



Changes in family functioning and child behavior following intensive in-home therapy

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Abstract

Mechanisms by which intensive in-home therapy results in positive outcomes are little explored. This study tests the efficacy of standardized intake assessments to predict educational, correctional and placement outcomes for troubled youth after an intervention derived from MST (Intercept). Demographics, prior risk, and assessments of family functioning (FAM-Gen III), family structure (FACES-III) and child behavior (CBCL) were completed for 862 youth at intake who received intensive in-home therapy. One-year post-discharge outcomes including living situation, out-of-home placement, trouble with the law, and educational progress are described. Cox–Snell pseudo- R^2 is used to assess the contribution of the independent variables. Results show that risk and demographic factors explain as much or more variation in outcomes than the three assessment measures. More maltreatment types, and past partial hospitalization, residential treatment, or inpatient treatment predict less likelihood of living with family, and greater likelihood of out-of-home placement during the follow-up period. Age is a predictor of experiencing trouble with the law, with the probability of experiencing such trouble increasing by 1% for each one month increase in age at intake. These findings suggest that psychometric measures administered at intake contribute only moderate amounts to the explanatory value of demographics and risk factors. Policy and practice implications are forwarded.

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1. Introduction

The effective use of evidence-based interventions in community settings begins with understanding clients' characteristics and determining what additional research evidence is needed to achieve the best outcome (APA Presidential Task Force [APA], 2005). Such an understanding transcends the traditional approach of determining an intervention's efficacy to reduce a disorder or problem in a specific setting. In the analysis of family-focused interventions, the types of additional research evidence that warrant consideration when assessing the effectiveness of interventions include service history, genetics, gender, culture, family functioning, and the community context. Understanding the interplay between these factors and the evidence-based intervention can help predict the likelihood of success, as well as suggest modifications that are needed for different subgroups. Weisz and Kazdin (2004) call for a "new generation of research on mechanisms underlying change" in evidence-based practices (p. 445). Further, they argue that findings that fail to support expected mediational relationships may be more important than those that do because they may encourage us toward more alternative and, perhaps, more efficient ways of thinking about the achievement of change. This article examines the contribution of history, risk factors, and family functioning in the implementation of an evidence-based family- and community-focused intervention derived from Multisystemic Therapy (MST). In so doing, this article serves as a guide to the collection of case information that can help explain treatment outcomes. In the present study, we address the following questions: (1) Do risk and demographic variables predict case outcomes and, if so, which risk and demographic variables predict case outcomes? (2) Do standardized assessment instruments provide additional information about case outcomes and, if so, are certain instruments more likely to contribute to understanding case outcomes?

MST is a comprehensive, short-term, home- and community-based intervention for troubled youth and their families. By way of 11 randomized-controlled trials that have included more than 1300 families, MST has arguably become the nation's most rigorously evaluated in-home treatment for reducing youths' serious antisocial behaviors (Henggeler, 2006). Although there is heated debate about the quality of the research that undergirds the efficacy claims of MST and the importance of findings that were never published and would have shown no benefit for MST (Henggeler, 2006; Littell, 2006), the approach has been heralded by many reviewers of evidence-based interventions for youth. Rooted in Bronfenbrenner's (1979) social-ecological model of human development, MST strives to change antisocial behavior by modifying fundamental features of a youth's social context in ways that endorse prosocial behavior (Huey, Henggeler, Brondino, & Pickrel, 2000). The evidence of the efficacy of MST in treating youths presenting with serious clinical problems and their families has been steadily accumulating over the past two decades.

Evidence that MST influences child outcomes is provided by studies that have examined changes in parental reports of child behavior using a problem behavior checklist (e.g., Child Behavior Checklist; [CBCL]), family functioning measured by psychometric properties (e.g., reported by youth or parents on the Family Adaptability and Cohesion Evaluation Scales [FACES-III]), and case status assessment (e.g., whether the child has been hospitalized). These changes have been assessed in relation to delinquency outcomes (Henggeler et al., 1986), mental health (Henggeler, Rowland et al., 1999), school attendance (Brown, Henggeler, Schoenwald, Brondino, & Pickrel, 1999), and child abuse (Brunk, Henggeler, & Whelan, 1987). The intention of this review is to articulate the "contextual pathways" (Huey et al., 2000, p. 451) identified in prior studies of MST, and to clarify the mechanisms of positive change that may be promoted by

receipt of MST. An understanding of these mechanisms will also give better guidance to the selection of measures most likely to assess whether such mechanisms are in operation or whether changes in clinical interventions may be necessary.

The organization of this review is complicated by the fact that MST studies include several different, albeit often overlapping, populations of concern such as delinquents, maltreating families, violent and chronic juvenile offenders, youth presenting with psychiatric emergencies, juvenile sex offenders, and youth with serious emotional disturbance. Current MST studies also vary by whether information about the relationship among preexisting risk, youth behavior problems, family functioning, school attendance, and changes in status were included. Given these challenges, the literature review that follows is organized by outcome area. Studies that evaluated multiple outcome areas are discussed in each of the applicable domains. The review is limited to published studies.

2. Risk factors

Few MST studies have entered risk factors as covariates for outcome measures to control for potential differences at intake between the intervention and comparison groups, as well as to account for possible time effects. Among studies using this approach, the most common covariates used are intake assessment scores of self-reported delinquency and child behavior. In a study of MST for youth with serious emotional disturbance (SED), [Rowland et al. \(2005\)](#) used intake scores on the Self-Report Delinquency Scale (SRDS) as a covariate to examine between-group differences. Baseline scores on the SRDS were significantly higher for MST-served youth than usual-services youth for both index offenses ($p < .05$) and minor offenses ($p < .05$), indicating that MST-served youth were considered more antisocial than usual services youth at pretreatment. The outcome analyses, per customary procedure, included pretreatment SRDS scores as covariates.

Differences between MST and usual-services groups were also used as covariates in the analysis of [Ogden and Hagen's \(in press\)](#) two year follow-up inquiry of MST effectiveness in a Norwegian study of youth with serious behavior problems. SRDS and CBCL scores indicated significantly lower baseline risk for delinquent and problem behavior for MST-served youth ($p < .05$). Pretreatment assessment scores were entered as covariates to control for these baseline differences.

Child and parent age served as covariates in [Brunk et al.'s \(1987\)](#) comparison of MST and parent training in the brief treatment of child abuse and neglect. When the analysis revealed a significant pre- to post-effect among each group of measures (e.g., Symptom Checklist-90, Behavior Problem Checklist, Family Environment Scale, Family Inventory of Life Events and Changes, and Treatment Outcome Questionnaire), the individual measures in the group were reanalyzed, with child age and parent age entered as covariates. However, no discussion of the effects of these covariates on the outcome measures was provided.

Despite the probable importance of measuring and correcting for covariates in outcome measures to reduce variability and to correct potential lack of independence between outcomes and treatment conditions ([Imbens, 2004](#); [Shadish, Cook, & Campbell, 2002](#)), the above evidence suggests that relatively few MST studies have done so. Although most prior MST research has used random assignment to decrease the plausibility of alternative explanations for observed effects, Shadish and his colleagues nevertheless emphasize the importance of addressing “whatever biases the best possible design cannot deal with” (p. 161). One approach is to enter risk factors as covariates. However, MST's origination as part of the empirically supported treatment (EST) movement may be responsible for the deemphasizing of covariates in MST research

because ESTs focus the evaluation on whether the treatment works for a certain disorder or problem under a specific circumstance (APA, 2005). Thus, ESTs, including MST, are less likely to address the characteristics, risk, and protective factors of the distinct client populations served. MST studies have not emphasized controlling for covariates even though there is evidence that the groups might not be equivalent, regardless of randomization. In the review of studies of MST, we consider which outcomes were assessed and whether or not covariates were tested for their ability to explain study outcomes.

3. Youth antisocial behavior and mental health symptoms

Prior research offers evidence that MST is effective in reducing youth's anti-social behavior. The first published MST study (Henggeler et al., 1986) evaluated treatment efficacy among 57 inner-city juvenile offenders and their families. MST-served adolescents ($n=23$) demonstrated a significant reduction in problem behaviors. Similarly, in another study of serious juvenile offenders, mothers of MST-served youth reported a significant decrease in adolescent behavior problems from pre to post-treatment, whereas mothers of youth in the control group reported a significant increase in behavior problems ($p<.05$; Borduin et al., 1995).

