5(2), 73-89.
- DeGarmo, D. S., Reid, J. B., Fetrow, B. A., Fisher, P. A., & Antoine, K. D. (2013). Preventing child behavior problems and substance use: The pathways home foster care reunification intervention. *Journal of child & adolescent substance abuse*, 22(5), 388-406.
- Dozier, M., Peloso, E., Lewis, E., Laurenceau, J.-P., & Levine, S. (2008). Effects of an attachment-based intervention on the cortisol production of infants and toddlers in foster care. *Development and Psychopathology*, 20(3), 845-859.
doi:10.1017/S0954579408000400
- Enders, C. K. (2010). *Applied Missing Data Analysis*. New York: The Guilford Press.
- Ezpeleta, L., Granero, R., Osa, N. d. l., Doménech, J. M., & Bonillo, A. (2006). Assessment of functional impairment in Spanish children. *Applied Psychology*, 55(1), 130-143.

- Fan, A. Y. (2015). The methodology flaws in Hinman's acupuncture clinical trial, Part II: Zelen design and effectiveness dilutions. *Journal of Integrative Medicine, 13*(3), 136-139.
- Fixsen, D. L., Blase, K. A., Naoom, S. F., & Wallace, F. (2009). Core implementation components. *Research on Social Work Practice, 19*(5), 531-540.
- Forgatch, M. S., & DeGarmo, D. S. (1999). Parenting through change: An effective prevention program for single mothers. *Journal of Consulting and Clinical Psychology, 67*, 711-724.
- Forgatch, M. S., DeGarmo, D. S., & Beldavs, Z. G. (2005). An efficacious theory-based intervention for stepfamilies. *Behavior Therapy, 36*(4), 357-365.
- Forgatch, M. S., & Domenech Rodríguez, M. M. (2016). Interrupting Coercion: The Iterative Loops Among Theory, Science, and Practice. In T. J. Dishion & J. J. Snyder (Eds.), *The Oxford Handbook of Coercive Relationship Dynamics* (pp. 194). New York, NY: Oxford University Press.
- Forgatch, M. S., & Patterson, G. R. (2010). Parent Management Training—Oregon Model: An intervention for antisocial behavior in children and adolescents. In J. R. Weisz & A. E. Kazdin (Eds.), *Evidence-based psychotherapies for children and adolescents* (Vol. 2, pp. 159-178). New York, NY: Guilford Press.
- Forgatch, M. S., Patterson, G. R., DeGarmo, D. S., & Beldavs, Z. G. (2009). Testing the Oregon delinquency model with nine-year follow-up of the Oregon Divorce Study. *Development and Psychopathology, 21*(2), 637-660.
- Fraser, J. G., Lloyd, S., Murphy, R., Crowson, M., Zolotor, A. J., Coker-Schwimmer, E., & Viswanathan, M. (2013). A comparative effectiveness review of parenting and trauma-focused interventions for children exposed to child maltreatment. *Journal of*

Developmental and Behavioral Pediatrics, 34(5), 353-368.

doi:10.1097/DBP.0b013e31828a7dfc

Gresham, F. M., & Elliot, S. (1990). Social skills rating scale. *Circle Pines, MN: American Guidance Service*.

Gresham, F. M., Elliott, S. N., Vance, M. J., & Cook, C. R. (2011). Comparability of the Social Skills Rating System to the Social Skills Improvement System: Content and psychometric comparisons across elementary and secondary age levels. *School Psychology Quarterly*, 26(1), 27-44. doi:<http://dx.doi.org/10.1037/a0022662>

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap) - A meta data-driven methodology and workflow process for providing translated research informatics support. *Journal of Biomedical Informatics*, 42(2), 377-381.

Hinman, R. S., McCrory, P., Pirotta, M., Relf, I., Forbes, A., Crossley, K. M., . . . Metcalf, B. R. (2014). Acupuncture for chronic knee pain: a randomized clinical trial. *JAMA*, 312(13), 1313-1322.

