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Child and case influences on recidivism in a statewide dissemination of Multisystemic Therapy for juvenile offenders

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Abstract

Multisystemic Therapy (MST) is an evidence-based treatment for high-risk youth and their families shown to reduce subsequent delinquent activity. This study investigated (1) re-arrest rates of a statewide MST dissemination; and (2) the relation of child, family, and case characteristics to re-arrest rates following receipt of MST. Analyses examined outcomes for 633 youth following referral to MST. Separate models examined predictors of general re-arrest of any type and of more serious misdemeanor or felony arrests. Sixty-five percent of youth experienced a new arrest of any type within 12-months of MST initiation; fewer (53%) experienced a misdemeanor or felony charge in that timeframe. Recipients who were younger, had an externalizing behavior disorder, and had a greater number and severity of pre-MST charges were more likely to recidivate. Findings highlight potential child and case factors that may account for variability in treatment effects when MST is implemented broadly within a system.

Keywords

Multisystemic Therapy; recidivism; juvenile offenders; dissemination

According to national estimates, 1.15 million juveniles under the age of 18 were arrested by US law enforcement officials in 2010 (Regoli, Hewitt, & DeLisi, 2014). Juveniles accounted for 14% of violent crime arrests and 23% of property crime arrests (Regoli et al., 2014). Costs to society are difficult to calculate and include both tangible (e.g., medical, incarceration, or educational expenses; Cohen, 1998) and intangible costs (e.g., pain,

suffering, fear, and diminished quality of life; Dolan, Loomes, Peasgood, & Tsuchiya, 2005; Dolan & Peasgood, 2007) to the victim and to the broader community. One report estimated the lifetime savings attributable to preventing a 14-year old high-risk youth from engaging in delinquent and criminal activity (based on societal costs of a lifetime criminal career) to be in the range of \$2.6 to 5.3 million (Cohen & Piquero, 2009). Given the prevalence and costs of adolescent delinquent behavior and recidivism, the development and dissemination of effective treatment programs to reduce recurrent juvenile delinquent behavior is a clear public health need.

Significant progress has been made in developing effective and comprehensive intervention programs for reducing antisocial behavior (Kazdin, 2011). Multisystemic Therapy (MST) is an intensive evidence-based family- and community-focused treatment model that reduces recidivism of delinquent activity among adolescent youth (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009). MST incorporates family systems and social ecological theories, as well as aspects of other evidence-based treatments (e.g., cognitive-behavioral therapies, parent training), to conceptualize both the causes and treatment targets of delinquent behavior within the context of the youth's home and community environments over a five to six month treatment period (Henggeler & Lee, 2003; Henggeler, Schoenwald, Rowland, & Cunningham, 2002).

Numerous studies have demonstrated the beneficial effects of MST to reduce recidivism and other problem behaviors among high-risk juvenile populations through several small-to-medium sized-sample randomized controlled trials (RCTs; e.g., Borduin et al., 1995; Henggeler, Melton, Brondino, Scherer, & Hanley, 1997; Henggeler, Melton, & Smith, 1992; Timmons-Mitchell, Bender, Kishna, & Mitchell, 2006). Overall, RCTs conducted by the treatment developers have shown that youth who participate in MST have lower rates of recidivism (e.g., arrests, convictions, incarcerations) than youth who receive services as usual or individual outpatient therapy (Henggeler & Lee, 2003; Henggeler et al., 1992). An independent meta-analysis of this research estimates reductions in re-arrest and placement would result in substantial savings (\$18,213 per youth [2006 \$US]) to states adopting MST (Aos, Miller, & Drake, 2006).

Although studies conducted by MST developers generally have found positive results following treatment, only about half of independent trials demonstrate significant reductions in recidivism (Aos, Phipps, Barnoski, & Lieb, 2001; Littell, 2005). One independent clinical trial of MST found that the overall recidivism rate of misdemeanor or felony charges for MST-served youth at the 18-month follow-up was 67% compared to 87% for control group participants, though follow-up analyses indicated felony arrest rates did not differ statistically between groups (13% and 10%, respectively; Timmons-Mitchell et al., 2006). Similarly, an independent RCT conducted in Ontario, Canada found that 6-, 12- and 24-month conviction rates among juvenile delinquent or high-risk youth assigned to MST did not differ statistically from youth assigned to treatment as usual (28%, 49%, and 63%, respectively, for youth in MST). However, several independently conducted small-scale studies outside of the US have found consistent reductions in youth offending and antisocial behaviors following MST, suggesting effectiveness of the program (Asscher et al., 2013; Butler, Baruch, Hickey, & Fonagy, 2011; Curtis, Ronan, Heiblum, & Crellin, 2009; Gervan,

Granic, Solomon, Blokland, & Ferguson, 2012). Further independent and large-scale dissemination research needs to be conducted to fully determine the effectiveness of MST on youth recidivism rates.

