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Mediators of Change for Multisystemic Therapy With Juvenile Sexual Offenders

Scott W. Henggeler, Elizabeth J. Letourneau, and Jason E. Chapman
Medical University of South Carolina

Charles M. Borduin
University of Missouri—Columbia

Paul A. Schewe
University of Illinois—Chicago

Michael R. McCart
Medical University of South Carolina

The mediators of favorable multisystemic therapy (MST) outcomes achieved at 12 months postrecruitment were examined within the context of a randomized effectiveness trial with 127 juvenile sexual offenders and their caregivers. Outcome measures assessed youth delinquency, substance use, externalizing symptoms, and deviant sexual interest/risk behaviors; hypothesized mediators included measures of parenting and peer relations. Data were collected at pretreatment, 6 months postrecruitment, and 12 months postrecruitment. Consistent with the MST theory of change and the small extant literature in this area of research, analyses showed that favorable MST effects on youth antisocial behavior and deviant sexual interest/risk behaviors were mediated by increased caregiver follow-through on discipline practices as well as decreased caregiver disapproval of and concern about the youth's bad friends during the follow-up. These findings have important implications for the community-based treatment of juvenile sexual offenders.

Keywords: multisystemic therapy, adolescent sexual offenders, mediators of change, evidence-based practice

The primary purpose of this study was to examine the mechanisms by which an evidence-based treatment of juvenile offenders decreased the antisocial behavior and deviant sexual interest and sexual risk behaviors of juvenile sexual offenders participating in a randomized effectiveness trial. Pertinent antisocial behaviors included criminal offending, substance use, and externalizing problems. Deviant sexual interest and sexual risk behaviors were also examined in light of their hypothesized association with sexual reoffending (Worling & Langstrom, 2006). Importantly, and consistent with the recommendations of Weersing and Weisz (2002) pertaining to studies testing mediational models, this effectiveness study focused on real-world clients treated in community-based contexts.

Multisystemic therapy (MST; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998) was selected as the evidence-based treatment model examined in this study (Letourneau, Henggeler, et al., 2009) for two main reasons. First, research shows that adolescent sexual offenders have more in common with other delinquents than is generally assumed (Blaske, Borduin, Henggeler, & Mann, 1989; Butler & Seto, 2002; Ronis & Borduin, 2007; van Wijk et al., 2005). Such findings suggest that effective treatments for delinquency hold promise in treating juvenile sexual offenders. With 10 published randomized trials with delinquents and their families (Henggeler, Sheidow, & Lee, 2007), MST has relatively well-established effectiveness with this clinical population (National Institutes of Health, 2006; U.S. Public Health Service, 2001). Although this conclusion has been disputed by Littell, Popa, and Forsythe (2005) in their meta-analysis, the findings of the Littell et al. review have not been replicated in other meta-analyses (Aos, Miller, & Drake, 2006; Curtis, Ronan, & Borduin, 2004), and the methodology of that review has been criticized (Henggeler, Schoenwald, Borduin, & Swenson, 2006; Ogden &

Scott W. Henggeler, Elizabeth J. Letourneau, Jason E. Chapman, and Michael R. McCart, Family Services Research Center, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina; Charles M. Borduin, Department of Psychological Sciences, University of Missouri—Columbia; Paul A. Schewe, Department of Criminology, Law, and Justice, University of Illinois—Chicago.

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Correspondence concerning this article should be addressed to Scott W. Henggeler, Family Services Research Center, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, McClennan Banks Building 4th Floor, 326 Calhoun Street STE MC406, Charleston, South Carolina 29425. E-mail: henggesw@musc.edu

Hagen, 2006). Second, two MST randomized efficacy studies (i.e., graduate students as therapists, an MST treatment developer as supervisor) with juvenile sexual offenders have demonstrated considerable promise (Borduin, Henggeler, Blaske, & Stein, 1990; Borduin, Schaeffer, & Heiblum, 2009). For example, at a 3-year follow-up (Borduin et al., 1990), MST was significantly more effective than individual counseling at preventing sexual reoffending (i.e., 12.5% recidivism for MST vs. 75% for individual counseling). Together, these outcomes with juvenile offenders in general and juvenile sexual offenders in particular led to the funding of an effectiveness trial (i.e., community-based practitioners and supervisors, minimal exclusion criteria) to examine the effectiveness of MST as adapted for juvenile sexual offenders in a real-world clinical setting. The present article is based on this trial.

