

Cost–Benefit Analysis of Multisystemic Therapy With Serious and Violent Juvenile Offenders

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This study investigated the economics of multisystemic therapy (MST) versus individual therapy (IT) using rearrest data from a 13.7-year follow-up (Schaeffer & Borduin, 2005) of a randomized clinical trial with serious juvenile offenders (Borduin et al., 1995). Two types of benefits of MST were evaluated: The value to taxpayers was derived from measures of criminal justice system expenses (e.g., police and sheriff's offices, court processing, jails, community supervision), and the value to crime victims was derived in terms of both tangible (e.g., property damage and loss, health care, police and fire services, lost productivity) and intangible (e.g., pain, suffering, reduced quality of life) losses. Results indicated that the reductions in criminality in the MST versus IT conditions were associated with substantial reductions in expenses to taxpayers and intangible losses to crime victims, with cumulative benefits ranging from \$75,110 to \$199,374 per MST participant. Stated differently, it was estimated that every dollar spent on MST provides \$9.51 to \$23.59 in savings to taxpayers and crime victims in the years ahead. The economic benefits 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.

Keywords: cost–benefit analysis, multisystemic therapy (MST), serious juvenile offenders, evidence-based treatment

Reviewers have identified a number of family-based treatment models that have shown effectiveness in reducing serious and violent juvenile offending (Eyberg, Nelson, & Boggs, 2008; National Institutes of Health, 2006). However, the economic costs and benefits of such treatments have seldom been evaluated. This is unfortunate because family-based treatments that are clinically effective with serious juvenile offenders are also likely to be cost effective. Indeed, the financial impact of serious criminal behavior is staggering, with high costs pertaining to law enforcement, the maintenance and expansion of the correctional system, and victimization (i.e., health-related injuries, reduced quality of life; Miller, Fisher, & Cohen, 2001). In fact, 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). Research findings demonstrating the economic benefits of family-based treatments for serious and violent juvenile offenders would be useful for policymakers to consider in their funding decisions about mental health services.

The purpose of the present study was to examine the economic costs and benefits of multisystemic therapy (MST; Henggeler & Borduin, 1990; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009), a family- and community-based treatment that has evidenced long-term reductions in the criminal activity of serious and violent juvenile offenders. For example, in a 4-year follow-up of chronic juvenile offenders who had been randomly assigned to MST or individual therapy (IT), Borduin et al. (1995) showed that MST produced a 63% reduction in rearrests for violent and other serious crimes. More recently, in a 13.7-year follow-up of the juvenile offenders (now in their 20s and early 30s) who had participated in the Borduin et al. (1995) clinical trial, participants treated with MST had 54% fewer arrests and 57% fewer days incarcerated than did participants treated with IT (Schaeffer & Borduin, 2005).

Given the evidence of clinical effectiveness from these MST follow-up studies as well as from independent replications of MST clinical outcomes (e.g., Timmons-Mitchell, Bender, Kishna, & Mitchell, 2006), it seems logical to evaluate the economics of MST. For MST to compete in the mental health treatment marketplace with other types of interventions for serious juvenile offenders (e.g., individual counseling, group therapy, pharmacotherapy), it is important to determine its potential cost advantages. Information

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regarding the economics of empirically supported treatments, and especially widely disseminated ones such as MST (see Henggeler et al., 2009), could greatly assist government funding agencies in selecting and administering clinically effective mental health programs for serious juvenile offenders (Barnett, 2000). Furthermore, if the benefits of MST to society do not exceed the costs of providing the treatment, such findings might provide an impetus to examine whether MST could be further refined and improved, such as providing posttreatment booster sessions or ongoing support services in late adolescence and early adulthood.

Of the various methods that are used to evaluate the financial benefits of providing effective clinical services, the most powerful is cost–benefit analysis (French, Salome, Sindelar, & McLellan, 2002; Kenkel, 1997). This technique compares the costs of an intervention with its economic benefits, with all costs and benefits measured on the same metric (e.g., dollars; Barnett, 2000; Singh, Hawthorne, & Vos, 2001). In contrast, other economic evaluation methods (e.g., cost-effectiveness analysis, cost-utility analysis) tend to rely on study-specific measures of costs and outcomes (e.g., quality adjusted life years, improved marital satisfaction, reductions in partner violence), making between-studies comparisons of interventions with different outcomes difficult (Fals-Stewart, Yates, & Klostermann, 2005).