Moreover, most studies have focused only on differences in treatment outcomes associated with receiving MST. Research is needed that examines the effects of known predictors of recidivism in a multivariate context, and how these predictors affect the rates and time to recidivism following MST. Studies have identified the following predictors of increased recidivism: being male (Cottle, Lee, & Heilbrun, 2001; Hoeve, McReynolds, & Wasserman, 2013), younger age of system contact (Cottle et al., 2001; Snyder & Sickmund, 2006), racial/ethnic minority status (Grunwald, Lockwood, Harris, & Mennis, 2010; Schwalbe, Fraser, Day, & Cooley, 2006), externalizing and internalizing behavior problems (McReynolds, Schwalbe, & Wasserman, 2010; Mulder, Brand, Bullens, & van Marle, 2011), substance use (Hoeve et al., 2013; McReynolds et al., 2010; Young, Dembo, & Henderson, 2007), and more serious past criminal behavior (e.g., number of past offenses; Mulder et al., 2011). However, few studies of MST effects have examined the relation of these individual and case-related predictors of recidivism, such as gender (Ogden & Amlund Hagen, 2009), racial/ethnic minority status (Fain, Greathouse, Turner, & Weinberg, 2014; van der Stouwe, Asscher, Stams, Dekovic, & van der Laan, 2014), impulsiveness (Manders, Dekovic, Asscher, van der Laan, & Prins, 2013), and therapist treatment adherence (Chapman & Schoenwald, 2011; Huey, Henggeler, Brondino, & Pickrel, 2000). The current study advances the MST literature by examining individual youth and case-related factors at intake that might differentially influence the overall rate and timing of recidivism events.

Finally, there have been few large-scale independent dissemination studies of MST. Only three published studies demonstrate transportability of MST within large systems, using community providers and therapists with samples in excess of 200 participants (Glisson et al., 2010; Löfholm, Eichas, & Sundell, 2014; Stambaugh et al., 2007). Both the Glisson et al. and Stambaugh et al. studies resulted in favorable improvements in behavioral symptoms and reductions in out-of-home placements relative to other community services, though behavioral gains were not sustained at 18-months in one study (Glisson et al., 2010). A transportability study of 156 child welfare-involved youth in Sweden suffered from poor treatment fidelity and failed to demonstrate robust effects (Sundell et al., 2008). A subsequent retrospective study in Sweden involving 973 families and youth found that greater MST treatment adherence was associated with greater rates of youth remaining in-home and engaged in school or work, with greater reductions in criminal behavior at 6-year follow-up (Löfholm et al. 2014). In 1996, MST developers recognized the need to support dissemination and formed a purveyor group (MST Services, Inc.) to provide training, consultation, and quality assurance to MST adopters. Several state systems (including Connecticut) were among those adopters to implement independent major statewide initiatives with support from MST Services, Inc. (Henggeler, 2011). The current study is one of the first to report MST outcomes based on a statewide dissemination effort.

The aims of the present study were to: (1) use a large, statewide implementation sample to investigate re-arrest rates in the context of a statewide dissemination of MST; and (2) identify child, family, and case factors that may affect re-arrest rates among MST recipients.

A range of individual demographic factors (age, gender, race/ethnicity, family structure), mental health characteristics (behavior, mood, and substance use disorders), and case characteristics (number of pre-MST arrests, severity of pre-MST offense history, parole/probation status, and treatment fidelity) were examined as predictors of re-arrest based on official juvenile and adult corrections systems records. Two separate models included predictors of any new arrest and predictors of more significant offenses (misdemeanor and felony charges). Examining separate models allowed for testing general recidivism (i.e., any new offense), which is consistent with the approach in previous MST studies (e.g., Borduin et al., 1995; Butler et al., 2011; Henggeler et al., 1992), as well as to differentiate more serious offenses (i.e., significant delinquent activity) from minor violations and status offenses.