Hodges, K., Doucette-Gates, A., & Kim, C.-S. (2000). Predicting service utilization with the Child and Adolescent Functional Assessment Scale in a sample of youths with serious emotional disturbance served by center for mental health services-funded demonstrations. *The Journal of Behavioral Health Services & Research*, 27(1), 47-59.

Hodges, K., Doucette-Gates, A., & Liao, Q. (1999). The relationship between the Child and Adolescent Functional Assessment Scale (CAFAS) and indicators of functioning. *Journal of Child and Family Studies*, 8(1), 109-122.

- Hodges, K., & Gust, J. (1995). Measures of impairment for children and adolescents. *The Journal of Mental Health Administration*, 22(4), 403-413.
- Hodges, K., & Kim, C.-S. (2000). Psychometric study of the Child and Adolescent Functional Assessment Scale: Prediction of contact with the law and poor school attendance. *Journal of Abnormal Child Psychology*, 28(3), 287-297.
- Hodges, K., & Wong, M. M. (1996). Psychometric characteristics of a multidimensional measure to assess impairment: The Child and Adolescent Functional Assessment Scale. *Journal of Child and Family Studies*, 5(4), 445-467.
- Hodges, K., Xue, Y., & Wotring, J. (2004). Use of the CAFAS to evaluate outcome for youths with severe emotional disturbance served by public mental health. *Journal of Child and Family Studies*, 13(3), 325-339.
- Horwitz, S. M., Chamberlain, P., Landsverk, J., & Mullican, C. (2010). Improving the mental health of children in child welfare through the implementation of evidence-based parenting interventions. *Administration and Policy in Mental Health*, 37, 27-39.
- Howard, W. J., Rhemtulla, M., & Little, T. D. (2015). Using Principal Components as Auxiliary Variables in Missing Data Estimation. *Multivariate Behavioral Research*, 50(3), 285-299. doi:10.1080/00273171.2014.999267
- Hurlburt, M. S., Chamberlain, P., DeGarmo, D. S., Zhang, J., & Price, J. M. (2010). Advancing prediction of foster placement disruption using Brief Behavioral Screening. *Child Abuse & Neglect*, 34(12), 917-926.
- Hurlburt, M. S., Nguyen, K., Reid, J., Webster-Stratton, C., & Zhang, J. (2013). Efficacy of the Incredible Years group parent program with families in Head Start who self-reported a

- history of child maltreatment. *Child Abuse & Neglect*, 37(8), 531-543.
doi:<http://dx.doi.org/10.1016/j.chiabu.2012.10.008>
- Jones, A. S., LaLiberte, T., & Piescher, K. N. (2015). Defining and strengthening child well-being in child protection. *Children and Youth Services Review*, 54, 57-70.
doi:<http://dx.doi.org/10.1016/j.childyouth.2015.05.001>
- Landsverk, J. A., Burns, B. J., Stambaugh, L. F., & Reutz, J. A. R. (2009). Psychosocial interventions for children and adolescents in foster care: Review of research literature. *Child Welfare*, 88(1), 49-69.
- Lang, K. M., Chesnut, S., & Little, T. D. (2015). Quark: An R package for automatically extracting auxiliary variables from large data sets (R package version 0.5.4). In.
- Lau, A. S., Valeri, S. M., McCarty, C. A., & Weisz, J. R. (2006). Abusive parents' reports of child behavior problems: Relationship to observed parent-child interactions. *Child Abuse & Neglect*, 30(6), 639-655. doi:<http://dx.doi.org/10.1016/j.chiabu.2005.11.009>
- Leathers, S. J. (2006). Placement disruption and negative placement outcomes among adolescents in long-term foster care: The role of behavior problems. *Child Abuse & Neglect*, 30(3), 307-324.
- Leslie, L. K., Hurlburt, M. S., Landsverk, J., Barth, R. P., & Slymen, D. J. (2004). Outpatient mental health services for children in foster care: A national perspective. *Child Abuse & Neglect*, 28(6), 697-712. doi:<http://dx.doi.org/10.1016/j.chiabu.2004.01.004>
- Leve, L. D., Harold, G. T., Chamberlain, P., Landsverk, J. A., Fisher, P. A., & Vostanis, P. (2012). Practitioner review: Children in foster care - vulnerabilities and evidence-based interventions that promote resilience processes. *Journal of Child Psychology and Psychiatry*, 53(2), 1197-1211.