MST has also been evaluated as an alternative to psychiatric hospitalization for youth in crisis, in a series of studies (Henggeler, Rowland et al., 1999; Henggeler et al., 2003). In the initial study, youth presenting with psychiatric emergencies were randomly assigned to MST ($n=57$) or inpatient hospitalization ($n=56$). Results obtained at four months post-recruitment showed that MST was more effective than emergency hospitalization at decreasing youths' externalizing symptoms as measured by the CBCL. In a follow-up study using the same sample of youth, results showed that significantly fewer MST-served youth experienced hospitalization ($p<.001$) and spent significantly fewer days hospitalized ($p=.001$) at four months post-approval for emergency psychiatric hospitalization. Furthermore, MST-served youth experienced significantly fewer changes to more restrictive placements ($p=.01$; Schoenwald, Ward, Henggeler, & Rowland, 2000). However, the most recent study in this series indicated that these favorable four-month outcomes dissipated at 16 months post-recruitment (Henggeler et al., 2003).

The efficacy of MST in treating juvenile sex offenders has also been assessed (Borduin & Schaeffer, 2001). Using an adaptation of MST referred to as MST-Problem Sexual Behavior (MST-PSB), researchers randomly assigned a sample of 48 youth and their families to either a MST-PSB group or usual sex-offender treatment conditions. Preliminary results suggested that MST-PSB was significantly more effective than the usual-services condition in decreasing youth behavior problems and symptomatology as measured by the CBCL.

In the second published study of MST outside of the United States and one of the first investigations conducted by researchers other than the developers of MST, Ogden and Halliday-Boykins (2004) randomly assigned 100 seriously antisocial youth in Norway to MST ($n=62$) or usual child welfare services ($n=38$). Results showed that MST was significantly more effective than usual child welfare services at reducing youth internalizing behaviors ($p=.03$), and marginally more effective at decreasing externalizing behaviors ($p=.07$).

Recently, Ogden and Hagen (in press) examined the long-term effectiveness of MST for the same sample of Norwegian youth. Results showed that two years post-intake, the parents of MST-served youth rated their children significantly lower on the total problem scale of the CBCL than did parents of youth in the comparison group ($p<.05$).

In a four-condition randomized design, MST was integrated with juvenile drug courts to determine the intervention's ability to enhance outcomes (Henggeler et al., 2006). Juvenile

offenders meeting diagnostic criteria for substance use or dependence were randomly assigned to four conditions: (1) family court with usual community services, (2) drug court with usual community services, (3) drug court with MST, and (4) drug court with MST enhanced with contingency management. Findings revealed that drug court was more effective than family court in decreasing adolescent substance use and criminal behavior, and that MST within the drug court context significantly improved substance use outcomes. No covariates were tested in the final models, and there was no discernible reduction in rates of out-of-home placement.

In the first randomized clinical trial of MST with juvenile offenders in the United States conducted without direct oversight by the model developers, Timmons-Mitchell, Bender, Kishna, and Mitchell (2006) examined the effectiveness of MST in a mental health setting with juvenile-justice involved youth and their families. Youth were randomly assigned to either MST or treatment as usual. MST youth experienced a significant reduction in re-arrest 18 months following treatment ($p < .05$), and significant improvement in four of the six areas of the Child and Adolescent Functional Assessment Scale (school/work, home, community, and moods and emotions, $p < .05$) six months following treatment.

In sum, eight published studies suggest that participation of families in MST is followed by measured reductions in antisocial behavior and mental health symptoms. Youth that received MST experienced a significant reduction in overall behavior problems (Borduin et al., 1995; Borduin & Schaeffer, 2001; Henggeler et al., 1986; Ogden & Hagen, in press), and both internalizing and externalizing symptoms (Henggeler et al., 2003; Henggeler, Rowland et al., 1999; Ogden & Halliday-Boykins, 2004). Additionally, youth in psychiatric crisis experienced less hospitalization and fewer changes to more restrictive placements (Schoenwald et al., 2000); juvenile offenders in receipt of MST had improved substance use outcomes (Henggeler et al., 2006), as well as a reduction in rearrest rates (Timmons-Mitchell et al., 2006).

4. Family functioning

Changes in family functioning that follow participation in MST have also been assessed. Henggeler et al. (1986) examined the effect of MST on family functioning using the self-reported Family Relationship Questionnaire (FRQ) and observational measures of affect, conflict, dominance, and defensive and supportive communication. The overall FRQ did not yield significant results, although the measure of affect for the mother-adolescent dyad was rated as significantly more warm and affectionate ($p < .01$), and evidenced significantly fewer aggressive verbalizations following MST ($p < .05$). Furthermore, the measure of affect for the mother-father dyad was rated as significantly more warm and affectionate following MST ($p < .001$).

In addition, MST has been examined as a treatment for child abuse and neglect, an indicator of family functioning. Brunk and her colleagues (1987) compared the effectiveness of MST to parent training. The researchers randomly assigned 33 families to either MST ($n = 16$) or parent training ($n = 17$). Self-report and observational measures were used to evaluate individual functioning, family relations, stress, and social support. Analyses of observational measures revealed that MST was significantly more effective than parent training at restructuring parent-child relations; specifically, parental effectiveness increased in both gaining the child's attention ($p < .05$) and at having the child perform some action ($p < .05$).

In a study of 84 serious juvenile offenders and their multiproblem families, Henggeler, Melton, and Smith (1992) assessed the efficacy of MST in improving family relations as measured by the FACES-III. Families in the MST condition ($n = 43$) reported a significant increase in family cohesion following the intervention as compared to the control group ($n = 41$; $p = .041$).

The long-term effects of MST were compared to individual therapy for the prevention of criminal behavior and violent offending in a study where 176 families were randomly assigned to MST ($n=92$) or individual therapy provided to the juvenile offender ($n=84$; [Borduin et al., 1995](#)). Parental and adolescent perceptions of family relations were assessed with the FACES-III. Families receiving MST reported a significant increase in family adaptability and cohesion post-treatment, whereas families receiving individual therapy reported a significant decrease ($p<.05$) in these characteristics.

[Henggeler, Rowland et al. \(1999\)](#) evaluated family functioning through youth and caregiver reports on the FACES-III. A significant treatment effect was found for youth reports of family adaptability ($p<.039$). Families in the MST condition became more structured, whereas families in the hospitalization condition became less structured. Caregiver reports also indicated that family cohesion increased in the MST group and decreased in the hospitalization group ($p<.01$).

In the first study to examine the multiple mechanisms through which MST is thought to produce favorable outcomes, [Huey et al. \(2000\)](#) assessed delinquent behavior in two samples of juvenile offenders. The first sample primarily included rural, violent, and chronic juvenile offenders who were predominantly male and African American. The second sample included adjudicated juvenile offenders meeting diagnostic criteria for either a substance abuse or dependence disorder who were predominantly urban, male, and Caucasian. All youth were randomly assigned to either the MST ($n=57$, Sample 1; $n=54$, Sample 2) or usual-services condition ($n=73$, Sample 1; $n=60$, Sample 2). The quality of family functioning in Sample 1 was evaluated using parent and youth reports on the Family Assessment Measure, whereas parent and youth perceptions of family cohesion in Sample 2 were assessed with the FACES-III. Results from Sample 1 indicated that MST adherence was directly associated with improved family functioning over time. However, results from Sample 2 indicated that improvements in family cohesion and monitoring were only associated with decreased deviant peer affiliation over time.

Overall, six published studies included measurements of family functioning. Improvements were shown following MST, across a variety of family types and conditions. Following MST, intervention families were more warm, affectionate, and used less aggressive language ([Henggeler et al., 1986](#)). They also become more cohesive ([Borduin et al., 1995](#); [Henggeler et al., 1992](#)) and adaptable ([Borduin et al., 1995](#); [Henggeler, Rowland et al., 1999](#)). In addition, as an indicator of family functioning, MST participation was associated with improved parent–child relations among families at-risk for child abuse and neglect ([Brunk et al., 1987](#)).

