

Multisystemic Therapy for Child Abuse and Neglect: A Randomized Effectiveness Trial

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Swenson, C.C., Schaeffer, C.M., Henggeler, S.W., Faldowski, R., & Mayhew, A.M. (2010). Multisystemic therapy for child abuse and neglect: A randomized effectiveness trial. *Journal of Family Psychology, 24*(4), 497-507. DOI:10.1037/a0020324.

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Abstract:

The primary purpose of this study was to conduct a randomized effectiveness trial of Multisystemic Therapy for Child Abuse and Neglect (MST-CAN) for physically abused youth (mean age = 13.88 years, 55.8% female, 68.6% Black) and their families. Eighty-six families being followed by Child Protective Services due to physical abuse were randomly assigned to MST-CAN or Enhanced Outpatient Treatment (EOT), with both interventions delivered by therapists employed at a community mental health center. Across five assessments extending 16 months post baseline, intent-to-treat analyses showed that MST-CAN was significantly more effective than EOT in reducing youth mental health symptoms, parent emotional distress, parenting behaviors associated with maltreatment, youth out-of-home placements, and changes in youth placement. Also, MST-CAN was significantly more effective at improving natural social support for parents. Effect sizes were in the medium to large range for most outcomes examined. Although fewer children in the MST-CAN condition experienced an incident of reabuse than did counterparts in the EOT condition, base rates were low and this difference was not statistically significant. The findings of this study demonstrate the potential for broad-based treatments of child physical abuse to be effectively transported and implemented in community treatment settings.

Article:

The purpose of this study was to evaluate an adaptation of multisystemic therapy (MST; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009) for physically abused adolescents and their families in the context of a randomized effectiveness trial (i.e., using real world therapists working in a community mental health center). Child physical abuse is a major public health concern (U.S. Department of Health and Human Services [HHS], 2009) that is associated with a broad array of adverse short- and long-term outcomes. For example, short-term effects can include trauma symptoms, mental health problems, substance abuse, and health problems (Hussey, Chang, & Kotch, 2006; Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997). These problems often extend into adulthood, where individuals who were abused as children are at increased risk of difficulties such as anxiety, depression, and poor health (Springer, Sheridan, Kuo, & Carnes, 2007). Consequently, physical abuse incurs enormous costs to society in the form of service system expenditures, health care costs, and decreased quality of life (Wang & Holton, 2007).

In light of the serious personal, social, and fiscal problems associated with child physical abuse, the development and validation of effective interventions that are transportable to community settings is a research priority. Fortunately, the potential viability of such development and transport is supported by three interrelated lines of correlational and treatment related research. First, consistent with a social ecological conceptualization of behavior (Bronfenbrenner, 1979), the physical abuse of youth has been linked with modifiable factors pertaining to the individual youth, parent, and family systems (e.g., Sidebotham & Heron, 2006). For example, youth with behavioral difficulties such as noncompliance (Black, Heyman, & Slep, 2001) are at heightened risk for physical abuse. Similarly, physical abuse has been linked with parent mental health problems (Sidebotham & Heron, 2006) and parenting characteristics such as low involvement with and negative perceptions of the child (see Kolko & Swenson, 2002). In addition, physically abusive parents have been shown to experience low social support, high stress and social isolation (Crouch, Milner, & Thomsen, 2001). In sum, child physical abuse is multi-determined, and several of the key risk factors are modifiable.

In the second line of research, several groups of investigators have examined family-based interventions (i.e., treatments that directly include at least one parent and child) for child maltreatment with promising results (Brunk, Henggeler, & Whelan, 1987; Chaffin et al., 2004; Kolko, 1996; Wesch & Lutzker, 1991). For example, Kolko (1996) found that that caregivers in parent and child parallel cognitive behavioral therapy (CBT) and family therapy conditions evidenced greater improvements in parental distress, abuse risk, and family cohesion and conflict than those in routine community services. In addition, Brunk et al (1987) compared standard MST to a group-based parent training intervention in a small randomized efficacy trial (N=33). Families who received MST showed more favorable pre- to post-treatment changes on amelioration of family problems, restructuring parent-child relations, and increased effectiveness at key parenting behaviors than did comparison families. Although results from these family-based studies were generally favorable, the applicability of the treatment models to real world clinical settings is unknown. Aforementioned evaluations were efficacy trials (Weisz & Kazdin, 2010) – studies conducted under relatively ideal conditions to maximize the probability of obtaining successful results (e.g., highly motivated therapists, university context, fewer bureaucratic requirements). Importantly, pertaining to child and adolescent psychotherapy research, Weisz and colleagues (Weisz, Donenberg, Han, & Weiss, 1995) have noted the substantive gap in outcomes achieved between university-based efficacy trials and community-based effectiveness trials. To the best of our knowledge, the aforementioned family-based models for physical abuse have not been replicated in effectiveness trials – studies of the intervention conducted in real world provider settings with community-based practitioners.

The third relevant line of research pertains to MST treatment development and transportability research during the past 30 years. This work provides a blueprint from university research to the large-scale community transport of an evidence based treatment, and the present study represents an important step in that process. As described by Henggeler et al. (2009), university efficacy studies with juvenile offenders led to several effectiveness studies in community settings, and these have led to transportability trials in several nations. Currently, MST programs for serious antisocial behavior have been transported worldwide, treating about 17,000 youth and their families annually, and almost 20 MST clinical trials have been published, six conducted by

independent research teams. Pertinent to the present investigation, research indicates that key features of the MST model are critical to achieving desired clinical outcomes and might be relevant for addressing serious clinical problems other than juvenile offending. These critical features of MST include addressing the multi-determined nature of serious clinical problems, viewing the family as key to effective behavior change, using a home-based model of service delivery to overcome barriers to service access, integrating evidence-based interventions, and using a comprehensive quality assurance system to support therapist fidelity. Hence, MST adaptations have been developed and validated for treating serious emotional disturbance in adolescents, juvenile sexual offenders, and chronic health care conditions in adolescents. These critical features are also central to the MST adaptation examined here.

