Washington State Institute for Public Policy

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MULTISYSTEMIC THERAPY OUTCOMES IN AN EVIDENCE-BASED PRACTICE PILOT

Introduction

In 2007, by legislative direction, the Washington State Department of Social and Health Services (DSHS) established a pilot program to provide evidence-based mental health services to children.[1] The Thurston-Mason Children's Mental Health Evidence-Based Practice Pilot Project (the Pilot) was formed.

To create the Pilot, DSHS contracted with the Thurston-Mason Regional Support Network (RSN), which contracted with Behavioral Health Resources (BHR) as the lead agency for implementation. A core team was established, consisting of the RSN, BHR, DSHS Children and Family Services, Mason County Juvenile Court, Community Youth Services, and the University of Washington. The team assessed the needs of the community and identified target populations and evidence-based options.[2]

The chosen target population included children with significant behavioral and mental health challenges who were involved in multiple systems (e.g., child welfare, mental health, and juvenile justice). The first evidence-based practice selected for the Pilot was Multisystemic Therapy (MST), an intensive family- and community-based intervention for chronic juvenile offenders and youth with serious emotional disorders, 12 to 17 years of age. MST focuses on home, family, school, neighborhood, and peers. BHR began providing MST in April 2007 and enrolled 268 youth as of March 2011.

Subsequently, additional evidence-based practices have been introduced at the Pilot, such as Trauma-Focused Cognitive Behavioral Therapy, the Triple P–Positive Parenting Program, and the Parent Empowering Program. This analysis focuses only on youth enrolled in the Pilot's MST program.[3]

Executive Summary

In 2007, the Washington State Department of Social and Health Services established the Thurston-Mason Children's Mental Health Evidence-Based Practice Pilot Project to provide mental health services to children. The Pilot's target population included children with significant behavioral and mental health problems who were served by multiple state systems. The first evidence-based practice selected by the Pilot was Multisystemic Therapy (MST), an intensive family- and community-based treatment program for youth. We examined characteristics and outcomes of the 215 youth enrolled between April 2007 and June 2010.

Implementation. Data indicate the Pilot's MST program serves a target population of youth with significant involvement in the juvenile justice system, involvement in multiple state systems, and with behavioral and disruptive disorders. While the program met MST adherence standards, some youth who should have been excluded were enrolled in the program. The preferred minimum age for MST is 12; however, 13 percent of enrollees were 11 or under.

Participant Outcomes. Over a one-year follow-up period, the study examined criminal convictions of youth enrolled in MST. Compared to youth with similar criminal histories and demographic characteristics, MST youth were convicted of fewer crimes on average:

One-year Follow-up Convictions for:	MST Youth	Non-MST Youth
Any Crime	30%	37%
Misdemeanor	23%	29%
Felony	9%	13%
Violent Crime	15%	18%

Rates are statistically adjusted based on analysis of 101 MST and 101 comparison youth.

Findings Consistent With Other Research. MST has been demonstrated to effectively reduce taxpayer and crime victim costs. Possibly due to sample size, statistical significance was not attained in this evaluation of MST outcomes. The effect sizes observed, however, are within the expected range for MST according to other rigorous studies of that intervention and would likely return a net economic benefit to tax payers and crime victims.

[1] ESSB 6386 § 204 (1), Chapter 372, Laws of 2006.

[2] *Thurston-Mason Children's Mental Health Evidence-Based Practice Pilot Program Strategic Plan.* December 29, 2006.

[3] A study of the Pilot by the Washington State Institute for Public Policy (ESSB 6386 § 607 (9), Chapter 372, Laws of 2006) was suspended by the legislature for budgetary reasons. Under contract with DSHS, the Institute conducted this one-year follow-up of youth enrolled in MST.

Suggested citation: J. Mayfield. (2011). *Multisystemic Therapy outcomes in an evidence-based practice pilot.* Olympia: Washington State Institute for Public Policy, Document No. 11-04-3901.