Method

Study Site

Connecticut Department of Children and Families (DCF) began implementing MST in 1999, in part, as an alternative to more costly residential treatment options. During the study period (January 2003 through June 2006) DCF operated a total of nine MST teams across the state. Teams had between three and 14 active therapists during the study period with a total of 74 therapists providing MST to the study sample. MST referrals within DCF targeted youth returning from out-of-home care or who were at risk of requiring out-of-home care due to problems of delinquency, disruptive behavior and/or substance abuse; eligibility did not require active DCF-involvement. MST teams were also operated by a separate state agency, Connecticut's Court Support Services Division (CSSD) of the Judicial Branch. The present study focuses on outcomes for youth served by DCF-supported MST teams. Non-DCF MST teams were excluded from the present analyses because they differed from the study population with respect to lead state agency, service population, data collection protocol, and management information system. CSSD may have purchased some DCF treatment slots for CSSD-involved youth if treatment spaces were not available in CSSD-operated teams; if youth were served by DCF teams, they were included in the present study sample.

Participants

The study sample included participants referred to a DCF MST team between January 2003 and June 2006 who had intake and discharge information entered in two statewide administrative data systems used to gather information about MST services (described below). These criteria resulted in a total of 726 youth, of which 93 youth were subsequently excluded based on administrative criteria for referral. These criteria included: did not meet referral criteria for program ($n = 69$), moved from area ($n = 13$), placement prior to beginning MST treatment that resulted in lack of opportunity to complete MST ($n = 9$), or no completed case review ($n = 2$). Using an intent-to-treat approach (e.g., Borduin et al., 1999; Butler et al., 2011; Henggeler et al., 1992) the final study sample included all youth referred to and eligible for MST services ($n = 633$), regardless of case completion. Of these, two-thirds of participants (67.5%, $n = 427$) successfully completed MST, 24.5% ($n = 155$) were discharged for placement after enrollment, and 8.1% ($n = 51$) were discharged for lack of family engagement.

Mean age of the sample was 15.3 years ($SD = 1.2$ years), and two-thirds were male. The racial and ethnic characteristics of the sample were: 37.4% African American, 28.3% White, 27.1% Hispanic, and 8.0% other or unknown. These and other sample characteristics are summarized in Table 1.

Data Sources

Intake and discharge information was extracted from electronic records in the Multisystemic Therapy Institute (MSTI) database and supplemented with additional demographic and clinical information maintained in a state administrative system (the Behavioral Health Data System or BHDS). Both systems included intake information based on clinician report with a common ID to facilitate matching.

Arrest records were extracted from two State data systems. The CSSD Case Management Information System (CMIS) provided juvenile arrest records, whereas the Computerized Criminal History (CCH) system maintained by the Connecticut State Police provided adult arrest records. Records were matched to youth in the DCF sample by CSSD personnel using an algorithm that included a range of possible identifiers and then assigned an ID code to permit merging with other data sources. Both pre-MST and post-MST arrest data were obtained to include arrest history variables as predictors of re-arrest, as well as to conduct analysis of re-arrest outcomes for a minimum of 14-months post-MST referral (mean follow-up time = 34.0 months, $SD = 10.1$ months).

Measures

Recidivism re-arrest outcome—Recidivism was defined as a new arrest subsequent to MST enrollment resulting from a status offense, violation of court order, misdemeanor, or felony. Use of re-arrest charges as the main recidivism outcome is consistent with other MST studies (e.g., Borduin et al., 1995; Henggeler et al., 1992; 1997; Timmons-Mitchell, 2006), and permits comparability in findings across studies. This calculation was based on the earliest date of arrest for new charges that occurred post-MST enrollment.

Predictor variables—Predictor variables for the current study included youth demographic characteristics, mental health diagnoses, pre-MST charge-history, probation/parole status, and therapist adherence to MST principles.

Demographic characteristics—Youth age, gender, race/ethnicity, and family structure were extracted from MSTI and BHDS data systems based on therapist report). Youth race/ethnicity was coded into four categories of White (non-Hispanic), African American, Hispanic/Latino, and Other/Multiracial. Family structure included four categories of youth residence structure at home: living with two parents, living with one parent, living with other relative, and out-of-home placement.

Mental health diagnoses—Therapist reports of youth clinical diagnoses (based on DSM-IV criteria) were extracted from BHDS. Therapists could indicate up to three Axis I (clinical disorders) and two Axis II (personality disorders or mental retardation) diagnoses.

Diagnostic information was coded to reflect presence of disruptive behavior disorder, mood disorder, and substance abuse disorder.

