

Long-Term Effects of Multisystemic Therapy for Problem Sexual Behaviors: A 24.9-Year Follow-Up to a Randomized Clinical Trial

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Objective: Although there is evidence that the positive impact of multisystemic therapy for problem sexual behaviors (MST-PSB) reaches as far as young adulthood, the longer-term effects of MST-PSB into midlife are unknown. The present study examined criminal and civil court outcomes for sexually offending youths who participated on average 24.9 years earlier in a clinical trial of MST-PSB (Borduin et al., *Journal of Consulting and Clinical Psychology*, 2009, 77, p. 26). **Method:** Participants were 48 individuals who were originally randomized to MST-PSB or usual community services (UCS) and were at high risk of continued criminality. Arrest, incarceration, and civil suit data were obtained in middle adulthood when participants averaged 39.4 years of age. **Results:** Intent-to-treat analyses showed that MST-PSB participants had 85% fewer sexual offenses and 70% fewer nonsexual offenses than did UCS participants. In addition, MST-PSB participants were sentenced to 46% fewer days of incarceration and had 62% fewer family-related civil suits. Moreover, the favorable effects of MST-PSB on participants' crimes and civil suits were mediated by improved peer and family relations during treatment. **Conclusion:** The current study represents the longest and most comprehensive follow-up to date of an MST-PSB clinical trial and demonstrates that the positive effects of an evidence-based youth treatment for sexual crimes can last well into adulthood. Implications of the findings for policymakers, service providers, and researchers are discussed.

What is the public health significance of this article?

This study demonstrates that a comprehensive, family-based treatment for youth sexual offending can have a lasting impact on participants' lives. The findings are useful for policymakers and service providers to consider in their selection of mental health interventions for youths who engage in sexual offenses.

Keywords: sexual offense, multisystemic therapy for problem sexual behaviors, MST-PSB, evidence-based treatment, cognitive-behavioral therapy, randomized clinical trial

Sexual offenses engender considerable pain and suffering for victims as well as substantial economic costs for the health care, social services, and criminal justice systems (Hailes et al., 2019;

Freyd et al., 2005; Letourneau et al., 2014). Notably, youths under the age of 18 years account for almost one-fifth of all arrests for rape and other sexual assaults (U.S. Department of Justice, 2018) and for more than one-third of all sexual offenses against minors (Finkelhor et al., 2009). Moreover, youths whose sexual offenses are adjudicated through the juvenile justice system are at increased risk for continued criminality, including both sexual and nonsexual offenses, into adulthood (Hagan et al., 2001; Lussier, 2017; Vandiver, 2006). Thus, there is a critical need to develop treatments that can prevent or attenuate persistent criminal activity among youths who engage in sexual offenses.

Historically, juvenile justice and mental health services have had little success in ameliorating sexually offending behaviors in youths (see Brown & Kolko, 1998; Davis & Leitenberg, 1987; Reitzel & Carbonell, 2006, for earlier reviews). Indeed, in the United States, juvenile justice services for youths convicted of sexual offenses have prioritized public safety, resulting in disproportionately punitive and restrictive legal responses such as community notification, sex offender registration, and residential treatment (Chaffin, 2008; Letourneau et al., 2014). Furthermore, mental health services for this population have primarily used cognitive-behavioral therapy (CBT) models that focus on individual-level risk factors

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(e.g., atypical sexual interests, cognitive distortions, problem-solving skills deficits; Hanson, 2014; McGrath et al., 2010). These legal and clinical approaches represent downward extensions of services for adults who offend sexually, despite concerns that such services are largely ineffective (and possibly harmful) with sexually offending youths (Dopp, Borduin, Rothman, & Letourneau, 2017). Although our understanding of service effects has been complicated by the fact that most youths who engage in illegal sexual behaviors have low rates of recidivism for sexual crimes in adulthood (e.g., 5%–7% in meta-analyses by Caldwell, 2010, 2016), it is well-documented that these youths have a similar risk for nonsexual recidivism as do youths who commit nonsexual offenses only (nearly 50%; Caldwell, 2010, 2016) and that a subset of sexually offending youths shows sexual recidivism rates as high as 30%–60% into adulthood (Langstrom, 2002; Lussier et al., 2012). In sum, it seems imperative to move beyond the status quo in our societal responses to youths who commit harmful sexual behaviors.

Recently, there has been increased recognition that the most successful treatments for youths who engage in problem sexual behaviors are comprehensive (i.e., address multiple risk factors for antisocial behavior), include high levels of caregiver involvement, and are individualized to match each youth's strengths and needs (Association for the Treatment of Sexual Abusers, 2012; Dopp, Borduin, Rothman, & Letourneau, 2017; Przybylski, 2015; Seto & Lalumiere, 2010). Examples include a family-oriented CBT treatment (Carpentier et al., 2006) designed as a preventive intervention for sexual behavior problems in younger children, ages 5 to 12 years; and multisystemic therapy for problem sexual behaviors (MST-PSB; Borduin & Munsch, 2014), a more intensive treatment for youths (ages 11 to 17 years) at high risk for continued sexual offending. Among these treatments, MST-PSB has the highest level of empirical support (Dopp, Borduin, Rothman, & Letourneau, 2017), with favorable outcomes in several randomized clinical trials. For example, in a community-based effectiveness trial, Letourneau et al. (2009) showed that MST-PSB was more effective than treatment as usual (i.e., outpatient group CBT) in reducing youth problem sexual behaviors, self-reported delinquency, and out-of-home placements; these positive results were sustained at a 2-year follow-up (Letourneau et al., 2013). Similarly, in an efficacy-effectiveness hybrid trial (i.e., conducted in a university setting but with minimal exclusion criteria) that included an 8.9-year follow-up, Borduin et al. (2009) found that MST-PSB participants had lower recidivism rates than did participants in usual community services (UCS; i.e., outpatient group and individual CBT) for sexual (8% vs. 46%, respectively) and nonsexual (29% vs. 58%, respectively) crimes. This latter study was important in demonstrating the ability of MST-PSB to curtail criminal activity in sexually offending youths through early adulthood.

Although extant research indicates that the positive effects of MST-PSB on serious crime reach as far as young adulthood, the longer-term impact of MST-PSB on criminal activity has not been examined. However, in light of evidence that sexual offending during adolescence can continue into midlife (Lussier et al., 2012), especially for youths who have also committed nonsexual offenses (Beaudry-Cyr et al., 2017; Ronis & Borduin, 2013), it seems important to determine whether MST-PSB is effective in preventing longer-term criminal activity. Information about the lasting benefits of evidence-based treatments such as

MST-PSB could assist program administrators in identifying and implementing mental health interventions for youths who engage in sexual offenses. On the other hand, if treatment effects comparable to those observed at shorter follow-ups did not continue for a longer period of time, this could indicate a need for refinements in interventions or for support services throughout adulthood.