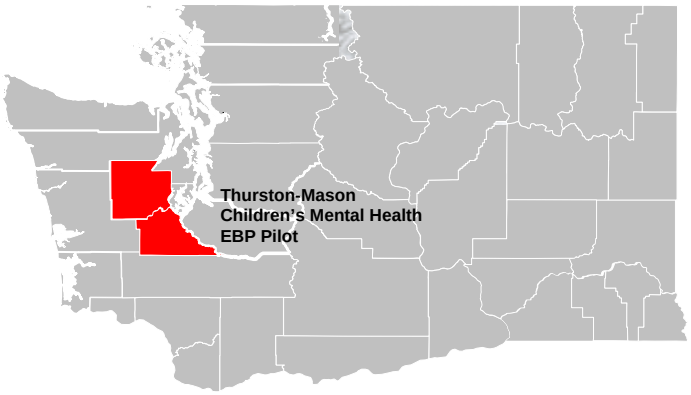
The Intervention and Referral Process

Multisystemic Therapy (MST) is an intervention for youth that focuses on improving the family's capacity to overcome the known causes of a child's delinquency. Its goals are to promote parents' ability to monitor and discipline their children and replace deviant peer relationships with pro-social friendships.[4] MST is an intensive treatment costing approximately $8,500 per enrolled youth.[5] Rigorous studies of MST have demonstrated the program effectively reduces delinquency.[6]

Trained MST therapists, in teams of four to five clinicians with masters' degrees, have ongoing caseloads of four to six families. MST typically lasts between three and six months. In addition to consultation provided by the University of Washington, MST, Inc., in Charleston, South Carolina, trains and supervises all MST therapists and also monitors the program to ensure fidelity.[7]

According to its 2008 Strategic Plan, the Pilot's MST intervention is for children in Washington State's Thurston and Mason Counties who meet the following criteria: "Youth 12 to 17 years of age with an available family/potential support structure who are exhibiting behavioral challenges, significantly interrupting functioning across multiple domains, and/or are at high risk of being placed out of home."[8]

Exhibit 1
Thurston-Mason Children's Mental Health Evidence-Based Practice Pilot Project

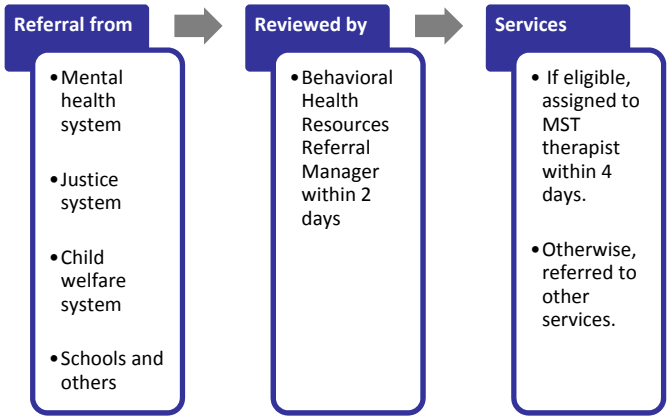


WSIPP, 2011

[4] http://mstservices.com/index.php
[5] Gary Enns, Thurston Mason RSN (personal communication, March 21, 2011).
[6] Drake, E. K. (2007). *Evidence-based juvenile offender programs: Program description, quality assurance, and costs*. Olympia: Washington State Institute for Public Policy, Document Number 07-06-1201.
[7] MST provided by BHR has met adherence standards throughout the project.
[8] *Thurston-Mason children's mental health evidence-based practices project: Strategic plan,* September 2008, p. 8.

Children who met these criteria were identified by staff in local mental health, juvenile justice, child welfare, and education systems and recommended to BHR for enrollment in MST. A simplified illustration of the referral, screening, and enrollment process is provided in Exhibit 2.[9]

