

# Effects of Multisystemic Therapy Through Midlife: A 21.9-Year Follow-Up to a Randomized Clinical Trial With Serious and Violent Juvenile Offenders

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**Objective:** Although current evidence suggests that the positive effects of multisystemic therapy (MST) on serious crime reach as far as young adulthood, the longer term impact of MST on criminal and noncriminal outcomes in midlife has not been evaluated. In the present study, the authors examined a broad range of criminal and civil court outcomes for serious and violent juvenile offenders who participated on average 21.9 (range = 18.3–23.8) years earlier in a clinical trial of MST (C. M. Borduin et al., 1995). **Method:** Participants were 176 individuals who were originally randomized to MST or individual therapy (IT) during adolescence and averaged 3.9 arrests for felonies prior to treatment. Arrest, incarceration, and civil suit data were obtained in middle adulthood when participants were on average 37.3 years old. **Results:** Intent-to-treat analyses showed that felony recidivism rates were significantly lower for MST participants than for IT participants (34.8% vs. 54.8%, respectively) and that the frequency of misdemeanor offending was 5.0 times lower for MST participants. In addition, the odds of involvement in family-related civil suits during adulthood were twice as high for IT participants as for MST participants. **Conclusions:** The present study represents the longest follow-up to date of an MST clinical trial and demonstrates that the positive impact of an evidence-based youth treatment such as MST can last well into adulthood. Implications of the authors' findings for policymakers and service providers are discussed.

**Keywords:** juvenile offenders, randomized clinical trial, multisystemic therapy, MST, evidence-based treatment

Serious and violent juvenile offenders continue to commit crimes well into adulthood (Laub & Sampson, 2001) and are at risk for a wide range of long-term negative outcomes, including low educational attainment, physical and mental health problems, and interpersonal and financial difficulties (Farrington, Tofei, & Coid, 2009; Shepherd, Farrington, & Potts, 2004). Moreover, criminal offenses, whether committed by juveniles or adults, have harmful effects on victims, the families of victims and perpetrators, and the larger community (e.g., Poehlmann, Dallaire, Loper, & Shear, 2010; Robinson & Keithley, 2000). When these harmful effects are

converted into dollar amounts and combined with criminal justice system costs (e.g., incarceration), the total economic impact of a single lifetime of crime ranges from \$1.3 to \$1.5 million (Foster, Jones, & the Conduct Problems Prevention Research Group, 2006). Thus, there is a critical need for treatments that can prevent or attenuate persistent criminal activity among serious juvenile offenders.

Historically, mental health and juvenile justice services have had little success in ameliorating the serious antisocial behavior of youths. More recently, however, reviewers have identified a small number of family- and community-based treatment models that address key correlates of juvenile offending (i.e., individual, family, peer, and school) and that have shown effectiveness in reducing youth criminality (Eyberg, Nelson, & Boggs, 2008; National Institutes of Health, 2006). One of these treatments, multisystemic therapy (MST), has demonstrated significant effects on the criminal activity of serious juvenile offenders in more than a dozen clinical trials (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009). The Missouri Delinquency Project helped to establish the potential of MST in a large randomized clinical trial ( $N = 176$ ) by Borduin et al. (1995), who showed that MST produced a 63% reduction in rearrests for violent and other serious crimes among chronic juvenile offenders at a 4-year follow-up. In a subsequent (i.e., 13.7-year) follow-up of the same sample, Schaeffer and Borduin (2005) found that MST produced continued reductions in serious crimes and days incarcerated for former participants, who were on average 28.8 years old. This latter

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follow-up was important because it demonstrated the efficacy of MST in curtailing criminal activity in high-risk youths through early adulthood.

Although existing evidence suggests that the positive effects of MST on serious crime reach as far as young adulthood, the longer term impact of MST on criminal behavior in midlife has not been evaluated. In the present study, we examine MST criminal outcomes (i.e., arrests, incarceration) in middle adulthood and focus on a broader range of crimes (i.e., both misdemeanor and felony arrests) than in the Schaeffer and Borduin (2005) follow-up, which focused on index offenses (i.e., primarily felonies). Although felony offenses generally pose a greater threat to public safety, misdemeanor offenses are more common and result in considerable costs to victims (e.g., property damage and loss, health care, lost productivity) and to the public treasury (e.g., police and court expenses; M. A. Cohen, 1998). Information regarding the breadth and sustainability of evidence-based treatments such as MST could greatly assist policymakers and administrators in selecting and implementing empirically supported mental health programs for serious juvenile offenders.

In the present study, we also examine noncriminal outcomes among former MST participants in adulthood. To date, we know little about the long-term impact of MST on areas of adult functioning outside of involvement in (or avoidance of) criminal activities. However, research indicates that serious and violent juvenile offenders experience wide-ranging problems that collectively interfere with their ability to meet important life tasks (e.g., develop committed romantic relationships, rear children, become financially self-sufficient; Farrington et al., 2009; Laub & Sampson, 2003). In the present study, we used civil suits as indices of adult functioning in the domains of family relationships and financial responsibilities. These noncriminal outcome measures help to provide a more detailed picture of the long-term developmental impact of MST on participants' lives.