In the present study, we examined both sexual and nonsexual offenses among former MST-PSB participants in middle adulthood. In addition, we obtained information about punitive sentencing (i.e., days sentenced to incarceration or probation) for each offense as an index of crime severity. We also examined a noncriminal outcome among the former participants in adulthood. Indeed, to date, we know little about the impact of MST-PSB on areas of functioning outside of involvement in criminal activity. However, there is substantial evidence that youths who engage in serious antisocial activities experience wide-ranging problems that interfere with their ability to accomplish important life tasks (e.g., establish committed romantic relationships; raise children; Farrington et al., 2009; Laub & Sampson, 2003). In this study, we used civil suits as indices of adult functioning in the domain of family relationships to provide a broader picture of the developmental impact of MST-PSB on participants' lives.

Finally, we examined theoretically plausible mediators as well as potential moderators of significant treatment effects on criminal and noncriminal outcomes in midlife. Because the MST-PSB theory of change (Borduin et al., 2016) emphasizes that improved social bonds are key mechanisms in reducing the problem behaviors of sexually offending youths, we assessed both family (i.e., cohesion and adaptability) and peer relations (i.e., attachment to prosocial peers) as potential mediating variables. In addition, based on findings that youths with histories of both sexual and nonsexual offenses frequently associate with peers who also engage in antisocial behaviors (Ronis & Borduin, 2007), we evaluated whether changes in youth involvement with deviant peers mediated changes in outcomes during adulthood. In regard to possible moderators, prior research (Letourneau et al., 2009) had indicated that the effects of MST-PSB were not moderated by perpetrator-victim age differential or level of aggression in the sexual offense. Given those results, as well as a pressing need to evaluate the efficacy of psychosocial treatments for youths and families from different backgrounds (see Pina et al., 2019), we chose to focus on more general demographic and criminal history characteristics as potential moderators, including age, socioeconomic status (SES), race, family composition, and the number of pretreatment arrests.

In summary, the current study from the Missouri Delinquency Project examined criminal and civil court outcomes for youths who participated on average 24.9 years earlier in a randomized clinical trial of MST-PSB (Borduin et al., 2009). Specifically, we evaluated the long-term impact of MST-PSB on the likelihood and number of (a) arrests for sexual and nonsexual offenses, (b) days sentenced to incarceration or probation in criminal court, and (c) civil suits related to family instability. In addition, we examined potential mediators and moderators of treatment effects on criminal offenses, punitive sentencing, and civil suits. As such, this study provides the most comprehensive and longest follow-up of an MST-PSB clinical trial.

Method

Design

In this study, we tracked the long-term criminal and civil court outcomes of 48 youths who received either MST-PSB or UCS in an earlier clinical trial (Borduin et al., 2009). The original trial used a pretest–posttest control group design, with random assignment to treatment conditions (MST-PSB vs. UCS). Because this sample has been described extensively elsewhere, a shorter description of the participants is provided here.

Participants

Participants were the full sample of 48 individuals from the original clinical trial (Borduin et al., 2009). These individuals had been referred to the Missouri Delinquency Project by juvenile court personnel from July 1990 through November 1993. Inclusion in the original study required that youths (a) had been arrested for a serious sexual offense (i.e., rape/sexual assault or molestation of younger children) with a subsequent court order for outpatient sexual offender counseling, (b) were currently living with at least one parent figure, and (c) showed no evidence of psychosis or serious intellectual disability. As depicted in Figure 1, 51 eligible youths and their families were referred to and recruited for the study, and 48 of these youths/families consented to participate and were randomly assigned (using a random number table) to the MST-PSB ($n = 24$) or UCS ($n = 24$) conditions. Pre- and posttreatment assessment batteries were completed by all (100%) of the families in the MST-PSB condition and 22 (91.7%) of the families in the

UCS condition. The posttreatment assessment was conducted within 1 week of the end of treatment for each family. Research participation at posttreatment in the UCS condition was attenuated by the out-of-home placement of two youths in Department of Youth Services residential facilities; these youths were classified as dropouts but were included in analyses of rearrests, days sentenced, and civil suits (i.e., intent-to-treat analysis).

The pretreatment arrest histories of the participants attested to their serious criminal involvement: The youths averaged 4.33 arrests ($SD = 4.81$) for sexual ($M = 1.62$) and nonsexual ($M = 2.71$) felonies (83.3% had both types of felonies), and all youths had been detained at least 4 weeks; the MST-PSB and UCS youths did not differ on their arrest histories. The youths' mean age at pretreatment assessment was 14.0 years ($SD = 1.9$); 95.8% were boys and 4.2% were girls; 72.9% were White and 27.1% were Black, and among all youths 2.1% indicated Hispanic ethnicity; and 68.7% lived with two caregivers. The primary caretaker included biological mothers (91.7%), biological fathers (6.3%), or stepmothers (2.1%). The majority (54.2%) of families were of lower SES (Class IV or V; Hollingshead, 1975). As shown in Table 1, MST-PSB and UCS youths did not differ on their demographic characteristics.

Treatment Conditions

The mean length of treatment was 30.8 weeks ($SD = 12.3$) for MST-PSB and 30.1 weeks ($SD = 18.0$) for UCS; these means were not significantly different, $F(1,47) = 0.02$, $p = 0.89$. Variability in the duration of each treatment condition reflected the individualized nature of the interventions as well as varying degrees of success in