Only a few studies have examined the costs and benefits of intervention programs designed for juvenile offenders, and those studies have included relatively serious methodological limitations. An exception to this overall dearth of studies is a series of cost–benefit analyses of programs for juvenile offenders, including MST, conducted by the Washington State Institute for Public Policy (WSIPP; Aos, Lieb, Mayfield, Miller, & Pennucci, 2004; Aos, Phipps, Barnoski, & Lieb, 2001; Drake, Aos, & Miller, 2009). The WSIPP developed a model (hereafter referred to as the WSIPP model) to estimate an expansive range of monetary costs and benefits for both taxpayers and crime victims and created computational routines to obtain the “bottom-line” economics of each program. Regarding MST, WSIPP researchers reported net benefits ranging from \$9,316 to \$131,918 for each participant, with benefit–cost ratios of \$2.64 to \$28.81 for every dollar spent (Aos et al., 2001, 2004; Drake et al., 2009). As such, these researchers identified MST as a treatment program that was likely to reduce taxpayer and other costs and that was worthy of implementation by state or local governments.

The cost–benefit studies conducted by the WSIPP provide a relatively comprehensive estimate of the economic impact of juvenile offender programs. However, the WSIPP findings regarding the costs and benefits of MST are limited in two main ways. First, the WSIPP studies calculated an average effect size across MST clinical trials published through 2006 (see Drake et al., 2009) using a dichotomous outcome measure (i.e., arrested or not) rather than a continuous measure (i.e., mean number of arrests per recidivist). An expected rate of future offenses for MST recidivists was then estimated using a heterogeneous population of juvenile offenders in Washington State, rather than the

population for which MST was developed (i.e., serious and violent juvenile offenders, a population whose recidivism rates through young adulthood range from 73% to 84%; Farrington, Coid, & West, 2009; Sampson & Laub, 2003). An economic evaluation that relies on a continuous outcome measure and is based on a sample of serious juvenile offenders seems warranted to provide a more precise estimate of the costs and benefits of MST. Second, the WSIPP estimated the cost of implementing MST on the basis of market rates for labor and services, rather than the more comprehensive set of costs that are inherent in operating an actual MST program. In light of the widespread dissemination of MST in recent years, real-world program costs (including the costs of quality assurance procedures) can now be calculated with greater accuracy than before. Such accuracy seems critical to inform treatment decisions in service organizations.

In the current study, we examined the costs and benefits of MST by adapting the WSIPP model to a long-term (13.7-year) follow-up of the largest MST clinical trial to date (Schaeffer & Borduin, 2005). More specifically, we investigated the benefits of MST in reducing (a) taxpayer costs (i.e., criminal justice system expenditures related to juvenile and adult crime) and (b) tangible costs and (c) intangible costs to crime victims. We improved on the methods used in the WSIPP studies by incorporating continuous data on criminal outcomes from a sample of serious and violent juvenile offenders as well as cost figures from a real-world MST program.

Method

Participants

Participants were 176 individuals who originally participated in a randomized clinical trial (Borduin et al., 1995) and were subsequently tracked in a 13.7-year follow-up of criminal activity (range = 11.8–15.2 years; $SD = 1.2$ years; Schaeffer & Borduin, 2005). In the original study, 200 juvenile offenders and their families were referred consecutively by juvenile court personnel and included all families in which the youth (a) had at least two prior arrests for criminal offenses (e.g., burglary, physical assault, grand larceny), (b) was living with at least one parent figure, and (c) showed no evidence of psychosis or dementia. Of these 200 families, 24 (12%) refused to participate in treatment and 176 were randomly assigned to MST ($n = 92$) or IT ($n = 84$); treatment completers and dropouts were collapsed in each condition to provide a conservative test of MST effects (i.e., intent to treat). 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). The mean age of the youths at the time of treatment was 14.5 years ($SD = 1.40$); 69.3% were male; 76.1% were White and 22.2% were African American; and 56.8% lived with two parent figures (biological parents, stepparents, foster parents, grandparents). At the 13.7-year follow-up, the average age of participants was 28.8 years ($SD = 1.78$).

The MST and IT groups did not differ on lengths of treatment or follow-up, criminal histories, or demographic characteristics.

Treatment Conditions

The mean hours of treatment were 20.7 ($SD = 7.4$) for the MST group and 22.5 ($SD = 10.6$) for the IT group. Details about the therapists, their supervision, and treatment fidelity in each condition are provided in Borduin et al. (1995).

MST. MST interventions, service delivery methods, and case examples are described in a clinical volume (Henggeler & Borduin, 1990) and subsequent treatment manual (Henggeler et al., 2009). Interventions integrate empirically based clinical techniques (e.g., from behavioral and cognitive-behavioral therapies and structural/strategic family therapy), which have historically focused on a limited aspect of a youth's social ecology (e.g., individual youth, family), into a broad-based ecological framework. MST therapists are service providers (not service brokers) whose sole responsibility is to deliver MST. Services are delivered to youths and their caregivers in home, school, or neighborhood settings at times convenient to the family. Therapeutic intensity is titrated to clinical need, with therapists spending more time with families in the initial weeks of therapy (e.g., 3–4 times per week if indicated) and tapering off during a 4- to 6-month course of treatment.

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 therapists' strategies (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. IT therapists also provided treatment to individuals who were not participants in the clinical trial.