In summary, the present study from the Missouri Delinquency Project examines a broad range of criminal and civil court outcomes for serious and violent juvenile offenders who participated on average 21.9 years earlier in the largest clinical trial of MST (Borduin et al., 1995). Specifically, we investigated the long-term effects of MST on the likelihood and number of (a) juvenile and adult arrests for misdemeanor or felony offenses, (b) years sentenced for incarceration or probation in the adult court system, and (c) civil court suits related to family instability or financial problems. As such, this study represents the longest and most comprehensive follow-up of an MST clinical trial to date and, to our knowledge, of any evidence-based psychotherapy for youths (see Weisz, Jensen-Doss, & Hawley, 2006).

## Method

### Design

In the present study, the long-term criminal and civil court outcomes of 176 serious adolescent offenders who received either MST or individual therapy (IT) in an earlier randomized clinical trial (Borduin et al., 1995) were examined on average 21.9 years (range = 18.3–23.8 years) after treatment completion. A pretest–posttest control group design was used in the original trial, with random assignment to conditions and a 4-year follow-up for rear-

rests, 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 clinical interventions is provided here.

### Participants

Participants were 176 individuals from the original clinical trial (Borduin et al., 1995). These individuals had been referred consecutively to the Missouri Delinquency Project by juvenile court personnel between July 1983 and October 1986. Inclusion in the original study required that youths (a) have at least two arrests (i.e., convictions) for violent or other serious crimes, (b) live with at least one parent figure, and (c) have no evidence of psychosis or dementia. The families of youths meeting these criteria were randomly assigned via coin toss to either MST ( $n = 92$ ) or IT ( $n = 84$ ). Of the 176 families, 140 (79.5%) completed treatment (i.e., completers) and 36 (20.5%) dropped out (i.e., dropouts), defined as having unilaterally terminated treatment after the first session but before the seventh session. The 36 dropouts included 15 (i.e., 16.3%) of those youths assigned to MST and 21 (i.e., 25.0%) of those youths assigned to IT, a difference that was not statistically significant. Analyses in the present study collapsed across completers and dropouts within each treatment group to provide a conservative test of treatment effects (i.e., intent-to-treat).

Referred youths averaged 3.9 arrests for felonies prior to referral ( $SD = 1.9$ ), with 47.8% of the youths having been arrested for one or more violent crimes (e.g., assault). The mean age of youths at first arrest was 11.7 years ( $SD = 1.9$ ) and at the time of treatment was 14.5 years ( $SD = 1.4$ , range = 12–17). All youths had been incarcerated previously for at least 4 weeks. In addition, 69.3% of the youths were boys and 30.7% were girls; 76.1% were White, 22.2% African American, 1.1% Asian American, and 0.9% Hispanic/Latino; and 56.8% lived with two parent figures (biological parents, stepparents, foster parents, grandparents). The primary caretaker included biological mothers (89.5%); step-, foster, or adoptive mothers (5.5%); other female relatives (2.5%); and biological fathers (2.5%). Families averaged 3.2 children ( $SD = 1.9$ ), and 63.4% were of lower socioeconomic status (Class IV or V; Hollingshead, 1975). The average age of participants at follow-up was 37.3 years ( $SD = 1.8$ ). There were no between-groups differences in the pretreatment criminal histories (i.e., number or type of arrests) or demographic characteristics of MST and IT participants.

### Treatment Conditions

The mean number of hours of treatment (across completers and dropouts) was 20.7 ( $SD = 7.4$ ) for MST and 22.5 ( $SD = 10.6$ ) for IT. This difference was not statistically significant. Details about the therapists in each condition are provided in Borduin et al. (1995).

**MST.** The MST interventions and model of service delivery used in the present study have been specified in a clinical volume (Henggeler & Borduin, 1990) and a subsequent treatment manual (Henggeler et al., 2009). The treatment emphases of MST fit closely with findings on the causes and correlates of serious delinquent behavior (Loeber & Farrington, 1998). Using interventions that are present-focused and action-oriented, MST directly addresses both individual (e.g., cognitive) and systemic (e.g.,

family, school, peer) factors that are known to be associated with youth antisocial behavior. MST interventions are individualized and flexible to account for the specific constellation of influences identified in each case. Services are delivered to youths and their caregivers in home, school, and/or neighborhood settings at times convenient to the family. In addition, services are time-limited, with an overriding goal of empowering caregivers with the skills and resources needed to independently address youth problem behaviors.

The mean number of hours (i.e., 20.7) of MST in the present efficacy trial is similar to the means reported in other efficacy studies of MST (e.g., Brunk, Henggeler, & Whelan, 1987; Henggeler et al., 1986) but is less than half the typical number of hours of MST reported by community-based provider organizations (i.e., 60 hr; Schaeffer, McCart, Henggeler, & Cunningham, 2010). The efficacy trials reflected the delivery of MST under relatively ideal conditions (i.e., stable administrative structure in university settings, close supervision by the MST developers, highly motivated therapists who were doctoral students) and did not involve some of the considerable challenges (e.g., organizational and stakeholder barriers, low supervisor or therapist fidelity to the treatment model) of implementing complex evidence-based practices in real-world clinical settings (Henggeler, 2011). Although the MST interventions delivered in the efficacy trials, including the present trial, are the same ones as delivered by clinical provider organizations, more hours of therapist–family contact are needed in provider organizations to achieve comparable goals as those achieved in the efficacy research.