Figure 1
Flow Diagram of Participants From Referral to Follow-up

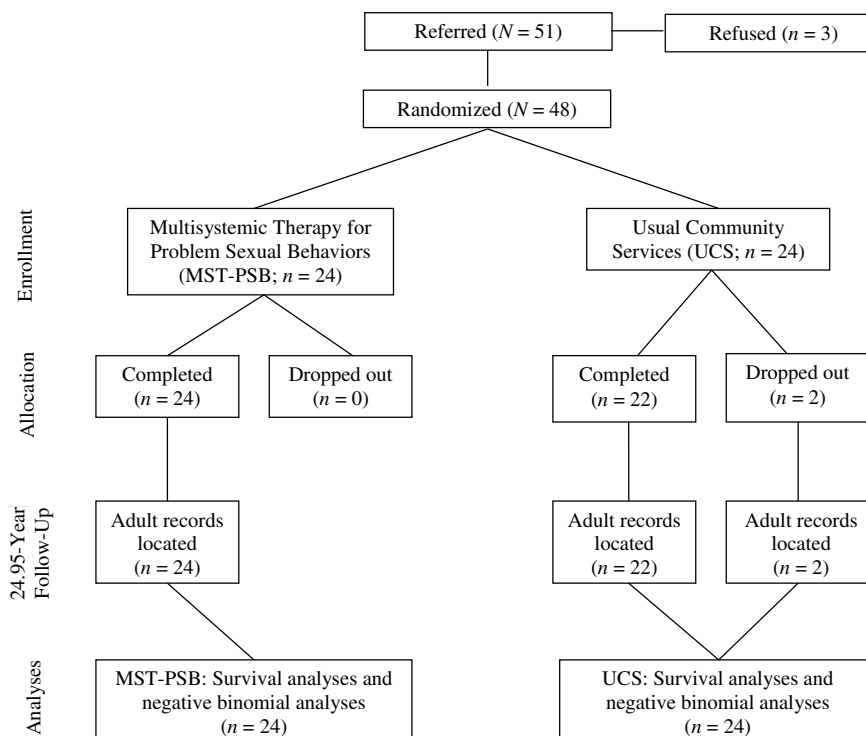


Table 1
Demographic Characteristics of Participants at Pretreatment Assessment

Variable	Group		Analyses	
	MST-PSB	UCS	<i>T</i>	χ^2
Age (years)	—	—	0.67	—
<i>M</i>	14.2	13.8	—	—
<i>SD</i>	1.8	2.1	—	—
Male gender (%)	95.8	95.8	—	0.00
Race (%)	—	—	—	0.95
White	79.2	66.7	—	—
Black	20.8	33.3	—	—
Two-caregiver household (%)	70.8	66.7	—	0.10
Social class ^a (%)	—	—	—	0.79
Class V	25.0	16.7	—	—
Class IV	33.3	33.3	—	—
Class III	37.5	41.7	—	—
Class II	4.2	8.3	—	—
Class I	0.0	0.0	—	—

Note. Sample sizes for therapy conditions are as follows: Multisystemic therapy for problem sexual behaviors (MST-PSB; $n = 24$); usual community services (UCS; $n = 24$). For age, $df = 46$; for male gender, race, and one-caregiver household $dfs = 1$; for social class, $df = 4$. For all T and χ^2 values, $ps > .05$.

^a Based on Hollingshead (1975) Four-Factor Index of Social Status.

achieving treatment goals. Details about the therapists, supervision practices, and treatment fidelity in each condition are provided in Borduin et al. (2009).

Multisystemic Therapy For Problem Sexual Behaviors

Standard MST interventions are described in a clinical volume (Henggeler & Borduin, 1990) and treatment manual (Henggeler, Schoenwald, et al., 2009). These interventions fit closely with findings from research on the correlates of serious antisocial behavior, including juvenile sexual offending (e.g., McCuish et al., 2015; Ronis & Borduin, 2007; Seto & Lalumiere, 2010), and target a comprehensive set of risk factors (e.g., across individual, family, peer, and school domains) using an individualized approach. The MST model uses a broad-based ecological framework to integrate evidence-based clinical techniques from behavioral and cognitive-behavioral therapies and structural/strategic family therapy.

MST-PSB is an adaptation of standard MST for youths with problem sexual behaviors (Borduin & Munsch, 2014). The MST-PSB model is based on the same principles and relies on many of the same evidence-based techniques as in standard MST but focuses on aspects of the youth's social environment that are functionally related to the problem sexual behavior. Family-level interventions in MST-PSB often focus on (a) reducing caregiver and youth denial about the problem sexual behaviors and their sequelae; (b) implementing effective parenting practices (i.e., rules, privileges, and consequences) that are appropriate to the youth's developmental stage; (c) supporting caregivers in the development and ongoing adaptation of plans for risk reduction, relapse prevention, and victim safety; and (d) promoting cohesion and communication between family members. Peer-level interventions are conducted by the youth's caregivers, with the guidance of the therapist, and often include active encouragement of relationship skills and friendships

with nonproblem (i.e., prosocial) peers, as well as substantive discouragement of associations with deviant peers (e.g., applying compelling sanctions). Similarly, at the school level, the therapist helps caregivers to promote the youth's academic progress (e.g., facilitate communication between caregivers and teachers, restructure after-school hours to enhance academic efforts). Finally, individual interventions are sometimes used with a youth or caregiver to alter perspective-taking skills, beliefs, or attitudes that contribute to problem sexual behavior.

As in standard MST, MST-PSB was provided in the family's natural ecology (home, school, and/or neighborhood) and at convenient times for the family's schedule. Interventions were delivered by graduate students in clinical psychology, each of whom had approximately 1.5 years of clinical experience with children or adolescents. Youths and their families received about 3 hr of intervention per week (i.e., across family, school, peer, and individual systems). Given the complexity of many cases involving youths with problem sexual behaviors (including intense community safety concerns), the MST-PSB condition had a higher average length of treatment (i.e., 7 months) and smaller therapist caseloads (i.e., 4–5 families) compared to standard MST; these parameters are consistent with quality assurance standards for MST-PSB (see Borduin et al., 2016).

Usual Community Services

The youths in this condition received cognitive-behavioral group and individual therapy through the treatment services branch of the local juvenile court. This condition represented the usual community (i.e., outpatient) treatment for youths with illegal sexual behaviors in our judicial district and in the vast majority of other judicial districts as well (see McGrath et al., 2010). Each of the therapists was licensed; had a master's degree in counseling psychology, clinical psychology, or social work; and had been certified through a university-based training program for the treatment of youths with illegal sexual behaviors. The youths attended group therapy for 90 min twice a week and individual therapy for 60–90 min once a week. Group therapy (4–6 youths who were participants in the clinical trial) focused on having each youth (a) take responsibility for his or her sexual offense(s), (b) eliminate deviant sexual cognitions, (c) learn new social skills (including anger management), (d) develop awareness and empathy for victims, and (e) engage in behaviors and thoughts that prevent relapse. Individual treatment for each youth was provided by a therapist other than the youth's group leader and was designed to reinforce progress in meeting group therapy goals.

Research Procedures

The Institutional Review Board of the University of Missouri approved all procedures. Those procedures and measures relevant to the present study are described below.