Procedures

All procedures were approved by the Institutional Review Board of the University of Missouri. Only those procedures and measures relevant to the current study are described below.

Original outcome study. Families were contacted by a research assistant and asked to participate in a research assessment shortly before treatment began and after treatment had ended (see Borduin et al., 1995). Family members provided written consent or assent for the research procedures and long-term follow-up.

Follow-up study. Youths' criminal arrest data were obtained yearly through county juvenile office records, and adult criminal arrest data were obtained from Missouri State Police records. An arrest was classified as having taken

place during the follow-up period if it occurred after the date of the posttreatment assessment (or after the date of termination from treatment for dropouts). Juvenile and adult arrest data were combined to provide a complete record (i.e., number and type of arrests) during the follow-up period. A search of criminal records in other states was not possible because participants' fingerprints would have been required to conduct a national records check, and these were not obtained at the time of the original study.

We used multiple sources (e.g., arrest records, driver's license records, parents) to determine whether each participant had lived in Missouri and thus was available to have an arrest record during the follow-up period (see Schaeffer & Borduin, 2005). Overall, 93.7% ($n = 165$) of the sample was located and determined to have lived in Missouri during the entire follow-up period (94% [$n = 87$] of the MST participants and 92.9% [$n = 78$] of the IT participants). In addition, at least partial rearrest data were available for the 11 youth who were not located; these data were included in all analyses ($N = 176$).

Present study. The present study applied the WSIPP model (see Aos et al., 2001) to the MST effectiveness data obtained in Schaeffer and Borduin (2005). The WSIPP model is an integrated set of estimates and computational routines designed to produce internally consistent benefit-to-cost ratios and operates using Microsoft Excel and Microsoft Visual Basic for Applications. The model provides monetary estimates of a vast range of costs associated with crime, as well as formulas for how to weigh those expenditures against the operational costs of programs (i.e., MST and IT) and for how to compare the relative costs and benefits of programs with one another (i.e., the MST treatment effect size). All computational routines from the original application of the WSIPP model (Aos et al., 2001) were retained in the present study.

Within the WSIPP model, monetary estimates regarding the benefits of preventing crimes can be broadly categorized as those pertaining to (a) taxpayer expenses, (b) tangible losses to victims, and (c) intangible losses to victims. Estimates of taxpayer expenses were derived from expenditures across public agencies in the state of Washington (e.g., Department of Corrections). Estimates of tangible and intangible expenses (i.e., losses) to crime victims were taken from studies by Cohen, Miller, and colleagues (Cohen & Miller, 1998; Cohen, Miller, & Rossman, 1994; Miller, Cohen, & Wiersema, 1996). Estimates of all taxpayer and victim expenses are adjusted in the WSIPP model to account for crime severity because more severe crimes typically have higher rates of conviction and longer sentences. To apply the WSIPP model to our data, we adjusted estimates of taxpayer and victim expenses to the state of Missouri using the American Chamber of Commerce Researchers Association (ACCRA) Cost of Living Index (ACCRA, n.d.).

The present study used a baseline year of 2008 for all monetary values. Specifically, actual program costs (rather than estimates) for MST and IT in 2008 were used. In addition, estimates of the expense of each type of arrest

were adjusted to 2008 values using the Consumer Price Index (U.S. Bureau of Labor Statistics, n.d.). We also used economic discounting to express any benefits of one treatment over another that accrue into the future (in the present case, over the next 13.7 years) in terms of their present (i.e., 2008) value. Discounting is necessary because the value of a dollar today is always greater than the value of the same dollar in a future year, even without inflation, because the opportunity to use the dollar now or invest it to earn additional income is forgone (Hargreaves, Shumway, Hu, & Cuffel, 1998). We used a 3% annual discount rate (see Gold, Siegel, Russell, & Weinstein, 1996).

Measures

Effectiveness. Each posttreatment arrest identified in the 13.7-year follow-up was classified based on the six categories of index offenses used in the WSIPP model: murder/manslaughter, sexual (e.g., assault, molestation), robbery, aggravated assault (e.g., with intent to kill, with a deadly weapon), property (e.g., auto theft, auto tampering, forgery, larceny), and drug (e.g., driving under the influence, distribution of a controlled substance).

Costs. The costs inherent in operating an MST program are different from those associated with implementing usual outpatient treatment services in the community. MST programs are funded by state or local public service agencies (i.e., mental health, juvenile justice, social welfare) and are typically implemented by private service organizations. These organizations have a contract with MST Services, Inc., the entity that licenses MST programs nationally and ensures that programs are implemented with fidelity to the MST model. To maintain this fidelity, quality assurance mechanisms include staff training (e.g., initial 5-day orientation training, quarterly booster training, weekly expert consultation), organizational support (e.g., ongoing program implementation reviews, problem solving for implementation barriers), and tracking and feedback systems (e.g., monthly phone surveys with program participants, web-based data management and reporting). In contrast, outpatient services in the community do not involve licensing costs (i.e., because treatments are eclectic and selected at the therapists' discretion) and do not have extensive quality assurance protocols.