Based on and in consideration of the aforementioned research, the present study aims to advance the field of family-based treatments for child maltreatment in several ways. First, although findings from family-based efficacy studies have been promising, the conduct of rigorous effectiveness trials is critical for demonstrating the viability of family-based approaches when implemented in real world clinical settings. Building on favorable results from an early MST efficacy trial (Brunk et al., 1987), the present study examines the viability of an up-to-date adaptation of MST (i.e., integrating research findings from the past 20 years) for physically abused youth with services provided through a community mental health center. Second, although older youth are at highest risk of out-of-home placement and placement changes (Aarons et al., 2010) and adolescents comprise over a third of youth in the child protection system (HHS, 2009), the vast majority of maltreatment intervention research has focused on children younger than 10 years of age. The present study focuses on youth 10 through 17 years of age. Third, several methodological strengths were included: (a) a relatively intensive comparison condition; (b) measurement of an array of youth, parent, and parenting behavior outcomes; (c) measurement of key maltreatment-related outcomes such as out-of-home placements, days in placement, changes in placement, and reabuse; (d) the longest post-baseline assessment period (16 months) measuring mental health functioning and placement of any physical abuse treatment outcome study to date; (e) use of intent-to-treat analyses; and, (f) inclusion of a substantive percentage of Black families, who are overrepresented in CPS systems.

In sum, the chief goals of the study were to determine whether an adaptation of MST for child abuse and neglect (MST-CAN) transported to a community agency (as is typical in effectiveness trials) would improve youth and parent functioning, reduce abusive parenting behavior, and decrease reabuse and placement to a greater degree than an enhanced version of the standard outpatient treatment for child physical abuse provided at that agency (i.e., Enhanced Outpatient Treatment, [EOT]). It was hypothesized that across all indicators, MST-CAN youths and parents would show more favorable outcomes than their EOT counterparts.

METHOD

Design

The study followed a 2 (treatment type: MST-CAN versus EOT) \times 5 (time: Baseline and 2, 4, 10, and 16 months post-baseline) design with random assignment of families to treatment conditions. Time points were selected to reflect changes from baseline to expected post-treatment based on standard MST community programs (i.e., 0 months and 4 months), with one intermediate time point (i.e., 2 months), and two follow-up points (i.e., 10 and 16 months).

Participants

Participants were 86 youth and the custodial parent who was implicated in the Child Protective Services (CPS) report of physical abuse. All cases were referred by the county CPS. Inclusion criteria were: (a) determination by CPS that physical abuse had occurred, (b) youth was within the age range of 10 to 17 years, (c) family resided within Charleston County, and (d) case was opened within the past 90 days. Excluded from the study were: (a) youth currently or previously enrolled in an MST project, (b) families where the child had been removed from the home and reunification was deemed inappropriate or unsafe by CPS (i.e., ever returning home was not a CPS goal), and (c) cases in which children or their parents had active psychosis.

Research Procedures

Recruitment. Participant recruitment occurred from November 2000 to October 2003, and data collection continued through May 2005. Prior to study referral, the CPS caseworker met with eligible families and provided a brief CPS-approved study description and advised them that study participation was not required. If the family was interested, the caseworker obtained written consent to release the contact and case information to the research project coordinator.

Consent and randomization. If the family met inclusion criteria, a research assistant met with the parent and youth to explain the study and attain informed consent and assent. All procedures were approved by the institutional review board of the participating university. A few adverse events were reported to the IRB but none were considered related to the treatment. The CPS caseworker accompanied the research assistant to answer questions and assure the family that participation in the study was not mandatory. If the family chose not to participate, the caseworker arranged other treatments. After consent, the research assistant opened a sealed envelope and informed the family of the assigned treatment condition, thus condition was not blinded. Randomization was based on a computer-generated table of random numbers.

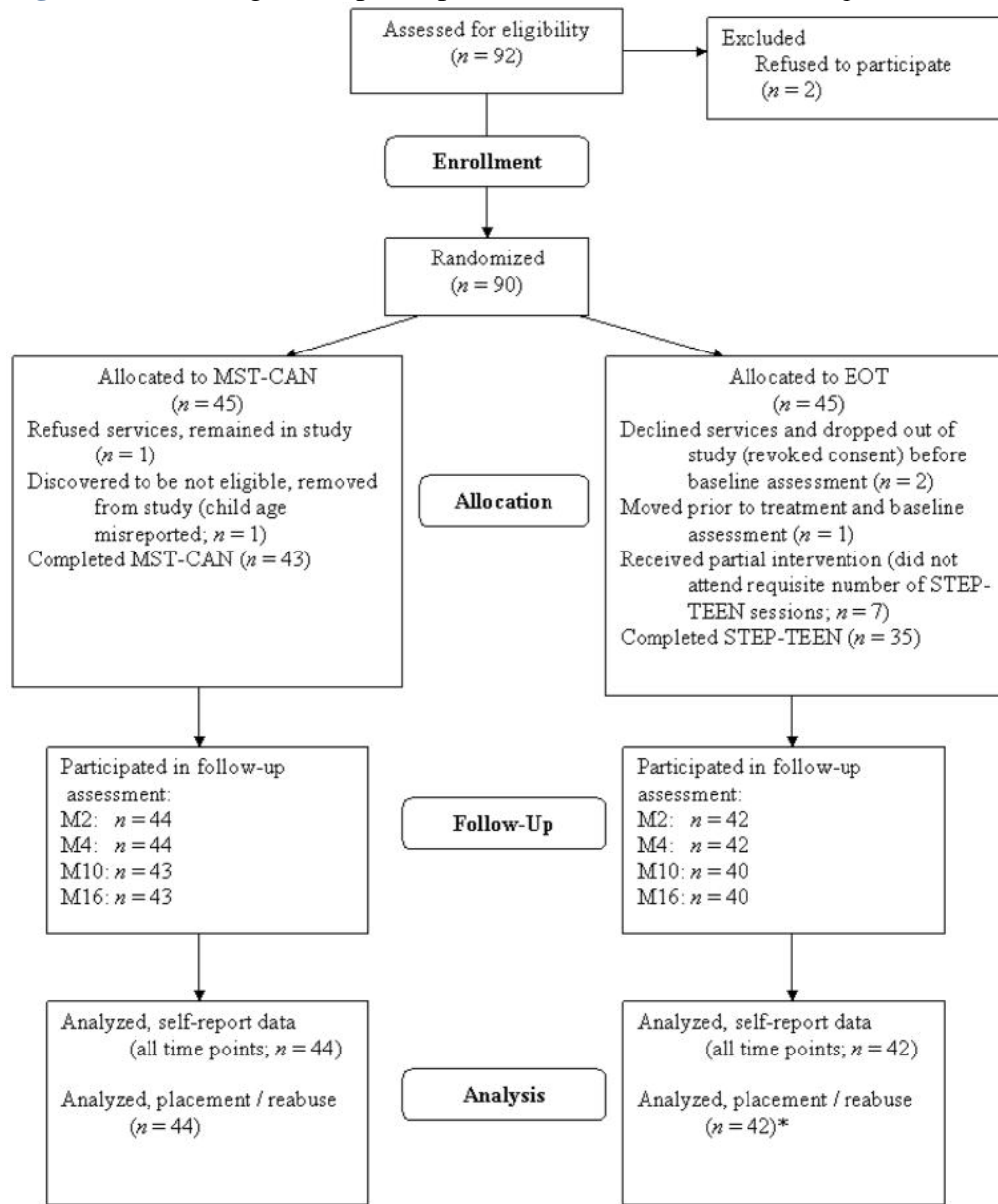
Data collection. All self-report measures were administered individually and separately for the youth and parent in their home at 5 time points (i.e., baseline, 2, 4, 10, and 16 months). Youth were compensated \$15 and parents \$35 per assessment. In addition, research assistants contacted all parents once per month to conduct a brief service utilization interview.