Original Outcome Study

Families referred to the project were contacted by telephone or home visit and asked to participate in a 2-hr research assessment prior to the start of treatment and again after treatment had ended. Families were informed that participation in the research was

voluntary and that refusing to participate or discontinuing participation would not jeopardize the receipt of treatment services or result in sanctions from the court. Families were also informed that juvenile arrest records would be collected through the youths' 17th birthdays and that adult arrest records and other public records would be obtained for the youths thereafter. Family members provided written consent (caregivers) or assent (youths) for the pretreatment/posttreatment research assessments and follow-ups. After completion of the pretreatment assessment, a sealed envelope was opened, and the family was informed of the treatment condition to which they had been randomized. The posttreatment assessment included the same measures as the pretreatment assessment. A teacher of the youth also completed a paper-and-pencil measure before and after treatment; the teacher was randomly selected and told that the youth was a participant in a study of adolescent socialization. Original study procedures are described more fully in [Borduin et al. \(2009\)](#).

Present Study

Public information for criminal (i.e., arrests and sentencing) and noncriminal (i.e., civil suits) court records was obtained within the state of Missouri. We confirmed Missouri residency to determine whether each participant had lived in the state since the time of an earlier follow-up completed in October 2001 ([Borduin et al., 2009](#)) and, thus, whether they were available to have a court record (i.e., arrests, sentencing, and civil suits) in the state through October 2017, when the present follow-up was completed. Accordingly, several steps were followed to confirm residency. First, we searched state court records and noted all records that were registered after the end of treatment for a given individual. Second, for individuals whose names did not appear in state court records, we conducted a search of state driver's license records; an individual was considered a Missouri resident if they held a Missouri driver's license. Third, we searched property ownership and marital records for individuals for whom there were no court records or driver's license records. Finally, we used addresses of parents to confirm residence in the state of several remaining individuals who could not be located through earlier steps. Each individual's follow-up period was anchored by the date of release from juvenile probation (i.e., within 2 weeks of treatment termination for completers and an average of 7 months from the time of referral for dropouts) and ran through the latest date for which the individual youth could be confirmed to live in the state. Overall, we located 100% of the sample ($N = 48$) and determined that all participants had lived in the state since the time of the prior follow-up period (during which the entire sample had also lived in the state).

Outcome Measures

We used both juvenile and adult criminal records as well as adult civil court records in the current study. [Borduin et al. \(2009\)](#) obtained juvenile criminal records in the original trial through yearly juvenile office records searches by research assistants who were uninformed as to each participant's treatment condition. For the present study, we obtained adult criminal and civil court records, which are available to the public in the state of Missouri, using an Internet database searched separately by two research assistants (also uninformed as to treatment condition). The research assistants

searched the records following a standardized protocol that used participants' names, known aliases, alternative first names (e.g., Bob for Robert), and alternative last names for women who may have changed their names due to marriage or remarriage (based on state-level court records and county-level marriage records).

We took several steps to reduce the possibility of false positives for those participants whose names appeared in court records. First, we matched participants to records by date of birth, middle name or middle initial, and suffixes (e.g., Jr.). Second, when those indicators were absent, we matched the participant to records based on similarity to cases that met the first search criterion, including previously known addresses, court locations, and names of other persons listed on the docket (e.g., spouses). We were able to match all of the participants' records using these steps.

For both juvenile and adult criminal records, we focused on arrests for felony offenses because these offenses generally pose the greatest threat to public safety. We included only substantiated arrests (i.e., convictions) in the data set and did not record charges that were dismissed or that were not yet disposed at the time of data collection. We coded each offense by date of arrest and classified each offense as either a sexual (e.g., rape, child molestation) or a nonsexual crime (e.g., breaking and entering, physical assault, distribution of cocaine). We measured sentencing for juveniles as the number of days that a youth was assigned to a Department of Youth Services residential facility. We measured sentencing for adults as the number of days that an individual was assigned to incarceration and/or probation; when an incarceration sentence had been suspended in favor of probation, we recorded only the days sentenced to probation. We combined juvenile and adult criminal records in our analyses to provide a complete record of all offenses (i.e., number and type) and sentencing. The average length of the follow-up period was 24.95 years ($SD = 1.02$; range = 23.23–26.56 years).

From civil court files, we recorded suits reflective of family instability (i.e., domestic or adult abuse, child protection or endangerment, and paternity) in which the participant in our study was the respondent (i.e., person against whom the suit was filed). We assumed that the respondents in such suits would generally display coercive behaviors (e.g., manipulation and intimidation) in their family relationships and that such behaviors are relatively common in families with high rates of antisocial behavior ([Patterson, 2016](#)). There were no instances in which a participant in our study was the petitioner (i.e., initiator) in a family instability suit. Again, we recorded only those cases that had been disposed at the time of data collection.

We provided approximately 20 hr of training to the research assistants prior to their coding of court records, and we assessed their interrater reliability on 30% of the participants. There were no discrepancies between the results obtained by the research assistants ($k = 1.0$). The intraclass correlation between the five outcome variables (i.e., sexual crimes, nonsexual crimes, incarceration days, probation days, and family instability suits) was .091 (95% confidence interval = $-.004$ – $.224$, $p = .031$), indicating a small level of overlap among the variables.

Measures of Potential Mediators of Treatment Effects

We examined two sets of hypothesized mediators of treatment effects on youths' long-term outcomes. The putative mediators

included youth peer relations (two measures) and family relations (two measures). The participants completed the measures of these domains during the aforementioned 2-hr pretreatment and posttreatment assessment sessions in the clinical trial. All of the measures had demonstrated favorable outcomes (i.e., significantly more positive changes) for MST-PSB participants relative to UCS participants in the trial.

Peer Relations

We assessed both youth attachment (i.e., emotional bonding) to prosocial peers and youth association with deviant peers. We measured *attachment to prosocial peers* using caregiver and teacher reports on the five-item Emotional Bonding subscale from the Missouri Peer Relations Inventory (MPRI-EB; Borduin et al., 1989). Item scores range from 1 (*rarely*) to 5 (*often*). Coefficient alphas for caregiver and teacher reports, respectively, were .79 and .74; we averaged these reports to create a composite score. The *M*s (and *SD*s) for the MPRI-EB composite score at pretreatment and posttreatment, respectively, were 12.28 (3.99) and 15.19 (3.02) for MST-PSB participants, and 12.79 (2.91) and 10.95 (3.02) for UCS participants. We measured *association with deviant peers* through caregiver reports on the 17-item Socialized Aggression subscale from the Revised Behavior Problem Checklist (RBPC-SA; Quay & Peterson, 1987). Item scores range from 0 (*no problem*) to 2 (*severe problem*). The coefficient alpha was .81 in the current study. The *M*s (and *SD*s) on the RBPC-SA at pretreatment and posttreatment, respectively, were 9.10 (4.80) and 3.35 (2.81) for MST-PSB participants, and 7.91 (4.06) and 11.77 (6.59) for UCS participants.