Another key difference is that MST therapists work exclusively within the MST program, and thus the costs associated with time spent in service delivery (e.g., family therapy, school meetings) and related activities (e.g., travel to homes, participation in trainings, supervision meetings) are captured within the overall program budget, as are expenses such as mileage reimbursement and cell phone service contracts. In contrast, outpatient therapists use a fee-for-service model (through private and public insurance reimbursement) in which salaries and operating expenses are captured through hourly session rates. Thus, in the present study, we used different approaches to accurately capture the total cost of treatment per youth in MST versus IT.

MST. The cost of providing MST was estimated using the budget of a private service organization delivering MST in St. Louis, MO, in 2008. All 2008 expenses involved in operating the MST program (outlined in the previous section) were summed and divided by the number of youths who received MST that year to obtain the cost of MST per youth. This cost, adjusted for the difference in cost of living between St. Louis, MO, and Columbia, MO (i.e., the site of the original clinical trial) using the ACCRA Cost of Living Index (ACCRA, n.d.), was \$10,882 per MST participant. This estimate is on the high end for MST programs nationally (i.e., \$6,000 to \$12,000 per youth; K. B. Strother, President, MST Services, Inc., personal communication, March 12, 2010) and, as such, provides a conservative estimate of MST benefits.

IT. Information obtained from the family counseling center that provided IT to youth in the original clinical trial was used to estimate the cost of IT. Specifically, the reimbursement rate per session (i.e., \$91.33) for IT in 2008 was multiplied by the average number of treatment sessions (i.e., 22.5) received by IT participants, resulting in an estimate of \$2,055 per youth.

Taxpayer benefits. As noted, estimates of taxpayer benefits included in the WSIPP model computational algorithms were used in the present study. In the Aos et al. (2001) study, Washington public agency expenditures for juvenile and adult offenders were obtained. The estimates stemming from these data were a function of the annual marginal capital and operating expenses of (a) police and sheriffs' offices, (b) superior courts and county prosecutors (for court processing), (c) jail and community supervision for adult felons, (d) juvenile detention (based on average daily population and length-of-stay data as well as new facility construction expenses) and probation, (e) juvenile rehabilitation services, and (f) adult detention (based on average daily population data and facility construction expenses) and postprison community supervision.

Crime victim tangible benefits. Tangible benefits were defined in terms of victim monetary expenses related to (a) property damage or loss (including insurance claim processing expenditures), (b) medical care (e.g., hospital and physician costs, emergency transport, rehabilitation, prescriptions), (c) mental health care, (d) police and fire services, (e) victim services (e.g., legal advocacy, safe houses), and (f) lost productivity (i.e., wages, fringe benefits, and school days lost by victims; productivity lost by coworkers and supervisors). Such expenses provide a more conservative estimate of the cost of crime to victims than do intangible losses (i.e., pain, suffering, reduced quality of life; Miller et al., 1996).

Crime victim intangible benefits. Intangible (i.e., quality of life) loss estimates within the WSIPP model provided a more expansive assessment of victim benefits when crime was prevented by placing a dollar value on the pain and suffering of crime victims. For nonfatal injuries, the model calculates monetary estimates of lost quality of life by subtracting the out-of-pocket expenses associated with an injury from the amount of compensatory damages awarded

by a jury. This technique for estimating intangible losses to crime victims has been used in more than 50 technically sound “willingness to pay” studies (Miller et al., 2001).

Analytic Strategy

The cost-benefit analysis of MST was based on the interrelationship of three major sets of dependent measures: (a) effectiveness (i.e., arrests during the 13.7-year follow-up for MST vs. IT participants), (b) costs (i.e., resources used to provide MST or IT), and (c) benefits to taxpayers and crime victims (i.e., of MST over IT). We assumed that all categories of arrests (i.e., murder/manslaughter, sexual, robbery, aggravated assault, property, and drug) resulted in taxpayer expenditures. Consistent with Aos et al. (2001) and Miller et al. (1996), we also assumed that property crimes resulted in tangible, but not intangible, losses to victims, and that drug crimes did not result in any losses to victims (i.e., tangible or intangible).