**IT.** The therapy in this condition represented the usual community outpatient treatment for juvenile offenders (see Loeber & Farrington, 1998). The offenders in this condition received an eclectic blend of psychodynamic (e.g., promoting insight and expression of feelings), client-centered (e.g., providing empathy and warmth), and behavioral (e.g., providing social approval for school attendance and other positive behaviors) therapies. Although there were some variations in the strategies used by therapists (e.g., some therapists provided less empathy or were more directive than other therapists), the common theme was that interventions focused on the individual youth rather than on his or her systems.

### Treatment Fidelity

To sustain the fidelity of MST, therapists received training in the MST model and ongoing quality assurance. Included were an initial orientation, 3-hr weekly group supervision, and individual supervision as needed. Therapist supervision was provided by Charles M. Borduin throughout the course of the investigation. Group supervision was task-oriented and focused on reviewing the goals and progress of each case and designing plans to overcome any barriers to obtaining strong treatment adherence and favorable outcomes. The therapists and supervisor also observed and discussed selected videotaped therapy sessions each week to promote intervention skills and adherence to MST treatment principles. Completion of treatment occurred when the therapist and family agreed that goals had been met and that ecological supports to sustain clinical gains were in place.

To monitor the integrity of interventions and promote adherence to treatment plans in the IT condition, the therapists were required

to attend weekly case reviews with the treatment coordinator from the Juvenile Court. The therapists were also required to provide weekly reports summarizing the nature of therapeutic contacts, who was present at the contacts, and youth progress in meeting treatment goals. Youths completed treatment when the therapists and treatment coordinator judged that treatment goals had been met.

At the time of the study, a standard measure of therapist adherence to MST was not yet developed. However, the therapists in both conditions completed a summary for each of their cases to indicate the systems directly addressed during the course of treatment (i.e., individual, marital, family, peer, school) and the general issues addressed in each identified system. These summaries revealed that all MST cases received interventions in two or more systems ( $M = 3.46$ ), whereas the vast majority (90.5%) of IT cases received interventions in only one system (always the individual youth).

### Research Procedures

**Original outcome study.** Families referred to the treatment project were initially contacted via phone or home visit and told that a 1.5-hr research assessment would be conducted prior to the start of treatment and again after all treatment sessions were completed. Families were informed that participation in the research was voluntary and that refusing to participate or discontinuing participation would not jeopardize the receipt of treatment services or result in sanctions from the court. Families were also informed that juvenile arrest records would be collected through youths' 17th birthdays and that adult arrest records and other public records would be obtained for youths thereafter. 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. Only those procedures and measures relevant to the present study are described below.

**Present study.** Public records information for criminal and non-criminal court 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 search, 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 participants remaining in the state. It was also assumed that differences between treatment groups in arrest rates would be consistent whether participants resided within or outside of Missouri.

In the present study, Missouri residency was confirmed to determine whether each participant had resided in the state since the time of an earlier follow-up completed in 1999 (Schaeffer & Borduin, 2005) and, thus, whether he or she was available to have a court record (i.e., arrests, sentencing, civil suits) in the state through 2007, when our follow-up was completed. Several steps were followed to confirm residency. First, state criminal records were searched, and arrests that occurred after release from treatment and that led to convictions were recorded. Next, for those individuals whose names did not appear in state criminal records, 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, original phone numbers and addresses of parents were used to confirm residence in the state of several additional youths for whom there were no arrest records or driver's license records. Overall, 84.1% of the sample ( $n = 148$ ) was located and determined to have lived in the state since the prior follow-up (in which 93.8% of the sample was located), including 81.5% ( $n = 75$ ) of the MST participants and 86.9% ( $n = 73$ ) of the IT participants; attrition rates did not differ significantly across groups. The remaining 15.9% of the sample for whom residency could not be verified were considered lost to follow-up (see Figure 1). There were no differences in the pretreatment criminal histories or demographic characteristics of participants included in the follow-up versus participants considered lost to follow-up.

Juvenile arrest data that had been collected during the original clinical trial (Borduin et al., 1995) and adult criminal and civil court records collected for the present study were included in odds ratios and 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 juvenile 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. Because counts of criminal and civil court outcomes (i.e., number of arrests or civil suits) are sensitive to within-state residency, only those youths whose residency was confirmed in both the prior long-term follow-up (Schaeffer & Borduin, 2005) and the present follow-up period were included in analyses of continuous outcomes ( $N = 148$ ).

## Measures

Juvenile and adult criminal records as well as adult civil court records were used in the present study. Juvenile criminal records

were obtained in the original clinical trial (Borduin et al., 1995) through yearly juvenile office records searches by research assistants who were uninformed as to each participant's treatment condition. Adult criminal and civil court records, which are freely available to the public in the state of Missouri, were obtained using an Internet database searched separately by two research assistants, both of whom were blind to treatment group status at the time of data collection. Participants' names were used to search court records, including known aliases, alternative first names (e.g., Jim for James), and alternative last names for women whose names may have changed due to marriage (based on state-level court records and county-level marriage records).