Pre-MST charge history—Two variables were extracted from arrest data to reflect Pre-MST court involvement: (1) a count of pre-MST arrests, and (2) severity rating of the most serious adjudicated offense prior to MST enrollment. Severity was based on state statute information that indicates a rating from 50 to 100 for each type of arrest or violation. Ratings were rescaled to represent scores from 0 to 6, with 0 indicating no charge and scores from 1 to 6 representing the re-scaled severity scores after dividing severity by a factor of 10.

Probation/parole status—Youth involvement with either probation or parole at MST enrollment was based on therapist report in BHDS data files. Probation or parole status was coded to three categories, including “neither,” “probation involved,” or “parole involved.” Five cases with dual probation and parole involvement were coded to parole.

MST treatment adherence—Therapist adherence to MST principles was assessed using the revised Therapist Adherence Measure (TAM-R; Henggeler & Borduin, 1992; Schoenwald, Sheidow, Letourneau, & Liao, 2003), a brief 15-item scale ($\alpha = .90$; current sample $\alpha = .87$). Scores range from 1 to 5, with higher scores indicative of better model adherence. Consistent with MST practice, all available TAM ratings for a given case were averaged to produce a single adherence score (current sample $M = 4.24$, $SD = 0.48$).

Data Analyses

Cox regression modeling was used to examine time to first re-arrest and the relation of child, family, and case characteristics to risk of re-arrest following MST enrollment (Allison, 1995; Connell, 2012). The dependent variable for the present study was operationalized as time to first re-arrest in either the juvenile or adult court system following enrollment in MST, and was modeled using methods for continuous time-to-event analyses rather than based on discrete time intervals. Two models were tested. In Model 1 [new arrest—any type], the re-arrest charges included any charge (i.e., status offenses, violations, misdemeanors, and felonies). Model 2 [new misdemeanor or felony arrest] included only new arrests resulting from misdemeanor and felony charges as the recidivism outcome. Both program completers and non-completers were included in all analyses; cases that did not experience a new arrest were censored at the end of the study observation period. Analyses were conducted in Mplus 7.1 (Muthén & Muthén, 2013) using robust maximum likelihood estimation and complex sampling to account for non-independence of observations resulting from having multiple cases served by the same therapist. Missing data were addressed using full information maximum likelihood (FIML; Acock, 2005).

Results

Model 1: New arrest (Any type)

Model 1 examined whether child demographic characteristics, mental health diagnoses, charge-related factors, probation/parole status, and treatment adherence were associated with

risk of a new arrest of any type (e.g., status offense, violation, misdemeanor, or felony) using Cox regression analyses. The cumulative survival estimate for Model 1 is depicted in Figure 1. Approximately 65% of youth experienced a new arrest within 12-months of enrolling in MST, and an additional 8% (73% total) experienced a new arrest by the 18-month post-enrollment period. Rates of re-arrest were steepest during the initial period of MST enrollment and declined over time. Model results also revealed several demographic, mental health, and charge-related characteristics associated with increased risk of re-arrest for youth following MST (see Table 2).

Beginning with demographic factors, results indicated that youth age, race/ethnicity, and family structure were significant predictors of recidivism. Youth who were younger at entry to MST, hazard ratio (HR) = 0.78, 95% CI [.70, .87], and who were of biracial or other racial identify, HR = 1.32, 95% CI [1.00, 1.75], were at greater risk of recidivism. Additionally, youth in an out-of-home placement at entry to MST were at greater risk of recidivism compared to those residing in a two-parent household, HR = 1.57, 95% CI [1.14, 2.15]. Gender did not predict recidivism.

Next, we examined how youth clinical characteristics of an externalizing behavior disorder, mood disorder, and substance use disorder diagnoses differentially predicted recidivism rates. Results showed that a positive behavior disorder diagnosis increased the risk of recidivism, HR = 1.31, 95% CI [1.04, 1.65], respectively. Mood disorder and substance use disorder did not emerge as significant predictors of differential recidivism rates.

Lastly, we examined pre-MST arrest counts, pre-MST charge severity, youth probation/parole status, and therapist adherence as predictors of recidivism rates. Both the number of pre-MST arrests and the severity of the most serious charge prior to MST entry were significantly associated with increased risk of recidivism, HR = 1.06, 95% CI [1.04, 1.09] and HR = 1.25, 95% CI [1.16, 1.35], respectively. Youth who had a probation officer, rather than a parole officer, were also at greater risk of recidivism, HR = 1.68, 95% CI [1.32, 2.13]. Finally, therapist adherence to MST principles was not significantly related to risk of recidivism.

