

# Long-Term Follow-Up to a Randomized Clinical Trial of Multisystemic Therapy With Serious and Violent Juvenile Offenders

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In this study, the authors examined the long-term criminal activity of 176 youths who had participated in either multisystemic therapy (MST) or individual therapy (IT) in a randomized clinical trial (C. M. Borduin et al., 1995). Arrest and incarceration data were obtained on average 13.7 (range = 10.2–15.9) years later when participants were on average 28.8 years old. Results show that MST participants had significantly lower recidivism rates at follow-up than did their counterparts who participated in IT (50% vs. 81%, respectively). Moreover, MST participants had 54% fewer arrests and 57% fewer days of confinement in adult detention facilities. This investigation represents the longest follow-up to date of a MST clinical trial and suggests that MST is relatively effective in reducing criminal activity among serious and violent juvenile offenders.

*Keywords:* treatment, juvenile offenders, multisystemic therapy

The treatment of serious and violent juvenile offenders has become a pressing issue on the national social policy agenda, largely because of the considerable social and economic costs exacted by these offenders. Indeed, serious juvenile offenders are at high risk for mental and physical health problems, substance abuse, low educational and vocational achievement, and interpersonal difficulties (Laub & Sampson, 1994; Lyons, Baerger, Quigley, Erlich, & Griffin, 2001). Likewise, the financial impact of violent crime is substantial, including costs related to victimization (i.e., health-related injuries, lost productivity, reduced quality of life), law enforcement, and incarceration (Britt, 2000; Cohen & Miller, 1998; Cohen, Miller, & Rossman, 1994; Robinson & Keithley, 2000). Preventing or attenuating further criminal activity in serious and violent juvenile offenders would favorably affect their lives, families, and communities.

Historically, mental health and juvenile justice services have had little success in ameliorating the serious antisocial behavior of youths (Kazdin, 2000; Tate, Reppucci, & Mulvey, 1995). Re-

cently, however, an intensive family- and home-based treatment (multisystemic therapy [MST]; Borduin & Henggeler, 1990; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998) has demonstrated significant effects on the criminal activity of serious juvenile offenders in several randomized trials. For example, with a sample of violent and chronic juvenile offenders at imminent risk of incarceration, Henggeler and his colleagues (Henggeler, Melton, & Smith, 1992; Henggeler, Melton, Smith, Schoenwald, & Hanley, 1993) showed that MST reduced incarceration by 64% at a 59-week follow-up and doubled the survival rate (i.e., percentage of youths not rearrested) at a 2.4-year follow-up. Similarly, with a sample of chronic juvenile offenders, Borduin et al. (1995) found that MST produced a 63% reduction in rearrests for violent and other serious crimes at a 4-year follow-up. These and other randomized trials (e.g., Borduin, Henggeler, Blaske, & Stein, 1990; Henggeler, Pickrel, & Brondino, 1999) suggest that MST is a promising approach to the treatment of serious antisocial behavior in adolescents.

Although clinical trials of MST have demonstrated significant reductions in youths' criminal activity during adolescence and early adulthood, the longer term impact of MST on criminal activity during adulthood has not been evaluated. It is important to determine whether MST is effective in preventing longer term criminal activity among serious juvenile offenders because such youths are, by far, at the greatest risk for committing additional serious crimes (Moffitt, 1993). Information regarding the possible lasting benefits of empirically supported treatments such as MST could greatly assist policymakers and program administrators in selecting and implementing mental health programs for serious juvenile offenders (Weisz, Hawley, Pilkonis, Woody, & Follette, 2000). However, if treatment effects similar to those observed at shorter term follow-ups were not maintained over a longer period of time, then such findings could suggest a need for refinements in the treatment, such as providing posttreatment booster sessions or ongoing support services in early adulthood (Weisz & Hawley, 1998).

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In the current study from the Missouri Delinquency Project, we examine long-term criminal activity for 176 serious and violent juvenile offenders who participated in an MST clinical trial an average of 13.7 years earlier (Borduin et al., 1995). As such, the study extends the follow-up period for participants in the largest clinical trial of MST to date. The study provides information regarding the long-term efficacy of MST across a range of criminal recidivism outcomes, including (a) number of adult arrests, (b) number of days sentenced for confinement in the adult court system, and (c) number of days sentenced to adult probation.

## Method

### Design

In the current study, we track the long-term criminal activity of 176 serious adolescent offenders who received either MST or individual therapy (IT) 11.8–15.2 years ( $M = 13.7$  years) earlier in a randomized clinical trial (Borduin et al., 1995). The original study used a pretest–posttest control group design, with random assignment to conditions and a 4-year follow-up for rearrests, to compare the effectiveness of MST versus IT. Because this sample has been described extensively elsewhere (Borduin et al., 1995), a shorter description of the participants and therapeutic interventions is provided here.