Several steps were taken to reduce the possibility of false positives for participants whose names were present in court records. First, participants were matched to records by date of birth, middle name or middle initial, and suffixes (e.g., Jr.). Second, when those indicators were absent for a specific case, participants were matched to records based on similarities to cases that met the first search criterion, including previously recorded addresses, court locations, and names of other individuals listed on the court docket (e.g., spouses, individuals involved in paternity cases). If participants could not be matched to records by this rule-out process, no information was recorded for a given participant. Thus, the data for the present study provided a conservative estimate of court involvement in the state of Missouri.

For criminal records, data were coded by crime classification (misdemeanor vs. felony), crime type (violent vs. nonviolent), and date of arrest. In addition, sentencing information was recorded as the number of days sentenced to incarceration and/or probation. For cases in which incarceration sentences were suspended in favor of probation, only days sentenced to probation were recorded, unless the terms of probation were violated and the incarceration sentence was executed. Only criminal arrests that resulted

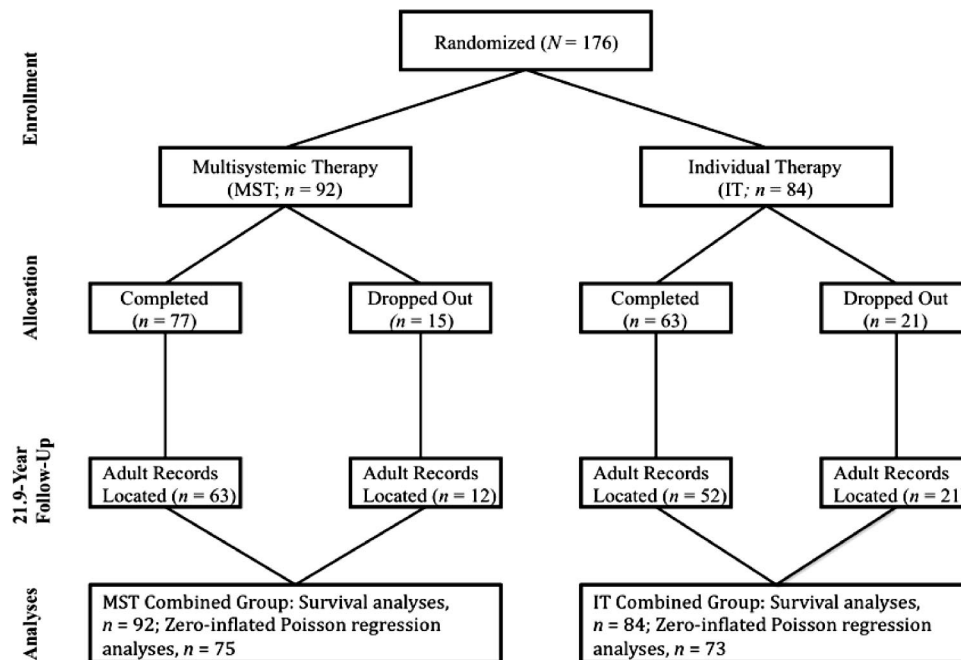


Figure 1. Flow diagram of participants from referral to follow-up.

in convictions were included in the present study; those criminal cases that were dismissed or that were not yet disposed at the time of data collection were not recorded. Traffic court records, which included minor traffic violations (e.g., speeding), were not included in the data set.

For civil court records, suits were classified as reflective of either *family instability* (i.e., divorce, paternity, and/or child support suits) or *financial problems* (i.e., account/credit, contract, and/or rent suits). Suits pertaining to family instability were recorded regardless of whether the participant was the petitioner (i.e., initiator of the suit) or the respondent (i.e., person against whom the suit was filed) because we assumed that both petitioners and respondents would likely experience family conflict and instability surrounding such suits. Suits pertaining to financial problems were limited to those cases in which participants were respondents rather than petitioners because (a) we were interested in measuring participants' failure to meet financial responsibilities and (b) there were almost no instances in which a participant had initiated a financial suit. As above, only those cases that were disposed at the time of data collection were recorded as having occurred.

## Results

We conducted three sets of analyses to evaluate the impact of treatment group (MST vs. IT) on criminal and civil court outcomes. First, we used descriptive statistics to examine the frequencies of dichotomous outcomes (e.g., rearrested vs. not rearrested) for each group. Second, we conducted survival analyses to evaluate between-groups differences in length of time to the first occurrence of a given outcome (i.e., rearrest, civil suit). Third, we used Zero-inflated Poisson (ZIP) regressions to examine between-groups differences on continuous outcomes (i.e., number of rearrests, years sentenced, and civil suits). ZIP regressions were also used to evaluate the effects of potential moderators of treatment.