Family Relations

We measured caregiver and youth perceptions of family relations with the 30-item Family Adaptability and Cohesion Evaluations Scales-II (FACES-II; Olson et al., 1982). The FACES-II assesses the dimensions of *adaptability*, which refers to the capacity of the family system to change its power structure, role relations, and relationship rules in response to situational and developmental stress; and *cohesion*, defined as the emotional bonding and individual autonomy of family members. Respondents rate the Likert-type items on a scale from 1 (*almost never*) to 5 (*almost always*). Coefficient alphas for the adaptability and cohesion subscales, respectively, were .83 and .88 for caregivers' reports, and .79 and .90 for youths' reports. We created composite ratings of adaptability and cohesion by averaging caregiver and youth scores on each scale. For the adaptability composite, the *M*s (and *SD*s) at pretreatment and posttreatment, respectively, were 33.11 (13.83) and 41.47 (12.36) for MST-PSB participants, and 40.10 (12.96) and 35.91 (13.45) for UCS participants. For cohesion, the *M*s (and *SD*s) at pretreatment and posttreatment, respectively, were 45.74 (12.62) and 53.58 (10.63) for MST-PSB participants, and 50.91 (12.67) and 47.42 (14.88) for UCS participants.

Measures of Potential Moderators of Treatment Effects

We also evaluated demographic and criminal history variables as possible moderators of treatment effects on participants' outcomes in adulthood. These variables included youth age (in years) at pretreatment assessment, SES (five categories based on

Hollingshead, 1975), race (all families were Black or White), number of caregivers in the home (one vs. two), and number of pretreatment arrests.

Results

We used three sets of analyses to examine differences between the MST-PSB and UCS groups on criminal and civil court outcomes. First, we used descriptive statistics to evaluate the percentages and relative odds of dichotomous outcomes (e.g., rearrested vs. not rearrested) for each group. Second, we used survival analyses to examine between-group differences in length of time to the first instance of a given outcome (i.e., rearrest and civil suit). Third, we used negative binomial regression analyses to estimate differences between groups on continuous outcomes (i.e., number of rearrests, days sentenced to incarceration or probation, and civil suits). In addition, we used causal mediation analyses to evaluate the effects of potential mediators of treatment outcomes, and we used negative binomial regression analyses to evaluate the effects of potential moderators of treatment outcomes.

Relative Odds of Rearrests and Civil Suits

We computed the percentages and relative odds of felony rearrests and civil suits in the UCS group versus the MST-PSB group. Odds ratios greater than 1.0 denoted higher odds for UCS participants relative to MST-PSB participants; results for which the associated confidence interval did not include 1.0 were unlikely to occur by chance (Cohen, 1994). As described in Table 2, 79.2% of UCS participants versus 37.5% of MST-PSB participants had been rearrested at least once by the end of the 24.95-year follow-up period; the odds of recidivism for any felony offense during follow-up were 6.33 times higher for the UCS group than for the MST-PSB group ($p = .003$). Similarly, when crime subtypes were examined, youths in the UCS group were 8.27 times more likely to have an arrest for a sexual offense ($p = .002$) and 3.40 times more likely to have an arrest for a nonsexual offense ($p = .042$). Regarding civil court outcomes, the odds of involvement in suits related to family

Table 2
Percentages and Odds of Arrests and Civil Suits During Follow-Up by Therapy Condition

Variable	%	OR	95% CI
Criminal arrests			
Any offense	—	6.33	[1.75, 22.91]
UCS	79.2	—	—
MST-PSB	37.5	—	—
Any sexual offense	—	8.27	[1.94, 35.34]
UCS	54.2	—	—
MST-PSB	12.5	—	—
Any nonsexual offense	—	3.40	[1.03, 11.26]
UCS	62.5	—	—
MST-PSB	29.2	—	—
Family civil suits	—	3.80	[1.11, 14.58]
UCS	50.0	—	—
MST-PSB	20.8	—	—

Note. Sample sizes for therapy conditions are as follows: Usual community services (UCS; $n = 24$); multisystemic therapy for problem sexual behaviors (MST-PSB; $n = 24$). OR = odds ratio; CI = confidence interval.

instability were 3.80 times greater for UCS participants than for MST-PSB participants ($p = .039$).

Survival Functions for Rearrests and Civil Suits

We used survival analyses (Cox proportional hazards regressions; SPSS for Windows, Version 26.0) to obtain cumulative survival functions for rearrest outcomes among participants who received either MST-PSB or UCS, whose average follow-up periods were 24.92 and 24.98 years, respectively. Survival analyses are useful because they model data that are censored (i.e., when some participants do not experience an event, such as arrest; Keiley & Martin, 2005). The cumulative survival function represents the proportion of participants who survived any type of felony arrest (i.e., were not arrested) in each group by the length of time (in years) from release from treatment. As depicted in Figure 2, a log-rank test (with the Kaplan–Meier estimator; Kaplan & Meier, 1958) revealed that the survival functions for the two groups on any offense were significantly different, $\chi^2(1, N = 48) = 7.98, p = .005$, with MST-PSB participants at lower risk of rearrest (i.e., more likely to survive) during follow-up than were UCS participants. The hazard ratio for the treatment group was 1.01, suggesting a large effect size for MST-PSB.

We also used survival analyses to examine between-group differences on time to first arrest for different types of felony crimes. The results demonstrated that MST-PSB participants were at significantly lower risk of arrest for both sexual offenses, $\chi^2(1, N = 48) = 11.65, p = .001$; and nonsexual offenses, $\chi^2(1, N = 48) = 3.75, p = .05$. The hazard ratio tests of these survival

functions again suggested large effect sizes for MST-PSB versus UCS (sexual offenses, $\beta = 1.22$; nonsexual offenses, $\beta = 1.12$).

Finally, we used a survival analysis to compare MST-PSB and UCS participants on time to a first civil suit related to family instability. As shown in Figure 3, MST-PSB participants were at lower risk of involvement in family instability suits than were UCS participants, $\chi^2(1, N = 48) = 4.44, p = .035$; the hazard ratio ($\beta = 0.98$) indicated a large effect size for MST-PSB.