The favorable outcomes that MST has achieved with juvenile offenders have been thought to support the model's underlying theory of change. A primary assumption in this theory of change is that adolescent antisocial behavior is driven by the interplay of risk factors associated with the multiple systems in which youth are embedded (Bronfenbrenner, 1979). This assumption is based largely on decades of correlational and longitudinal research (e.g., Loeber & Farrington, 1998; U.S. Public Health Service, 2001) showing that adolescent antisocial behavior is linked with key characteristics of the youth (e.g., poor problem solving skills), the family (e.g., low monitoring, ineffective discipline), peer relations (e.g., association with deviant peers), school functioning (e.g., poor academic performance), and neighborhood context. Thus, to be optimally effective, interventions should have the capacity to address a comprehensive array of risk factors (e.g., association with problem peers), though on an individualized basis (i.e., not all youth and families will have the same risk factors), while concomitantly building protective factors (e.g., parenting effectiveness).

Although the individualized nature of MST has likely facilitated its clinical success, such individualization also decreases the probability that hypothesized mediators of favorable outcomes will evidence significant treatment effects in clinical trials—because those mediators will not be targeted in each and every clinical case. Hence, in examining possible mediators of favorable MST outcomes, analyses that focus on measures of those constructs most central to the MST theory of change are most likely to be fruitful. For MST, caregivers have been viewed as the main conduits of change. MST, therefore, focuses on empowering caregivers to gain the resources and skills needed to be more effective (i.e., improved monitoring, supervision, discipline) with their children. Then, as caregiver effectiveness increases, the therapist guides caregiver efforts to prevent antisocial behavior (e.g., by disengaging their children from deviant peers). Although the logic of this perspective seems relatively compelling and the targeted variables fit with key factors that sustain antisocial behavior in adolescents, the MST theory of change with juvenile offenders has not been tested in a formal mediational study.

MST is not alone among evidence-based practices that have few rigorous tests of their underlying theories of change (Kazdin, 2007; Weersing & Weisz, 2002). Nevertheless, at least for evidence-based interventions for youth antisocial behavior, the small extant literature supports the pivotal roles played by caregivers and peers. In a study of multidimensional treatment foster care (MTFC; Chamberlain, 2003), in which juvenile offenders received either MTFC or group home care, Eddy and Chamberlain (2000) showed that the positive effects of MTFC on adolescent criminal activity were mediated by improved caregiver behavior management practices and decreased adolescent association with deviant peers. Similarly, in an indicated prevention trial of the Coping Power program with at-risk preadolescent boys, Lochman and Wells (2002) found that parental inconsistent discipline was a key mediator of subsequent youth antisocial behavior outcomes. These results are consistent with MST findings from two separate clinical trials with juvenile offenders showing that the degree of therapist adherence to the MST protocol was associated with improved family relations and decreased deviant peer affiliation, which, in turn, were associated with decreased delinquent behavior (Huey, Henggeler, Brondino, & Pickrel, 2000). Although these findings are consistent with the MST theory of change, Huey et al. (2000) did not include the types of formal mediational tests (i.e., the control groups in the pertinent studies were not included in the analyses) recommended by reviewers (Kazdin, 2007; Weersing & Weisz, 2002). The present study aims to build on this budding area of research by examining family and peer variables as mediators of positive MST effects with juvenile sexual offenders.

Two methodological and conceptual points are particularly pertinent to the design and conduct of this study. First, as emphasized by reviewers (e.g., Worling & Langstrom, 2006), juvenile sexual offenders have low rates of recidivism. Hence, for the 1-year postrecruitment follow-up examined in the present study, it was not possible to include sexual reoffending as a key outcome variable. Thus, in addition to measures of antisocial behavior in general, deviant sexual interest and sexual risk behaviors were used as outcome indices. These behaviors are well-supported risk factors for adult sexual offender recidivism (e.g., Hanson & Bussière, 1998) and widely hypothesized predictors of juvenile sexual reoffending (Worling & Langstrom, 2006), though the latter association has not been demonstrated empirically (Letourneau & Miner, 2005). Second, as noted throughout the article, we have endeavored to address the multiple requirements for demonstrating mediators and mechanisms of change originally proposed by Hill (1965) and recently summarized by Kazdin (2007). These requirements include the usually expected associations between the treatment, mediators, and outcomes in the context of a randomized clinical trial (Baron & Kenny, 1986); specificity (i.e., only a subset of plausible mediators account for therapeutic change); consistency of results with similar studies; demonstration of a timeline between cause and effect; and the plausibility of the findings.