Research retention. Figure 1 depicts the study flow from referral through data analysis. The recruitment rate was 98%. One family in MST-CAN and three families in EOT did not complete any assessments. Of the 86 families remaining, research retention was 100% through months 2 and 4, and 97% through months 10 and 16.

Interventions

Site. The study intervention site was a public sector mental health center (hereafter referred to as the Center) that is routinely referred abuse/neglect cases from CPS. The Center provides an array of services, including individual, family, and group therapy; parent training; day treatment programs; and school-based services. Treatments follow various theoretical models that are consistent with the training and preference of the therapists.

Figure 1: Flow diagram of participants from randomization through 16 months post-baseline.



* CPS information unavailable for youth who moved.

Treatment conditions

Multisystemic Therapy for Child Abuse and Neglect. The MST-CAN adaptation (Swenson, Penman, Henggeler, & Rowland, 2010) includes the core components of standard MST (Henggeler et al., 2009) noted previously, as well as several adaptations for treating maltreated youth and their families.

Home-based model of service delivery. Consistent with standard MST practices aimed at overcoming barriers to service access, therapists delivered interventions in the home and other community locations (e.g., school) at times convenient to families (e.g., evenings, weekend hours). The frequency of treatment sessions was titrated to family need – ranging from daily

sessions to once or twice per week. In addition, the team provided a 24 hour/7 day per week on call service for families to manage crises.

Clinical process. Consistent with standard MST, MST-CAN used a recursive analytical process to identify, develop, and prioritize interventions. Each stakeholder (e.g., family members, the CPS worker) was interviewed to attain her or his opinion on desired outcomes, and these became the overarching goals of treatment. Next, within a social-ecological conceptual framework (Bronfenbrenner, 1979), the therapist conducted a comprehensive assessment of the strengths and needs of individuals and systems in the family's social ecology (family members, peers, school, social support system), and each target behavior was assessed to determine the *fit* or drivers of that behavior (e.g., harsh discipline was associated with parental anxiety, youth noncompliance, and low parenting skills). The fit factors that were the strongest drivers (e.g., low parenting skills, parental anxiety) of the target behaviors (i.e., harsh discipline) were prioritized for intervention. In general, techniques used to address initial targets of intervention were based on strategies that have at least some empirical support (e.g., CBT for anxiety management). The interventions were implemented with the support of the family's social ecology and outcomes were assessed. If not fully successful, the fit factors and interventions were re-examined and modified in a recursive process until desired outcomes were achieved.

MST-CAN adaptations. MST-CAN adaptations were based on prior research and the clinical experience of the investigator team (e.g., Kolko & Swenson, 2002). First, to address the serious child safety concerns and the severity of parental difficulties identified in families of physically abused youth, the length of treatment was allowed to extend beyond the typical 4 to 6 months used in standard MST. The increased treatment length was in keeping with MST principles as MST is outcome driven rather than time driven and treatment length varies by family. Second, an MST-trained psychiatrist was available to the team and provided evidence-based pharmacotherapy to children and parents when warranted (i.e., 28% of youth received medication for ADHD and 7% of caregivers for depression or anxiety) and consultation on psychiatric emergencies. Third, the MST supervisor was full-time, rather than half time as with standard MST, to help therapists address the crisis-driven nature of the referrals and relative complexity of the problems presented by the families.

As with standard MST, MST-CAN applies evidence-based interventions that meet the referred family's clinical needs (Swenson et al., 2010). Some of these interventions are conducted with all families and others only as warranted. First, based on a functional analysis of abuse incidents (Kolko & Swenson, 2002), a safety plan was developed for each family that outlined what family members would do if they felt unsafe (defined by family), and this plan was signed by all. Second, the treatment team worked closely with CPS, rather than with juvenile justice as in standard MST, to foster positive CPS-family relations and ensure that CPS decision making was based on clinical need or clinical progress. Third, a clarification process was used with all families who completed treatment to help the parent address cognitions about the abuse incident, accept responsibility for the abuse, and apologize to the child and family (Lipovsky, Swenson, Ralston, & Saunders, 1998). Fourth, several cognitive behavioral and behavioral interventions were incorporated as needed. Specifically, CBT for deficits in anger management (e.g., Feindler, Ecton, Kingsley, & Dubey, 1986) was provided when indicated (i.e., for 63% of parents and 28% of children). Similarly, a CBT protocol (Robin, Bedway, & Gilroy, 1994) was used with families

who had low problem solving skills or difficulties communicating without conflict (provided to 95% of MST-CAN families). In addition, parents experiencing PTSD symptoms (7%) received prolonged exposure therapy (Foa & Rothbaum, 1998).