### Relative Odds of Rearrests and Civil Suits

We calculated the percentages and relative odds of rearrests and civil suits in the IT group versus the MST group. As noted earlier, treatment completers and treatment dropouts were collapsed in each group. Odds ratios greater than 1.0 indicated higher odds for IT participants relative to MST participants. Confidence intervals that did not include 1.0 indicated that results were unlikely to occur by chance (J. Cohen, 1994). As described in Table 1, 54.8% of IT participants versus 34.8% of MST participants had been rearrested at least once for a felony offense by the end of the 21.86-year follow-up period. The odds of recidivism for any felony offense during follow-up were approximately twice as high for the IT group as for the MST group. Similarly, when felony subtypes were examined, the odds of recidivism for violent and nonviolent felonies, respectively, were 4.08 and 1.97 times greater for IT participants than for MST participants. For all categories of arrests except misdemeanors, the confidence interval around the odds ratio did not include 1.0. Regarding civil court outcomes, the odds of involvement in suits related to family instability were about twice as high for IT participants as for MST participants; again, the associated confidence interval did not include 1.0.

Table 1  
*Percentages and Odds of Rearrests and Civil Suits During Follow-Up by Therapy Condition*

| Variable           | %    | OR   | 95% CI        |
|--------------------|------|------|---------------|
| Criminal arrests   |      |      |               |
| Any felony         |      | 2.27 | [1.29, 4.01]  |
| IT                 | 54.8 |      |               |
| MST                | 34.8 |      |               |
| Violent felony     |      | 4.08 | [1.35, 12.36] |
| IT                 | 15.5 |      |               |
| MST                | 4.3  |      |               |
| Nonviolent felony  |      | 1.97 | [1.11, 3.47]  |
| IT                 | 51.2 |      |               |
| MST                | 34.8 |      |               |
| Any misdemeanor    |      | 1.22 | [0.68, 2.17]  |
| IT                 | 65.5 |      |               |
| MST                | 60.9 |      |               |
| Civil suits        |      |      |               |
| Family instability |      | 2.08 | [1.17, 3.47]  |
| IT                 | 47.6 |      |               |
| MST                | 30.4 |      |               |
| Financial problems |      | 1.03 | [0.56, 1.88]  |
| IT                 | 31.0 |      |               |
| MST                | 30.4 |      |               |

Note. Sample sizes for therapy conditions are as follows: individual therapy (IT;  $n = 84$ ); multisystemic therapy (MST;  $n = 92$ ). OR = odds ratio; CI = confidence interval.

### Survival Functions for Rearrests and Civil Suits

Survival analyses (Cox proportional hazards regressions; SPSS, Version 15) were used to obtain cumulative survival functions (or survival curves) for criminal outcomes among participants who received either MST or IT. 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 years) from release from treatment. Survival analyses are appropriate here because they model data that are censored (i.e., when some individuals in the sample do not experience an event, such as arrest; Keiley & Martin, 2005). Because the length of follow-up was shorter for the MST group ( $M = 21.56$  years,  $SD = 1.37$ ) than the IT group ( $M = 22.20$  years,  $SD = 0.91$ ),  $t(174) = 3.65$ ,  $p < .001$ , follow-up length was centered around the mean and entered into Step 1 of the regressions, and treatment condition was entered in Step 2. Chi-square difference tests indicated whether or not treatment group predicted survival length over and above follow-up length. By the end of the follow-up period, 54.8% of participants in the IT group had been rearrested at least once for a felony criminal offense, compared with 34.8% of the participants in the MST group,  $\chi^2(1, N = 176) = 6.89$ ,  $p = .01$  (see Figure 2). The hazards ratio for treatment condition was .616, suggesting a medium effect size for the lower risk of rearrest observed for MST participants.

We also used survival analyses to examine between-groups differences on time to first arrest for various types of felonies as well as for misdemeanors. Participants in the MST group were at significantly lower risk of rearrest for violent felony offenses,  $\chi^2(1, N = 176) = 5.66$ ,  $p = .02$ , and nonviolent felony offenses,  $\chi^2(1, N = 176) = 4.58$ ,  $p = .03$ . The hazards ratios for these survival functions suggested large and medium effects for MST on

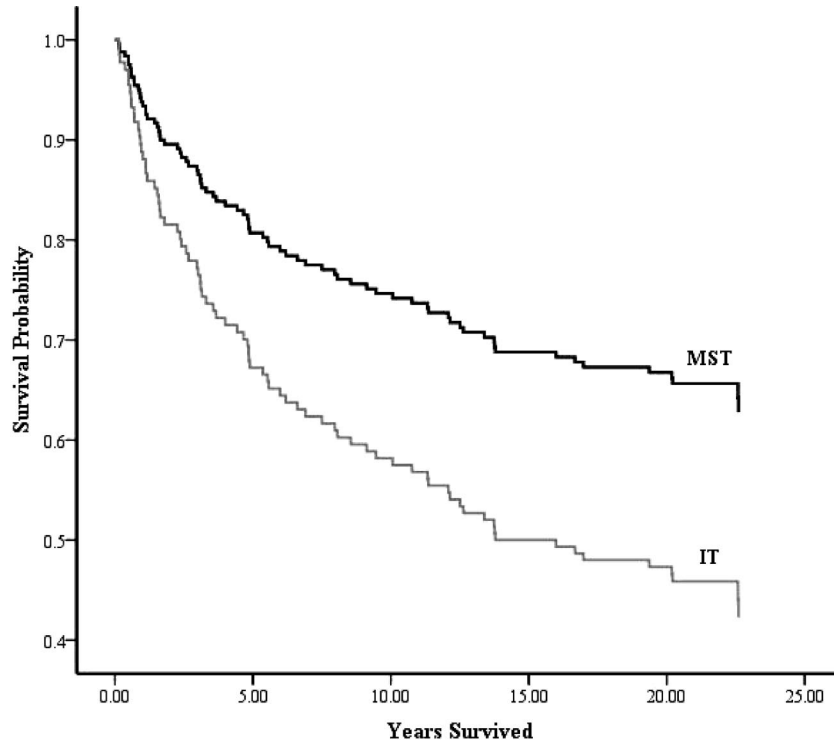


Figure 2. Survival functions for multisystemic therapy (MST) and individual therapy (IT) groups on time to first arrest for any felony offense following treatment.