5. School attendance

Although not as widely evaluated as other outcome areas, two studies have examined the effectiveness of MST in increasing school attendance. [Brown et al. \(1999\)](#) examined data on 118 substance abusing juvenile offenders with high rates of psychiatric comorbidity who were randomly assigned to receive MST ($n=58$) versus usual community-based services ($n=60$). Participants' school attendance was assessed with a multimethod approach. Results indicated that there was a significant increase in school participation for the MST-served youth over time, as treatment gains were maintained at the six-month follow-up ($p=.027$). [Henggeler, Rowland et al. \(1999\)](#) also examined school attendance in their study of MST used as an alternative to hospitalization for youth in psychiatric crisis. Results indicated that youth in the MST group were absent from school significantly fewer days than youth who were hospitalized ($p<.044$). The promising results of educational gains shown in this pair of published studies suggests that MST may benefit school performance, although the infrequency of reported results on school performance leaves substantial need for research assessing this outcome.

6. Case outcome status

Although many factors contribute to a child's case plan — and some of them are not closely tied to a child's performance — case status is still an important outcome indicator because it often has significant fiscal implications and may also shape a youth's future opportunities. Both criminal recidivism and out-of-home placements of juvenile offenders impact the health and well-being of communities and are associated with substantial financial costs. Therefore, reducing these outcomes is both an important social and economic concern. Various studies have examined the effectiveness of MST in treating violent and chronic juvenile offenders by evaluating criminal recidivism and out-of-home placements.

Henggeler et al. (1992) found that in comparison with youth who received usual services, youth who received MST had significantly fewer arrests ($p=.050$), fewer self-reported offenses ($p=.047$), and spent significantly fewer weeks incarcerated ($p=.006$). Using the same sample of youth, another study provided evidence that MST significantly reduced criminal recidivism almost 30 months post-referral (Henggeler, Melton, Smith, Schoenwald, & Hanley, 1993). Survival analysis showed that MST youth ($n=43$) were significantly less likely to be rearrested than youth who received usual services ($n=41$; $p<.05$). Similarly, Borduin et al. (1995) found that results from a four-year follow-up of rearrest data indicated MST to be significantly more effective than individual therapy in preventing criminal behavior, including violent offending ($p<.0001$).

In a study of 155 violent and chronic juvenile offenders and their families, Henggeler, Melton, Brondino, Scherer, and Hanley (1997) examined the use of MST compared to usual juvenile justice services. Participants and their families were randomly assigned to MST ($n=82$) or usual services ($n=73$). At almost two-years post-discharge, the annualized rate of days incarcerated was significantly lower for youth in the MST condition than for those who received usual services ($p<.008$).

MST has also been shown to reduce out-of-home placement. Using the same sample of substance abusing delinquents as Brown et al. (1999) and evaluating data from a six-month post-treatment follow-up, Henggeler, Pickrel, and Brondino (1999) found that receiving MST reduced total days in out-of-home placement by 50%. Results showed that youth in the MST condition experienced substantially fewer days in out-of-home placement (i.e., any institution-based domicile, including detention centers, jails, psychiatric or substance abuse hospitals, and residential treatment centers) than youth in the usual services condition during the period between baseline and six-month post-treatment follow-up. MST's long-term effectiveness in preventing criminal recidivism and incarceration among juvenile sex offenders has also been investigated (Borduin & Schaeffer, 2001). At a nine-year follow-up, MST was significantly more effective than usual services at preventing sexual offending, other criminal offending, and incarceration.

Recently, MST has been adapted for youth with serious emotional disturbance (SED). Rowland et al. (2005) examined six-month post-recruitment placement outcomes in a study in Hawaii where 31 youth with SED were randomly assigned to MST adapted for SED populations ($n=15$) or to Hawaii's existing continuum of care services ($n=16$). This research examined the efficacy of MST to maintain the youth in the community by calculating the number of days youth spent in out-of-home placement (e.g., inpatient, residential, foster care, group homes, detention, or jail) between baseline and follow-up per month. Results showed that MST was more effective at maintaining youth in the community ($p=.025$); MST youth averaged fewer days of out-of-home placement services per month than usual services youth.

In the most extensive follow-up to date of a MST clinical trial, Schaeffer and Borduin (2005) examined the long-term criminal activity of 176 youth who participated in either MST ($n=92$) or individual therapy ($n=84$) in a randomized clinical trial (Borduin et al., 1995). Arrest and

incarceration data were obtained on average 13.7 years later when participants' age averaged 28.8 years. Results showed that the overall recidivism rate for the MST participants was significantly lower than the overall rate for the control group ($p < .0001$).

Ogden and Halliday-Boykins (2004) examined the effectiveness of MST in reducing child welfare out-of-home placements in Norway. Youth in the MST group were maintained in their homes significantly more often than youth in the comparison group ($p < .001$). In Ogden and Hagen's (in press) extension of this work, out-of-home placement was examined two years after intake to treatment. Results suggest that MST participants were significantly less likely to be placed out-of-home than their comparison group counterparts ($p < .07$).

Although this extensive evidence suggests that MST has demonstrated substantial promise for the treatment of youth with serious clinical problems, relatively little is known about how MST brings about these favorable outcomes. The authors are aware of only one study that has examined multiple change processes. In that study, Huey et al. (2000) examined the outcomes of MST in two samples of juvenile offenders (see previous description). The 57 youth and families who received MST in Sample 1 experienced an improvement in family functioning that was directly associated with decreased delinquent peer affiliation and decreased delinquent behavior over time. In Sample 2, the 54 youth and families who received MST experienced improvement in family cohesion and monitoring that was associated with decreased affiliation with deviant peers, which in turn, was associated with decreased delinquent behavior. At pretest, a latent variable that combined family functioning and cohesion had a direct path to delinquency of $-.20$ and at post-test this was $-.21$. Findings showed changes in delinquent behavior were predicted by changes in family functioning. In addition, the findings also supported a family-centered mediation model in which improved family relations predicted both decreased delinquent peer affiliation and delinquent behavior.

In sum, nine studies included outcome data on changes in case status. MST significantly reduced youth's arrests, incarceration, recidivism, and out-of-home placement rates. These results highlight the importance of additional research that brings to light the fiscal implications associated with the successful redirection of violent and chronic juvenile offenders.

The predictive capability of the child behavior and family functioning assessments that are used to measure such MST outcomes has not been widely explored. Questions remain regarding the robustness of the findings of a relationship between the measures of family functioning, especially the extent to which the use of alternative measures and statistical methods will yield similar results. The present investigation builds upon the work of Huey et al. (2000) by examining the value of the information from child and family clinical assessments in predicting educational, correctional, and placement outcomes for troubled youth following an intensive in-home therapy intervention derived from MST.

Although the present study also uses the FACES III and the Family Assessment Measure-General Scale, (FAM-Gen III), the population served was more heterogeneous (i.e., was not restricted to delinquent youth) and the outcome measures were more varied (e.g., education, placement, and trouble with the law) and based on parental report rather than youth self-report. Furthermore, two measures (e.g., parental monitoring and therapist fidelity) used by Huey et al. (2000) in their multivariate models were not included in our multivariate analyses. However, other additional background factors (e.g., youth demographics and prior service involvement) are included. In all, these significant variations in method would not be expected to produce estimates of the impact of family functioning on child outcomes that are a precise match to the prior research. Yet, if the conceptual framework is robust, these relationships should be manifest.

7. Method

7.1. Design and sample

In describing changes in family functioning, family structure, child behavior, and one-year post-discharge outcomes (e.g., educational status, legal problems, placement instability, and restrictiveness of placement) the authors used data from closed case files from a large provider of behavioral health services for troubled children and their families with locations throughout the Southeast. The one-year outcomes of an intensive in-home treatment program derived from MST were assessed. The outcomes in this study included changes in family relationships, changes in problem behavior, and one-year post-discharge outcomes for school attendance, trouble with the law, and the case status of placement at home or in a home-like environment.

Data used in the present investigation are from 862 participants. This is 68% of the 1264 children in the population of African American or Caucasian youth who received intensive in-home therapy only and who had data on at least one assessment. The 862 participants had *all three* assessments (CBCL, FAM-Gen III, and FACES-III) at admission. Table 1 presents the demographic characteristics of the final study sample. The number of study participants varies by analytic model due to listwise deletion of missing data.