Enhanced Outpatient Treatment. EOT included the standard services the Center provided for physically abused youths and their parents as well as enhanced engagement and parent training interventions. Additional services were brokered with other agencies as needed.

Standard services. In day-to-day practice, referrals are made to the Center and an intake and psychiatric assessment are completed. Depending on the results of the intake, the child, parent, or family may begin individual therapy, family therapy, and parent and child sessions provided from the theoretical framework of the clinician and lasting from a few months to several years. In addition, if indicated, a Center psychiatrist prescribes medication. If problems that are not typically treated at this Center are identified (e.g., substance abuse), a referral is made for treatment at another agency. Youths in this study participated in mental health outpatient (41%), day (12%), and residential (17%) treatment as well as substance abuse outpatient (7%), day (2%), and residential (5%) treatment. Parents participated in the parent training intervention discussed subsequently (100%), other mental health outpatient (26%) and day treatment (2%), and substance abuse outpatient (2%) and day (2%) treatment services.

Enhanced engagement. The public sector Center serves the most challenging clinical populations in the county. In standard Center practice, families often fail to attend scheduled treatment sessions or drop out of treatment, and are allowed to reschedule missed appointments a few times before their case is closed. To support participation and retention in interventions within the EOT condition, special measures were taken to engage families above and beyond that of standard practice. Specifically, therapists made multiple efforts to engage parents by phone to remind them about upcoming appointments and to reschedule missed appointments. In addition, therapists made home visits if the family did not have a phone, and vouchers were provided to cover family transportation to the Center.

Parent training. The Systematic Training for Effective Parenting of Teens (STEP-TEEN; Dinkmeyer, McKay, McKay, & Dinkmeyer, 1998) program was provided for all parents. STEP-TEEN is a structured, 7-lesson (may run longer than 7 sessions), group-based parent-training program that targets parent-child relations. This program was selected because of its acceptability to local stakeholders and empirical support from more than 25 years of research, including a meta-analytic study indicating large effect sizes for abusive parents in pre-post evaluations (see Gibson, 1999). Through didactic instruction, role-play, videotapes and group discussion, the program teaches skills in understanding teens, communication, problem solving, building responsibility, and encouraging cooperation.

Therapist characteristics. Therapists in both treatment conditions were employees of the Center. The MST-CAN therapists worked in a team of three, and, due to turnover, eight therapists participated during the 3 year clinical portion of the study. None of the therapists had prior MST experience, and they were assigned MST-CAN cases only. Within the EOT condition, STEP-TEEN, enhanced engagement, and other standard services delivered at the Center were provided by a single therapist. Due to turnover, three therapists served in this role over the course

of the study, none of whom had prior experience with STEP-TEEN. In addition, EOT therapists brokered services with other agencies (e.g., substance abuse treatment) for families and carried some non-study participants on their clinical caseloads. Consistent with the Center standard, all therapists in both conditions had master's degrees in clinical counseling, social work, or psychology and at least one year of prior clinical experience.

Treatment fidelity. Several procedures were used to sustain the fidelity of the treatments. Consistent with standard MST community practice, all MST-CAN therapists received a 5-day orientation to the standard MST model. Additional training sessions were provided for the MST-CAN adaptations. Most important for supporting treatment adherence, therapists participated in 4 hours of weekly group supervision (two sessions of 2 hours each) and individual supervision as needed. Clinical supervision was provided jointly by the first author, who led the specification of the MST-CAN adaptations for this project, and a supervisor at the Center. Group supervision focused on family safety, review of case goals, progress and barriers to meeting goals, and interventions to overcome those barriers.

Therapists in the EOT condition received one day of training on administering the STEP-TEEN program and participated in weekly 1.5-hour consultation sessions with a supervisor who was not involved in any clinical aspect of MST-CAN. STEP-TEEN supervision focused on methods for engaging families and implementation of the STEP-TEEN sessions. The EOT therapists also received ongoing individual supervision and participated in trainings on various clinical topics consistent with Center requirements.

Measures

A multimethod, multisource assessment process was used to evaluate youth and parent functioning, parenting behavior, social support, and maltreatment outcomes.

Youth functioning. Youth behavioral and emotional functioning was assessed with three well-validated instruments: (a) the 113-item Child Behavior Checklist (CBCL; Achenbach, 1991) measures behavioral functioning of children ages 6 to 18 years by parent ratings and includes three broadband behavior problem scales (Internalizing, Externalizing, and Total). In addition, a 20-item CBCL-PTSD scale (Ruggiero & McLeer, 2000) was included. For this sample, internal consistency was high ($\alpha = .84-.96$) across time points for all scales. (b) The 54-item Trauma Symptom Checklist for Children (TSCC; Briere, 1989) was used to assess children's self-reports of trauma-related symptoms including Anger, Anxiety, Depression, Dissociation, and Posttraumatic Stress. These subscales have demonstrated satisfactory psychometrics with abused populations (Lanktree, Briere, & Hernandez, 1991) and had strong internal consistency with the current sample ($\alpha = .77 - .90$). (c) Parent ratings of youth social skills were obtained with the Social Skills Rating System (Gresham & Elliott, 1990), and internal consistency for the Total Scale was high in the current sample ($\alpha = .88-.92$).

Parent functioning. Psychiatric distress was measured using the Global Severity Index (GSI) of the Brief Symptom Inventory (BSI; Derogatis, 1975). In addition, the number of symptoms was measured on the BSI Positive Symptom Total Scale (PST). Strong internal consistencies have been shown for the GSI and PST across multiple studies (Boulet & Boss, 1991) and with the present sample ($\alpha = .63-.95$).