violent felonies ( $\beta = 1.286$ ) and nonviolent felonies ( $\beta = .513$ ), respectively. The difference in survival probability between treatment conditions for misdemeanor crimes was not significant ( $p = .21$ ).

We also used survival analyses to compare MST and IT participants on time to each type of civil suit (i.e., family instability, financial problems). A nonsignificant trend indicated that MST participants were at lower risk for involvement in family instability suits than were IT participants,  $\chi^2(1, N = 176) = 3.28, p = .07$  (see Figure 3). The hazard ratio for this effect indicated a small effect of treatment group on family instability suit involvement ( $\beta = .449$ ). The difference in survival probability between treatment conditions for financial problems suits was not significant ( $p = .57$ ).

### Number of Rearrests, Years Sentenced, and Civil Suits

ZIP regression analyses evaluated the impact of treatment condition on the number of (a) posttreatment arrests, (b) years sentenced to incarceration or probation, and (c) civil suits.<sup>1</sup> We computed all ZIP regressions using the Mplus (Version 4; Muthén & Muthén, 2007) statistical package and used maximum likelihood estimation. These analyses were conducted only for participants who had complete data through the present follow-up period ( $N = 148$ ). Treatment condition was dummy coded with IT equal to 1 and MST equal to 0. As before, follow-up length was centered around its mean and entered into the model as a covariate. Descriptive statistics and regression coefficients are presented in Table 2.

We calculated an odds estimate (*OE*) and rate estimate (*RE*) for each outcome variable. *OE* values reflected inferential estimates of the odds of posttreatment rearrests, sentencing outcomes, and civil suits as predicted by treatment condition. *RE* values reflected estimates of frequencies of criminal and civil suit outcomes as predicted by treatment condition. For both *OE*s and *RE*s, a value greater than zero represented a higher likelihood of an outcome among IT participants relative to MST participants. The results of the ZIP regressions indicated that the estimated odds of felony arrests were approximately twice as high for IT participants as for MST participants ( $OE = 2.16$ ), as were the estimated odds of IT participants' having been sentenced to adult incarceration ( $OE = 2.35$ ). The results also revealed that the estimated rate of misdemeanor arrests among IT participants was about 5.04 times higher

<sup>1</sup> Because the outcome variables in the present study are continuous, nonnormal, and nonnegative (i.e., there are no negative values), they are considered censored-dependent variables (Greene, 1993). These variables contain both qualitative (e.g., arrested vs. not arrested) and quantitative (e.g., number of arrests among recidivists) components. ZIP regressions account for the qualitative and quantitative components of such variables by producing two separate estimates: (a) an estimate of relative odds (e.g., of being arrested) and (b) an estimate of relative rate (e.g., of number of arrests). Both estimates differ from traditional odds and rate statistics in that they are inferential estimates of effect rather than descriptive statistics. ZIP regressions perform well when sample distributions of counts are highly skewed due to an excess of zeroes (e.g., individuals with no criminal convictions; Lambert, 1992).

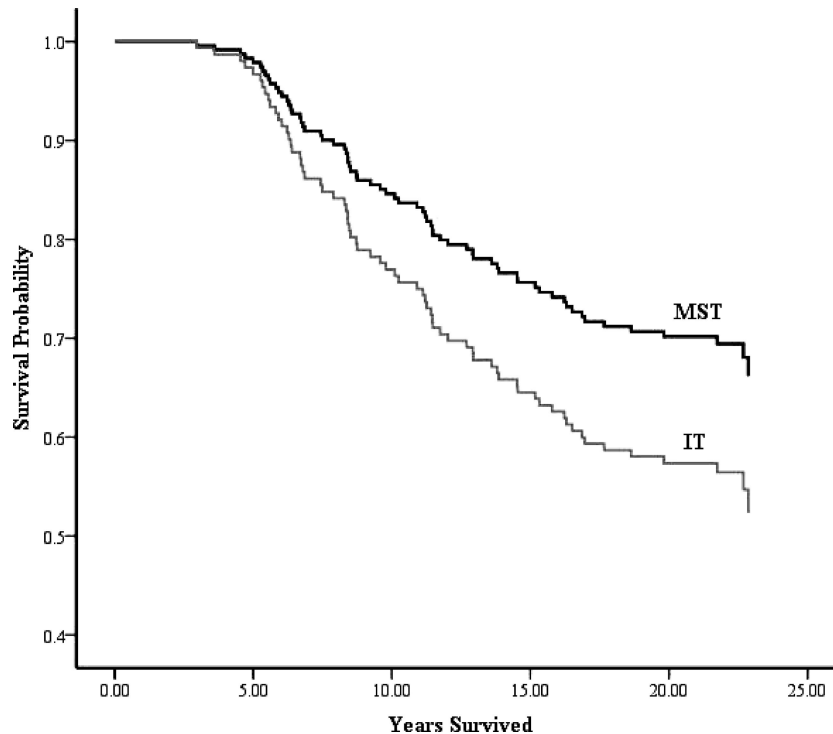


Figure 3. Survival functions for multisystemic therapy (MST) and individual therapy (IT) groups on time to first civil suit related to family instability following treatment.

than for MST participants. Although all other *OE* and *RE* values favored MST over IT, none reached statistical significance.