In sum, this study tested the theory of change of an evidence-based treatment of juvenile offenders within the context of a randomized effectiveness trial conducted with juvenile sexual offenders and their families. Specifically, key aspects of family relations and peer relations were examined as mediators of antisocial behavior outcomes in general and sexual problem outcomes in particular.

Method

Design and Procedures

The present article is based on data collected through a 12-month postrecruitment follow-up of a recently completed randomized trial comparing MST with treatment as usual (TAU) for juvenile sexual offenders (Letourneau, Henggeler, et al., 2009).

The parent study included a randomized design with assessment data collected at pretreatment, 6 months postrecruitment, and 12 months postrecruitment. Research assistants administered the assessment batteries to youth and their caregivers at convenient times in their homes or to youth in out-of-home placement, if necessary. Families were reimbursed for their time for each completed assessment.

Participant Recruitment and Retention

Participants were 127 11- to 18-year-old youth recruited from the Juvenile Justice Bureau of a large Midwestern city after being referred to the state's attorney from January 2004 through May 2006 for sexual offending and their caregivers. Inclusion criteria were (a) adjudication or diversion for a serious sexual offense (e.g., offenses that involved sexual assault or attempted sexual assault) with an order for outpatient sexual offender-specific treatment, (b) presence of a local caregiver with whom the youth resided, (c) youth age from 11 to 17 years, (d) fluency in either English or Spanish, and (e) absence of current psychotic symptoms or serious mental retardation. To enhance external validity, youth with co-occurring psychiatric or behavioral disorders were included. Most instances of study ineligibility were due to the youth having already begun sex offender treatment.

Families were recruited for the study by a researcher who obtained informed consent and assent, with all forms and procedures approved by the institutional review boards of the participating universities. Immediately following recruitment, a sealed envelope was opened, and the family was informed of the condition to which they were assigned. A permeated stratified random assignment process (McEntegart, 2003) was used to avoid chance imbalances on important characteristics (e.g., youth–victim age differences) that can occur with the use of traditional randomization procedures. As described more extensively in the parent study (Letourneau, Henggeler, et al., 2009), the recruitment rate was 74%, but 2 families withdrew from the study upon learning that they were not randomized to their desired intervention—leaving a final sample of 127 families. Of these 127 families, 6 withdrew from the research during the course of the following year for a variety of reasons (e.g., change in guardianship, stigma associated with participation in a sexual offender study). Nevertheless, intent-to-treat analyses were used in all analyses (i.e., no participants were excluded for reasons of treatment dropout, low treatment compliance, etc.).

Intervention Conditions

Participants in both treatment conditions included diverted youth (i.e., treatment requirements but no probation oversight) and youth on probation (i.e., treatment requirements and probation oversight).

Multisystemic therapy. MST is a well-specified (Henggeler et al., 1998), comprehensive, family- and community-based treatment for adolescents presenting serious clinical problems and at imminent risk of out-of-home placement. Clinicians at the master's or advanced bachelor's (social work, psychology) level provide MST by using a home-based model of service delivery in which treatment is delivered in the family's natural ecology (e.g., home, school, community). Drawing upon evidence-based intervention strategies (e.g., cognitive-behavioral therapy, pragmatic family therapy approaches), MST clinicians develop and direct interventions toward ameliorating those individual, family, peer, school, and community factors that are linked directly and or indirectly with the youth's presenting problems, with caregivers viewed as the keys to achieving sustainable outcomes. Therefore, and most pertinent to the present study, the central emphasis of MST is usually to develop caregiver parenting competencies and to concomitantly overcome any barriers (e.g., caregiver skill deficits, substance abuse, lack of social support, stress) to the development of these competencies. Caregivers are then supported and guided in their development and implementation of interventions aimed at addressing youth emotional, behavioral, peer, and school difficulties. MST clinicians usually carry between four and six cases at any one time and are available to youth and families 24 hours a day, 7 days a week. The duration of treatment usually ranges from 4 to 5 months. In the present case, however, the average duration of treatment was 7.1 months, primarily due to the intense community safety concerns presented by this clinical population.