Parenting behavior. Parent self-report and youth report of parental behavior on the Conflict Tactics Scale (CTS; Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) provided measures of strategies used in parent-child interpersonal conflict. Subscales include neglect, psychological aggression, minor assault, severe assault, and nonviolent discipline. Studies have supported discriminant and construct validity, and reliabilities have ranged from low to moderate (Straus et al., 1998). All subscales were transformed into count variables representing the average number of times that each tactic was used during the prior month. Internal consistencies ranged from moderate to strong ($\alpha = .59-.89$) for the present sample.

Social support. Social support for the parents was assessed by the 40-item Interpersonal Support Evaluation List (ISEL; Cohen, Mermelstein, Kamarck, & Hoberman, 1985), which had good internal consistencies ($\alpha = .66-.93$) in the present sample. Total perceived support, appraisal support (perceived availability of someone to talk to about one's problems), and belonging support (perceived availability of people with whom to do things) subscales were used.

Maltreatment outcomes. Reabuse (new report of abuse of the target child, abuse of any child by the target parent) and youth out-of-home placement (whether placed, days placed, and placement changes) data were obtained from CPS records. For children who were in placement at the baseline assessment, the computation for number of days placed started at baseline.

Service utilization. On a monthly basis, parents reported whether the youth or parent had participated in mental health or substance abuse treatment (outpatient, residential, or inpatient) during the past month, using an interview developed for the present study. These data were used to determine amount and duration of treatment services for families in both treatment conditions.

Analytic Strategy

Latent growth curve modeling (LGM) and the Mplus Version 5.1 software package (Muthen & Muthen, 2007) were used to assess intervention effects over 16-months post-baseline on self-report measures. Analyses used sums of raw scores of each measure, and models controlled for referent age and gender. Individually varying scores for the five time points, rather than fixed time scores, were used to account for variability in when measures were completed. All models were estimated using the maximum likelihood robust (MLR) estimator. Outcomes expressed as counts (i.e., the CTS scales) were analyzed using negative binomial LGMs.

Standard LGM fit indices (e.g., the Comparative Fit Index [CFI], the Root Square Error of Approximation [RMSEA]) are not available when using individually varying time scores. Instead, the Bayesian Information Criterion (BIC) and the Yuan-Bentler chi-square difference test for nested models were used to compare the relative fit of models with different assumptions with regards to the nature of change over time (e.g., linear increases across all time points versus a leveling off at later time points) and other parameter specifications (e.g., fixing vs. freely estimating residual variances). Specifications that significantly improved model fit and resulted in a lower BIC score over a more parsimonious model were retained. For example, for each measure, models that included intercept-only (i.e., no change over time), intercept + linear slope (i.e., scores increasing or decreasing over time), and intercept + linear slope + quadratic slope (i.e., linear change that levels off at early or later time points) growth factors were compared.

Once the best fitting model was determined for each measure, covariates (i.e., age, gender, and intervention condition) were added as predictors of the growth factors. The estimate of the linear growth factor regressed on treatment condition was used as the indicator of an intervention effect. Effect sizes (Cohen's d) were calculated for LGMs by taking the difference in linear slope estimates for each condition and dividing by the SD of the pooled (across conditions) linear slope estimate. A priori power analyses of LGMs with $N = 86$ indicated that power was limited for detecting medium effects (i.e., $d = .50$, power = .64), but adequate for large effects (i.e., $d = .80$, power = .95). All analyses included data from families who did not complete treatment or who had missing data points for other reasons (i.e., intent-to-treat).

RESULTS

Participant Characteristics

As shown in Table 1, the treatment conditions did not differ significantly on any baseline demographic or maltreatment characteristic. Across conditions, the mean age of the youths was 13.88 years ($SD = 2.07$ years); 55.8% were female; and 68.6% were Black, 22.1% were White, and 9.3% were other. Regarding parents (recalling that the participating parent was the subject of the abuse report), mean age was 41.79 years ($SD = 10.49$ years), 65.1% were female, and 58.1% were single parents. As described more extensively in Table 1, more than 80% of the abuse incidents included at least minor injuries, and 23.3% of families had a prior CPS report.

Treatment Intensity

Treatment conditions also did not differ on the amount of services delivered to participating families, $F(1, 85) = 0.13$, ns. Based on the monthly service utilization interviews, MST-CAN parents reported that they (youth and parent combined) received an average of 88 hours (range = 3 to 388 hours) of treatment over an average duration of 7.6 months (range = 2 to 12 months). EOT parents reported that they (youth and parent combined) received an average of 76 hours of treatment (range = 3 to 897 hours) over an average period of 4.0 months (range = 1 to 12 months). EOT parents attended an average of 6.8 sessions of STEP-TEEN (range = 1 to 21 sessions) over an average 2.8-month period (range = 1 to 4 months). Although hours of treatment did not differ between groups, the completion rate for EOT (defined as completing STEP-TEEN; 83%) was significantly lower than that for MST-CAN (98%), $\chi^2(1, N = 86) = 4.96$, $p < .05$.

Youth and Parent Functioning, Parenting Behavior, and Social Support

Table 2 provides growth factor and treatment effect estimates and effect sizes for all self-report measures. The following description focuses on significant time (i.e., slope) and treatment (i.e., slope on treatment) effects from baseline through 16 months post baseline.

Youth outcomes. A main effect for time (slope) was found for youth-reported PTSD and depressive symptoms and parent-reported social skills, indicating overall improvement in these areas across conditions. However, the improvement in youth-reported PTSD symptoms was significantly greater for MST-CAN youth. Further, MST-CAN, but not EOT youth, showed significant decreases in parent-reported internalizing, PTSD, and total symptoms, and youth-reported dissociative symptoms.

Parent outcomes. Across treatment conditions, parents reported significant decreases in global psychiatric distress and number of positive symptoms. Parents who received MST-CAN,

however, reported significantly greater decreases in psychiatric distress than did counterparts in the EOT condition.