Model 2: Predictors of misdemeanor/felony arrest recidivism

Model 2 examined the relation of the same set of child demographic, clinical, and charge-related factors to risk of a new arrest for more serious misdemeanor or felony charge. The cumulative survival estimate for Model 2 is also depicted in Figure 1. Re-arrest rates for these more serious charges resulted in a lower 12-month re-arrest rate (53%) that rose to 62% at the 18-month period. As with overall re-arrest rates, the rate of new incidents declined over time. As with the general model, analyses identified several demographic, clinical, and charge-related characteristics associated with increased risk of new misdemeanor or felony arrest for youth following MST (see Table 2).

Similar to Model 1, youth who were younger at MST referral had increased risk of recidivism, HR = .80, 95% CI [.71, .89]. However, other predictors emerged that were not present in Model 1. Males were at greater risk of recidivism, HR = 1.36, 95% CI [1.08, 1.72], and African-American, HR = 1.29, 95% CI [1.00, 1.66], and those of biracial or other

racial identity were at greater risk of increased recidivism, $HR = 1.70$, 95% CI [1.22, 2.36]. Family structure was not a significant predictor of recidivism. Consistent with the previous model, having a behavior disorder diagnosis increased risk of re-arrest, $HR = 1.33$, 95% CI [1.04, 1.69], and having a mood or substance use disorder did not affect recidivism rates. Finally, the number of pre-MST arrests and the severity of the most serious charge prior to MST entry were significantly associated with greater risk of recidivism, $HR = 1.04$, 95% CI [1.01, 1.07], and $HR = 1.23$, 95% CI [1.14, 1.33], respectively. Probation/parole status and therapist adherence to MST principles were not significantly associated with risk of recidivism.

The nature of recidivism events for both models is depicted in Table 3. For Model 1, 155 youth (24.5%) were arrested for lesser charges (i.e., FWSN, status offenses, violations, infractions) during the follow-up period, 232 youth (36.7%) for a misdemeanor offense, and 106 (16.7%) for a felony charge. For Model 2, which excluded lesser types of charges fewer youth experienced a new charge, overall, but 303 youth (47.9%) were arrested for a misdemeanor charge during the follow-up period, and 143 youth (22.6%) were arrested for a felony charge. Table 3 provides additional detail on the severity of new offenses as well as the types of offenses for which youth were charged.

Discussion

This study examined MST recidivism outcomes with a multi-year cohort of 633 youth referred to services through child welfare contracted community-based providers as part of a statewide dissemination initiative. Cox regression models examined both general and misdemeanor or felony re-arrests following entry to MST. Rates of re-arrest for new charges of any type initially were high, though risk of recidivism for a new arrest declined over time. Nearly two-thirds of youth experienced a new arrest within 12-months of beginning MST. With respect to misdemeanor or felony re-arrest incidents, approximately one-half of participants experienced a new arrest within 12 months of beginning MST.

Direct comparison of these rates to those reported in prior MST studies is challenging, as researchers vary in terms of the operationalization of recidivism with respect to type of charge (e.g., any offense vs. misdemeanor or felony), inclusion of arrest vs. conviction, and whether time to recidivism begins at enrollment or discharge. With this caveat, our re-arrest rates are consistent with other published studies examining recidivism survival times. For example, Timmons-Mitchell et al. (2006) reported MST re-arrest rates of nearly 67% at 18 months, though they did not account for arrests that occurred prior to treatment discharge, which was sizeable in the present study. Additionally, a Canadian transportability study reported 6-, 12-, and 24-month post-discharge conviction rates (a more stringent requirement than re-arrest) of 28%, 49%, and 63%, respectively (Leschied & Cunningham, 2002).

Comparing the overall re-arrest rates to those of misdemeanor or felony offenses revealed a marked difference in incidents during the first 6-months post-enrollment, based on steepness of the survival curves. Following this initial period, differences in the rates of new arrests of any time and of more serious misdemeanor or felony offenses appeared less marked. This pattern suggests that many early incidents of re-arrest result from status offenses or

violations of court order, potentially while the youth is still active with an MST provider or under court supervision. These incidents of lower-level status offenses and violations may be due to increased surveillance of the youth through contact with MST providers and from probation or parole officers during this period.