Each case was categorized according to whether parent reports were completed, not completed, or not required (assessments were not required if length of service was less than 30 days or if the youth was a participant in the Rural Appalachian Project). Age, race, and gender were then tested to determine if there were relationships with these categories. Youth ages 13 to 15 years had fewer completed intake assessments (31.9%) as compared to youth ages 12 and under (35.4%) and youth 16 years and older (32.7%); [$\chi^2(2, n=1,119)=8.21; p<.05$]. No relationship was found with gender ($p<.28$) or race/ethnicity ($p<.41$). All cases with missing data were excluded from the analyses.

A relationship may exist between the case characteristics and missing data that would confound results. To assess this likelihood, the status of each assessment packet was examined by

Table 1
Sample demographic characteristics ($n=862$)

Variable	% or <i>M</i> (SD)
Race	
Caucasian	78.0%
African–American	22.0%
Gender	
Male	65.2%
Female	34.8%
Age at intake — in months	155.3 (37.7)
Referral source	
Tennessee Department of Children’s Services	2.4%
TennCare — Tennessee’s Medicaid Waiver Program	82.2%
Community Services Agency	6.6%
Mississippi Department of Human Services	6.0%
Other*	2.6%
Program location	
Urban area (Pop. 50,000+)	53.6%
Non-urban area	46.4%

Note: *Includes private insurance, charity care, and unique funding agreements.

case characteristic. Age, race, gender, and risk factor counts of the youth were tested to determine if there were relationships with sample attrition between baseline and one-year follow-up. No relationship was found between sample attrition and (a) race/ethnicity ($p < .40$); (b) gender ($p < .27$); or (c) risk factor count ($p < .10$). Youth younger than 12 years had lower attrition (18.0%) than either youth ages 13 to 15 years (24.0%) or youth ages 16 and older (26.6%); [$\chi^2(2, n=1,119)=8.22; p < .05$].

7.2. Measures

7.2.1. Demographics and case background

Data included youth gender, race, and age at intake, referral source, and urbanization of the program location where the youth was served. Additional intake data included risk factor domains such as youth's criminal charges, presenting problems, past treatment, past runaway behavior, gang involvement, commission of a sex offense, and the presence of siblings in out-of-home care. Risk factor variables were derived from the intake assessment data and included both dummy and count variables. Derived dummy variables were created for 15 distinct risk factors including beyond parental control¹ (13.5%); simple assault (4.3%); other criminal behavior (14.1%); maltreatment (12.9%); delinquency (52.7%); mental health problems (49.9%); substance abuse problems (13.3%); runaway behavior (10.2%); gang involvement (1.2%); commission of a sex offense (6.1%); siblings in out-of-home care (2.2%); past placement (4.9%); past mental health placement (61.3%); past inpatient treatment (28.6%); and past outpatient treatment (42.1%). Count risk factor variables were derived for distinct risk factors that had multiple responses including the number of maltreatment types ($M=.18, SD=0.51$); number of delinquency types ($M=1.14, SD=1.32$); number of mental health problems ($M=1.02, SD=1.25$); and number of substance abuse problems ($M=1.18, SD=0.50$). A summary count variable was created for the total count of risk factors including each of the distinct risk factors as well as the variation within risk factors ($M=0.51, SD=0.72$).

7.2.2. Family functioning outcomes

Clinical parameters of family functioning (e.g., task accomplishment, role performance, communication, affective expression, involvement, control, and values and norms) were assessed using the Family Assessment Measure (FAM; Skinner, Steinhauer, & Santa-Barbara, 1995). Although the FAM consists of four self-report components, the present study used only the General Scale (FAM-Gen III), which consists of 50 items and 9 subscales. This instrument focuses on the family from a system perspective and provides an overall rating of family functioning. Two performance scales (i.e., social desirability and defensiveness) are also provided, the responses to which determine if the scores on the other scales are valid. Responses to items are made on a 4-point Likert scale ranging from *strongly agree* to *strongly disagree*. Standardized scores outside of the normal range (i.e., less than 40 or greater than 60) are thought to indicate either very healthy functioning (40 or less) or considerable disturbance (60 or greater). Internal consistency for the FAM-Gen III has been estimated to be .93 for adults and .94 for children as assessed in a study of 247 normal adults and 65 normal adolescents participating in control groups at a variety of health and social settings (Skinner et al., 1995). Median test–retest reliabilities were examined in a study by Jacob (1995 as cited in Skinner et al., 1995) of 138

¹ This variable was derived from the following risk factors: runaway, incorrigible, truancy, violated probation, curfew violation, and alcohol related.

families recruited from the community and ranged from .46 to .72 across subscales. The FAM-Gen III has previously been used in research with several different populations, including child welfare and children with disabilities (Kufeldt, Armstrong, & Dorosh, 1995; Trute & Hiebert-Murphy, 2005).

7.2.3. Family structure outcomes

Cohesion and adaptability were assessed using the FACES-III (Olson, Portner, & Lavee, 1985), the development of which was based on the theory that differences between functional and dysfunctional families result from two interrelated elements: cohesion and adaptability (Matherne & Thomas, 2001). Cohesion refers to the level of attachment and emotional bonding between family members and is described with four ranked levels: disengaged, separated, connected, and enmeshed. Adaptability is defined as the ability of the family to change power structure, roles, and relationships to adjust to situational stressors (Matherne & Thomas, 2001) and is also categorized into four ranked levels: rigid, structured, flexible, and chaotic. FACES-III consists of 20 negatively and positively worded statements scored on a 5-point Likert-type scale ranging from *almost never* to *almost always*. Greater family cohesion and more adaptability are considered more desirable, although the scores from FACES-III are integrated in a circumplex model in which extreme scores do not necessarily indicate family well-being. Yet, an investigation of the relationship between family cohesion and depression (McKeown et al., 1997) showed that quadratic and cubic terms for family cohesion did not improve on the linear explanation of depression. In addition, a study of the relationship between family cohesion and delinquent youth behavior (Matherne & Thomas, 2001) showed that a linear relationship had excellent explanatory power.

Adaptability is a less studied component of family functioning, and was not included in Huey et al. (2000), but appears to have a simple inverse linear relationship to greater fear (Peleg-Popko & Dar, 2001). Moreover, the curvilinear relationship to family and child functioning may only operate at the extremes. The reliability of the FACES-III subscales is moderate with estimates of .62 for adaptability and .77 for cohesion, with the test–retest (4 to 5 weeks) estimate ranging from .80 for adaptability to .83 for cohesion (Olson et al., 1985). The FACES-III is completed by youth and parents, although only parent measures were used in this study.

7.2.4. Child behavior

Child behavior was assessed using the CBCL, which provides a view of youth's behavior from the parent's perspective. The reliability and validity of this instrument is well established (Achenbach, 1991), and it has previously been used in research with child welfare populations (Burns et al., 2004). The CBCL was developed to address the problem of defining child behavior problems empirically. The test–retest reliability is satisfactory. Cronbach alphas ranged from .82 to .95 for the scale scores for youth aged 4 to 16 years (Achenbach, 1991).

7.2.5. One-year post-discharge outcomes

Reports of their children's educational accomplishments, legal problems, placement instability, and restrictiveness of placement were gathered by agency staff via telephone from parent(s), custodial agents, or the youth themselves if age 15 and over. Custody status was recoded into "family" (83.87%) and "not family" (16.13%). Current living arrangement was also recoded into "family" (82.20%) and "not family" (17.80%). Out-of-home placements in the past six months (17.72%) and any trouble with the law (13.72%) were dichotomized into "yes/no" from the provider agency's original variables. Out-of-home placements included adult jail, drug-

alcohol rehab, diagnostic center, emergency shelter, group home, half-way house, juvenile corrections, psychiatric hospital, regular foster care, residential treatment center, and therapeutic foster care. School status was recoded into graduated high school/received GED (1.93%); attends school/in GED classes (39.69%); dropped out/does not attend (2.80%); and not applicable/not available/missing (55.57%). Educational achievement was derived from the school status variable, and included making/made progress (41.63%); out of school (2.80%); and not applicable/not available/missing (55.57%).

A composite outcome variable using three categories (desirable, mixed, and undesirable) was created. The categories were derived from the original one-year outcome variables that included living with family, educational progress, trouble with the law, and out-of-home placement. The desirable category consisted of those cases with indication for all of the following criteria: living with family, progress in school, no trouble with the law, and no out-of-home placements. The mixed category consisted of those cases with indications for living with family, and at least one of the following criteria: no progress in school, trouble with the law, or an out-of-home placement. The undesirable category consisted of those cases with indication of the child not living with family. Cases with missing data on any of the outcome variables were excluded from the analyses.