Table 1: Comparability Between Groups at Baseline on Demographic and Maltreatment Characteristics

Characteristics	Frequencies or Means (<i>SDs</i>)		Significance	
	MST-CAN (<i>n</i> = 44)	EOT (<i>n</i> = 42)	χ^2 or <i>t</i>	<i>p</i>
Child gender (% female)	52.3	59.5	0.46	.32
Parent gender (% female)	65.9	64.3	0.03	.53
Parent role (% of each category)			1.36	.72
Biological mother	43.2	45.2		
Biological father	25.0	33.3		
Other female caregiver	18.2	14.3		
Other male caregiver	13.6	7.2		
Abuse severity (scale 1-9; % each category) ¹			5.81	.33
Pushing or shaking, no injury (1)	2.3	7.1		
Excessive spanking, no injury (2)	18.2	7.1		
Pinched or bit, minor injury (3)	11.4	11.9		
Hit with object, minor injury (4)	59.1	54.8		
Threatened with weapon (6)	0	4.8		
Major assault (e.g., battery, beating) (7)	9.1	14.3		
CPS reports preceding referral incident (% each)			3.08	.38
0	77.3	76.2		
1	20.5	19.0		
2 or more	2.3	4.8		
Placed for referral incident (% yes)	4.5	14.3	2.42	.12
Placed at research enrollment (% yes)	2.3	9.5	2.06	.17
Child race (% each)			0.85	.65
Black	72.7	64.3		
White	18.2	26.2		
Other	9.1	9.5		
Caregiver high school graduate (% yes)	75.0	64.3	1.17	.20
Caregiver marital status (% single)	52.3	64.3	1.27	.18
Family annual income, all sources (% each)			8.17	.23
Less than 10,000	19.2	31.3		
10,001 – 15,000	14.4	13.1		
15,001 – 20,000	2.4	5.2		
20,001 – 25,000	19.1	7.8		
25,001 – 30,000	19.2	5.3		
More than 30,000	26.4	36.5		
Child age (in years)	13.81 (2.22)	13.95 (1.91)	0.10	.75
Caregiver age (in years)	40.82 (11.15)	41.81 (11.81)	0.16	.69
Number of children in home	2.31 (1.43)	2.52 (1.45)	0.44	.51

¹From “The Abuse Dimensions Inventory: Initial Data on a Research Measure of Abuse Severity, by M. Chaffin, J. N. Wherry, C. Newlin, A. Crutchfield, & R. Dykman, 1997, *Journal of Interpersonal Violence*, 12, pp. 569–589. Copyright 1997 by Sage Publications. Adapted with permission. Zero frequencies were obtained for both groups in categories 5 (“Burned”), 8 (“Attacked with weapon”), and 9 (“Burned impulsively”).

Parenting outcomes. Significant time effects were found for neglect (youth and parent report), psychological aggression (youth and parent reports), minor assault (youth report), and severe assault (parent report). However, a post-hoc examination of the slope estimates obtained for each condition (when examined separately) revealed that these time effects were driven by improvements in MST-CAN (i.e., in all but one case [parent report of psychological aggression], the slope estimate for the EOT group was not significant). MST-CAN was significantly more effective than EOT at reducing neglect (youth and parent report), psychological aggression (youth report), minor assault (youth report), and severe assault (parent and youth report). In addition, although use of nonviolent discipline decreased significantly for both groups over time, this decline was significantly less for MST-CAN.

Table 2: Latent Growth Model Parameters: Youth and Parent Functioning, Parenting Behaviors, and Social Support

	Intercept				Slope (S)				Quadratic ^a		S on treatment			Fit
	Est	SE	V	SE(V)	Est	SE	V	SE(V)	Est	SE	Est	SE	D	BIC
	<i>Youth functioning</i>													
CBLC, Int.	5.90	4.88	43.21**	10.00	-0.15	0.08	0.34*	0.17	0.12	0.08	-2.13*	0.95	.71	2626.71
CBLC, Ext.	21.93*	8.79	105.09**	16.55	4.96	3.31	0.59	0.49	-0.53	0.44	-0.75	1.47		2918.72
CBLC, Tot.	49.12**	18.25	94.60**	20.52	5.39	3.46	4.64	2.53	-0.45	0.35	-3.50**	0.77	.85	3560.84
CBLC, PTSD	7.55	5.00	24.45**	4.25	0.52	3.01	0.26	0.14	0.02	0.41	-1.43*	0.70	.55	2391.91
TSCC, Diss.	3.35	1.14**	12.03**	2.35	-0.36	0.42	0.05	0.08	0.05	0.04	-0.94*	0.39	.73	2129.22
TSCC, PTSD	3.30	1.23**	10.60**	1.71	-1.31*	0.51	0.05	0.06	0.14**	0.03	-0.25*	0.12	.68	2208.50
TSCC, Dep.	1.05	2.63	6.93**	2.50	-1.09*	0.50	0.16*	0.07	0.14*	0.03	-0.03	0.12		2090.39
TSCC, Ang.	7.36	3.28	13.30**	2.13	-0.40	0.51	0.15*	0.07	—	—	-0.15	0.13		2241.72
TSCC, Anx.	1.45	2.05	5.30**	1.43	-0.92	.049	0.07	0.05	0.11*	0.03	-0.13	0.11		2036.85
SSRS, Tot.	74.30**	9.69	103.71**	15.03	14.30**	2.60	0.98	0.56	1.73*	0.30	0.38	1.60		3070.83
	<i>Parent functioning</i>													
BSI, GSI	0.41	0.23	0.11**	0.03	-0.05*	0.03	0.00	0.00	—	—	-0.03*	0.01	.63	290.58
BSI, PST	13.68*	6.15	114.19**	19.59	-3.40**	0.94	0.38	0.35	0.27*	0.08	-0.54	0.30		2781.74
	<i>Parenting behaviors: CTS scales (respondent)</i>													
Neglect (Y)	3.53*	1.45	1.91**	0.51	-0.35**	0.01	0 ^a	—	—	—	-0.18**	0.00	.89	901.00
Neglect (P)	5.41**	0.97	1.85	1.26	-2.71**	0.00	0 ^a	—	—	—	-0.04**	0.00	.28	302.19
P. Agg. (Y)	1.19	0.98	1.12**	0.26	-0.08**	0.02	0 ^a	—	—	—	-0.03**	0.01	.21	1996.04
P. Agg. (P)	0.51	0.58	0.89**	0.29	-0.22**	0.02	0 ^a	—	—	—	-0.01	0.01		1637.05
M. Assault (Y)	2.09	1.20	1.56**	0.42	-0.76**	0.01	0 ^a	—	—	—	-0.02**	0.00	.14	761.42
M. Assault (P)	2.46	4.18	2.03**	0.60	0.11	1.47	0 ^a	—	—	—	0.07	2.45		496.92
S. Assault (Y)	0.44	1.64	2.00**	0.77	-1.50	0.01	0 ^a	—	—	—	-0.34**	0.00	.54	487.69
S. Assault (P)	2.82	1.59	1.79**	0.70	-0.74**	0.00	0 ^a	—	—	—	-0.15**	0.00	.57	247.07
NV Disc. (Y)	0.36	0.67	0.64**	0.13	-0.26**	0.02	0 ^a	—	—	—	0.02**	0.01	.20	1881.67
NV Disc. (P)	1.91**	0.42	0.55**	0.15	-0.27**	0.02	0 ^a	—	—	—	0.04**	0.01	.57	1969.33
	<i>Social support</i>													
ISEL, Tot.	90.40**	6.02	139.42**	27.52	0.55	1.10	2.22*	0.83	—	—	1.21**	0.46	.46	2998.82
ISEL, App.	21.68**	2.18	14.14**	3.93	0.13	0.40	0.23*	0.10	—	—	-0.45**	0.17	.67	2258.46
ISEL, Bel.	22.30**	2.17	14.11**	2.64	0.12	0.37	0.18*	0.09	—	—	0.36**	0.15	.57	2169.86