We calculated benefits to crime victims using two different assumptions (see Aos et al., 2001; Miller et al., 1996). First, the benefit to crime victims was calculated assuming one victimization per arrest. This analysis was based on the number of arrests made by the police and assumed that “official” crime statistics were an accurate representation of the number of offenses committed by the offenders in the present sample. Second, the benefit to crime victims was calculated assuming multiple victimizations per arrest. These analyses were based on a large body of evidence (e.g., Elliott, 1995; U.S. Bureau of Justice Statistics, 2006) suggesting that the number of offenses that are committed across various criminal behaviors is much greater than the actual number of arrests for such offenses; therefore, there are likely to be multiple offenses (and thus multiple victims) for every arrest that is actually made. Accordingly, we included both conservative (i.e., assuming one victimization) and expansive (i.e., assuming multiple victimizations) estimates of the net benefit and benefit-cost ratio of MST to crime victims. Criminologists use lambda, an estimate of the number of offenses per type of arrest (based on the distribution of arrests and the probability of conviction), for multiple victimization analyses. Lambdas for the various

arrest categories (except drug crimes, which we assumed had no victims) were taken from Aos et al. (2001) and were as follows: murder/manslaughter, 0.01; sexual offense, 0.12; robbery, 0.69; aggravated assault, 1.05; property, 19.70.

Results of cost-benefit analyses were expressed in terms of a net benefit estimate (i.e., benefits minus costs) or benefit-cost ratio (i.e., benefits divided by costs). In each case, MST was considered cost beneficial if the net benefit was positive and the benefit-cost ratio exceeded \$1 (see Singh et al., 2001).

Results

Taxpayer Benefits

We initially calculated the average present (i.e., 2008) value expense of a single arrest for recidivists in each treatment condition. As illustrated in Table 1, we began by multiplying the expense (listed in column 2) associated with each category of arrest by the distribution (%) of that crime among MST and IT recidivists (columns 3 and 5, respectively) to calculate the expected taxpayer expense per arrest category for each treatment condition (columns 4 and 6, respectively). For example, the expense associated with aggravated assault (i.e., \$64,468) was multiplied by the respective percentages of arrests for that crime in the MST (11.73%) and IT (14.08%) conditions to derive expected taxpayer expenses of \$7,562 (MST) and \$9,077 (IT). We summed the expected taxpayer expenses for all arrest categories to calculate the total taxpayer expenditure (i.e., average present value expense) for one arrest in the MST (\$55,046) and IT (\$43,277) conditions, respectively.

We then took several steps to calculate the benefit to taxpayers of providing MST over IT. First, the average taxpayer expense for one arrest in each treatment condition (derived in Table 1) was multiplied by the expected number of posttreatment arrests per participant in each condition. For the MST condition, we multiplied the recidivism rate (i.e., 50%) by the average number of arrests per recidivist (i.e., 3.43), resulting in an average of 1.72 arrests per participant. Similarly, for the IT condition, we multiplied

Table 1
Taxpayer Expenses per Arrest by Therapy Condition

Arrest category	Arrest expense (\$)	Therapy condition			
		Multisystemic therapy (MST)		Individual therapy (IT)	
		Arrest distribution (%)	Expected taxpayer expense (\$) ^a	Arrest distribution (%)	Expected taxpayer expense (\$) ^a
Murder/manslaughter	403,092	0.00	0	0.00	0
Sexual	102,841	38.89	39,995	23.94	24,620
Robbery	105,238	0.62	652	0.47	495
Aggravated assault	64,468	11.73	7,562	14.08	9,077
Property	12,371	35.19	4,353	36.62	4,530
Drug	18,302	13.57	2,484	24.89	4,555
Total	—	100.00	55,046	100.00	43,277

Note. All expenses are expressed in 2008 dollars. Sample sizes for therapy conditions are MST ($n = 92$) and IT ($n = 84$).

^a Product of arrest expense and arrest distribution for therapy condition.

the recidivism rate (i.e., 81%) by the average number of arrests per recidivist (i.e., 4.54), for an average of 3.68 arrests per participant. Next, each product was multiplied by the constant 0.9 (i.e., an arbitrary percentage reduction in the taxpayer value of reducing crime to avoid the chance that taxpayer benefits could be overstated) to yield expected criminal justice system taxpayer expenditures of \$84,964 for each MST participant and \$143,234 for each IT participant. The expenditure for each MST participant was then subtracted from the expenditure for each IT participant, indicating that \$58,270 in taxpayer benefits per participant were achieved by providing MST rather than IT.

We subtracted the cost of providing IT per participant (i.e., \$2,055) from the cost of providing MST per participant (i.e., \$10,882) to calculate an incremental treatment cost of \$8,827. This cost was subtracted from the criminal justice system expenditures avoided for each participant in MST (i.e., \$58,270) to calculate the net present value (i.e., benefits minus costs) of MST to taxpayers (i.e., \$49,443). Finally, we divided the criminal justice system expenditures avoided for each participant in MST by the incremental treatment cost to calculate the benefit–cost ratio (i.e., benefits divided by costs; \$6.60). In other words, \$1 spent on MST today can be expected to return \$6.60 to taxpayers over the next 13.7 years.