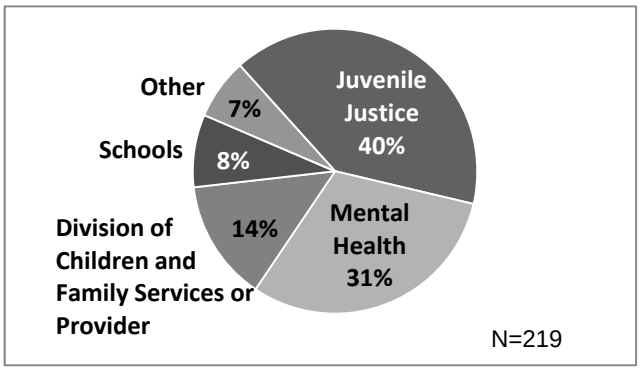
Exhibit 2
Referral, Screening, and Enrollment for MST Thurston-Mason Children's Mental Health EBP Pilot



WSIPP, 2011

As displayed in Exhibit 3, the majority (71 percent) of MST enrollees were referred from the juvenile justice or mental health systems.

Exhibit 3
Referral Sources for Youths Enrolled in MST (April 2007 to June 2010)



WSIPP, 2011
Source: TMRSN MST Monthly Service Delivery Report-FY2010

[9] Greater detail about the implementation and referral processes are provided in J. Mayfield & S. Lee. (2009). *A pilot program for evidence-based children's mental health services: Characteristics of participants enrolled in Multi-Systemic Therapy*, Olympia: Washington State Institute for Public Policy, Document No. 09-04-3902.

After the Referral Manager determined whether or not a child met MST criteria, that child was either assigned an MST therapist or referred to other services. Final determination regarding enrollment in MST was made within six days of the original referral.

Of 219 referrals made from April 2007 through June 2010, 215 were enrolled in MST. The few referrals not enrolled were excluded due to age.[10] Enrollment grew over a "ramping-up" period of just over a year, leveling off at an average monthly caseload of 23.5 in fiscal year 2010. The enrollees were served by 4.75 FTE MST therapists.

Characteristics of Youth Enrolled in the Pilot's MST Program

Demographics. Exhibit 4 displays the distribution of youth referred to the Pilot's MST program (from April 2007 through June 2010) by location, gender, age, and race.

Exhibit 4
Demographic Characteristics of Youth Referred to the Pilot's MST Program (April 2007 to June 2010)

	Total Referrals *n=219**	Percentage of Referred *n=219*
County		
Thurston	167	76%
Mason	52	24%
Gender		
Female	87	40%
Male	132	60%
Age		
< =10 years	16	7%
11 years	14	6%
12 years	17	8%
13 years	31	14%
14 years	31	14%
15 years	48	22%
16 years	40	18%
17 years	22	10%
Race/Ethnicity		
White	182	83%
Hispanic	19	9%
Native American	9	4%
Asian/Pacific Islander	6	3%
African American	3	1%

Source: TMRSN MST Monthly Service Delivery Report
*Includes youth referred multiple times.
Note: Some percentages may not sum to 100 due to rounding.

- **Location.** Three-quarters of referrals came from agencies in Thurston County and the remaining 24 percent from Mason County. Of the total child population of the Pilot's counties, aged 10 to 17, 82 percent were in Thurston County.[11]
- **Gender.** Males (60 percent) were more likely than females (40 percent) to be referred to MST.
- **Age.** Youth referred to MST averaged 14 years of age and the majority was between the ages of 14 and 16. Thirteen percent of enrolled youth were below the age of 12, which is outside the preferred age range for MST.
- **Race.** Children referred to MST were predominately white (83 percent) followed by Hispanic (9 percent), then Native Americans (5 percent), Asians and Pacific Islanders (2 percent), and African Americans (1 percent). Referrals by race were in similar proportions to the racial and ethnic composition of both counties combined.[12]

According to administrative data, 74 percent of enrolled youth were involved in two or more state systems and one in five MST youth had some involvement in all three systems prior to enrollment.[13] Compared to other youth (aged 9 to 17) with service episodes in the public mental health system, youth enrolled in MST stand out in the following ways (See Appendix for details):[14]

- MST youth were more likely to be involved in the criminal justice system: 68 percent were convicted of a felony or misdemeanor in the prior year compared with 17 percent of all other youth in the public mental health system (Exhibit A1 in the Appendix).
- MST youth were more intensive consumers of inpatient (6 versus 1 percent) and other mental health services and were more likely (69 versus 22 percent) to be diagnosed with behavioral or attention deficit disorders (see Exhibit A2 in the Appendix).