- Linares, L. O., Montalto, D., Li, M., & Oza, V. S. (2006). A promising parenting intervention in foster care. *Journal of Consulting and Clinical Psychology, 74*(1), 32-41.
doi:<http://dx.doi.org/10.1037/0022-006X.74.1.32>
- Little, R. J., & Rubin, D. B. (2014). *Statistical Analysis with Missing Data*. Hoboken, NJ: John Wiley & Sons.
- Manteuffel, B., Stephens, R. L., & Santiago, R. (2002). Overview of the national evaluation of the comprehensive community mental health services for children and their families program and summary of current findings. *Children's Services: Social Policy, Research, and Practice, 5*(1), 3-20.
- Mason, S. E. (2012). Child well-being as a federal priority in child welfare. *Families in Society, 93*, 155-156.
- Mersky, J. P., Topitzes, J., Grant-Savelle, S. D., Brondino, M. J., & McNeil, C. B. (2016). Adapting Parent–Child Interaction Therapy to foster care: Outcomes from a randomized trial. *Research on Social Work Practice, 26*(2), 157-167. doi:10.1177/1049731514543023
- Muthén, L. K., & Muthén, B. O. (2012). *Mplus User's Guide* (7th ed.). Los Angeles, CA: Author.
- Ogden, T., & Hagen, K. A. (2008). Treatment effectiveness of Parent Management Training in Norway: a randomized controlled trial of children with conduct problems. *Journal of Consulting and Clinical Psychology, 76*(4), 607-621.
- Oxford, M. L., Marcenko, M., Fleming, C. B., Lohr, M. J., & Spieker, S. J. (2016). Promoting birth parents' relationships with their toddlers upon reunification: Results from Promoting First Relationships® home visiting program. *Children and Youth Services Review, 61*, 109-116. doi:<http://dx.doi.org/10.1016/j.chilyouth.2015.12.004>

Park, J. M., & Ryan, J. P. (2009). Placement and permanency outcomes for children in out of home care by prior inpatient mental health treatment. *Research on Social Work Practice, 19*(1), 42-51.

Patterson, G. R. (1982). *A Social Learning Approach: Coercive Family Process*. Eugene, OR: Castalia Publishing Company.

Patterson, G. R., Forgatch, M. S., & DeGarmo, D. S. (2010). Cascading effects following intervention. *Development and Psychopathology, 22*(04), 949-970.

Pecora, P. J., Jensen, P. S., Romanelli, L. H., Jackson, L. J., & Ortiz, A. (2009). Mental Health Services for Children Placed in Foster Care: An Overview of Current Challenges. *Child Welfare, 88*(1), 5-26.

Permanency Innovations Initiative Training and Technical Assistance Project (PII-TTAP), & Permanency Innovations Initiative Evaluation Team (PII-ET). (2013). *The PII Approach: Building Implementation and Evaluation Capacity in Child Welfare*. Washington, DC: U.S. Department of Health and Human Services; Administration for Children and Families, Children's Bureau & Office of Planning, Research and Evaluation. Retrieved from http://www.acf.hhs.gov/sites/default/files/cb/implementation_and_evaluation_capacity.pdf

Price, J. M., Chamberlain, P., Landsverk, J., Reid, J. B., Leve, L. D., & Laurent, H. (2008). Effects of a foster parent training intervention on placement changes of children in foster care. *Child Maltreatment, 13*(1), 64-75.