### Participants

Participants were 176 adolescent offenders (12–17 years of age) and their families who had been referred consecutively to the Missouri Delinquency Project by juvenile court personnel from July 1983 to October 1986. Referrals to the project included all families in which the youth (a) had at least two arrests, (b) was currently living with at least one parent figure, and (c) showed no evidence of psychosis or dementia. Following agreement to participate in the clinical trial, each family was randomly assigned (simple randomization with a coin toss) by a court administrator to receive either MST ( $n = 92$ ) or IT ( $n = 84$ ). Of the 176 families, 140 (79.5%) completed treatment (hereafter referred to as *completers*) and 36 (21.5%) dropped out, defined as unilaterally terminating after the first session (with the youth or family) and before the seventh session. Of the 36 youths and their families who dropped out of treatment (hereafter referred to as *dropouts*), 15 were from the MST condition, and 21 were from the IT condition (dropout rates for MST [16.3%] and IT [25.0%] were not significantly different). In the current study, treatment completers and treatment dropouts were collapsed in each condition to provide a conservative test of MST effects.

The arrest histories of the referred youths attest to their serious criminal involvement. The youths averaged 3.9 previous arrests for felonies ( $SD = 1.9$ ), and 47.8% of the youths had at least one arrest for a violent crime (e.g., sexual assault, assault and battery with intent to kill, aggravated assault). Moreover, all of the youths had been incarcerated previously for at least 4 weeks. The mean age of the youths at the time of their first arrest was 11.7 years ( $SD = 1.9$ ) and at the time of treatment was 14.5 years ( $SD = 1.4$ ); 69.3% were boys, 30.7% were girls; 76.1% were White, 22.2% were African American, 1.1% were Asian American, and 0.9% were Hispanic. In addition, 56.8% lived with two parental figures (biological parents, stepparents, foster parents, grandparents). The primary caretaker of the youths included biological mothers (89.5%); step-, foster, or adoptive mothers (5.5%); other female relatives (2.5%); or biological fathers (2.5%). Families averaged 3.2 children ( $SD = 1.9$ ), and 63.4% of the families were of lower socioeconomic status (SES; Class IV or V; Hollingshead, 1975). The average age of participants at the time of follow-up was 28.8 years ( $SD = 1.8$ ).

### Treatment Conditions

The mean numbers of hours of treatment were 20.7 ( $SD = 7.4$ ) for the MST group and 22.5 ( $SD = 10.6$ ) for the IT group. These means were not significantly different,  $F(1, 175) = 1.85, p = .176$ .

**MST.** Therapeutic interventions were based on the multisystemic approach to the treatment and prevention of behavior problems in children and adolescents (Henggeler et al., 1998). The treatment and prevention emphases of MST fit closely with findings on the correlates and causes of serious delinquent behavior (for a review, see Loeber & Farrington's, 1998, study). With interventions that are present focused and action oriented, MST directly addresses intrapersonal (e.g., cognitive) and systemic (i.e., family, peer, school) factors that are known to be associated with adolescent antisocial behavior. Moreover, because different combinations of these factors are relevant for different adolescents, MST interventions are individualized and highly flexible. Guidelines for designing and implementing MST interventions with antisocial adolescents and their families are described in detail elsewhere (Borduin & Henggeler, 1990; Henggeler et al., 1998).

MST uses a home- and community-based model of service delivery. To promote cooperation and enhance generalization, therapists usually held sessions in the family's home and in community locations (e.g., school, recreation center) at a convenient time. In addition, services were time limited, with an overriding goal of empowering parents with the skills and resources needed to independently address the inevitable difficulties that arise in raising adolescents.

**IT.** The therapy provided in this condition was selected to represent the usual community treatment for juvenile offenders in this judicial district and perhaps in many other judicial districts as well (see the following studies: Loeber & Farrington, 1998; Office for Juvenile Justice and Delinquency Prevention, 1993). All of the offenders in this condition received IT that focused on personal, family, and academic issues. The therapists offered support, feedback, and encouragement for behavior change. Their theoretical orientations were an eclectic blend of psychodynamic (e.g., promoting insight and expression of feelings), client-centered (e.g., building a close relationship, providing empathy and warmth), and behavioral (e.g., providing social approval for school attendance and other positive behaviors) approaches. Although there were some variations in the treatment strategies used by the therapists (e.g., some therapists provided less empathy or were more directive than other therapists), the common thread of the approaches was that the interventions focused on the individual adolescent rather than on the systems in which the adolescent was embedded.

### Therapists

MST was provided by three female and three male graduate students (ages ranged from 23 to 31 years;  $M = 26$ ) in clinical psychology. Each had approximately 1.5 years of direct clinical experience with children or adolescents before the study. Therapist supervision was provided by Charles M. Borduin in a 3-hr weekly group meeting and continued throughout the course of the investigation. During these meetings, the therapists and supervisor reviewed the goals and progress of each case, observed and discussed selected videotaped or audiotaped therapy sessions, and made decisions about how best to facilitate the family's progress.

Interventions in the IT group were provided by three female and three male therapists (ages ranged from 25 to 33 years;  $M = 28$ ) at local mental health outpatient agencies, including the treatment services branch of the juvenile court. Each therapist had a master's degree (or equivalent training) in either counseling psychology, social work, or another mental health-related field and had approximately 4 years of direct clinical experience with adolescents. These therapists attended 2.5-hr weekly case reviews with the treatment coordinator from the juvenile court to discuss the goals and progress of each case.