[10] As noted in the following section, some children who were not in the preferred age range for MST were still enrolled.

[11] Washington State Office of Financial Management. <http://www.ofm.wa.gov/pop/coagemf/default.asp>. Table: *Intercensal and postcensal estimates of April 1 county population by age and sex: 1980-2010.*

[12] Washington State Office of Financial Management <http://www.ofm.wa.gov/pop/race/10estimates/detailed.asp>. Table: *Detailed table of April 1 population estimates by county by age, gender, race, and Hispanic origin: 2010.*

[13] "Involvement" in each state system is defined as follows: enrolled in the state public mental health system, any criminal convictions, or any referrals accepted for investigation by child protective services.

[14] The basis of comparison is all children, 9 to 17, with an encounter in the public mental health system between April 2007 and June 2010. Records for children with multiple encounters were selected at random.

- MST youth were more likely to have a history of out-of-home placements in foster care or groups homes (21 versus 15 percent) and more likely (10 versus 4 percent) to have experienced multiple out-of-home placements, previously (Exhibit A3 in the Appendix).

Outcomes examined in the following section control for these and other differences associated with MST youth.

Outcomes: Subsequent Involvement in Criminal Justice and Mental Health Systems

There is a considerable body of rigorous research supporting the effectiveness of MST.[15] Ten studies with a total of 699 participants meta-analyzed by the Washington State Institute for Public Policy (Institute) demonstrate that the intervention significantly reduces crime, with an average adjusted effect size of –0.20. MST effectively reduces state and crime victim costs, with an expected lifetime benefit (minus the $8,500 per-person cost of the Pilot's MST program) of approximately $19,500 per enrolled youth.[16]

Ideally, an evaluation would examine the outcomes of youth randomly assigned to MST and "treatment as usual" or "no treatment" control groups. If the randomly assigned groups are otherwise identical, differences in their outcomes may be attributed to the intervention. For practical reasons, the Pilot did not use random assignment to assign youth to the MST program.

For this evaluation, administrative data were used to identify youth in the mental health system with characteristics similar to the Pilot's MST youth: similar in age, gender, ethnicity, primary diagnosis, level of functioning, prior mental health service utilization, and criminal history. It is possible, however, that critical characteristics of youth (the presence of acute psychosis, living situation, amenability to treatment, other treatment interventions, etc.) were not reflected in the administrative data used for this study. Findings should be interpreted with these limitations in mind.

This analysis, based on administrative data, measures outcomes associated with enrollment in the Pilot's MST program. Outcomes examined include criminal convictions and mental health service utilization: inpatient, outpatient, support services, and crisis services.[17] We tracked post-enrollment outcomes over a one-year follow-up period, employing statistical techniques to compare the outcomes of MST participants and comparison group youth.

After creating statistically similar comparison groups based on matched pairs, separate statistical analyses were conducted for each specific outcome.[18]

- For crime outcomes, 101 out of 105 youth were successfully matched with similar comparison youth; and

- For mental health service utilization outcomes, 126 out of 131 youth were successfully matched with similar comparison youth.

The influence of MST on each outcome was estimated using a statistical technique called logistic regression, accounting for such things as age, gender, race, primary mental health diagnoses, level of functioning, and prior measures for the outcome of interest.

12-Month Criminal Justice Outcomes.[19] The annual conviction rates of MST youth fell from 68 percent pre-enrolment to 35 percent post-enrolment (See Exhibit A4 in the Appendix). To put the post-enrollment conviction rates of MST youth in proper perspective, we compared them to conviction rates of youth with similar criminal histories in their matched comparison group.[20] Adjusting for criminal history and other background characteristics, we estimated the expected follow-up conviction rates for youth with and without MST.