Predictors of re-arrest generally were consistent with existing literature on risks of recidivism, though some variation in effects was observed between general and misdemeanor or felony outcome models. Youth demographic characteristics predicted both types of outcomes. For both models, adolescents who were younger at MST entry were at greater risk of new arrest, consistent with research suggesting earlier system contact is indicative of more persistent delinquent behavior (Cottle et al., 2001). For misdemeanor and felony re-arrest incidents, male and African American youth and youth from 'other' racial/ethnic backgrounds were at greater risk of recidivism. However, these differences were not observed for males and African American youth with respect to more general re-arrests. Research suggests that males and minority youth (particularly African American youth) are at greater risk of recidivism, although these differences may be at least partially explained by exposure to contextual risk factors associated with recidivism (Schwalbe et al., 2006). These factors include greater exposure to socioeconomic and neighborhood risks (Hawkins, Laub, Lauritsen, & Cothorn, 2000) or disproportional contact with law enforcement and the juvenile justice system (Brownfield, Sorenson, & Thompson, 2001; Fain et al., 2014; Tapia, 2010).

Findings for differences in MST across race/ethnicity vary among studies. A recent meta-analysis examining moderator effects of race/ethnicity indicated that MST may be more effective for non-minority youth (van der Stouwe et al., 2014). However, at least one large-scale study found differential MST effectiveness across minority youth, such that MST was more effective on recidivism and other behavioral outcomes for Hispanic MST participants compared to Hispanic comparison youth, yet Black MST participants showed no more positive outcomes than Black comparison youth (Fain et al., 2014). Moreover, some small-scale studies that examined race/ethnicity as a moderator found no effect (e.g., Borduin et al., 1995; Henggeler et al., 2002), likely because of small sample sizes (van der Stouwe et al., 2014). Thus, further research to clarify the effects of race/ethnicity, and include other socioeconomic and neighborhood risk factors (e.g., through risk assessment screening tools; Schwalbe et al., 2006) may yield further useful information on the differential effectiveness of MST. Use of a large-scale RCT effectiveness study design will be most useful to test for moderator effects of sociodemographic factors and MST effectiveness on outcomes.

Youth with a more serious pre-MST arrest history and those with an identified behavior disorder diagnosis were also more likely to recidivate in both the general and misdemeanor or felony outcome models. The stability of these effects across models is consistent with previous research (McReynolds et al., 2010; Mulder et al., 2011), and suggests a robust relationship between more serious delinquency or clinical levels of externalizing behavior and more persistent delinquent activity, even in the context of an evidence-based treatment model.

Youth in out-of-home placement at entry to MST and those involved with probation (rather than parole) were more likely to experience new general charges but not more serious offenses. Out-of-home placement may pose a potential barrier to involvement in MST's intensive family-based model, resulting in poorer outcomes. MST reviews support this finding, noting that home-based interventions are more effective in preventing recidivism than those for youth in out-of-home placements, such as detention facilities (Henggeler, 2011; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009; Schoenwald, 2010). Importantly, though, this effect was not found for more serious re-arrests (e.g., Lipsey & Wilson, 1998). It is not clear why family effects would be stronger with respect to status offenses and other violations, suggesting a need for further research on the relation of placement to treatment fidelity and MST outcomes. Similarly, the effect of probation involvement was only seen with respect to general re-arrest rates. Here, it may be that more regular contact with probation had a surveillance effect with respect to new charges of court order violations. It is not clear why such effects were not observed for parole contact, though there may be differences in caseload or other factors that could impact surveillance effects within this setting.

Contrary to previous research (Chapman & Schoenwald, 2011), therapist adherence to MST principles was not significantly related to risk of either general or more serious re-arrest (though effects were in the direction of a positive effect). Treatment fidelity was generally strong for this statewide dissemination, unlike some transportability studies (e.g., Sundell et al., 2008), which may have reduced the potential for effects. In light of research indicating that client-related characteristics (e.g., the presence of a history of criminal offenses and substance abuse, educational and socioeconomic disadvantage) may influence treatment adherence (Schoenwald, Halliday-Boykins, & Henggeler, 2003), post hoc analyses were conducted to assess whether inclusion of client characteristics in multivariate analyses reduced the direct effect of implementation fidelity as a unique predictor of outcomes. The effect of TAM-R scores at the univariate level was also non-significant, so the restricted range of treatment fidelity scores likely is the primary limiting factor for this effect.