### Treatment Integrity

To sustain the integrity of MST, therapists documented each therapeutic contact by summarizing what transpired and how much progress had been made in meeting the goals of treatment; ongoing clinical supervision and feedback were provided throughout the investigation. To monitor the integrity of IT, therapists were required to provide monthly reports that summarized the nature of therapeutic contacts, who was present at the contacts, and adolescent progress in meeting the goals of treatment. The project director (Charles M. Borduin) met periodically with the therapists to review selected videotapes of sessions and to ensure that the therapists adhered to their stated treatment plans. Adherence to treatment plans also was promoted by the juvenile court treatment coordinator, who met weekly with the therapists in the IT condition. Although it was not possible to include an independent assessment of the integrity of either MST or IT, the therapists in both conditions completed a checklist for each of their cases to indicate the systems directly addressed during the course of treatment (i.e., individual, marital, family, peer, school). These checklists revealed that all MST cases received interventions in two or more systems ( $M = 3.5$ ), whereas the vast majority (90.5%) of IT cases received interventions in only one system (always the individual adolescent).

### Research Procedures

**Original outcome study.** All families who were referred to the project were initially contacted by phone or a home visit by a research assistant. It was emphasized that the family's participation in research was voluntary and that refusal to participate (or exercising the right to discontinue participation at any time) would not jeopardize the receipt of treatment services or result in any sanctions from the court. Families also were informed that the youth's juvenile arrest records would be obtained from the juvenile court through the youth's 17th birthday and that adult arrest records would be obtained on the youth thereafter. Youths remained under the jurisdiction of the court regardless of their families' decisions about participating in the research assessments or in treatment. Family members provided written consent or assent for the research procedures. All procedures were approved by the Institutional Review Board of the University of Missouri—Columbia.

For the original outcome study, all families completed extensive pre- and posttreatment assessment batteries of self-report instruments, behavior rating inventories, and observational tasks that measured individual, family, peer, and school functioning (see Borduin et al.'s, 1995, study). Each assessment session was scheduled at the family's convenience, either in their home (91% of sessions) or at a youth center in their neighborhood. Data collected in these sessions were not included in the current study. Only those procedures and measures relevant to the current study are described below.

**Current study.** Participants' juvenile and adult criminal records were obtained within the state of Missouri. A broader search of criminal records in other states was not possible because fingerprints would have been required to conduct a national criminal records check, and these were not obtained at the time of the original study. Nevertheless, we assumed that arrest rates for those participants residing outside of Missouri were not systematically different from those remaining in the state. We also assumed that variation between treatment groups in arrest rates would be consistent whether the participant resided within or outside of Missouri.

It was necessary to determine whether each participant had lived in Missouri since the previous follow-up assessment (conducted approximately 10 years earlier; Borduin et al., 1995) and, thus, whether he or she was available to have an arrest record in the state after that time. Accordingly, several steps were followed to confirm state residency. First, state arrest records were searched, and crimes committed in the state after the previous follow-up with this sample were noted. Next, for those individuals whose names did not appear in the state criminal registry, a search of state driver's license records was conducted. An individual was considered to have resided in the state during the follow-up period if he or she held a

Missouri driver's license. Finally, we used original phone numbers and addresses of parents to confirm residence in the state of several additional youths for whom there were no arrest records or driver's license records. Overall, 93.8% ( $n = 165$ ) of the sample was located and determined to have lived in the state during the follow-up period. The number and percentage of youths found in each group were as follows: MST completers ( $n = 73$ , or 94.8%), MST dropouts ( $n = 14$ , or 93.3%), IT completers ( $n = 59$ , or 93.7%), and IT dropouts ( $n = 19$ , or 90.5%). Those youths ( $n = 11$ ) who could not be verified to live in the state were considered lost to long-term follow-up (see Figure 1).

Juvenile and adult arrest data that had been collected for this sample previously (Borduin et al., 1995) were included in survival analyses, resulting in at least partial data for those youths lost to long-term follow-up. Thus, each youth's follow-up period was anchored by the point of release from probation (i.e., within 2 weeks of treatment termination for completers and an average of 6 months from the time of referral for dropouts) and was considered to run through the latest date for which the youth could be confirmed to live in the state.

### Measures of Criminal Activity

Both juvenile and adult criminal records were obtained for this study. A condition of the original clinical trial was that the juvenile court would provide access to juvenile arrest records through consenting participants' 18th birthdays. Youths' criminal arrest data were obtained yearly from juvenile office records by research assistants who were uninformed as to each participant's treatment condition. Adult criminal arrest data, which in the state of Missouri are available to the public, were obtained from a computerized database by a state police employee (also uninformed as to treatment condition) who conducted a search by participant names; these records were searched at the time of the original outcome study and again for the current study. Dates of all juvenile and adult arrests were recorded to ensure that arrest information was not duplicated. For both juvenile and adult arrest records, only substantiated arrests for index offenses were included in the data set (i.e., charges that were dismissed at trial were excluded). The average length of the follow-up period for those youths confirmed to have been available for arrest was 13.7 years (range = 11.8–15.2 years;  $SD = 1.2$  years).