According to the analysis, had they enrolled in MST, youth with the same characteristics as those in the comparison group would have had overall conviction rates of 30 instead of 37 percent over the follow-up year (Exhibit 5). Similarly, the conviction rates would have been 23 percent instead of 29 percent for misdemeanor convictions, 9 percent instead of 13 percent for felonies, and 15 instead of 18 percent for violent crimes.[21]

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[15] Several characteristics of the Pilot's program may render it less robust than previous implementations: deviation from age-based exclusionary criteria; serving youth better suited for the MST-psychiatric adaptation, and multiple referral sources from across the community rather than the courts.

[16] Estimate generated using the WSIPP Benefit-Cost Model: Version 1.1. Details are available from the author on request.

[17] Due to changes in administrative data systems, Child Protective Services outcomes were not analyzed. Data were available for 78 MST youth for whom there were six months of follow-up, during which there was only one accepted referral, four placements, and two reunifications.

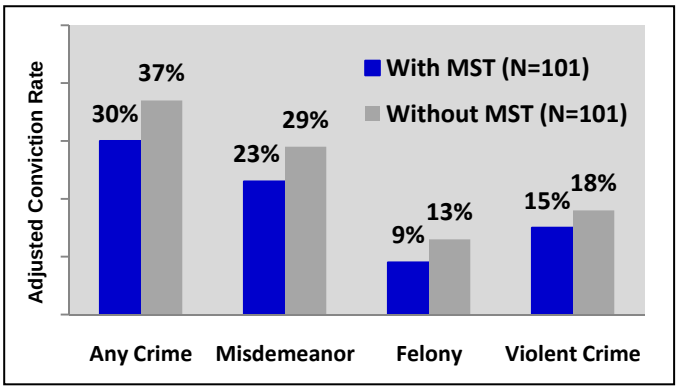
[18] Due to differences in available data, separate comparison groups were created for crime outcomes (based on youth enrolled May 2007 through December 2008) and mental health service outcomes (May 2007 through June 2009). Two comparison groups were constructed of youth in the mental health system with characteristics and histories statistically similar to those enrolled in MST. Follow-up periods for youth in MST began at the date of enrollment. For the comparison group, the follow-up period started at the begin date of a mental health service episode (event date). For youth with multiple episodes, the event date was selected at random.

[19] A 12-month adjudication period, in addition to a one-year follow-up period, was used in calculating conviction rates. That is, we allowed up to one year for criminal cases to resolve.

[20] Matching criteria are described in Exhibit A6.1 in the Appendix.

[21] Regression coefficients and other results are described in the Exhibit 75 in the Appendix.

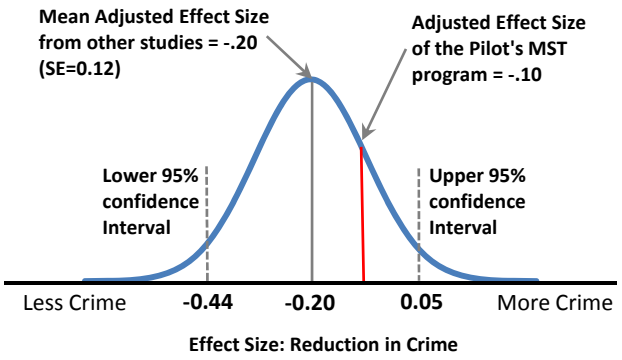
Exhibit 5
12-Month Adjusted Criminal Conviction Rates for Youth With and Without MST



WSIPP, 2011
Note: Convictions allow for a 12-month adjudication period.

While the results were not statistically significant in combination with other background characteristics and criminal history, [22] they are consistent with the previous examinations of MST.[23] The observed, adjusted effect size for any criminal conviction (-.10) at the Pilot MST program is within the expected range (-0.20 ± 0.24) of previous studies (Exhibit 6).[24]

Exhibit 6
The Effect Size Associated With the Pilot's MST Program Is Within the Expected Effect Size of MST*