7.3. Data analysis approach

To determine which variables should be included in the multivariate analysis, the inter-correlations of all pairs of independent variables were examined. The purpose of this analysis was twofold: (a) to examine whether the three assessment measures (CBCL, FACES-III, and FAM-GEN III) were highly correlated to other independent variables; and (b) to examine which independent variables other than the three assessment measures were correlated. Results showed that the three assessment measures did not highly correlate to other independent variables, suggesting that multicollinearity would not be an issue in this analysis. To make the comparison between the models most meaningful, models for each outcome measure were fixed; therefore, having the same cases.

Logistic regression was selected as the analytic tool primarily because it enables the linking of dichotomous or categorical outcome measures to a set of predictor variables, allowing the discernment of variables with statistical significance. Four distinct logistic regression models were created for each outcome variable: Model 1, using demographic variables only (race, gender, and age); Model 2, using demographic variables plus risk factors (e.g., past out-of-home placement, past legal charges, and siblings in out-of-home care); Model 3, using demographic variables plus the three assessment measures (CBCL, FACES-III, FAM-Gen); and Model 4, using all variables including demographics, the three assessment measures, and risk factors. A generalized R^2 statistic (i.e., the Cox–Snell R^2), which is used to evaluate the importance of each set of independent variables in the model, roughly indicates the strength of predictor variables. This measure was employed primarily for answering the research question: Do the three assessment measures help predict outcome probability?

8. Results

The Cox–Snell R^2 was compared across models (see Table 2). Except for the “educational progress” models, all models showed a very modestly higher increment in Cox–Snell R^2 from Model 1 to Model 2 than that from Model 1 to Model 3. For the probability of living with family, the explanatory power of the model increased from .00 to

Table 2

Sample and logistic models predicting living in family ($n=554$: 461 in family, 93 not in family)

Variable	% or <i>M</i> (SD)	Odds ratio (95% confidence interval)			
		Model 1 (Demographics)	Model 2 (Demographics, Risk factors)	Model 3 (Demographics, Assessments)	Model 4 (Demographics, Risk factors, Assessments)
Race (White)	76.7%				
African American	23.3%	.69 (.42, 1.14)	.78 (.46, 1.30)	.65 (.39, 1.08)	.71 (.41, 1.21)
Gender (Female)	33.6%				
Male	66.4%	1.17 (.74, 1.87)	1.15 (.70, 1.87)	1.20 (.75, 1.93)	1.16 (.70, 1.90)
Age at intake (Months)	156.5 (36.4)	.99 (.99, 1.01)	1.00 (.99, 1.01)	.99 (.99, 1.01)	1.00 (.99, 1.01)
Most serious problems (No)	84.5%				
Yes	15.6%		.78 (.40, 1.53)		.86 (.43, 1.71)
Num. of maltreatment types	.20 (0.55)		.62 (.42, .91)		.59 (.40, .88)
Num. of delinquent behaviors	1.25 (1.33)		1.06 (.85, 1.33)		1.05 (.84, 1.33)
Num. of MH problems	1.11 (1.28)		1.22 (.95, 1.55)		1.23 (.95, 1.59)
Num. of substance abuse problems	.19 (0.53)		.88 (.57, 1.37)		.92 (.59, 1.45)
Past day treatment, foster care, etc. (No)	33.9%				
Yes	66.1%		.67 (.30, 1.52)		.67 (.29, 1.54)
Past partial hospitalization, etc. (No)	70.6%				
Yes	29.4%		.44 (.24, .79)		.43 (.24, .79)
Past outpatient treatment, etc. (No)	53.2%				
Yes	46.8%		1.62 (.91, 2.89)		1.70 (.94, 3.08)
CBCL Total score 60 or above (No)	13.2%				
Yes	86.8%			.46 (.20, 1.03)	.41 (.18, .94)
FAMGEN score 60 or above (No)	56.3%				
Yes	43.7%			1.80 (1.04, 3.14)	1.68 (.94, 3.00)
FACES Adaptability score (10–19)	20.4%				
20–24	31.8%			.81 (.42, 1.57)	.80 (.40, 1.61)
25–29	31.0%			.62 (.32, 1.20)	.57 (.29, 1.14)
30–50	16.8%			1.05 (.46, 2.39)	.96 (.41, 2.25)
FACES Cohesion score (10–31)	28.5%				
32–37	28.2%			1.39 (.76, 2.54)	1.39 (.74, 2.61)
38–43	31.9%			2.20 (1.12, 4.32)	2.16 (1.07, 4.37)
44–50	11.4%			1.39 (.59, 3.25)	1.50 (.62, 3.64)
Cox–Snell R^2		.0048	.0464	.0296	.0701

Note: 1. Odds ratio that does not contain a value 1 in the 95% confidence interval is in bold, which is equivalent to a significance level of $p < .05$. 2. Reference group is shown in parentheses.

.05 when it included demographic and family assessment data, as compared to the increase from .00 to .03 when only demographic and risk factors were included. For the probability of placement in the past six months, the inclusion of family assessment information to the basic demographic information increased the explanation from .00 to .05, as compared to .00 to .01 when only the demographic and risk information was included. For the probability of experiencing trouble with the law, the explanatory power of the model that included both risk factors and family assessment measures increased from .04 to .08, as compared to .04 to .07.

Although the assessments contributed to the prediction of the outcomes, the risk and demographic factors used in the model explained as much or more variation in the outcome variable than the three assessment measures. The risk factors played a more important role than the three assessments at baseline alone. It is important to recognize that Model 4 (i.e., all variables model) for all outcomes is always the best in terms of the Cox–Snell R^2 , which indicates the utility of both sets of variables.

We next examined the variables that were statistically significant in predicting outcomes. The following discussion is focused on Model 4. The probability of living with family (see Table 2) was less likely for a youth with a high number of maltreatment types, or for those who experienced partial hospitalization, residential treatment, or inpatient treatment, or for those youth who had a CBCL total score above the borderline or clinical range at baseline. However, youth with a FACES-III cohesion score between 38 and 43 (enmeshed) at baseline were more likely to live in family than youth with a FACES-III cohesion score between 10 and 31 at baseline.

The probability of having a placement in the past six months, regardless of whether the youth was currently living with family was also modeled (see Table 3). Youth with a high number of maltreatment types, or those who experienced partial hospitalization, residential treatment, or inpatient treatment, were more likely to have such an outcome one year following treatment.

The model for probability of having trouble with the law (Table 4) only showed age as an important predictor. The probability of experiencing trouble with the law increased by 1% for each one month increase in age at intake. Family assessment measures did not contribute to this outcome.

The probability of not making educational progress and not having completed high school/GED classes was also modeled (see Table 5). Youth who were older at intake, or who had a FACES-III adaptability score above 31 (connected or enmeshed), were more likely to have a positive educational outcome one year following treatment. In contrast, youth with a clinical FAM-Gen III score or a FACES-III cohesion score between 38 and 43 were less likely to have made educational progress one year post-treatment. This model had a relatively small proportion of participants with the event of interest (i.e., 21 out of 398, or only 5.3%, were not making progress). Such a small proportion with a relatively large set of predictor variables may have resulted in a technical problem and these results may exaggerate the effects. These outcome results, are therefore, only suggestive.

The probabilities of being in each of the outcome groups (desirable, $n=256$; mixed, $n=57$; undesirable outcome, $n=49$) was predicted using the three category, composite outcome variable. Table 6 shows the results of this logistic regression analysis. Only two variables were statistically significant using the Wald F test for overall significance: age at intake ($p<.001$) and experience with past partial hospitalization ($p<.05$). Both the variables for number of maltreatment types and number of mental health problems showed statistical trends, as illustrated in Table 6.