Price, J. M., Roesch, S., Walsh, N. E., & Landsverk, J. (2015). Effects of the KEEP foster parent intervention on child and sibling behavior problems and parental stress during a

- randomized implementation trial. *Prevention Science*, 16(5), 685-695.
doi:10.1007/s11121-014-0532-9
- R Core Team. (2014). *R: A language and environment for statistical computing [Computer software]*. Vienna, Austria: R Foundation for Statistical Computing.
- Romanelli, L. H., Landsverk, J., Levitt, J. M., Leslie, L. K., Hurley, M. M., Bellonci, C., . . . Jensen, P. S. (2009). Best Practices for Mental Health in Child Welfare: Screening, Assessment, and Treatment Guidelines. *Child Welfare*, 88(1), 163-188.
- Rubin, D. B. (1987). *Multiple Imputation for Nonresponse in Surveys*. New York: John Wiley & Sons.
- Rubin, D. M., O'Reilly, A. L. R., Luan, X., & Localio, A. R. (2007). The impact of placement stability on behavioral well-being for children in foster care. *Pediatrics*, 119(2), 336-344.
- Samuels, B. H. (2011). Introduction: Addressing trauma to promote social and emotional well-being: A child welfare imperative. *Child Welfare*, 90(6), 19-28.
- Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., . . . Wood, D. L. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1), e232-e246.
- U.S. Department of Health and Human Services (USDHHS); Administration on Children Youth and Families. (2012). *Promoting social and emotional well-being for children and youth receiving child welfare services*. Washington, DC: Author. Retrieved from <http://www.acf.hhs.gov/programs/cb/resource/im1204>
- Walrath, C. M., Mandell, D. S., Liao, Q., Holden, E. W., De Carolis, G., Santiago, R. L., & Leaf, P. J. (2001). Suicide attempts in the “comprehensive community mental health services

for children and their families” program. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(10), 1197-1205.

Webster-Stratton, C., & Reid, M. (2010). Adapting The Incredible Years, an evidence-based parenting programme, for families involved in the child welfare system. *Journal of Children's Services*, 5(1), 25-42. doi:doi:10.5042/jcs.2010.0115

Zelen, M. (1990). Randomized consent designs for clinical trials: An update. *Statistics in Medicine*, 9, 645-656.

Figure 1. Flow Diagram of Children Involved in Randomized Trial Comparing PMTO and Usual Care in the Context of Foster Care