Note. CBCL _ Child Behavior Checklist (Int. _ internalizing symptoms; Ext. _ externalizing symptoms; Tot. _ total symptoms); TSCC _ Trauma Symptom Checklist Children (Dep. _ depression; Diss. _ dissociation; Ang. _ Anger; Anx. _ Anxiety); SSRS _ Social Skills Rating Scale (Tot. _ total skills); BSI _ Brief Symptom Inventory; GSI _ Global Severity Index; PST _ Positive Symptom Total; CTS _ Conflict Tactics Scale (P. _ Psychological; M. _ Minor; S. _ Severe; NV _ Nonviolent); (Y) _ youth; (P) _ parent; ISEL _ Interpersonal Support Evaluation List (Tot. _ total support; App. _ appraisal; Bel. _ belonging); V _ parameter variance; SE _ standard error; d _ effect size for MST-CAN; BIC _ Bayesian information criterion. Dichotomous coding was treatment (EOT _ 0, MST-CAN _ 1). All models used individually varying time scores (T0-T16; MLR estimation) and controlled for age and gender on growth factors; *N* = 86. ^aResidual variances were fixed at zero for all quadratic growth factors and for linear (slope) growth factors involving count variables (i.e., negative binomial models).

* *p* < .05. ** *p* < .01.

Social support outcomes. Parents who received MST-CAN reported significant increases in total, appraisal, and belonging social support, whereas EOT counterparts did not.

Maltreatment Outcomes

Maltreatment outcomes pertained to reabuse of the youth, abuse of any child by the target parent, and youth out-of-home placements. Over 16 months post-baseline, fewer youth in the MST-CAN condition experienced an incident of reabuse than did counterparts in the EOT condition (4.5% [2 children] vs 11.9% [5 children], respectively); however, this difference was not statistically significant, $\chi^2(1, N = 86) = 1.56, p = .198$. Similarly, although parents who received EOT were more likely to have an incident of reabuse relative to MST-CAN parents (4.8% [2 parents] vs. 2.3% [1 parent], respectively), this difference was not statistically significant (95% CI = 0.19–24.43, ns). Moreover, history of CPS involvement did not predict reabuse by the parent (OR = 0.74, 95% confidence interval [CI] = .06–8.69). Although it is possible that parents’ reabuse rates were affected in cases where target youths were out of the home, this concern is mitigated by including abuse of any child, not just the target child.

Youth who received MST-CAN were significantly less likely to experience an out-of-home placement (*n* = 6 placed) over 16 months than were youth in the EOT condition (*n* = 13 placed), $\chi^2(1, N = 86) = 3.74, p < .05, \phi = .21$. Likewise, youth in the MST-CAN condition experienced significantly fewer placement changes (*M* = 0.25 vs. 0.76, respectively; range 0–7 placement changes; *t*(1) = 3.88, *p* < .05, $\eta^2 = .21$). Although youth who received MST-CAN spent fewer days out of their homes than did EOT counterparts (*M* = 21.3 vs. 57.7 days, respectively; range 0–442 days; *t*(1) = 2.68, *p* = .11, $\eta^2 = .17$), this effect was not significant.

Clinical Significance

Evidence for clinical significance was apparent for youth and parents across domains. For example, MST-CAN reduced the percentage of youth scoring in the clinical range (i.e., T score > 65) on self-reported PTSD symptomatology by half (from 17.8% at baseline to 8.9% at 16 months post baseline) whereas the percentage for the EOT group increased (from 19.0% at baseline to 21.4% at 16 months). Similarly, the percentage of MST-CAN parents exceeding clinical thresholds for psychiatric distress (i.e., T score on the BSI-GSI > 65) decreased by 75% (from 20.5% at baseline to 5.3% at 16 months), whereas the EOT group remained flat (from 16.7% to 15.8%). Regarding the clinical significance of changes in parenting behavior, for example, on average, MST-CAN youth reported about half as many incidents of severe assault by their parent across the 16 months than did EOT youth (4.7 vs. 9.8 incidents, respectively).