Table 3

Sample characteristics and logistic regression models predicting the probability of having an out-of-home placement ($n=554$, 87 yes, 467 no)

Variable	% or <i>M</i> (SD)	Odds ratio (95% confidence interval)			
		Model 1 (Demographics)	Model 2 (Demographics, Risk factors)	Model 3 (Demographics, Assessments)	Model 4 (Demographics, Risk factors, Assessments)
Race (White)	76.7%				
African American	23.3%	.83 (.48, 1.46)	.72 (.40, 1.29)	.85 (.48, 1.50)	.73 (.40, 1.33)
Gender (Female)	33.6%				
Male	66.4%	.97 (.60, 1.57)	.97 (.58, 1.62)	.94 (.58, 1.54)	.95 (.57, 1.59)
Age at intake (months)	156.5 (36.4)	1.00 (.99, 1.01)	.99 (.99, 1.01)	1.00 (.99, 1.01)	1.00 (.99, 1.01)
Most serious problems (No)	84.5%				
Yes	15.6%		1.94 (1.00, 3.75)		1.90 (.97, 3.72)
Num. of maltreatment types	.20 (0.55)		1.65 (1.11, 2.44)		1.68 (1.13, 2.50)
Num. of delinquent behaviors	1.25 (1.33)		.88 (.70, 1.12)		.89 (.70, 1.12)
Num. of MH problems	1.11 (1.28)		.89 (.69, 1.14)		.90 (.69, 1.16)
Num. of substance abuse problems	.19 (0.53)		1.23 (.78, 1.92)		1.21 (.77, 1.90)
Past day treatment, foster care, etc. (No)	33.9%				
Yes	66.1%		1.37 (.58, 3.24)		1.37 (.57, 3.29)
Past partial hospitalization, etc. (No)	70.6%				
Yes	29.4%		2.40 (1.32, 4.37)		2.31 (1.26, 4.24)
Past outpatient treatment, etc. (No)	53.2%				
Yes	46.8%		.69 (.38, 1.26)		.66 (.36, 1.21)
CBCL Total score 60+ (No)	13.2%				
Yes	86.8%			1.57 (.72, 3.43)	1.78 (.80, 4.00)
FAMGEN score 60+ (No)	56.3%				
Yes	43.7%			.58 (.33, 1.02)	.63 (.35, 1.14)
FACES Adaptability score (10–19)	20.4%				
20–24	31.8%			1.18 (.60, 2.30)	1.14 (.56, 2.30)
25–29	31.0%			1.28 (.65, 2.53)	1.34 (.66, 2.72)
30–50	16.8%			1.06 (.47, 2.38)	1.17 (.50, 2.70)
FACES Cohesion score (10–31)	28.5%				
32–37	28.2%			.79 (.42, 1.47)	.80 (.42, 1.53)
38–43	31.9%			.55 (.28, 1.09)	.60 (.30, 1.23)
44–50	11.4%			.86 (.37, 2.02)	.85 (.35, 2.09)
Cox–Snell R^2		.0018	.0506	.0147	.0604

Note: 1. Odds ratio that does not contain a value 1 in the 95% confidence interval is in bold, which is equivalent to a significance level of $p < .05$. 2. Reference group is shown in parentheses.

Table 4

Sample characteristics and logistic regression models predicting the probability of having trouble with the law ($n=367$, 50 yes, 317 no)

Variable	% or <i>M</i> (SD)	Odds ratio (95% confidence interval)			
		Model 1 (Demographics)	Model 2 (Demographics, Risk factors)	Model 3 (Demographics, Assessments)	Model 4 (Demographics, Risk factors, Assessments)
Race (White)	80.1%				
African American	19.9%	1.10 (.52, 2.32)	.89 (.41, 1.95)	1.21 (.55, 2.64)	.97 (.42, 2.22)
Gender (Female)	32.4%				
Male	67.6%	1.22 (.63, 2.37)	1.21 (.61, 2.43)	1.26 (.64, 2.49)	1.21 (.59, 2.46)
Age at intake (months)	157.5 (36.9)	1.02 (1.01, 1.03)	1.01 (1.00, 1.02)	1.02 (1.01, 1.03)	1.01 (1.00, 1.02)
Most serious problems (No)	80.9%				
Yes	19.1%		1.96 (.91, 4.23)		2.03 (.91, 4.53)
# of maltreatment types	.18 (0.51)		.80 (.38, 1.70)		.82 (.38, 1.77)
# of delinquent behaviors	1.22 (1.35)		1.08 (.78, 1.48)		1.07 (.77, 1.48)
# of MH problems	1.06 (1.27)		.87 (.60, 1.26)		.85 (.58, 1.25)
# of substance abuse problems	.22 (0.57)		1.72 (1.01, 2.94)		1.68 (.97, 2.93)
Past day treatment, foster care, etc. (No)	34.9%				
Yes	65.1%		1.06 (.33, 3.37)		1.11 (.34, 3.63)
Past partial hospitalization, etc. (No)	70.3%				
Yes	29.7%		1.04 (.43, 2.53)		1.25 (.50, 3.11)
Past outpatient treatment, etc. (No)	54.2%				
Yes	45.8%		.47 (.20, 1.13)		.44 (.17, 1.12)
CBCL Total score 60+ (No)	12.5%				
Yes	87.5%			.77 (.31, 1.95)	.98 (.36, 2.65)
FAMGEN score 60+ (No)	57.5%				
Yes	42.5%			1.68 (.77, 3.67)	1.65 (.74, 3.69)
FACES Adaptability score (10–19)	20.5%				
20–24	33.0%			1.21 (.46, 3.19)	1.01 (.37, 2.80)
25–29	30.2%			1.37 (.53, 3.52)	1.21 (.45, 3.28)
30–50	16.3%			1.15 (.38, 3.48)	1.11 (.35, 3.58)
FACES Cohesion score (10–31)	26.2%				
32–37	27.2%			.46 (.18, 1.16)	.44 (.17, 1.16)
38–43	33.0%			1.21 (.52, 2.81)	1.32 (.55, 3.18)
44–50	13.6%			.43 (.11, 1.78)	.52 (.12, 2.20)
Cox–Snell R^2		.045	.0826	.0714	.1065

Note: 1. Odds ratio that does not contain a value 1 in the 95% confidence interval is in bold, which is equivalent to a significance level of $p < .05$. 2. Reference group is shown in parentheses.

Table 5

Sample characteristics and logistic regression models predicting the probability of being out of school (educational progress) ($n=398$, 21 yes, 377 no)

Variable	% or <i>M</i> (SD)	Odds ratio (95% confidence interval)			
		Model 1 (Demographics)	Model 2 (Demographics, Risk factors)	Model 3 (Demographics, Assessments)	Model 4 (Demographics, Risk factors, Assessments)
Race (White)	80.4%				
African American	19.6%	1.87 (.58, 6.02)	1.81 (.52, 6.29)	2.30 (.62, 8.62)	2.01 (.45, 8.98)
Gender (Female)	32.4%				
Male	67.6%	1.34 (.46, 3.87)	1.29 (.41, 4.01)	1.38 (.43, 4.47)	1.12 (.30, 4.16)
Age at intake (months)	156.5 (37.3)	1.09 (1.05, 1.13)	1.09 (1.05, 1.14)	1.10 (1.05, 1.14)	1.10 (1.06, 1.16)
Most serious problems (No)	81.9%				
Yes	18.1%		1.43 (.42, 4.87)		1.82 (.43, 7.64)
Num. of maltreatment types	.18 (0.51)		1.02 (.31, 3.38)		1.02 (.25, 4.21)
Num. of delinquent behaviors	1.20 (1.33)		.93 (.51, 1.70)		.71 (.34, 1.47)
Num. of MH problems	1.05 (1.27)		1.36 (.75, 2.47)		1.65 (.81, 3.38)
Num. of substance abuse problems	.20 (0.54)		.81 (.26, 2.55)		1.01 (.29, 3.52)
Past day treatment, foster care, etc. (No)	35.4%				
Yes	64.6%		.89 (.09, 8.74)		.99 (.05, 18.85)
Past partial hospitalization, etc. (No)	71.4%				
Yes	28.6%		.29 (.05, 1.62)		.12 (.01, 1.06)
Past outpatient treatment, etc. (No)	54.3%				
Yes	45.7%		.69 (.13, 3.71)		.44 (.05, 3.65)
CBCL Total score 60+ (No)	11.8%				
Yes	88.2%			1.80 (.41, 7.95)	2.06 (.40, 10.67)
FAMGEN score 60+ (No)	57.0%				
Yes	43.0%			.19 (.04, .87)	.10 (.02, .57)
FACES Adaptability score (10–19)	20.6%				
20–24	33.2%			8.57 (.86, 85.9)	30.48 (2.05, 453)
25–29	28.9%			8.69 (.77, 97.7)	17.15 (1.19, 248)
30–50	17.3%			7.98 (.48, 131.9)	27.49 (1.07, 708)
FACES Cohesion score (10–31)	27.6%				
32–37	27.6%			.42 (.11, 1.67)	.23 (.05, 1.16)
38–43	31.7%			.10 (.02, .66)	.06 (.01, .44)
44–50	13.1%			.20 (.03, 1.44)	.19 (.02, 1.86)
Cox–Snell R^2		.1255	.1368	.1529	.1734

Note: 1. Odds ratio that does not contain a value 1 in the 95% confidence interval is in bold, which is equivalent to a significance level of $p < .05$. 2. Reference group is shown in parentheses.