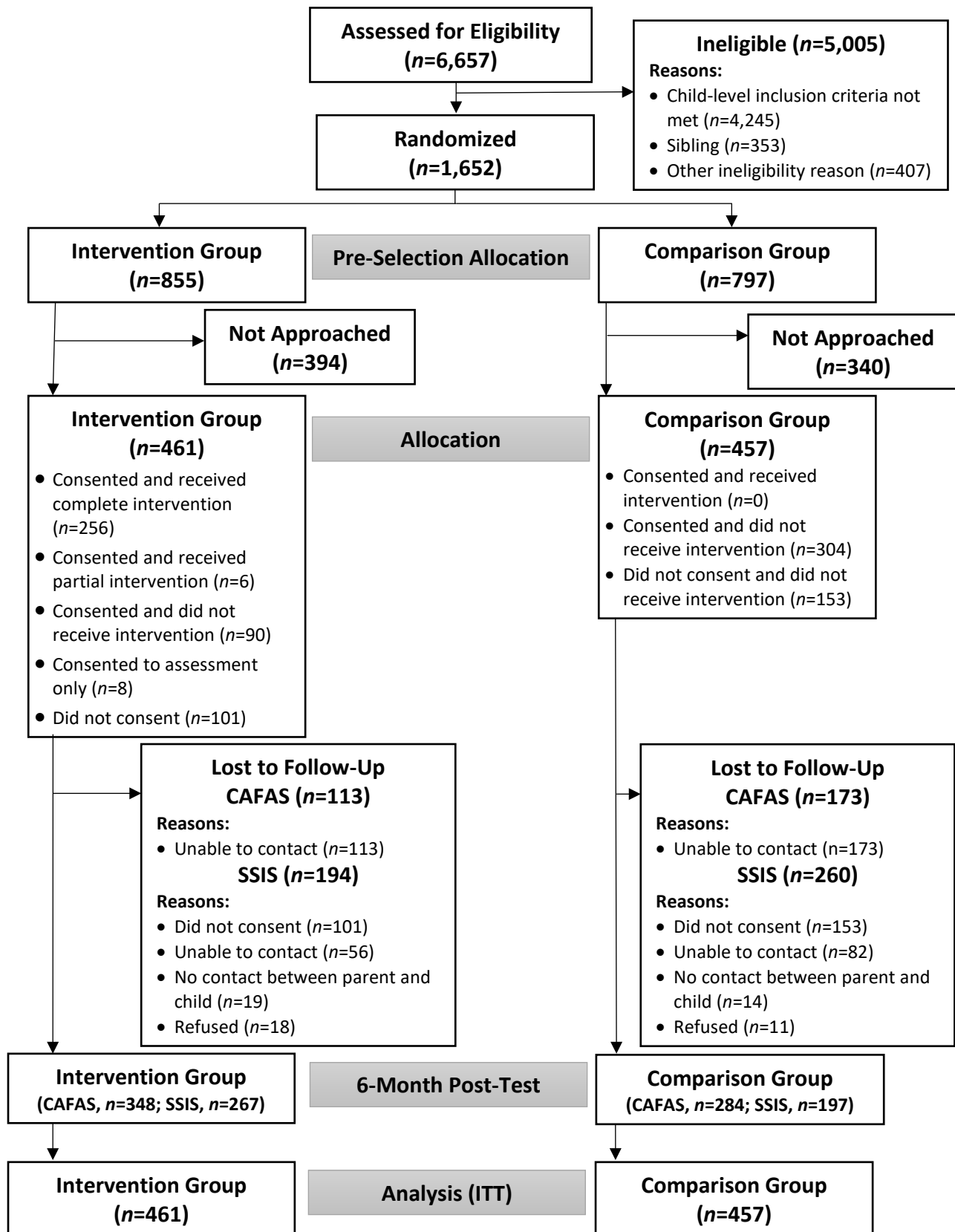


Table 1. Baseline Characteristics of Children and Parents by Study Condition

Characteristic	Total <i>N</i> (%)	Intervention Group <i>n</i> (%)	Comparison Group <i>n</i> (%)	<i>p</i>
Child gender is female, <i>n</i> (%)	427 (46.5)	204 (44.3)	223 (58.8)	.167
Child race is White, <i>n</i> (%)	709 (77.2)	350 (75.9)	359 (78.6)	.341
Child is Latino, <i>n</i> (%)	111 (12.3)	55 (11.9)	58 (12.7)	.351
Child age, <i>M</i> (<i>SD</i>)	11.8 (4.2)	11.6 (4.1)	11.9 (4.3)	.248
Caretaker age at first removal, <i>M</i> (<i>SD</i>)	38.4 (10.2)	38.2 (10.4)	38.7 (10.1)	.491
Child has diagnosed disability, <i>n</i> (%)	493 (53.8)	243 (52.9)	250 (54.7)	.592
Removal reason was physical abuse, <i>n</i> (%)	169 (18.4)	87 (18.9)	82 (17.9)	.717
Removal reason was sexual abuse, <i>n</i> (%)	57 (6.2)	27 (5.9)	30 (6.6)	.657
Removal reason was neglect, <i>n</i> (%)	340 (37.0)	170 (36.9)	170 (37.2)	.919
Removal reason was parent sub abuse, <i>n</i> (%)	196 (21.4)	102 (22.1)	94 (20.6)	.565
Parent was single mother, <i>n</i> (%)	479 (52.2)	255 (55.3)	224 (49.0)	.056
Parent was single father, <i>n</i> (%)	74 (8.1)	38 (8.2)	36 (7.9)	.839
Parents were married/unmarried couple, <i>n</i> (%)	365 (39.8)	168 (36.4)	197 (43.1)	.039
Child had prior removals, <i>n</i> (%)	197 (21.5)	107 (23.2)	90 (19.7)	.194
Child eligible for IV-E payment, <i>n</i> (%)	108 (11.8)	63 (13.7)	45 (9.8)	.073
Time in care at study start, <i>M</i> (<i>SD</i>)	50.2 (81.0)	54.4 (102)	45.6 (50.8)	.102

Notes:

Total sample, *N* = 918; Intervention group, *n* = 461; Comparison group, *n* = 457