Number of Arrests, Days Sentenced, and Civil Suits

We conducted additional analyses to examine the number of criminal and civil suit outcomes among participants in the MST-PSB and UCS groups. The outcome variables in this study can be considered censored-dependent variables (see Greene, 1993) because they are continuous, nonnormal, and nonnegative (i.e., no negative values). Furthermore, the majority of the variables were overdispersed (i.e., variance exceeded mean). Accordingly, we used negative binomial regression analyses (see Osborn & Tseloni, 1998) to evaluate between-group differences in the number of (a) felony arrests, (b) days sentenced to incarceration or probation, and (c) civil suits during the follow-up period. These differences were expressed as the rate of a given outcome among UCS participants relative to MST-PSB participants. We used the “MASS” package (Venables & Ripley, 2002) in R (version 3.6.1; R Core Team, 2019) to compute all negative binomial regressions, in which we dummy-coded treatment condition (with UCS = 1 and MST-PSB = 0). We present descriptive statistics and regression coefficients in Table 3.

Figure 2
Survival Functions for Multisystemic Therapy for Problem Sexual Behaviors (MST-PSB) and Usual Community Services (UCS) Groups on Time to First Arrest for Any Offense Following Treatment

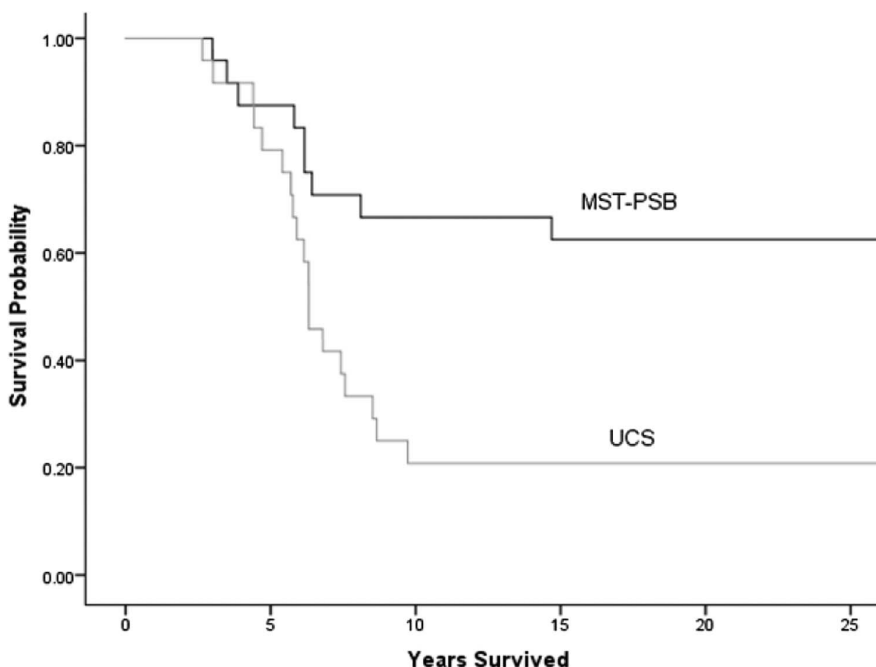
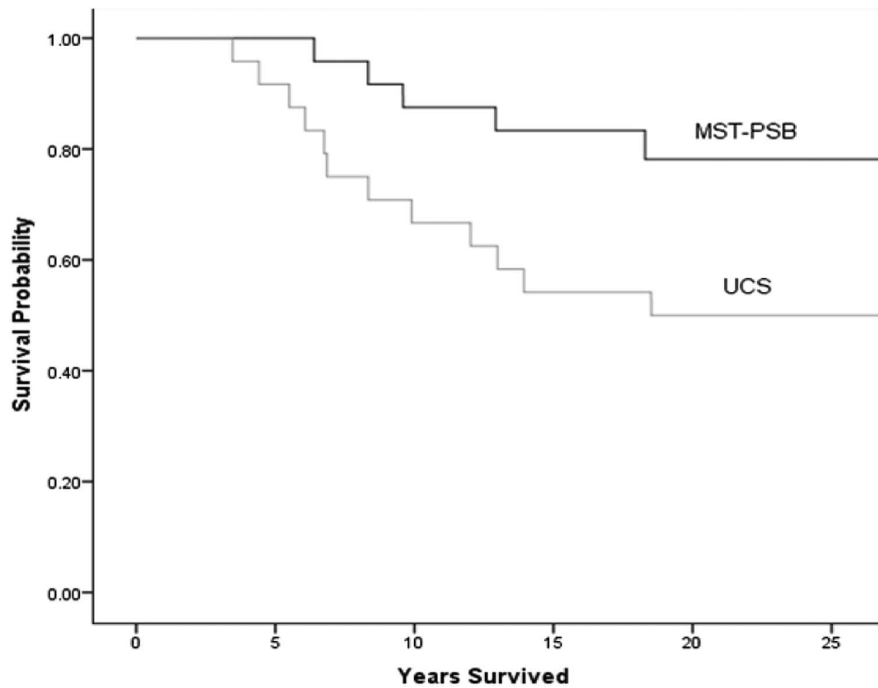


Figure 3
Survival Functions for Multisystemic Therapy for Problem Sexual Behaviors (MST-PSB) and Usual Community Services (UCS) Groups on Time to First Civil Suit Related to Family Instability Following Treatment



For criminal outcomes, the results showed that the estimated rate of any felony offense for UCS participants was 4.67 times higher than for MST-PSB participants. In addition, the estimated rates of sexual offenses and nonsexual offenses, respectively, were 13.13 and 3.79 times higher for participants in the UCS group than for their MST-PSB counterparts. Moreover, results demonstrated that the estimated rates of days sentenced to incarceration and probation, respectively, were 5.25 and 2.67 times greater for UCS participants than for MST-PSB participants. For civil suit outcomes, a nonsignificant trend ($p = .065$) revealed that the estimated rate of involvement in family instability suits was 1.13 times greater

for participants in the UCS group relative to participants in the MST-PSB group.

Potential Mediators of Arrests, Days Sentenced, and Civil Suits

We used causal mediation analyses to evaluate whether the positive effects of MST-PSB on participants' outcomes during follow-up were mediated by pre- to posttreatment (a) increases in youth attachment to prosocial peers, (b) decreases in youth association with deviant peers, and (c) improvements in family relations.

Table 3
Descriptive Statistics and Negative Binomial Regression Results for Criminal and Civil Suit Outcomes

Variable	MST-PSB		UCS		Regression coefficient
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Criminal arrests (no.)					
Any offense	1.26	2.07	4.67	7.35	4.67**
Sexual offense	0.13	0.34	0.88	1.08	13.13**
Nonsexual offense	1.13	1.85	3.79	6.97	3.79*
Punitive sentencing (days)					
Incarceration	1,040.96	2,198.81	1,939.48	3,261.68	5.25***
Probation	836.42	1,110.36	978.87	1,366.04	2.67***
Family civil suits (no.)	0.42	0.93	1.12	1.70	1.13 ⁺

Note. Sample sizes for therapy conditions are as follows: Multisystemic therapy for problem sexual behaviors (MST-PSB; $n = 24$); usual community services (UCS; $n = 24$).