Crime Victim Tangible Benefits

Assuming one victimization. We initially calculated the present value tangible expense (i.e., loss) to victims for an

arrest using estimates of victim expenditures from Miller et al. (1996). As illustrated in Table 2, we began by multiplying the tangible expense of each category of arrest to crime victims (listed in column 2, with drug arrests excluded) by the distribution (%) of that crime among MST and IT recidivists (columns 3 and 5, respectively) to calculate the expected crime victim tangible expense per arrest category for each treatment condition (columns 4 and 6, respectively). We summed the expected taxpayer expenses for all arrest categories to calculate the total crime victim tangible expenditure (i.e., present value expense) for one arrest in the MST (\$3,217) and IT (\$2,194) conditions.

We then took several steps to calculate the tangible benefit to crime victims of providing MST over IT. First, we multiplied the average tangible expense for one arrest in each treatment condition (derived in Table 2) by the expected number of arrests per participant in each condition (i.e., 1.72 for MST and 3.68 for IT). The expected tangible expense to crime victims was \$5,517 per MST participant and \$8,069 per IT participant. The difference between the two treatment conditions revealed that \$2,552 in tangible expenses to crime victims were avoided per MST participant. Next, we subtracted the incremental treatment cost of MST over IT (i.e., \$8,827) from the avoided tangible expense to crime victims (i.e., \$2,552) to determine the net present value of MST to crime victims (i.e., a loss of \$6,275). We then divided the avoided tangible expense to crime victims by the incremental treatment cost to yield a benefit–cost ratio of \$0.29.

Table 2
Crime Victim Expenses by Therapy Condition Assuming One Victim per Arrest

Arrest category	Arrest expense (\$)	Therapy condition			
		Multisystemic therapy (MST)		Individual therapy (IT)	
		Arrest distribution (%)	Expected expense/loss (\$) ^a	Arrest distribution (%)	Expected expense/loss (\$) ^a
Murder/manslaughter					
Tangible	1,179,862	0.00	0	0.00	0
Intangible	2,189,329	0.00	0	0.00	0
Sexual					
Tangible	7,139	38.89	2,777	23.94	1,709
Intangible	94,623	38.89	36,799	23.94	22,653
Robbery					
Tangible	2,698	0.62	17	0.47	13
Intangible	6,679	0.62	42	0.47	31
Aggravated assault					
Tangible	1,674	11.73	196	14.08	236
Intangible	9,091	11.73	1,066	14.08	1,280
Property					
Tangible	646	35.19	227	36.62	236
Intangible	0	35.19	0	36.62	0
Drug					
Tangible	0	13.57	0	24.89	0
Intangible	0	13.57	0	24.89	0
Total					
Tangible	—	100.00	3,217	100.00	2,194
Intangible	—	100.00	37,907	100.00	23,964

Note. All expenses are expressed in 2008 dollars. Sample sizes for therapy conditions are MST ($n = 92$) and IT ($n = 84$).

^a Product of arrest expense/loss and arrest distribution for therapy condition.

Assuming multiple victimizations. For the multiple victimization analyses, we used lambda to estimate the number of offenses (i.e., victimizations) per arrest. We also used a distribution of expected offenses from Aos et al. (2001) to account for the varying likelihoods of different types of undetected offenses (e.g., sexual crimes are less likely than property crimes). We subtracted the number of expected offenses per MST participant ($M = 1.72$ offenses) from the number of expected offenses per IT participant ($M = 3.68$ offenses) to calculate the advantage of participating in MST relative to IT (i.e., 1.96 offenses per participant).

Table 3 shows the avoided expenses (i.e., losses) to crime victims per MST participant. For each arrest category, we took the product of (a) lambda, (b) the expected change in offenses for MST over IT, (c) the arrest expense, and (d) the expected distribution of offenses to calculate avoided tangible expenses. We then summed the products across arrest categories to calculate the total avoided tangible expense to crime victims per MST participant (i.e., \$56,910). Next, we subtracted the incremental treatment cost of MST over IT from the total avoided tangible expense to determine the net present value of MST to crime victims (i.e., \$48,083). We then divided the total avoided tangible expense to crime victims by the incremental treatment cost, to obtain a benefit-cost ratio of \$6.45.

Crime Victim Intangible Benefits

Assuming one victimization. We calculated the present value of intangible expenses to victims for each type of arrest (excluding property and drug arrests) using estimates

of victim losses from Miller et al. (1996). As shown in Table 2, the total expected intangible expense to crime victims was \$37,907 per MST participant and \$23,964 per IT participant.

We then multiplied the total intangible expense by the expected number of posttreatment arrests per participant in each treatment group. The expected intangible expense to crime victims was \$65,010 per participant in MST and \$88,126 per participant in IT, revealing that \$23,116 in intangible expenses to crime victims were avoided per MST participant. Next, we subtracted the incremental treatment cost of MST over IT from the avoided intangible expense to crime victims to determine the net present value of MST to crime victims (i.e., a benefit of \$14,289). We then divided the avoided intangible expense to crime victims by the incremental treatment cost, revealing a benefit per dollar of cost of \$2.62.