Each arrest was coded as having taken place during the follow-up period if it occurred after the date of the posttreatment assessment (or, if a posttreatment assessment was not completed, then after the date of termination from MST or IT). In addition, each arrest was classified as either a nonviolent (e.g., breaking and entering, theft), violent (e.g., assault, rape), drug related (e.g., possession of marijuana, distribution of cocaine), or other (e.g., violation of probation, failure to pay child support) offense;

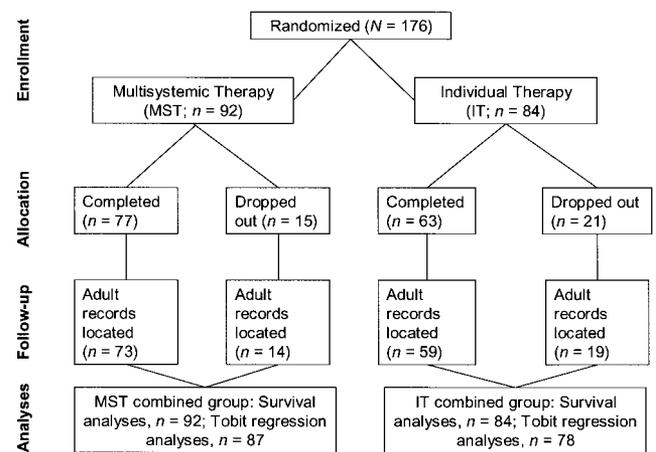


Figure 1. Flow diagram of participants from randomization to follow-up.

these categories were mutually exclusive. Juvenile and adult arrest data were combined in analyses to provide a complete record of all arrests (i.e., number and type) during the follow-up period.

In addition to obtaining information pertaining to the date and reason for each juvenile and adult offense, information about punitive sentencing also was obtained for each adult offense. The total number of days that a participant convicted for an adult crime was sentenced to serve in an adult correctional facility composed the adult confinement variable. Similarly, the total number of days that a participant convicted of an adult crime was sentenced to a term of probation composed the adult probation variable. A sentence of probation was given as an alternative to incarceration for less serious crimes and required the individual to adhere to a number of stipulations, such as abstaining from criminal activity, holding a regular job, and meeting frequently with court personnel; a longer probation sentence reflected a relatively more severe crime than did a shorter sentence. These variables reflected days sentenced to either confinement or probation, not days served; participants in the current study may have served fewer days than actually sentenced, given that most convicted persons do not serve the entire length of their original sentences (Hughes, James-Wilson, & Beck, 2001). In addition, because sentencing was done prospectively, the length of some participants' sentences exceeded the length of the follow-up period for the current study. Differences in the length of participants' follow-up periods were controlled for in all analyses.

## Results

### *Likelihood and Relative Odds for Rearrest*

As noted, treatment completers and treatment dropouts were collapsed in each condition.<sup>1</sup> At 13.7 years of follow-up, the overall recidivism rate for the MST group (50%) was significantly lower than the overall rate for the IT group (81.0%),  $\chi^2(1, N = 176) = 18.45, p < .0001$ . Between-groups differences in recidivism rates for various types of offenses are described in Table 1.

To describe the relative risk of arrest in the IT group versus the MST group, we conducted binary logistic regressions. Youths in the IT condition were 4.25 times more likely than youths in the MST condition to be rearrested (95% confidence interval [CI] = 2.15–8.40,  $p < .001$ ) during the follow-up period. More specifically, youths in the IT condition were 2.57 times more likely to have an arrest for a violent offense (95% CI = 1.22–5.45,  $p < .01$ ), 2.63 times more likely to have an arrest for a nonviolent offense

(95% CI = 1.43–4.84,  $p < .01$ ), and 3.33 times more likely to have an arrest for a drug offense (95% CI = 1.56–7.11,  $p < .01$ ).

### *Survival Functions*

Survival analysis (based on the SURVIVAL procedure; SPSS Version 11.0.1 for Windows; SPSS, 2001) was used to obtain the cumulative survival functions (or survival curves) for participants who were randomly assigned to the MST ( $n = 92$ ) or IT groups ( $n = 84$ ), whose average follow-up periods were 4,898.7 and 5,102.3 days, respectively. The cumulative survival function represents the proportion of participants who survived any type of arrest (i.e., were not arrested) in each group by the length of time (in days) from release from treatment (or juvenile probation for treatment dropouts). A log-rank test (with the Kaplan–Meier estimator; Kaplan & Meier, 1958) revealed that the survival functions for the two groups were significantly different,  $\chi^2(1, N = 176) = 7.92, p < .01$ . As depicted in Figure 2, MST participants were at lower risk of rearrest (i.e., more likely to survive) during follow-up than were IT participants. By the end of 13.7 years (5,007.2 days), 81.0% of the participants in the IT group had been arrested at least once, compared with 50.0% of the participants in the MST group. To determine an effect size for this survival function, we performed a Cox proportional hazards regression (Cox, 1972). The hazards ratio for treatment condition (MST or IT;  $p = .002$ ) was .576, suggesting a medium effect size for the lower risk of rearrest observed for MST participants.