Table 6

Sample characteristics and a multinomial logistic regression model showing the effect of predictor variables on probabilities of three outcomes (Desirable $n=256$, Mixed $n=57$, Undesirable $n=49$, Total $n=362$)

Variable	% or M (SD)	Proportion		
		Desirable	Mixed	Undesirable
Race (White)	80.7%	.77	.12	.11
African American	19.3%	.77	.11	.11
Gender (Female)	32.9%	.77	.11	.11
Male	67.1%	.77	.12	.11
Age at intake (years)***	13.08 (3.07)			
6		.92	.01	.06
10		.86	.05	.09
14		.74	.15	.11
18		.50	.39	.11
Most serious problems (Yes)	18.8%	.77	.11	.12
No	81.2%	.77	.12	.10
Num. of maltreatment types+	.19 (0.52)			
0		.79	.12	.10
1		.71	.11	.18
2		.58	.10	0.32
3		.43	.08	0.49
Num. of delinquent behaviors	1.20 (1.33)			
0		.76	.11	.12
1		.77	.12	.11
2		.78	.12	.10
3		.79	.13	.09
4		.79	.13	.08
5		.80	.13	.07
6		.80	.14	.06
Num. of MH problems+	1.07 (1.27)			
0		.74	.10	.17
1		.77	.12	.11
2		.79	.14	.07
3		.79	.16	.05
4		.78	.19	.03
5		.77	.22	.02
6		.74	.24	.01
Num. of substance abuse problems	.21 (0.55)			
0		.78	.11	.12
1		.75	.17	.08
2		.69	.25	.06
Past day treatment, foster care, etc. (Yes)	65.2%	.76	.11	.12
No	34.8%	.79	.12	.08
Past partial hospitalization, etc. (Yes)*	29.3%	.68	.09	.23
No	70.7%	.79	.13	.08
Past outpatient treatment, etc. (Yes)	46.1%	.83	.10	.07
No	53.9%	.71	.13	.15
CBCL Total score 60+ (Yes)	88.1%	.76	.12	.12
No	11.9%	.83	.12	.04
FAMGEN score 60+ (Yes)	42.8%	.78	.13	.09
No	57.2%	.77	.11	.13
FACES Adaptability score 10–19	20.5%	.76	.14	.11
FACES Adaptability score 20–24	33.4%	.72	.15	.12

(continued on next page)

Table 6 (continued)

Variable	% or <i>M</i> (SD)	Proportion		
		Desirable	Mixed	Undesirable
FACES Adaptability score 25–29	3 .1%	.73	.15	.12
FACES Adaptability score 30–50	16.0%	.76	.14	.10
FACES Cohesion score 10–31	26.3%	.83	.10	.07
FACES Cohesion score 32–37	27.6%	.87	0.08	.05
FACES Cohesion score 38–43	32.3%	.86	0.09	.04
FACES Cohesion score 44–50	13.8%	.86	0.09	.06

Note: 1. *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .1$, based on the Wald F , which is a test of overall significance of the variable. 2. Predictions are based on the estimated coefficients of the multinomial logistic model and are calculated at the means of all other variables. The outcome “Undesirable” serves as a reference group in the three outcomes.

Youth who were younger at the intake were also more likely to have a desirable outcome. As age increased, the probability of having a desirable outcome decreased, and the probability of having a mixed or undesirable outcome increased.

In addition, youth who had not previously experienced past secure treatment, including partial hospitalization, residential treatment, or inpatient treatment were most likely to have a desirable outcome (i.e., predicted probability = .79), second most likely to have a mixed outcome (i.e., predicted probability = .13), and least likely to have an undesirable outcome (i.e., predicted probability = .08). In contrast, the probabilities of having desirable, mixed, and undesirable outcomes for youth who had experienced past secure treatment were .68, .09, and .23, respectively.

9. Discussion

This study investigated the value of three widely used clinical assessments of family functioning, family structure, and child behavior in predicting developmental outcomes following an intensive in-home therapeutic intervention derived from MST. These assessments might have value in assessing changes that may result from in-home services as well as elucidating the positive outcomes achieved. Furthermore, current research suggests that the domains evaluated by the instruments function as the “contextual pathways” through which MST mediates change (Huey et al., 2000). Findings from the present study suggest that these assessments contribute only a moderate amount to the predictive usefulness of intake demographic and risk factor data that are already collected on a routine basis. As such, this study takes an important step toward understanding the limited value of psychometric measures in predicting educational, correctional, and placement outcomes.

Although this lack of a finding of a strong relationship between change in these measures and longer term outcomes does not rule out the possibility that these are the mechanisms for change, there is little support here for that formulation. There are several explanations for this. The instruments that intended to capture the change in these mechanisms may not be precise enough to do so. Or, possibly, the outcome measures are not sensitive enough for fully capturing what happens to the youth who receive intensive in-home therapy. Or, perhaps the heterogeneity of the population is obscuring the expected relationship which may only be observable in studies with narrower selection criteria to enter treatment.

Other limitations of this study should be noted and reviewed for possible explanations of why the expected relationship between the expected mechanisms of change were not observed. First, a problem encountered in the data analysis was that few study participants had a complete set of valid variables. This resulted in a substantial quantity of missing data. Furthermore, there was a relationship between noncompletion and age; however, there was no indication of other

differences between completers and noncompleters. Second, this study was non-experimental. Consequently, we are limited in our ability to (a) conclude causal relationships between the demographics, risk factors, and assessment scores, and the one-year outcomes; and (b) to generalize our findings to settings and populations beyond those of the provider agency.

Despite these limitations, the findings are compelling. That is, age and histories of prior secure treatment are critical to the explanation of case outcomes and are likely to be important covariates in the analysis of clinical trials. Indeed, the literature review shows that there might well be an underuse, in prior studies of intensive in-home therapy, of corrections involving covariates and propensity score matching insofar as small studies with randomization do not always adequately mitigate bias that occurs from unbalanced group membership. An unequal and uncorrected distribution of older children and children who have prior exposure to secure treatment could bias results. Given the evident impact of this risk factor on case outcomes, analyses should be conducted to determine whether this condition is equally represented across groups. When necessary, corrective multivariate methods should be used.

Future research on MST and other evidence-based interventions might profitably continue in two directions. The first is the line of inquiry reflected in Huey et al.'s (2000) research on the mechanisms by which MST works. Understanding these mechanisms can prove useful by illuminating how MST affects change. Knowing how such social interventions work can subsequently facilitate the refinement and delivery of increasingly efficacious treatments to troubled youth and their families. The second direction for future research is the line of inquiry of which the present study has made limited, preliminary investigation. Future studies that ask similar questions about the value of clinical assessments in predicting developmental outcomes should strive to use comparison groups in order to increase the ability to conclude causal relationships and generalize beyond the study population.

The results of this study also bring focus to important implications for children's services, namely, how to use real-time assessment data as a tool for intervention planning, such as tailoring programs to fit different families' particular needs. Many child and youth serving agencies, including the one providing the data for the present analysis, have taken the critical first step. They have implemented the use of high quality, well established measurement tools designed to assess child and family behavior and functioning. These organizations understand that without assessment and diagnosis, it is difficult to discern which evidence-based practice should be employed.