### Potential Moderators of Rearrests, Years Sentenced, and Civil Suits

ZIP regression analyses were also used to evaluate the effects of potential moderators (age, race, socioeconomic status [SES], gender, pretreatment arrest for a violent crime, and number of pretreatment arrests) of MST effectiveness. We examined these potential moderators for all outcomes with significant or near significant treatment effects (i.e., numbers of posttreatment violent felonies, nonviolent felonies, all felonies, all misdemeanors, years sentenced to incarceration, and civil suits related to family instability). For each regression analysis, we entered 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 simultaneously. Moderator variables that were continuous (age, SES, and pretreatment arrests) were centered around their means in each cross-product term. A significant regression coefficient (i.e., *OE* or *RE* value) for the cross-product term indicated whether MST was differentially effective with youths and families from different backgrounds. There were no significant moderators for any outcome variable. Thus, these results generally suggest that MST was equally effective with youths of divergent backgrounds.

### Discussion

The present study represents the longest and most comprehensive follow-up to date of an MST clinical trial. The results indi-

cated that MST participants were significantly less likely to be arrested for felony crimes than were IT participants (34.8% vs. 54.8%, respectively) within 21.9 years of treatment termination. More specifically, MST participants' odds of recidivism for violent and nonviolent felonies, respectively, were one quarter and one half those of IT participants. In addition, the frequency of misdemeanor offending was 5.04 times lower for MST participants than for their IT counterparts. Moreover, MST participants' odds of being involved in family-related civil suits during adulthood were half those of IT participants. Furthermore, consistent with conclusions from recent reviews regarding the cultural effectiveness of MST (e.g., Henggeler, 2011; Huey & Polo, 2008), the relative efficacy of MST was not moderated by measured demographic characteristics (e.g., race, gender, social class), suggesting that MST was not differentially effective with youths and families from different backgrounds.

The results demonstrate that MST had long-lasting effects in reducing the likelihood and odds of serious criminal activity (i.e., felonies) and incarceration among former participants. These findings extend those of a previous follow-up with this sample showing that MST participants were less likely to be rearrested and imprisoned for serious crimes 13.7 years following treatment (Schaeffer & Borduin, 2005). The continued impact of MST on serious offending and its consequences for more than two decades is particularly important given the pressing need for treatments that can prevent or attenuate life-course-persistent antisocial behavior. Furthermore, although MST did not reduce the overall likelihood of committing less serious crimes (i.e., misdemeanors) among participants, MST did produce an 80% reduction in the number of rearrests for such crimes. Thus, the effects of MST were evident

Table 2  
*Descriptive Statistics and ZIP Regression Results for Criminal and Civil Suit Outcomes*

| Variable                 | MST      |           | IT       |           | ZIP coefficients |           |
|--------------------------|----------|-----------|----------|-----------|------------------|-----------|
|                          | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>OE</i>        | <i>RE</i> |
| Offense type (number)    |          |           |          |           |                  |           |
| Any felony               | 1.53     | 2.94      | 1.99     | 2.61      | 2.16*            | 3.40      |
| Any misdemeanor          | 2.39     | 3.15      | 3.58     | 5.16      | 1.16             | 5.04**    |
| Adult sentencing (years) |          |           |          |           |                  |           |
| Incarceration            | 5.25     | 12.91     | 7.88     | 13.78     | 2.35*            | 18.01     |
| Probation                | 1.72     | 2.64      | 1.85     | 2.72      | 1.08             | 3.80      |
| Civil suits (number)     |          |           |          |           |                  |           |
| Family instability       | 0.57     | 0.92      | 0.93     | 1.21      | 1.62             | 1.30      |
| Financial problems       | 0.55     | 0.91      | 0.55     | 0.87      | 1.52             | 1.01      |

*Note.* For all analyses, only those youths with complete 21.9-year follow-up data were included, and completers and dropouts within each treatment condition were combined. Sample sizes for therapy conditions are as follows: IT ( $n = 73$ ); MST ( $n = 75$ ). All analyses controlled for each individual's length of follow-up period. MST = multisystemic therapy; IT = individual therapy; ZIP = zero-inflated Poisson; *OE* = odds estimate; *RE* = rate estimate.

\*  $p < .05$ . \*\*  $p < .01$ .

across a broad range of criminal activities and extended well into midlife.