Another set of survival analyses was conducted to examine between-groups differences on time to first arrest for various types of offenses. As depicted in Figures 3, 4, and 5, respectively, participants in the MST group were at lower risk of arrest for violent offenses,  $\chi^2(1, N = 176) = 4.88, p < .05$ ; nonviolent offenses,  $\chi^2(1, N = 176) = 6.27, p < .05$ ; and drug offenses,  $\chi^2(1, N = 176) = 7.97, p < .01$ , during follow-up than were participants in the IT group. Cox proportional hazards ratio tests of these survival functions suggested medium to large effect sizes for MST versus IT (violent offenses,  $p = .011, \beta = .844$ ; nonviolent offenses,  $p = .009, \beta = .572$ ; and drug offenses,  $p = .010, \beta = .864$ ).

### *Number of Posttreatment Arrests and Days Sentenced to Incarceration and Probation*

Additional analyses examined the number of posttreatment arrests, adult incarceration days, and adult probation days during the follow-up period among youths in the MST and IT groups. Because these recidivism variables are continuous and nonnormal, they can be considered censored-dependent variables (Greene, 1993), containing both a qualitative (e.g., arrested vs. not arrested) and a quantitative (e.g., number of arrests among recidivists) component. Accordingly, Tobit regression analyses (based on the STATA 6.0 statistical package; StataCorp, 1999), which use maximum-likelihood estimation procedures and a corresponding chi-square test statistic, were used to examine differences between

Table 1  
*Likelihood of Rearrest for Different Types of Crimes by Therapy Condition*

Type of posttreatment offense	%	$\chi^2(1)$	$p$
Any offense		18.44	.001
IT	81.0		
MST	50.0		
Any violent offense		6.34	.012
IT	29.8		
MST	14.1		
Any nonviolent offense		9.86	.002
IT	59.5		
MST	35.9		
Any drug offense		10.29	.001
IT	33.3		
MST	13.0		

Note. Sample sizes for therapy conditions are as follows: individual therapy (IT;  $n = 84$ ); multisystemic therapy (MST;  $n = 92$ ).

<sup>1</sup> In the current study, we collapsed across completers and dropouts for each treatment group. However, it is informative to note that the recidivism rates for MST completers and MST dropouts were 45.5% and 73.3%, respectively, and for IT completers and dropouts were 79.4% and 85.7%, respectively.

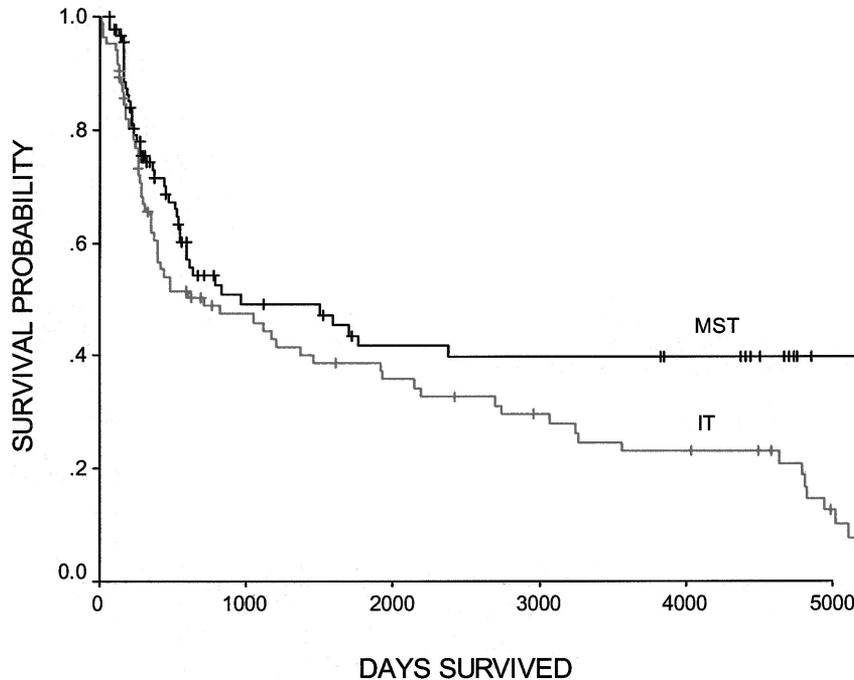


Figure 2. Survival functions for multisystemic therapy (MST) and individual therapy (IT) groups on time to any first arrest following treatment. Completers and dropouts are combined in each group.

groups on these measures.<sup>2</sup> For these analyses, only those individuals who were available for long-term follow-up were included. In addition, variation in the length of the follow-up period was controlled for in all analyses by entering the number of follow-up days into the regression equations.

As shown in Table 2, MST participants had half as many rearrests and were sentenced to less than half as many days of incarceration as their IT counterparts. MST participants also had significantly fewer arrests for violent, nonviolent, or drug-related offenses. Although MST participants were sentenced to 43% fewer days of adult probation than were IT participants, this difference only approached statistical significance ( $p = .08$ ).