Table 2. Completion Rates and Scale Scores at Baseline and Six-Months by Study Condition

	Intervention Group		Comparison Group	
	Baseline	6-Months	Baseline	6-Months
Completion Rates, <i>n</i> (%)				
Child Functioning (CAFAS)	461 (100.0)	348 (75.5)	457 (100.0)	284 (62.1)
Child Problem Behaviors (SSIS)	352 (76.4)	267 (57.9)	295 (64.6)	197 (43.1)
Child Prosocial Skills (SSIS)	352 (76.4)	267 (57.9)	295 (64.6)	197 (43.1)
Scores, <i>M</i> (<i>SD</i>)				
Child Functioning (CAFAS)	84.2 (41.3)	81.4 (76.1)	87.5 (40.7)	107.8 (82.6)
Child Problem Behaviors (SSIS)	36.5 (15.5)	28.8 (15.2)	35.1 (16.2)	30.8 (13.9)
Child Prosocial Skills (SSIS)	79.6 (22.0)	84.5 (22.6)	80.6 (22.9)	80.7 (21.6)

Notes: The CAFAS is scored as a sum of 8 subscales ranging from 0 to 240 with higher scores indicating higher functional impairment. The SSIS Problem Behavior and Prosocial Skills scales are scored based on an algorithm from the survey developer, incorporating their five and seven subscales, respectively. Higher scores on Problem Behavior indicate more problems and higher scores on the Prosocial Skills indicate more prosocial skills. Therefore, desired are decreases in the CAFAS and Problem Behavior scales and increases in the Prosocial Skills scale.

Table 3. ANCOVA Models of Child Functioning (CAFAS)

Model	Child Functioning				
	Estimate	SE	Wald	<i>p</i>	FMI
Unconditional ANCOVA					
Intercept	0.16	0.05	3.46	0.001	0.004
T1 CAFAS	0.17	0.03	5.13	<.001	0.01
Intervention	-0.31	0.07	-4.87	<.001	0.01
Unconditional Moderated ANCOVA					
Intercept	0.16	0.05	3.53	<.001	0.004
T1 CAFAS	0.09	0.05	1.95	0.051	0.01
Intervention	-0.32	0.06	-4.88	<.001	0.01
Intervention X T1 CAFAS	0.15	0.07	2.31	0.021	0.01
Conditional ANCOVA					
Intercept	-0.27	0.13	-2.02	0.043	0.01
T1 CAFAS	0.06	0.05	1.36	0.173	0.01
Intervention	-0.31	0.06	-4.83	<.001	0.01
Caretaker age at first removal	0.01	0.003	2.81	0.005	0.01
Annualized placement rate	0.02	0.01	2.41	0.016	0.01
Intervention X T1 CAFAS	0.14	0.06	2.25	0.025	0.01
Moderated Conditional ANCOVA					
Intercept	-0.17	0.18	-0.94	0.346	0.01
T1 CAFAS	0.08	0.05	1.59	0.112	0.01
Intervention	-0.47	0.25	-1.87	0.062	0.01
Caretaker age at first removal	0.01	0.01	1.71	0.087	0.01
Annualized placement rate	0.01	0.01	0.73	0.466	0.01
Intervention X T1 CAFAS	0.12	0.07	1.87	0.062	0.01
Intervention X Caretaker Age	0.002	0.01	0.28	0.781	0.01
Intervention X Annual Place Rate	0.03	0.02	1.48	0.139	0.01

Notes: *N* = 918 children; SE = standard error; FMI = fraction of missing information, which represents the proportion of the total sampling variance that is due to missing data.