Assuming multiple victimizations. The total avoided intangible expense to crime victims for MST participants was \$93,022 (see Table 3). We subtracted the incremental treatment cost of MST over IT from the avoided intangible expense to determine the net present value of MST to crime victims (i.e., \$84,195). We also divided the avoided intangible expense by the incremental treatment cost to calculate a benefit-cost ratio of \$10.54.

Cumulative Benefit

Table 4 summarizes the taxpayer and crime victim benefits (i.e., net present values) and benefit-cost ratios of providing MST. We also calculated the conservative (i.e.,

Table 3
Crime Victim Expenses Avoided for Multisystemic Therapy Assuming Multiple Victims per Arrest

Arrest category	Arrest expense (\$)	Distribution of expected offenses (%) ^a	Avoided expense/loss (\$) ^b
Murder/manslaughter			
Tangible	1,179,862	0.01	23,154
Intangible	2,189,329	0.01	42,963
Sexual			
Tangible	7,139	0.07	1,681
Intangible	94,623	0.07	22,283
Robbery			
Tangible	2,698	0.41	3,654
Intangible	6,679	0.41	9,044
Aggravated assault			
Tangible	1,674	0.62	3,450
Intangible	9,091	0.62	18,732
Property			
Tangible	646	11.66	24,971
Intangible	0	11.66	0
Drug			
Tangible	0	87.23	0
Intangible	0	87.23	0
Total			
Tangible	—	100.00	56,910
Intangible	—	100.00	93,022

Note. All expenses are expressed in 2008 dollars.
^a From Aos et al. (2001). ^b Product of lambda, expected change in offenses (1.96), arrest expense/loss, and distribution of expected offenses.

Table 4
Cumulative Benefit of Multisystemic Therapy to Taxpayers and Crime Victims

Benefit	Analyses	
	Net present value (\$)	Benefit–cost ratio (\$)
Taxpayer ^a	49,443	6.60
Tangible crime victim ^a		
One victimization	(6,275)	0.29
Multiple victimizations	48,083	6.45
Intangible crime victim ^a		
One victimization	14,289	2.62
Multiple victimizations	84,195	10.54
Cumulative ^b		
One victimization	75,110	9.51
Multiple victimizations	199,374	23.59

Note. All expenses are expressed in 2008 dollars. Dollar amounts in parentheses indicate negative savings.

^a Includes the incremental cost of providing multisystemic therapy (MST) over individual therapy (IT; i.e., \$8,827). ^b Because taxpayer, tangible crime victim, and intangible crime victim benefits each include the incremental cost of MST over IT, cumulative values are not the simple sums of these benefits and have been adjusted to reflect a single incremental cost of MST.

one victimization per arrest) and more expansive (i.e., multiple victimizations per arrest) estimates of the cumulative benefit of MST (see Table 4). Conservatively, the cumulative net present value of MST to taxpayers and crime victims was \$75,110 per participant, and the benefit of MST per dollar of cost was \$9.51. More expansively, the cumulative net present value of MST was \$199,374 per participant, and the benefit of MST per dollar of cost was \$23.59.

Discussion

Increasingly, policymakers are under pressure to address public concerns about crime with interventions that not only improve public safety but also are cost beneficial to taxpayers. The present study examined the costs and long-term benefits to taxpayers and crime victims of providing MST, an empirically supported and widely disseminated family-based intervention for serious and violent juvenile offenders, whose high recidivism rates are of great concern to policymakers. The study had several methodological strengths, including (a) a comprehensive and well-validated cost–benefit model designed specifically for juvenile offender populations (i.e., the WSIPP model); (b) continuous data on criminal outcomes (rather than simple recidivism rates) over a long-term follow-up; (c) a sample of serious and violent juvenile offenders, the population for which MST is intended; and (d) actual (rather than estimated) treatment costs from real-world MST and IT programs.

The findings suggest that even under the most conservative assumptions regarding the number of crimes committed by recidivists (i.e., that recidivists only commit crimes for which they are arrested), MST is cost beneficial to taxpayers and leads to intangible benefits to crime victims. In the taxpayer domain, providing MST to a single juvenile offender resulted in a savings of \$49,443 over the course of

13.7 years. Framed differently, \$1 spent on MST yielded a minimum return of \$6.60 to taxpayers over this time period. In the crime victim domain, MST did not result in sufficient tangible benefits (i.e., fewer property and medical expenses, greater productivity) to offset the greater cost of MST over IT. However, MST did result in a cost offset of \$14,289 in intangible benefits (i.e., jury awards to victims for pain and suffering) per juvenile offender treated and a benefit–cost ratio of \$2.62 per dollar spent. Taken together, the net cumulative benefit (i.e., combining taxpayer and crime victim benefits) of providing MST was \$75,110, with a benefit–cost ratio of \$9.51 per dollar spent.