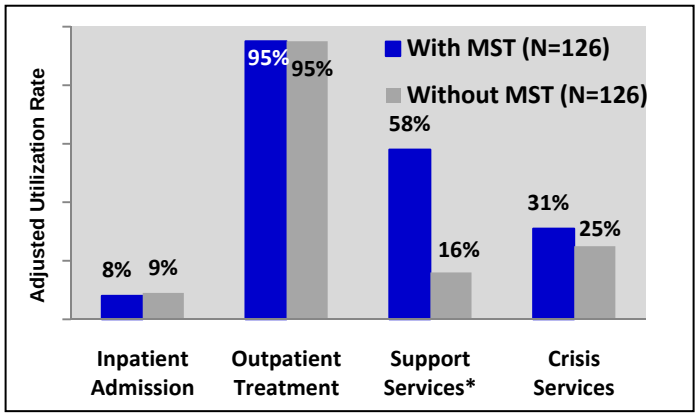
WSIPP, 2011

As noted earlier, based on the Pilot's MST program cost of approximately $8,500 per enrolled youth, the expected net benefit (to taxpayers, crime victims, and participants) of MST is $19,500 per enrollee (in 2010 dollars). Even at the lower effect size observed for the Pilot MST program, we would expect benefits to exceed costs by over $5,800 per enrollee.[25]

Subsequent Use of Public Mental Health Services. Compared to the previous year, rates of inpatient admission and use of crisis services remained relatively stable before and after enrollment in MST. Utilization of outpatient treatment and support services increased significantly (See Exhibit A5 in the Appendix)..To put the post-enrollment mental health service utilization rates in perspective, we compared them to similar youth with identical mental health service utilization histories.[26] Adjusting for background characteristics and history of service utilization, we estimated the expected follow-up service utilization rates for youth with and without MST.

Based on the analysis, enrollment in MST is associated with significantly higher utilization rates of mental health support services (58 percent instead of 16 percent) over the one-year follow-up (Exhibit 7).[27] The rates of inpatient admissions and outpatient treatment were similar over the follow-up period regardless of MST enrollment status. On average, MST was associated with slightly higher utilization of crisis services (31 versus 25 percent) but the differences were not statistically significant.

Exhibit 7
12-Month Adjusted Mental Health Services Utilization Rates for Youth With and Without MST



WSIPP, 2011
*Differences shown are significant at p=.0001.

[22] The lack of statistical significance may be attributable to the sample size. The same results with a sample of 250 in both the MST and control groups would have resulted in a p-value of 0.10.
[23] Unpublished meta-analysis of 10 rigorous evaluations of MST. Available from the author on request.
[24] The methodology for estimating and adjusting effect sizes is described in S. Aos & E. Drake (2010). *WSIPP's Benefit-Cost Tool for States: Examining Policy Options in Sentencing and Corrections.* Olympia: Washington State Institute for Public Policy, Document No. 10-08-1201.
[25] The net benefit estimate was generated using the WSIPP Benefit-Cost Model: Version 1.1. Details are available from the author on request.
[26] Matching criteria are described in Exhibit A6.2 in the Appendix.
[27] Logistics coefficients and other regression results are described in Exhibit A5 in the Appendix.

It is difficult to draw meaningful conclusions regarding mental health service utilization outcomes and MST enrollment. Increased use of support services could be characterized as a good outcome (MST promotes access to services) or a negative outcome (MST is associated with increased dependence on public services). There were also too few inpatient admissions to draw conclusions about the effect of MST on a potentially important outcome, hospitalization. Future analyses using a larger MST sample and more detailed information on specific mental health services may provide more useful results for policy makers.

Summary

As part of the Thurston-Mason Children's Mental Health Evidence-Based Practice Pilot Project, 215 youth were enrolled in MST between April 2007 and June 2010. Rigorous studies have demonstrated that MST effectively reduces state and crime victim costs. Using linked administrative data from multiple state agencies, we examined the characteristics and the criminal and mental health service utilization outcomes of youth served by the program.

Information available in administrative data systems provided a picture of the youth being served by the Pilot's MST program. In general, the Pilot's MST program appeared to be serving its target population:

- 68 percent of the youth had a misdemeanor or felony conviction in the year leading up to enrollment in MST;
- Three-quarters of enrolled youth were involved in multiple state systems (juvenile justice, child welfare, or mental health) prior to enrolling in MST; one in five were involved in all three systems;
- The majority of enrolled youth were diagnosed with behavioral and disruptive disorders.