⁺ $p = .065$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Results for which the associated confidence interval did not include zero were unlikely to occur by chance. Imai et al. (2010) developed a causal mediation framework for linear models with continuous and count variables, which made it an ideal technique for testing mediation with our outcome data. We used the “Mediation” package (Tingley et al., 2014) in R (version 3.6.1; R Core Team, 2019) to compute all causal mediation analyses.

Most (94.4%) of the data for the potential mediating variables were available from the original clinical trial; the MST-PSB and UCS participants did not differ significantly in their amounts of missing data, $F(1,47) = 0.64, p = .43$. Aside from the two treatment dropouts in the UCS condition, there were no observable patterns in the missing data, suggesting that the data were missing at random and able to be replaced through multiple imputation (Little & Rubin, 2014), as recommended by Enders and Baraldi (2018). Although the original trial used random assignment to MST-PSB or UCS, we calculated residualized change scores for each group on the potential mediating variables to control for possible between-group differences on these variables at pretreatment. We used the residuals derived from this procedure as the indices of change.

As shown in Table 4, the results demonstrated that improvements in youths' peer and family relations during treatment had significant causal mediating effects on long-term outcomes in MST-PSB. Below, we describe the nature of the significant mediating effects on these outcomes (i.e., criminal arrests, punitive sentencing, and civil suits).

Criminal Arrests

An increase in youths' attachment to prosocial peers (as reported by caregivers and teachers on the MPRI) mediated the lower rates of sexual offenses for MST-PSB participants. In addition, a reduction in youths' association with deviant peers (as reported by caregivers on the RBPC) mediated the lower rates of nonsexual offenses for MST-PSB participants, although the mediating effect was only marginally significant ($p = .09$).

Punitive Sentencing

A reduction in youths' involvement with deviant peers (RBPC) also mediated the lower number of days that MST-PSB participants

were sentenced to incarceration. Furthermore, reduced involvement with deviant peers mediated the effect of MST-PSB on the days that participants were sentenced to probation.

Civil Suits

An increase in caregivers' and youths' perceived adaptability (composite measure) on the FACES-II mediated the effect of MST-PSB on participants' lower involvement in family instability suits. Similarly, an increase in family members' perceived cohesion (FACES-II) also mediated the effect of MST-PSB on involvement in family instability suits.

Potential Moderators of Arrests, Days Sentenced, and Civil Suits

We also used negative binomial regression analyses to evaluate whether the positive effects of MST-PSB on participants' long-term outcomes (i.e., numbers of arrests, days sentenced to incarceration or probation, and civil suits) were moderated by demographic (i.e., age, SES, race, and two-caregiver household) and criminal history variables (i.e., pretreatment arrests). For each regression, we simultaneously entered a dummy variable (for the treatment group), the moderating variable, and the cross-product term of the treatment group and the moderating variable. We centered continuous moderator variables around their means in each cross-product term. A significant regression coefficient for the cross-product term denoted whether MST-PSB was differentially effective with youths from dissimilar backgrounds. The analyses revealed no significant moderator for any outcome variable.

Discussion

The current study is the longest and most comprehensive follow-up to date of an MST-PSB clinical trial. Over a period extending 24.9 years after the end of treatment, the results demonstrated that MST-PSB participants were less likely to be arrested for any felony offense than were UCS participants (37.5% vs. 79.2%). More specifically, MST-PSB participants had 85% fewer arrests for sexual offenses and 70% fewer arrests for nonsexual offenses during follow-up than did UCS participants. In addition, MST-PSB

Table 4

Causal Mediation Analyses Evaluating Peer and Family Relations Measures as Mediators of MST-PSB Outcomes

Outcome Variable	Peer relations				Family relations			
	Prosocial peers (MPRI-EB)		Deviant peers (RBPC-SA)		Adaptability (FACES-II)		Cohesion (FACES-II)	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Criminal arrests								
Sexual offense	-0.14*	[-0.27, -0.02]	0.01	[-0.16, 0.19]	0.04	[-0.09, 0.16]	0.04	[-0.08, 0.16]
Nonsexual offense	-1.54	[-4.70, 1.46]	4.63 ⁺	[-1.16, 10.84]	1.31	[-1.91, 4.74]	1.22	[-1.85, 4.30]
Punitive sentencing								
Incarceration	3.09	[-19.79, 13.83]	35.59*	[4.98, 67.08]	4.79	[-12.31, 22.21]	5.06	[11.89, 22.34]
Probation	-0.30	[-2.23, 1.76]	2.67*	[.07, 4.75]	0.71	[-1.42, 2.83]	0.98	[-1.08, 2.87]
Family civil suits	0.10	[-0.17, 0.40]	0.09	[-0.34, 0.53]	-0.33**	[-0.65, -0.06]	-0.36**	[-0.69, -0.11]

Note. Sample sizes for therapy conditions are as follows: Multisystemic therapy for problem sexual behaviors (MST-PSB; $n = 24$); usual community services ($n = 24$). MPRI-EB = Missouri Peer Relations Inventory, Emotional Bonding subscale; RBPC-SA = Revised Behavior Problem Checklist, Socialized Aggression subscale; FACES-II = Family Adaptability and Cohesion Evaluation Scales-II; CI = Confidence Interval.

⁺ $p = .09$. * $p < .05$. ** $p < .01$.

participants were sentenced to 46% fewer days of incarceration than were UCS participants. Moreover, the odds of being involved in civil suits related to family instability were 3.80 times lower for MST-PSB participants than for UCS participants. Notably, the positive effects of MST-PSB on participants' long-term criminality and civil suits were mediated by improved relations with peers and family members. Furthermore, consistent with the conclusions of reviewers about the cross-cultural effectiveness of standard MST (e.g., Pina et al., 2019), analyses of potential moderators (e.g., race, SES) suggested that MST-PSB was not differentially effective with participants from different backgrounds.

The results show that MST-PSB had enduring effects in reducing serious criminal offenses (i.e., felonies) and incarceration among former participants. These results extend those of an earlier follow-up with the current sample in which MST-PSB participants were less likely to be rearrested and imprisoned 8.9 years after treatment (Borduin et al., 2009). The lasting impact of MST-PSB on criminal activity and its consequences for almost a quarter-century is especially important given the urgent need for interventions that can prevent or attenuate serious antisocial behavior in youths, including sexual violence and abuse. Although the childhood behavioral histories of the individuals in the present sample are not known, their arrest records prior to treatment ($M = 4.33$ felonies across treatment conditions) and high rates of recidivism at follow-up (79% in the UCS condition) suggest that these individuals are largely representative of those slow-to-desist (i.e., life-course-persistent) offenders who are of greatest concern to researchers, policymakers, and the broader community (see Lussier, 2017; Moffitt, 2018).