#### *Potential Moderators of Criminal Recidivism in MST*

Tobit regression analyses were used to evaluate the effects of potential moderators (age, race, SES, gender, pretreatment arrest for a violent crime, and number of pretreatment arrests) of MST effectiveness. The dependent variables were number of posttreatment arrests, confinement days, and probation days. For each of the regression analyses, a dummy variable that represented treatment group (which collapsed across treatment completers and dropouts in each group), the moderating variable, and the cross-product term of the treatment group and the moderating variable (which controlled for the length of the follow-up period) were entered simultaneously. Moderator variables that were continuous (age, SES, and pretreatment arrests) were centered around their means in each cross-product term. A significant coefficient for the cross-product term indicated whether MST was differentially effective with youths and families from different backgrounds. In no case was the cross-product term significant. Although these results generally suggest that MST was equally effective with youths of

different backgrounds, it should be noted that some of the variables that were tested for moderation included relatively few participants in certain subgroups. For example, there were small numbers of girls and minority youths in each treatment condition. Thus, any conclusions about moderators of MST effectiveness should be considered tentative.<sup>3</sup>

#### Discussion

The current study represents the longest follow-up to date of a MST clinical trial with serious juvenile offenders. The results indicated that MST participants were significantly less likely to be arrested than were IT participants (50% vs. 81%, respec-

<sup>2</sup> The use of ordinary least squares regression is inappropriate for censored-dependent variables because the relationship between an independent variable and a censored-dependent variable is inherently nonlinear (Greene, 1993; Kinsey, 1981; Tobit, 1958). Common data transformation techniques also are inappropriate with such variables. Making a log transformation of the dependent variable does not eliminate the large degree of clustering at the lower limit and does not adequately capture the qualitative difference between a zero and a nonzero value. Another possible transformation, dichotomizing the dependent variable and using logistic or probit regression analysis, also is inefficient because it ignores important information on the extent of criminal activity. To avoid these transformation problems, researchers have applied Tobit regression to many types of nonnormal variables, including measures of substance abuse (e.g., Frone, Cooper, & Russell, 1994), life events (e.g., Fraser, Jenson, Kiefer, & Popuang, 1994), and health status (e.g., Grootendorst, 2000).

<sup>3</sup> A table of the main effects of these moderators (i.e., independent of treatment condition) on outcome variables is available from Cindy M. Schaeffer on request.

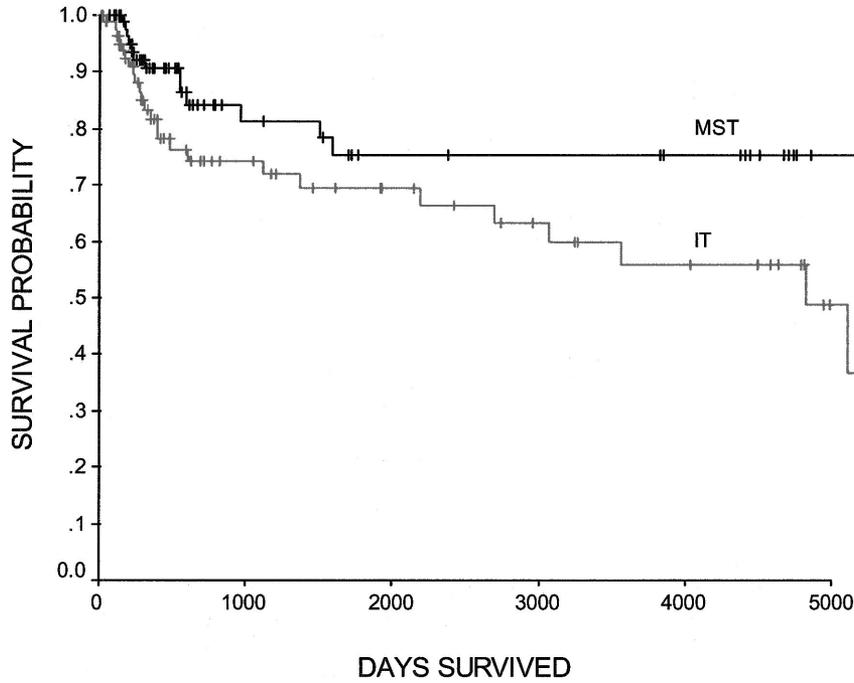


Figure 3. Survival functions for multisystemic therapy (MST) and individual therapy (IT) groups on time to first violent arrest following treatment. Completers and dropouts are combined in each group.

tively) within 13.7 years after treatment termination. In addition, the odds of rearrest for drug, violent, or nonviolent offenses were 2–4 times lower for MST participants than for IT participants. Moreover, MST participants were sentenced to 61% fewer days of

confinement in adult detention facilities and to 37% fewer days of probation as adults than were comparison counterparts.

The results extend those of a previous follow-up study with this sample in which only 26.1% of the MST participants had been