As noted, the assumption that recidivists experience an arrest for every crime they commit is untenable in light of decades of research indicating that many crimes go unsolved or unreported (e.g., Elliott, 1995; U.S. Bureau of Justice Statistics, 2006) and are committed by a relatively small group of chronic offenders who cycle in and out of the criminal justice system (Loeber & Farrington, 1998). Thus, it is more reasonable to assume that there are multiple offenses (and thus multiple victims) for every arrest that is actually made. Using the more expansive assumption of multiple victimizations per actual arrest, the present findings suggest that MST resulted in \$48,083 in tangible benefits to victims for every youth served (i.e., a benefit–cost ratio of \$6.45 per dollar spent) and \$84,195 in intangible benefits (i.e., a benefit–cost ratio of \$10.54). When combined with savings to taxpayers, MST resulted in as much as \$199,374 in overall savings, for a cumulative benefit–cost ratio of \$23.59 per dollar spent.

The cost savings identified in the present study are important for administrators and policymakers to consider when allocating scarce financial resources to interventions for serious and violent juvenile offenders. Otherwise, the initial costs of providing MST (\$10,882 per youth in 2008) may seem formidable when compared with the cost of less intensive community services. Moreover, fiscal realities dictate that funding decisions about interventions are typically made on a year-to-year basis and without consideration of long-term cost savings (i.e., over 13.7 years). However, in addition to the long-term economic benefits of MST demonstrated here, it should be noted that communities that invest in MST will likely recoup their costs within the first few years after starting a program. Indeed, other findings with our sample showed that most of the recidivists in the MST and IT conditions had reoffended within the first 2 years following treatment (see Schaeffer & Borduin, 2005). Thus, it seems likely that a community would do no worse than break even in the short run and save a considerable amount of money in the long run using a cost-beneficial program such as MST.

The present study has several methodological limitations. First, we were unable to confirm that individuals maintained continuous residence in Missouri throughout the follow-up period. As a result, we cannot rule out the possibility that a portion of the sample may have committed crimes in other states. However, it seems unlikely that length of residency in Missouri would vary systematically across treatment conditions. Furthermore, at least partial recidivism data were

available for the entire sample, and complete follow-up data were available for the vast majority (i.e., 93.7%) of the sample. Second, it is possible that IT for serious juvenile offenders (the comparison treatment in this study) may have changed since the time of our original clinical trial (e.g., increased use of manualized treatments such as cognitive-behavioral therapy). Even so, there is no evidence that individual treatment is effective with serious and violent juvenile offenders (National Institutes of Health, 2006). Third, our estimates of MST and IT treatment costs were each generated from a single provider site, thus limiting the generalizability of our findings. Fourth, although we think that our estimate of the cost of MST (\$10,882 per youth) is high in the context of other licensed MST programs (as reported by the organization that disseminates MST), a national survey of such costs does not currently exist. Fifth, different cost-benefit results might have been derived from an intervention study in which multiple previous offenses were not part of the enrollment criteria; however, the youths in the present study are representative of those offenders for whom MST is designed. Sixth, although a broad range of costs were covered, it is likely that some were missed because resources were not available to track other possible services (e.g., psychiatric care) provided to participants during treatment or follow-up. An examination of service utilization across different sectors (e.g., social welfare, mental health, primary care) is needed to more fully explicate the types of services received by participants and to explore the possibility of cost shifting. Service utilization data also could provide information about benefits in domains other than recidivism (i.e., services avoided). Seventh, while estimates of costs and benefits in the present study were based on archival records, our study involved a principal developer of MST (Charles M. Borduin) and, thus, was not an independent analysis. Finally, we recognize that there are methods besides cost-benefit analysis for evaluating the economics of interventions (e.g., cost-effectiveness analysis) and that investigators may wish to consider these methods as well (see Fals-Stewart et al., 2005).

In conclusion, the results of this study create a persuasive argument for increased funding for MST and other cost-beneficial family interventions for serious juvenile offenders and decreased funding for individually focused interventions like those in the alternative treatment condition. This shift in funding would result in further reductions in juvenile crime, increases in the efficiency of how taxpayer dollars are spent, and decreases in social problems associated with victimization. To maximize financial benefits, communities also need to select the appropriate evidence-based treatment for specific juvenile offender populations, such as MST or multidimensional treatment foster care (Chamberlain, 2003) for more serious offenders and functional family therapy (Alexander & Parsons, 1982) for less serious offenders. Of course, funding for provision of evidence-based family treatments must be competitive and enduring to ensure their adoption within the provider community. Furthermore, because the implementation of programs such as MST often requires a substantial shift in the organizational structure (e.g., from office-based to home-

and community-based services) and culture (e.g., rigorous quality assurance procedures) of provider organizations, public service agencies must develop strong partnerships with providers if such programs are to achieve positive outcomes.

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