The crucial next step for these organizations is to draw on their rich assessment data to inform the delivery of services to at-risk youth and their families. Different strategies and relationships may be more appropriate for different populations (APA, 2005). The thoughtful and timely use of intake assessment information can allow us to implement the adage of knowing "the person who has the disorder in addition to knowing the disorder the person has" (APA, p. 279). The same can be said for understanding the families of children with behavioral disorders. The challenge faced is how best to translate and deliver assessment data into timely, user-friendly information in a system already overtaxed by too many children and too little time. These findings suggest a sharper focus for future data collection and offer promise that the information gathered can provide early clues about outcomes. Such information has the potential to help shape services that boost our achievement of beneficial outcomes.

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References

- Achenbach, T. M. (1991). *Manual for the child behavior checklist and the 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.
- American Psychological Association. (2005). *Report of the Presidential Task Force on Evidence Based Practice*. Washington, DC: Author.
- Borduin, C. M., Mann, B. J., Cone, L. T., Henggeler, S. W., Fucci, B. R., Blaske, D. M., et al. (1995). Multisystemic treatment of juvenile sexual offenders: A progress report. *Journal of Consulting and Clinical Psychology, 63*, 569–578.
- Borduin, C. M., & Schaeffer, C. M. (2001). Multisystemic treatment of juvenile sexual offenders: A progress report. *Journal of Psychology & Human Sexuality, 13*, 25–42.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Brown, T. L., Henggeler, S. W., Schoenwald, S. K., Brondino, M. J., & Pickrel, S. G. (1999). Multisystemic treatment for substance abusing and dependent juvenile delinquents: Effects on school attendance at post-treatment and 6-month follow-up. *Children's Services: Social Policy, Research and Practice, 2*, 81–93.
- Brunk, M., Henggeler, S. W., & Whelan, J. P. (1987). Comparison of multisystemic therapy and parent training in the brief treatment of child abuse and neglect. *Journal of Consulting and Clinical Psychology, 55*(2), 171–178.
- Burns, B. J., Phillips, S. D., Wagner, H. R., Barth, R. P., Kolko, D. J., & Campbell, Y. (2004). Mental health need and access to mental health services by youth involved with child welfare. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*, 960–970.
- Henggeler, S. W. (2006). Methodological critique and meta-analysis as Trojan horse. *Children and Youth Services Review, 28*, 447–457.
- Henggeler, S. W., Halliday-Boykins, C. A., Cunningham, P. B., Randall, J., Shapiro, S. B., & Chapman, J. E. (2006). Juvenile drug court: Enhancing outcomes by integrating evidence-based treatments. *Journal of Consulting and Clinical Psychology, 74*, 42–54.
- Henggeler, S. W., Melton, G. B., Brondino, M. J., Scherer, D. G., & Hanley, J. H. (1997). Multisystemic therapy with violent and chronic juvenile offenders and their families: The role of treatment fidelity in successful dissemination. *Journal of Consulting and Clinical Psychology, 65*, 821–833.
- Henggeler, S. W., Melton, G. B., & Smith, L. A. (1992). Family preservation using multisystemic therapy: An effective alternative to incarcerating serious juvenile offenders. *Journal of Consulting and Clinical Psychology, 60*, 953–961.
- Henggeler, S. W., Melton, G. B., Smith, L. A., Schoenwald, S. K., & Hanley, J. H. (1993). Family preservation using multisystemic treatment: Long-term follow-up to a clinical trial with serious juvenile offenders. *Journal of Child and Family Studies, 2*, 283–293.
- Henggeler, S. W., Pickrel, S. G., & Brondino, M. J. (1999). Multisystemic treatment of substance abusing and dependent delinquents: Outcomes, treatment fidelity, and transportability. *Mental Health Services Research, 1*, 171–184.
- Henggeler, S. W., Rodick, J. D., Borduin, C. M., Hanson, C. L., Watson, S. M., & Urey, J. R. (1986). Multisystemic treatment of juvenile offenders: Effects on adolescent behavior and family interactions. *Developmental Psychology, 22*, 132–141.
- Henggeler, S. W., Rowland, M. D., Halliday-Boykins, C., Sheidow, A. J., Ward, D. M., Randall, J., et al. (2003). One-year follow-up of multisystemic therapy as an alternative to the hospitalization of youths in psychiatric crisis. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 543–551.
- Henggeler, S. W., Rowland, M. D., Randall, J., Ward, D. M., Pickrel, S. G., Cunningham, P. B., et al. (1999). Home-based multisystemic therapy as an alternative to the hospitalization of youths in psychiatric crisis: Clinical outcomes. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*, 1331–1339.
- Huey, S. J., Jr., Henggeler, S. W., Brondino, M. J., & Pickrel, S. G. (2000). Mechanisms of change in multisystemic therapy: Reducing delinquent behavior through therapist adherence and improved family and peer functioning. *Journal of Consulting and Clinical Psychology, 68*(3), 451–467.
- Imbens, G. W. (2004). Nonparametric estimation of average treatment effects under exogeneity: A review. *The Review of Economics and Statistics, 86*, 4–29.
- Jacob, T. (1995). The role of the time frame in the assessment of family functioning. *Journal of Marital and Family Therapy, 21*(3), 281–286.

- Kufeldt, K., Armstrong, J., & Dorosh, M. (1995). How children in care view their own and their foster families: A research study. *Child Welfare*, 74(3), 695–715.
- Littell, J. H. (2006). The case for multisystemic therapy: Evidence or orthodoxy? *Children and Youth Services Review*, 28, 458–472.
- Matheme, M. M., & Thomas, A. (2001). Family environment as a predictor of adolescent delinquency. *Adolescence*, 36 (144), 655–664.
- McKeown, R. E., Garrison, C. Z., Jackson, K. L., Cuffe, S. P., Addy, C. L., & Waller, J. L. (1997). Family structure and cohesion, and depressive symptoms in adolescents. *Journal of Research on Adolescence*, 7(3), 267–281.
- Ogden, T., & Hagen, K.A. (in press). Multisystemic therapy of serious behaviour problems in youth: Sustainability of therapy effectiveness two years after intake. *Child and Adolescent Mental Health*.
- Ogden, T., & Halliday-Boykins, C. A. (2004). Multisystemic treatment of antisocial adolescents in Norway: Replication of clinical outcomes outside of the U.S.. *Child and Adolescent Mental Health*, 9(2), 77–83.
- Olson, D. H., Portner, J., & Lavee, Y. (1985). *FACES III*. St. Paul, MN: Department of Family Science, University of Minnesota.
- Peleg-Popko, O., & Dar, R. (2001). Marital quality, family patterns, and children's fears and social anxiety. *Contemporary Family Therapy*, 23(4), 465–487.
- Rowland, M. R., Halliday-Boykins, C. A., Henggeler, S. W., Cunningham, P. B., Lee, T. G., Kruesi, M. J. P., et al. (2005). A randomized trial of multisystemic therapy with Hawaii's Felix class youths. *Journal of Emotional and Behavioral Disorders*, 13, 13–23.
- Schaeffer, C. M., & Borduin, C. M. (2005). Long-term follow-up to a randomized clinical trial of multisystemic therapy with serious and violent juvenile offenders. *Journal of Consulting and Clinical Psychology*, 73(3), 445–453.
- Schoenwald, S. K., Ward, D. M., Henggeler, S. W., & Rowland, M. D. (2000). Multisystemic therapy versus hospitalization for crisis stabilization of youth: Placement outcomes 4 months post-referral. *Mental Health Services Research*, 2(1), 3–12.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin Company.
- Skinner, H. A., Steinhauer, P. D., & Santa-Barbara, J. (1995). *Family assessment measure - III manual*. Toronto, Canada: Multi Health Systems.
- Timmons-Mitchell, J., Bender, M. B., Kishna, M. A., & Mitchell, C. C. (2006). An independent effectiveness trial of multisystemic therapy with juvenile justice youth. *Journal of Clinical Child and Adolescent Psychology*, 35(2), 227–236.
- Trute, B., & Hiebert-Murphy, D. (2005). Predicting family adjustment and parenting stress in childhood disability services using brief assessment tools. *Journal of Intellectual & Developmental Disability*, 30(4), 217–225.
- Weisz, J. R., & Kazdin, A. E. (2004). Present and future of evidence based psychotherapies. In A. E. Kazdin & J. R. Weisz (Eds.), *Evidence based psychotherapies for children and adolescents* (pp. 439–452). New York: Guilford.