Other administrative data, however, indicated that some children who should otherwise be excluded were still being enrolled in the program:

- While the preferred minimum age for MST is 12, 13 percent of youth enrolled were 11 or younger.
- 7 percent of enrolled youth were 10 years old or younger.

Compared to similar youth in the mental health system, those enrolled in MST were significantly more likely to be provided mental health support services over the follow-up year. There were no significant differences observed in their utilization of crisis services, outpatient treatment, or inpatient admissions.

During a one-year follow-up period after enrollment, MST youth were convicted of fewer misdemeanors, felonies, and violent crimes than similar youth in the mental health system. Possibly due to sample size, a multivariate analysis controlling for youth characteristics and criminal history did not attain statistical significance. The observed effect sizes, however, are within the range of previous rigorous evaluations of MST and the Pilot MST program is likely to return a net benefit to tax payers, crime victims, and youth enrolled in the program.

Appendix

Sample. Of the 215 MST enrollees from April 2007 through June 2010, 16 did not match administrative records in agency data bases. Another 16 youth were enrolled in MST multiple times. Only the first enrollment was used in the analysis, resulting in a full sample of 183 unduplicated MST youth. Dissimilarities in administrative data systems, reporting lags, and outcome definitions resulted in different sample sizes for the outcomes examined. Crime outcomes were based on the experiences of 101 MST youth enrolled from May 2007 through December 2008. Mental health services outcomes were based on the experiences of 126 MST youth enrolled from May 2007 through June 2009.

Exhibit A1
Prior Convictions and Detentions of Youth Enrolled in the Pilot's MST and All Other Youth in the Mental Health System

Criminal Convictions in the Prior Year	MST Youth N=101	All Other Youth N=34,700
Any Conviction	68%	17%
Any Felony	32%	6%
Any Misdemeanor	61%	15%
Conviction-Violent Crime	49%	8%

Source: WSIPP-CJS

Exhibit A2
Public Mental Health Services Utilization and Mental Health Characteristics of MST Enrollees and All Other Youth in the Mental Health System

Public Mental Health Services Received in the Prior Year	MST Youth N=126	All Other Youth N=34,700
Percentage With Inpatient Stays	6%	1%
Percentage With Outpatient Treatment	63%	20%
Percentage With Support Services	21%	3%
Percentage With Crisis Services	34%	8%
Primary Mental Health Diagnoses		
Behavior Disorders	48%	13%
Attention Deficit/Hyperactivity Disorders	21%	9%
Mood Disorders	21%	38%
Anxiety Disorders	6%	26%
Other Mental Health Disorder	1%	6%
Missing	3%	8%

Source: WSIPP analysis of DSHS MHD-CIS

Exhibit A3
Lifetime Involvement With Child Welfare Services: Youth Enrolled in MST and All Other Youth in the Mental Health System

Child Protective Services	MST Youth N=78	All Other Youth N=33,900
Out-of-Home Placement History		
Any Prior Placements	21%	15%
One Prior Placement	11%	11%
Two or More Prior Placements	10%	4%
Average Number of Placements (for those with placements)	1.7	1.3
Child Welfare Out-of-Home Placement at Enrollment		
In Any Out-of-Home Placement	6%	5%
In Kinship Care	2%	1%
In Family Foster Care	3%	3%
In Group Home	1%	1%

Source: WSIPP analysis of DSHS CAMIS data

Exhibit A4
Actual Criminal Conviction Rates of MST Youth 12 Months Before and After Enrollment in MST

Type of Conviction	Percentage With Criminal Convictions (N=101)	
	One-Year Before Enrollment	One-Year After Enrollment
Misdemeanor or Felony	68%	35%
Misdemeanor	61%	28%
Felony	32%	9%
Violent Crime*	49%	16%

Source: WSIPP
*May include misdemeanor or felony assault, violent property crime, robbery, kidnapping, sex crime, or homicide.