Overall, the findings from this study highlight potential child and case factors that may account for variability in treatment effects when evidence-based models such as MST are disseminated. Programs such as MST are not a panacea; youth who receive MST are still likely to engage in significant rates of subsequent delinquent behavior and have future contact with authorities, though generally at lower rates of recidivism than other treatment models. What our findings offer is a means of identifying high-risk cases entering services that may require additional supports to prevent further delinquent activity. Specifically, youth referred for MST at a younger age and who already have a history of relatively serious delinquent behavior are at significantly greater risk of recidivism for both general and more serious misdemeanor and felony offenses. MST is already an intensive model, but these findings raise the question as to whether some youth may benefit from additional intensive supports, post-MST service referrals, or family-based booster sessions to strengthen and maintain treatment effects. In particular, our overall findings for significant predictors of recidivism suggest that youth with particular characteristics (i.e., younger age, male gender, racial/ethnic minority status, higher pre-MST arrest count and charge severity, a mental health behavior disorder diagnosis, out-of-home placement, and probation status) may be

potential subgroups that are at highest risk for recidivism among MST treatment populations. Through use of expanded screening measures (e.g., Schwalbe et al., 2006) at system entry, case workers and therapists may implement additional supports and services to meet specific needs of high-risk youth and ultimately reduce recidivism rates (Henggeler, 2011).

Limitations and Conclusions

There are some limitations to the current study. In particular, the statewide dissemination model did not permit use of a control or comparison group. Thus, our findings should not be interpreted to suggest that MST is less effective for certain cases. For example, though younger participants are more likely to recidivate within our sample, their rates of recidivism may still be better than would have been observed in the absence of MST – an interpretation supported by numerous empirical studies when MST is implemented with fidelity. Future statewide MST studies will benefit not only from the inclusion of these types of predictors (e.g., demographic characteristics, arrest history, etc.) as potential moderators of program effects to better understand how they impact program outcomes, but also from an RCT study design to determine the large-scale effectiveness of MST. In addition, due to the limitations of using administrative data sets, we were unable to investigate other service- and individual-level variables that are known to be associated with recidivism (e.g., family engagement or involvement in treatment, direct changes in child behavior, etc.). Future studies will benefit from including a greater range of variables, particularly related to the family context.

Another limitation is the focus on re-arrest as the sole outcome. Previous studies have demonstrated beneficial effects of MST on a range of child and family behavioral indicators (e.g., parental and youth reports of delinquency or other behavioral outcomes; Borduin et al., 1995; Butler et al., 2011; Henggeler et al. 1992), but these types of measures are not generally available in state data systems. Nonetheless, the inclusion of child, peer, and family behavioral outcomes in future large-scale dissemination studies will be important for examining wider-range effects of MST on youth functioning. It is important to note, though, that re-arrest and the resulting consequences (e.g., incarceration or detention) are significant cost-drivers for juvenile and adult corrections systems, so this outcome is of particular importance to state systems adopting evidence based treatment models for this service population.

Despite these limitations, this study makes important contributions to the MST literature. It is the first study, using data from a statewide dissemination of MST, to examine child and case predictors that may influence recidivism rates for both general and more serious misdemeanor and felony offenses. Additionally, from a public health perspective, there is increasing emphasis on the adoption of evidence-based treatment models but limited research on the effects observed when such models are delivered to scale. The results of statewide and system-level initiatives are critical to informing public policy efforts to disseminate these models, particularly as relates to program planning and resource allocation to meet the needs of high risk service populations likely to be encountered as programs are delivered to scale.

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Biographies

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Figure 1.
Cumulative survival curve for Model 1 (new arrest—any type) and Model 2 (new misdemeanor or felony charge) following entry to MST.

Table 1

Sample characteristics

	n	M (SD)
Age at intake (range: 10.9 – 17.7)	633	15.3 yrs (1.2 yrs)
Pre-MST offense history (# of offenses)	633	5.71 (4.17)
Maximum severity of adjudicated offense	633	4.45 (1.9)
	<i>n</i>	%
Gender		
Male	423	66.8
Female	210	33.2
Race/ethnicity		
White (Non-Hispanic)	178	28.3
African American	235	37.4
Hispanic/Latino	170	27.1
Other/Multiracial	45	7.2
Unknown/Missing	5	0.8
Youth Residence/Family Structure		
Living with two parents	150	23.7
Living with one parent	365	57.7
Living with other relative	84	13.3
Out-of-home	34	5.4
Behavior Disorder Diagnosis	405	64.0
Mood Disorder Diagnosis	111	17.5
Substance Abuse Disorder Diagnosis	179	28.3
Most Serious Type of Offense (Pre-MST)		
No Pre-MST Charge	88	13.9
Families with service needs (FWSN)	7	1.1
Status/Ordinance/Infraction	27	4.3
Misdemeanor	213	33.6
Felony (Class C or D)	267	42.2
Felony (Class A or B)	31	4.9
Current Probation/Parole Involvement		
None	30	4.7
Probation	373	59.0
Parole ^I	230	36.4

^I Five cases with probation and parole involvement were coded affirmative for parole.