The favorable effects of MST-PSB on criminal outcomes in adulthood are likely due, at least in part, to the capacity of MST-PSB interventions to address empirically identified risk and protective factors for youth antisocial behavior. Regarding risk factors, results of the causal mediation analyses indicated that the positive impact of MST-PSB on rates of nonsexual offending and punitive sentencing (i.e., incarceration and probation) during follow-up were mediated by reductions in youth involvement with deviant peers. These results, in conjunction with those from a previous study of MST-PSB mediators of short-term (i.e., 1-year follow-up) improvements in self-reported antisocial behavior (Henggeler, Letourneau, et al., 2009), suggest that empowering caregivers to discourage their youths' associations with deviant peers is essential to the amelioration of youth criminality in MST-PSB. At the same time, it would appear that caregiver support of youth involvement with prosocial peers is also critical to the success of MST-PSB. Indeed, our results showed that the positive effect of MST-PSB on rates of sexual offending was mediated by increases in youth attachment to prosocial peers. When one considers that youths who engage in sexual offenses often have difficulty maintaining close interpersonal relations and are isolated from prosocial peers (Blaske et al., 1989; Ronis & Borduin, 2007), the explicit focus of MST-PSB on helping caregivers to promote healthier (i.e., positive, age-appropriate, and strength focused) peer relations and activities (e.g., sports, church youth groups, clubs) for their youths would seem to be particularly important in the treatment of sexual offending.

Civil court records revealed that MST-PSB participants had 62% fewer suits related to family instability than did their UCS counterparts. In addition, the positive effect of MST-PSB on participants' civil suits was mediated by increases in both family adaptability

and cohesion. These results are consistent with the emphasis that MST-PSB places on the development of effective parenting strategies as well as on the promotion of warmth and affection between family members (Borduin & Munsch, 2014). Nevertheless, the long-term influence of family interventions in MST-PSB has not been demonstrated previously and is noteworthy because such interventions appear to play a durable role in preventing difficulties in family relations during adulthood (i.e., as indexed by suits related to family instability). Of course, it would be more conclusive to directly measure family relations (and other domains of functioning) among former MST-PSB participants and their children, and we plan to do so in future research. Indeed, considering the present findings as well as a host of investigations documenting the intergenerational transmission of psychosocial risk (see Besemer et al., 2016; Serbin & Karp, 2004; Thornberry, 2005), it seems reasonable to propose that the benefits of MST-PSB may carry over from former participants to their offspring.

Viewed together, the results of this study also have important clinical and policy implications. At a clinical level, there is increasing recognition that serious antisocial behaviors in youths, including both sexual and nonsexual offenses, share a number of common risk factors across multiple levels of the youth's social ecology (McCuish et al., 2015; Seto & Lalumiere, 2010) and that the most effective treatments for youth antisocial behaviors are designed to address those risk factors (Dopp, Borduin, White, & Kuppens, 2017; McCart & Sheidow, 2016). Because MST-PSB was adapted from a well-established treatment approach for nonsexual offending in youths (i.e., standard MST), the present findings augur well for adapting other effective approaches for youth nonsexual offending [e.g., Treatment Foster Care Oregon (Chamberlain, 2003); Functional Family Therapy (Alexander et al., 2000)] to the treatment of youth sexual offending, given the considerable overlap in clinical emphases (i.e., comprehensive interventions across key social systems, ecologically valid service delivery). At a policy level, the reductions in criminality in the MST-PSB condition speak to the fiscal viability of this treatment. In fact, a cost-benefit study (Dopp, Borduin, Willroth, & Sorg, 2017) based on the 8.9-year follow-up in our original clinical trial indicated that reductions in arrests associated with MST-PSB led to economic benefits for both taxpayers and crime victims, with cumulative benefits ranging from \$343,445 to \$450,366 per participant; stated differently, every dollar spent on MST-PSB recovered \$48.81 to \$61.98 in savings to taxpayers and crime victims over the follow-up. The continuing effectiveness of MST-PSB in reducing criminal activity, as demonstrated in the present study, should result in even greater economic savings and create a compelling argument for increased funding of comprehensive family-based treatments for youths with sexual offenses.

It should be noted that the present study has several methodological limitations. First, the felony arrest records that we used to measure criminal offenses during follow-up are likely an underestimate of actual criminal activities because (a) felony offenses are sometimes pleaded down to less serious (i.e., misdemeanor) offenses and (b) many offenses (both felonies and misdemeanors) are not reported and adjudicated (see Loeber & Farrington, 1998). However, felony arrest records are a key index of involvement in crime and likely provided an accurate estimate of the relative effectiveness of the two treatment conditions in our study. Second, while we determined that all of the participants were residing in

Missouri at the time of the present follow-up, we could not confirm that participants had (a) maintained continuous residency in the state for the entire follow-up period or (b) not committed crimes in other states. Nevertheless, it is unlikely that residency length or a number of crimes committed outside of Missouri would vary systematically by treatment condition. Third, the original trial did not assess potential mediating variables at times other than pretest and posttest; thus, it is possible that we missed some important mediational pathways during the course of treatment or follow-up. Finally, given the relatively modest sample size in this study, a few of our findings reached only marginal levels of statistical significance. Even so, in an area of research in which randomized trials are rare, the present study can provide useful information on the enduring benefits of an evidence-based treatment for problem sexual behavior (for a discussion of the statistical justification of knowledge, see Rosnow & Rosenthal, 1989).

In conclusion, the results of this study provide additional support for the effectiveness of MST-PSB with sexually offending youths, whose behaviors pose a high risk of harm yet are often treated with interventions that lack an evidence base. Over a follow-up period that extended into middle adulthood, MST-PSB produced lasting reductions in a broad range of serious criminal offenses and in civil suits related to family instability. In addition, the positive effects of MST-PSB on participants' outcomes during follow-up were mediated by improvements in peer and family relations during treatment. As evidence-based treatments are disseminated more broadly, our findings should be considered by policymakers and service providers in the adoption of interventions for youths with problem sexual behaviors. Moreover, our hope is that the favorable results of this study correspond to more satisfying lives for youths and their families, increases in cost savings for taxpayers, and lower risks of victimization for members of the community.

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