Civil court records indicated that MST participants' odds of being involved in a suit related to family instability (i.e., divorce, paternity, or child support suits) were half those of IT participants. This finding is consistent with the emphasis that MST places on family interventions (Henggeler et al., 2009) and with previous studies of change processes in MST showing that improvements in family relations predicted decreases in individual problems (i.e., psychiatric symptoms, antisocial behavior) during adolescence (Henggeler et al., 2009; Huey, Henggeler, Brondino, & Pickrel, 2000; Mann, Borduin, Henggeler, & Blaske, 1990). Even so, the long-term impact of MST on family relations in adulthood has not been demonstrated previously and is noteworthy. Moreover, evidence from the criminal desistance literature (see Laub & Sampson, 2001) suggests that positive family relations in adulthood can act as a natural social control for crime and points to a possible mechanism of action for the long-term influence of MST. Conversely, MST did not have an effect on civil suits related to financial problems, suggesting that the benefits of MST may not generalize across all areas of adult functioning. In future work, we plan to more directly assess various domains of functioning among former MST participants (e.g., educational achievement, employment stability, marital quality, parenting effectiveness) and their children (e.g., behavioral and emotional adjustment, academic performance). Given the present results as well as the extant knowledge base on the intergenerational transmission of antisocial behaviors (for reviews, see Serbin & Karp, 2004; Thornberry, 2005), it seems reasonable to suggest that the benefits of MST may carry over from former participants to their children.

The collective results of this study have important implications for how current public policies address youth antisocial behavior. Indeed, when compared with usual outpatient services for serious and violent juvenile offenders (e.g., the IT condition in the present study), MST is associated with substantial reductions in expenses to taxpayers and intangible losses to crime victims, with cumula-

tive benefits ranging from \$131,918 (Aos, Phipps, Barnoski, & Lieb, 2001) to \$199,374 per participant up to 13.7 years following treatment (Klitz, Borduin, & Schaeffer, 2010). To conclude with greater confidence that MST in the present study was less costly than IT, however, we need a comprehensive examination of service use across different sectors (e.g., social welfare, mental health, 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 delinquents showed no evidence of cost shifting (Schoenwald, Ward, Henggeler, Pickrel, & Patel, 1996).

The present study has several methodological limitations. First, we assessed criminal activity during the follow-up period using official arrest records, which underestimate the actual number of crimes (Loeber & Farrington, 1998). However, arrest records are one useful index of criminal involvement and likely resulted in an accurate estimate of the relative effectiveness of MST versus IT in reducing criminal activity. Second, we could not confirm continuous residency in Missouri throughout the follow-up period, and we cannot rule out the possibility that some youths may have committed crimes in other states. However, it seems unlikely that length of residency in the state would vary systematically by treatment group. Moreover, at least partial recidivism data were available for the entire sample, and complete follow-up data were available for the vast majority (84.1%) of the sample. Third, although civil suits provided indices of noncriminal outcomes and have not been examined in previous studies, such suits represented indirect measures of various domains of adult functioning. Finally, the results of this study indicated a flattening of survival curves toward the end of our follow-up period, suggesting that future follow-ups of our sample focused solely on recidivism data may be of limited value.

In conclusion, the present findings provide additional support for the efficacy and applicability of MST with serious and violent juvenile offenders, whose high recidivism rates are of great concern to policymakers. Over the longest follow-up period ever examined in an MST clinical trial, MST produced lasting reductions in a broad range of criminal outcomes and in civil suits



related to family instability. These results likely correspond to improved life outcomes for youths and families receiving MST and to substantial cost savings for taxpayers and crime victims. Moreover, the present findings bode well for other evidence-based treatments of delinquency (e.g., Multidimensional Treatment Foster Care [Chamberlain, 2003]; Functional Family Therapy [Alexander & Parsons, 1982]), given similar clinical emphases (i.e., focus on key risk factors associated with delinquency, ecologically valid service delivery). As evidence-based treatments are disseminated more broadly, our findings should be considered by policymakers and service providers in the selection of interventions for serious juvenile offenders. Furthermore, given the harmful and long-lasting consequences of youth mental health problems (La Greca, Silverman, & Lochman, 2009) and the general absence of long-term follow-ups of evidence-based treatments for youths (Weisz et al., 2006), we hope that the favorable results of this study encourage researchers to examine the sustainability of outcomes for other effective treatment models for child and adolescent clinical populations.

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### Correction to Gloster et al. (2011)

In the article “Psychological Treatment for Panic Disorder With Agoraphobia: A Randomized Controlled Trial to Examine the Role of Therapist-Guided Exposure In Situ in CBT,” by Andrew T. Gloster, Hans-Ulrich Wittchen, Franziska Einsle, Thomas Lang, Sylvia Helbig-Lang, Thomas Fydrich, Lydia Fehm, Alfons O. Hamm, Jan Richter, Georg W. Alpers, Alexander L. Gerlach, Andreas Ströhle, Tilo Kircher, Jürgen Deckert, Peter Zwanzger, Michael Höfler, and Volker Arolt (*Journal of Consulting and Clinical Psychology*, 2011, Vol. 79, No. 3, pp. 406–420), the name of author Georg W. Alpers was misspelled as George W. Alpers. In Table 2, in the footnote, line two, the criteria should read “MI ≤ 1.8”. The online versions of this article have been corrected.

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