Table 4. ANCOVA Models of Child Problem Behaviors (SSIS)

Model	Child Problem Behaviors				
	Estimate	SE	Wald	<i>p</i>	FMI
Unconditional ANCOVA					
Intercept	1.21	0.12	11.50	<.001	0.44
T1 Problem Behaviors	0.41	0.04	11.10	<.001	0.32
Intervention	-0.09	0.04	-2.41	0.016	0.28
Unconditional Moderated ANCOVA					
Intercept	1.32	0.14	10.08	<.001	0.40
T1 Problem Behaviors	0.36	0.05	7.24	<.001	0.29
Intervention	-0.20	0.08	-2.43	0.015	0.16
Intervention X T1 Problem Behaviors	0.13	0.09	1.54	0.123	0.11
Conditional ANCOVA					
Intercept	1.06	0.24	4.44	<.001	0.14
T1 Problem Behaviors	0.39	0.04	10.37	<.001	0.34
Intervention	-0.09	0.04	-2.68	0.007	0.29
Caretaker age at first removal	-0.08	0.04	-2.16	0.031	0.25
Annualized placement rate	0.08	0.03	2.50	0.012	0.08
Child is White	-0.07	0.03	-2.10	0.036	0.11
Child is Latino	0.08	0.03	2.36	0.018	0.14
Child had prior removals	0.11	0.03	3.45	0.001	0.09
Moderated Conditional ANCOVA					
Intercept	0.92	0.33	2.86	0.004	0.12
T1 Problem Behaviors	0.39	0.04	10.47	<.001	0.34
Intervention	0.04	0.22	0.16	0.872	0.07
Caretaker age at first removal	-0.04	0.05	-0.94	0.349	0.18
Annualized placement rate	0.07	0.05	1.55	0.122	0.11
Child race is White	-0.05	0.05	-0.98	0.328	0.10
Child is Latino	0.08	0.04	1.89	0.059	0.10
Child had prior removals	0.03	0.05	0.68	0.494	0.07
Intervention X Caretaker Age	-0.10	0.10	-1.00	0.317	0.08
Intervention X Annual Place Rate	0.02	0.05	0.29	0.776	0.08
Intervention X Child is White	-0.05	0.08	-0.60	0.549	0.07
Intervention X Child is Latino	-0.05	0.18	-0.26	0.797	0.11
Intervention X Child had prior removals	0.11	0.05	2.34	0.019	0.07

Notes: *N* = 918 children; SE = standard error; FMI = fraction of missing information, which represents the proportion of the total sampling variance that is due to missing data.

Table 5. ANCOVA Models of Child Prosocial Skills (SSIS)

Model	Child Prosocial Skills				FMI
	Estimate	SE	Wald	<i>p</i>	
Unconditional ANCOVA					
Intercept	2.04	0.17	14.54	<.001	0.33
T1 Social Skills	0.42	0.04	10.35	<.001	0.47
Intervention	0.09	0.03	2.79	0.005	0.20
Unconditional Moderated ANCOVA					
Intercept	2.12	0.21	11.57	<.001	0.29
T1 Social Skills	0.40	0.05	7.52	<.001	0.39
Intervention	0.01	0.12	0.08	0.934	0.08
Intervention X T1 Social Skills	0.09	0.12	0.74	0.460	0.11
Conditional ANCOVA					
Intercept	2.35	0.22	11.48	<.001	0.25
T1 Social Skills	0.41	0.04	10.09	<.001	0.47
Intervention	0.10	0.03	3.03	0.002	0.20
Caretaker age at first removal	-0.11	0.03	-3.36	0.001	0.14
Child is White	0.09	0.03	3.07	0.002	0.05
Child had prior removals	-0.11	0.03	-3.56	<.001	0.04
Moderated Conditional ANCOVA					
Intercept	2.38	0.26	9.58	<.001	0.18
T1 Social Skills	0.40	0.04	10.08	<.001	0.47
Intervention	0.10	0.14	0.70	0.485	0.03
Caretaker age at first removal	-0.09	0.05	-2.03	0.042	0.10
Child race is White	0.04	0.04	0.91	0.364	0.06
Child had prior removals	-0.04	0.05	-0.81	0.419	0.04
Intervention X Caretaker Age	-0.07	0.12	-0.57	0.569	0.05
Intervention X Child is White	0.12	0.08	1.56	0.118	0.04
Intervention X Child had prior removals	-0.11	0.05	-2.25	0.024	0.04

Notes: *N* = 918 children; SE = standard error; FMI = fraction of missing information, which represents the proportion of the total sampling variance that is due to missing data.