DISCUSSION

The findings support the capacity of MST-CAN to be transported effectively to a community-based setting and to improve key risk factors for youth physical abuse across youth, parent, parenting, and social support domains – with effect sizes in the medium to large range for most outcomes examined. When contrasted with standard community services enhanced with specific engagement strategies and a parenting program, intent-to-treat analyses showed that MST-CAN was more effective at decreasing youth and parent mental health symptoms, with effect sizes in the medium to large range. Importantly, given the serious nature of the referral problems, MST-CAN was also more effective at addressing aspects of parenting that are associated closely with maltreatment from both youth and parent perspectives. In particular, the reduction in parental use of severe assault was strong and consistent from both perspectives (medium effects), and the youth-reported reduction in parental neglect was substantial (large effect size). Moreover and consistent with the aims and social-ecological framework of MST, social support outcomes indicated that parents in the MST-CAN condition made connections with people in their natural environment that lasted well beyond treatment. Improvements in social support were robust, with medium effect sizes. These changes occurred across several levels of the family's social ecology, potentially supporting the interdependence of these risk factors (e.g., improved parent mental health and social support facilitate improved parenting).

Although the risk factor findings were consistent, results were mixed regarding maltreatment outcomes. At 16 months post baseline, between group differences on reabuse of the youth (4.5% versus 11.9%) and by the parent (2.3% versus 4.8%) for MST-CAN and EOT respectively, were not significant. However, youth in the MST-CAN condition were significantly less likely to be placed out of their home (14% versus 30%) than were EOT counterparts during this time. Moreover, when placements did occur, MST-CAN youth experienced significantly fewer placement changes. Although the treatment effects on out-of-home placements were small, a youth remaining with family and improving on mental health functioning is meaningful.

Given the clinical outcomes noted above, a next step is to consider the characteristics of MST-CAN that make it a successful model and to determine factors related to implementation. Given that MST is a model that includes specific clinical, service delivery, and quality assurance characteristics, the relative effectiveness of MST-CAN is likely linked to the multiple key components of MST noted earlier. First, as indicated by the risk factor results, MST-CAN

explicitly addressed the multi-determined nature of child physical abuse at individual, family, and social system levels. Second, treatment emphasized the empowerment of family members, and study outcomes tended to support the validity of such an emphasis. Third, the home-based model of service delivery was effective at engaging families through an intensive clinical process (e.g., 98% rate of treatment completion). Fourth, holding sessions at times convenient to families and the 24/7 therapist on call availability assured that safety plans were in use. Fifth, assessment focused on understanding the drivers of key problems occurring in the family and evidence-based interventions were tailored to the needs of each family rather than a one size fits all strategy. Sixth, intensive quality assurance (intensive training, weekly intensive supervision) was used to support therapist fidelity, which has been critical to favorable outcomes in previous MST trials (Henggeler et al., 2009). Seventh, MST-CAN provided services via a clinical team rather than through multiple uncoordinated providers as is often the case in standard services.

MST-CAN, like standard MST, has the potential to be successfully transported to the real world through a single provider agency. Importantly, transport of this model to community agencies requires a strong commitment on the part of stakeholders to follow the model with integrity by supporting all clinical, supervision, and consultation processes. Although the intensity of MST-CAN and its associated cost might be considered a barrier to such transport, similar barriers have been addressed successfully by the more than 400 MST programs for treating juvenile offenders and their families that are currently in operation worldwide. Given the small caseloads and the intensity of the treatment, MST-CAN also requires financial commitment to assure that the clinical team is adequately funded. But, in light of existing vast expenditures in the area of child protection, the feasibility of transporting evidence-based treatments of physical abuse into community settings should not be dampened by barriers to system change or costs that may exceed those of less effective or nonevidence-based services.

Limitations

Several study limitations should be noted. First, we examined multiple outcomes, which may have increased the risk of Type I error. However, given the small sample size ($N = 86$) and restricted statistical power in this study, the risk of Type II error seemed the greater concern, and a decision was made to retain alpha at .05 for all statistical tests. Moreover, because MST-CAN targets a broad range of risk factors associated with child maltreatment, the examination of multiple outcome domains was important, particularly given the dearth of studies regarding interventions for maltreated adolescents and the need to understand the potential range of treatment effects. Second, although expert consultation is a core component of MST programs in the real world, the lead developer of the MST-CAN adaptation was co-supervisor on the project, which could limit generalizability of outcomes. Third, MST-CAN therapists provided services in the home, which is critical to removing barriers to service access for all MST programs. It is unknown whether their presence reduced or increased the likelihood of reabuse or its detection (i.e., due to increased monitoring). Fourth, although the completion rate of the STEP-TEEN program was high relative to common completion rates for families at the Center and to maltreatment populations in general, this rate was significantly lower than for MST-CAN and could have influenced the clinical outcomes. Fifth, 69% of the participating families were Black, generalization is somewhat limited by race. Finally, service utilization data were collected via parent self report. Not including chart data from the differing agencies, especially for EOT families may have underestimated the services received.

In conclusion, this study presented findings from the first randomized effectiveness trial of MST-CAN. Extending beyond the previous family-based efficacy research with this population, findings support the viability of a comprehensive ecologically-based approach in a community setting.

ACKNOWLEDGMENTS

This study was supported by National Institute of Mental Health Grant R01MH60663 to Cynthia Cupit Swenson. The authors wish to thank Dr. Lisa Saldana for her substantial contributions during the study and Dr. Elena Tuerk, Dr. Thom Hiers, Cathy Joyner, Eugene Caldwell, Mac Magee, Odessa Williams, Ralph Terry, Anthony Joyner, Tyren Gaines, Dawn Cassidy Allen, Premsagar Bandi, Mary Grady, Sonya Jenkins, Rand Butcher, Janet Cox, Stephanie Pilgrim, Patsy Strom, Sonya Easterling, Anne Fouche, Perry Johnson, Lourdes Sanchez, Jackie Knight, Stacey Cody, and Angelia Herndon for their work to make this project successful. We thank Dr. David Kolko, Dr. Barbara Burns, Dr. John Landsverk, and Dr. Elissa Brown for their guidance on this project. We are especially grateful to the families who participated in the project.

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