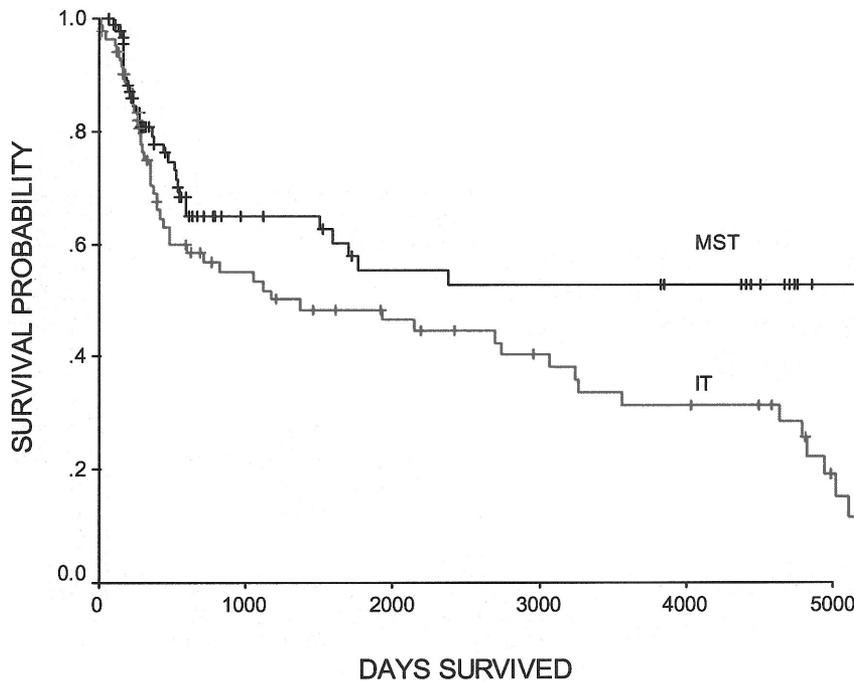


Figure 4. Survival functions for multisystemic therapy (MST) and individual therapy (IT) groups on time to first nonviolent arrest following treatment. Completers and dropouts are combined in each group.

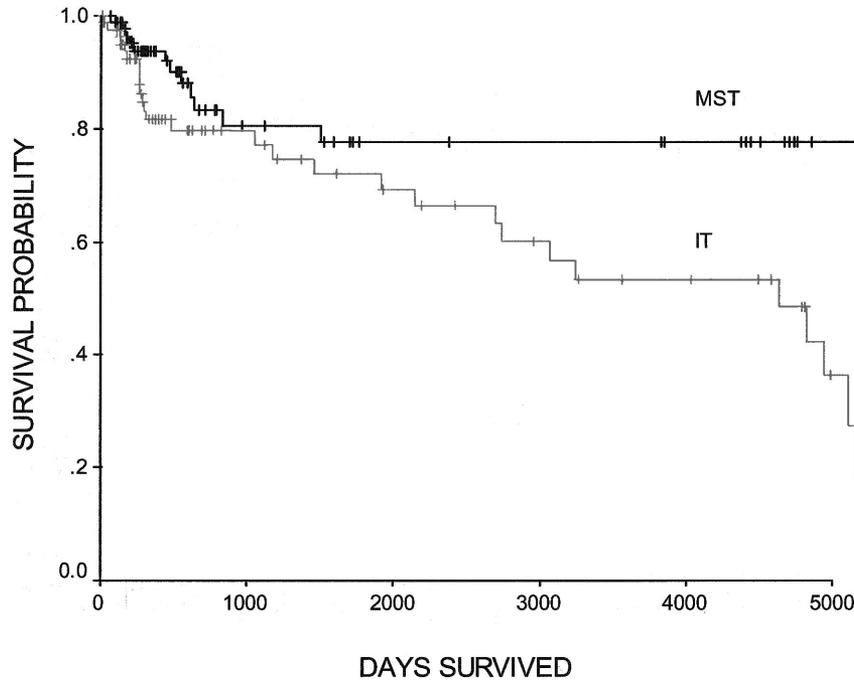


Figure 5. Survival functions for multisystemic therapy (MST) and individual therapy (IT) groups on time to first drug-related arrest following treatment. Completers and dropouts are combined in each group.

rearrested 4 years following treatment (Borduin et al., 1995). The longer follow-up in the current study showed that an additional 23.9% of the MST participants had been arrested since the previous follow-up, for an overall recidivism rate of 50.0%. Thus, for some individuals, the short-term preventive effects of MST on criminal activity did not persist into adulthood. The findings also highlight the need for longer term follow-ups of treatment outcomes for serious juvenile offenders, even for a treatment as successful as MST. We hope to conduct a more comprehensive follow-up with the current sample to determine why some youths desisted from offending, whereas others did not.

Although the childhood behavioral histories of the serious juvenile offenders in the current study are not known, it is possible that this sample of youths is representative of those life-course-persistent offenders (see Moffitt's, 1993, study) about whom policymakers and researchers are most concerned. Indeed, the youths in the current study were quite young at the time of their first arrest ( $M = 11.7$  years of age) and had been arrested an average of three more times by the age of 14 years. Moreover, the vast majority of youths (81%) in the IT condition were rearrested at some point during the follow-up period, which lasted well into adulthood (participants' average age at follow-up was 28.8 years). Other research has suggested that youths who are involved in serious antisocial behavior throughout the life course, although estimated to represent only 15%–25% of all juvenile offenders, account for more than half of the total volume of youth crime in a community (Farrington, Ohlin, & Wilson, 1986; Loeber & Farrington, 1998). To our knowledge, the current study is the first to demonstrate the efficacy of MST in altering the criminal trajectories of serious juvenile offenders beyond early adulthood.