Exhibit A5
Use of Public Mental Health Services 12 Months Before and After Enrollment in MST

Type of Service	Percentage Using Service (N=126)	
	One-Year Before Enrollment	One-Year After Enrollment
Inpatient	6%	7%
Outpatient	62%	96%
Support	20%	54%
Crisis	34%	33%

Source: WSIPP

Exhibit A6.1
Matched Comparison Group for Crime Outcomes

Matching Criteria	Percentages and Means	
	MST Youth	Matched Youth
Gender (Male)	60%	63%
Age	14.3	14.2
Ethnic Minority†	17%	24%
Behavioral or Attention Disorder†	68%	54%
Level of Functioning (C-GAS)	46.8	46.2
With Previous Mental Health Services		
--Support Services†	28%	11%
--Outpatient Treatment†	69%	57%
--Crisis Services	34%	35%
--Inpatient Admission†	6%	4%
Percentage with Any Conviction	68%	68%
Percentage with Misdemeanor Conviction	62%	62%
Percentage with Felony Conviction	32%	32%
Percentage with Violent Crime Conviction	49%	48%
Average Criminal Convictions	1.8	1.8
Criminal History Risk Score*	5.4	5.4
N	101	1010
Sum of Weights	101	101

Matching without replacement was accomplished in four rounds, relaxing criteria after each round to maximize the number of MST youth with matches. Multiple matches were allowed and then weighted in subsequent analyses.

† Significant differences at p<.05. Included as controls in outcomes analysis.

*The criminal history risk score is a composite based on prior convictions and crime severity used to predict recidivism.

Exhibit A6.2
Matched Comparison Group for Mental Health Service Utilization Outcomes

Matching Criteria	Percentages and Means	
	MST Youth	Matched Youth
Gender (Male)	56%	62%
Age	14.1	13.9
Ethnic Minority†	17%	28%
Behavioral or Attention Disorder	69%	66%
Level of Functioning (C-GAS)	46.7	46.6
With Previous Mental Health Services		
--Support Services	21%	21%
--Outpatient Treatment	63%	63%
--Crisis Services	34%	34%
--Inpatient Admission	6%	6%
Medicaid Eligible	79%	81%
Average Criminal Convictions†	1.6	1.2
Any Criminal Convictions†	62%	52%
N	126	973
Sum of Weights	126	126

Matching without replacement was accomplished in four rounds, relaxing criteria after each round to maximize the number of MST youth with matches. Multiple matches were allowed and then weighted in subsequent analyses.

† Significant differences at p<.05.

Exhibit A7
Logistic Regression Results for MST Outcomes

Outcome	N (Sum of Weights)	AUC	MST Coefficient (p-value)
Any Conviction	1111 (202)	.675	-0.33 (.3185)
Any Misdemeanor	1111 (202)	.670	-0.30 (.3901)
Any Felony	1111 (202)	.758	-0.41 (.3065)
Any Conviction-Violent	1111 (202)	.688	-0.25 (.4589)
Outpatient Treatment	1099 (252)	.890	0.10 (.8915)
Mental Health Support Services	1099 (252)	.705	1.99 (.0001)
Mental Health Crisis Services	1099 (252)	.611	0.30 (.2964)
Psychiatric Inpatient Admission	1099 (252)	.700	-0.11 (.8202)

Source: WSIPP

The reported coefficient and p-value are the values associated with the MST dummy variable in the logistic regression estimated for each outcome. Regressions controlled for remaining differences in the MST and Comparison group youth demographic characteristics, diagnoses, service utilization, and criminal history.

Data Sources. The Institute combined data from multiple administrative data systems to identify study subjects and examine their characteristics and history. The following information systems maintained by the Department of Social and Health Services (DSHS) and the Institute (WSIPP) were used for this report:

- MHD-CIS: DSHS Mental Health Division data track investigations, petitions and commitments, referral sources and outcomes, services, providers, diagnoses, global assessment of functioning, and demographic information;
- WSIPP-CJS: The Institute's Criminal Justice System tracks Washington State criminal (misdemeanor and felony) convictions; and
- CAMIS: DSHS Children's Administration data track residential out-of-home placements and referrals and history of abuse and neglect.

For further information, contact Jim Mayfield at (360) 586-2783 or mayfield@wsipp.wa.gov

Document No. 11-04-3901