Table 2

Cox proportional hazards model for any re-arrest following MST enrollment

Variable	Model 1: New arrest (any type)				Model 2: New misdemeanor/felony arrest			
	Hazard Ratio	95% CI Lower	95% CI Upper		Hazard Ratio	95% CI Lower	95% CI Upper	
Age	0.78**	0.70	0.87		0.80**	0.71	0.89	
Gender								
Female ^a	-	-	-		-	-	-	
Male	1.09	0.87	1.37		1.36**	1.08	1.72	
Race/Ethnicity								
Caucasian ^a	-	-	-		-	-	-	
African-American	1.11	0.88	1.40		1.29*	1.00	1.66	
Hispanic	1.06	0.84	1.33		1.14	0.86	1.51	
Other	1.32*	1.00	1.75		1.70**	1.22	2.36	
Family Structure								
2-parent household ^a	-	-	-		-	-	-	
1-parent household	1.10	0.90	1.34		0.99	0.79	1.25	
Relative household	1.17	0.89	1.55		1.00	0.75	1.34	
Out-of-home placement	1.57**	1.14	2.15		1.20	0.79	1.80	
Mental Health Diagnosis ^b								
Behavior disorder	1.31*	1.04	1.65		1.33*	1.04	1.69	
Mood disorder	1.04	0.78	1.37		0.98	0.74	1.29	
Substance disorder	1.08	0.88	1.32		1.04	0.83	1.31	
Pre-MST arrest count	1.06**	1.04	1.09		1.04**	1.01	1.07	
Pre-MST charge severity	1.25**	1.16	1.35		1.23**	1.14	1.33	
Probation/Parole Status								
Parole ^a	-	-	-		-	-	-	
Probation	1.68**	1.32	2.13		0.96	0.78	1.19	

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Variable	Model 1: New arrest (any type)				Model 2: New misdemeanor/felony arrest			
	Hazard Ratio	Lower	Upper	95% CI	Hazard Ratio	Lower	Upper	95% CI
None	1.55	0.93	2.60		1.29	0.79	2.10	
MST Therapist Adherence	0.89	0.75	1.05		0.96	0.78	1.17	

*
p < 0.05;

**
p < 0.01.

^aReference category

^bFor Mental Health Diagnosis reference category for each type is „not present.”

Table 3

Characteristics of recidivism arrest event

	Model 1: New arrest (any type)	Model 2: New misdemeanor or felony arrest
	<i>M (SD)</i>	<i>M (SD)</i>
Arrest charge severity ^a	4.26 (1.34)	5.06 (0.36)
	<i>n (%)</i>	<i>n (%)</i>
Offense Class		
None	140 (22.1)	187 (29.5)
Family with Service Needs (FWSN)	20 (3.2)	–
Status/Ordinance/Infractions	135 (21.3)	–
Misdemeanor Charge	232 (36.7)	303 (47.9)
Felony Charge (Class C or D)	92 (14.5)	127 (20.1)
Felony Charge (Class A or B)	14 (2.2)	16 (2.5)
Offense Type		
No new arrest	140 (22.1)	187 (29.5)
Assault	56 (8.8)	71 (11.2)
Burglary	25 (3.9)	36 (5.7)
Drug Offense	35 (5.5)	41 (6.5)
Family Offense	75 (11.8)	9 (1.4)
Flight	19 (3.0)	31 (4.9)
Fraud	1 (0.2)	1 (0.2)
Homicide	1 (0.2)	2 (0.3)
Kidnapping	3 (0.5)	2 (0.3)
Larceny	58 (9.2)	62 (9.8)
Motor Vehicle Offense	6 (1.0)	1 (0.2)
Obstruction	26 (4.1)	31 (4.9)
Property	11 (1.7)	14 (2.2)
Public Peace	80 (12.6)	101 (16.0)
Robbery	8 (1.3)	12 (1.9)
Sexual Assault	4 (0.6)	3 (0.5)
Weapons	12 (1.9)	17 (2.7)
Miscellaneous	73 (11.5)	12 (1.9)

^aExcludes individuals with no new arrest