The findings also have implications for the cost savings and fiscal viability of MST. For more than 13 years of follow-up, MST

reduced the rate of incarceration by an average of 62.4 days per year. A recent study that examined cost effectiveness with this sample indicated a cost savings of at least \$50,000 for each youth receiving MST (Merbler, Borduin, & Schaeffer, 2004). These savings compare favorably with MST program costs of \$4,000–\$6,000 per youth (Henggeler, Schoenwald, Rowland, & Cunningham, 2002). To conclude with greater confidence that the MST program in the current study was less costly than IT, however, we need a comprehensive examination of service use across service sectors (e.g., social welfare, mental health, juvenile justice, primary care) to more fully explicate the types of services received by the youths and to explore the possibility of cost shifting. Nevertheless, a cost analysis of MST with substance abusing or dependent delinquents showed no evidence of cost shifting (Schoenwald, Ward, Henggeler, Pickrel, & Patel, 1996).

The relative efficacy of MST in reducing criminal activity in high-risk youths may be due in part to the match between MST intervention foci and empirically identified determinants of criminality and violence in youths, including behavior problems, parental disturbance, problematic family relations, association with deviant peers, and poor school performance (Borduin, 1999). Indeed, a recent study that examined mechanisms of change in MST with serious juvenile offenders found that improvements in family functioning predicted decreases in delinquent peer affiliations that, in turn, predicted decreases in delinquency at a 1.7-year follow-up (Huey, Henggeler, Brondino, & Pickrel, 2000). Perhaps the longer term effects of MST observed in the current study also are linked with treatment-related changes in family and peer relations. More specifically, improved family support and decreased deviant peer involvement may have allowed MST participants to experience increased success in accomplishing educational, occupational, and other important developmental tasks (e.g., the formation of healthy

Table 2  
Main Effects of Treatment Group on Criminal Recidivism  
Outcomes at 13.7-Year Follow-Up

Outcome	Group		$\chi^2(1)$
	Multisystemic therapy	Individual therapy	
No. of all posttreatment offenses			17.83***
<i>M</i>	1.82	3.96	
<i>SD</i>	3.24	4.30	
No. of posttreatment violent offenses			169.92***
<i>M</i>	0.21	0.51	
<i>SD</i>	0.57	1.08	
No. of posttreatment nonviolent offenses			11.17***
<i>M</i>	0.89	2.00	
<i>SD</i>	2.12	2.71	
No. of posttreatment drug-related offenses			11.16**
<i>M</i>	0.20	0.55	
<i>SD</i>	0.71	1.12	
Days sentenced to adult confinement			8.97**
<i>M</i>	582.25	1,356.53	
<i>SD</i>	2,843.84	3,120.10	
Days sentenced to adult probation			3.02†
<i>M</i>	420.97	738.71	
<i>SD</i>	945.72	1,353.19	

Note. For all analyses, only those youths with complete 13.7-year follow-up data were included (i.e., individual therapy,  $n = 78$ ; multisystemic therapy,  $n = 87$ ), and completers and dropouts within each treatment condition were combined. Chi-square test statistics reflect Tobit regression analyses. All analyses controlled for each individual's length of the follow-up period.

†  $p = .08$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

romantic relationships) during late adolescence and early adulthood. Additional research is needed to evaluate the mechanisms of long-term change in MST.

Another important aspect of MST pertains to the accessibility and ecological validity of services. Traditionally, mental health services for juvenile offenders either have been inaccessible (i.e., office based) or have provided interventions that have little bearing on the natural ecology of youths (e.g., residential treatment centers, incarceration). In contrast, by having the family preservation model of service delivery, MST is provided in natural community contexts (e.g., home, school, recreation center). The delivery of services in the natural ecology of youths has several advantages, including the promotion of family cooperation and the acquisition of more accurate data regarding the assessment of identified problems and the results of treatment interventions (Borduin & Henggeler, 1990). Indeed, there is a growing consensus that providers of children's mental health services should recognize the natural ecology of the child and diminish barriers to service access (e.g., Burns & Hoagwood, 2002; Cauce et al., 2002; Henggeler, 1994; Roberts, 1994; Stroul, 1996).

As described earlier, we are contending that the favorable results of this study were largely due to two crucial aspects of MST: its comprehensive nature and ecologically valid delivery. However, it must be noted that this study still has several methodological

limitations. First, we assessed criminal activity during the follow-up period using arrest records, which are believed to underestimate the actual number of crimes committed by serious offenders (Loeber & Farrington, 1998). Nevertheless, arrest records are one useful index of criminal involvement and likely provided an accurate estimate of the relative effectiveness of MST versus IT in reducing serious criminal activity. Second, we were unable to confirm that youths maintained continuous residence in Missouri throughout the follow-up period and cannot rule out the possibility that a portion of youths may have committed crimes in other states. However, it seems unlikely that length of residency in the state would vary systematically across treatment conditions. Moreover, at least partial criminal recidivism data were available for the entire sample, and complete follow-up data were available for the vast majority (91.5%) of the sample.

In summary, the current findings further support the efficacy and applicability of MST for a broad range of serious antisocial behaviors. Over the longest follow-up period ever examined in a MST clinical trial, criminal recidivism among MST participants was half that of their counterparts receiving IT. In addition to improved life outcomes for youths and families receiving MST, societal benefits of MST include reduced incidents of crime in communities and enormous public savings in incarceration and probation costs (Borduin, Schaeffer, & Ronis, 2003). The cost effectiveness of MST, as well as its clinical effectiveness, should be considered by policymakers and the public at large in the selection of interventions for serious juvenile offenders.

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