In the present study, standard MST was supplemented with three primary adaptations for treating juvenile sexual offenders as detailed in a supplementary manual (Borduin, Letourneau, Henggeler, Saldana, & Swenson, 2005). First, to attenuate youth and caregiver denial about the offense, therapists were trained to assess and address the primary drivers of an individual's denial (e.g., shame, fear of additional social or legal consequences) and the extent to which denial interfered with treatment goals (e.g., whether, despite denying the extent of the offense, caregivers remained willing to make changes to reduce the likelihood of future offending). Youth denial was considered relatively normative, given that many youth will lie to stay out of trouble. As long as caregivers and youth made relevant behavioral changes, they were retained in treatment despite denial. Second, protocols also addressed safety planning to minimize the youth's access to potential victims. Safety planning was based on the functional analysis of the index offense, in which the behavioral drivers and other factors leading up to the offense were targeted for change. For example, if easy access to younger children (e.g., via frequent unmonitored babysitting or sharing bedrooms) was a driver of the youth's offending behavior, that access would be eliminated. Third, protocols addressed the promotion of age-appropriate and normative social experiences with peers. For example, prosocial after-school and community activities were identified on the basis of youth interests, and caregivers were given strategies to assist youth involvement in such activities.

Treatment as usual (TAU). All youth in the TAU condition were referred to sexual offender-specific treatment provided by the juvenile sexual offender unit of the county juvenile probation department. Standard treatment components of this weekly group-based treatment included (a) decreasing deviant arousal, (b) increasing victim empathy, (c) addressing cognitive distortions, (d) relapse prevention, and (e) family counseling. Based on juvenile sexual offender treatment practice recommendations from nationally recognized organizations (Association for the Treatment of Sexual Abusers, 2001; Center for Sex Offender Management, 1999), the comparison treatment condition is considered an example of best practices. In addition, youth on probation, but not diverted youth, received monthly home and school visits by probation officers. The average duration of treatment and justice

oversight for youth on probation was 14.6 months, and the duration averaged 8.2 months for diverted youth. Moreover, 5 caregivers opted to send their youth to private sexual offender treatment services. These youth were retained in the TAU condition because Illinois has legislated minimum standards for sexual offender treatment providers that are very similar to treatment practices in the juvenile sexual offender unit in the probation department.

Treatment Fidelity of MST

MST has a relatively intensive and comprehensive quality assurance protocol that aims to promote youth and family outcomes through enhanced therapist adherence to MST treatment principles. This protocol includes a 5-day orientation training, quarterly booster training, weekly face-to-face supervision from an MST supervisor, weekly telephone consultation with an MST expert, and ongoing fidelity monitoring from several sources (e.g., caregiver ratings, supervisor reports, consultant reports). As reviewed by Schoenwald (2008), this quality assurance system is well specified, and several studies have demonstrated significant associations between therapist adherence to the MST protocols and short- and long-term youth outcomes. For the present purposes, the MST Therapist Adherence Measure (Henggeler & Borduin, 1992) was completed monthly by caregivers in the MST condition to assess treatment adherence. Although mean scores were below those of MST therapists in a recently completed clinical trial (Henggeler, Halliday-Boykins, et al., 2006) and a 45-site transportability study (Schoenwald, Sheidow, Letourneau, & Liao, 2003), scores were well above those of therapists who were not delivering MST in that clinical trial (Henggeler, Halliday-Boykins, et al., 2006).

Outcome Measures

The key outcome measures examined in the present study were those that had demonstrated significant treatment effects in the parent study (Letourneau, Henggeler, et al., 2009).

Antisocial behavior. Adolescent antisocial behavior (i.e., externalizing behaviors, delinquency, and substance use) was tapped with three well-validated instruments. First, the Externalizing *T* scores of the Youth Self Report (YSR) of the Child Behavior Checklist (Achenbach, 1995) were used to assess youth externalizing behaviors. The Child Behavior Checklist measures are considered among the best for assessing youth mental health functioning (e.g., Hudziak, Copeland, Stanger, & Wadsworth, 2004). Second, the 40-item Self-Report Delinquency Scale (SRD; Elliott, Ageton, Huizinga, Knowles, & Canter, 1983) is one of the best validated of the self-report delinquency scales (Thornberry & Krohn, 2000). The General Delinquency subscale was used to assess criminal activity during the previous 3 months. Third, substance use was assessed with two items from the Personal Experience Inventory (PEI; Winters & Henly, 1989) that tap the frequency of self-reported alcohol and marijuana use for the previous 3 months.

Sexual deviance and risk taking. Youth sexual deviance and risk taking were assessed with the youth-report and parent-report versions of the Adolescent Sexual Behavior Inventory (ASBI; Friedrich, Lysne, Sim, & Shamos, 2004), a 45-item instrument that measures inappropriate or concerning sexual behaviors. The ASBI was based on the Child Sexual Behavior Inventory (CSBI; Friedrich, 1997), the only measure of child sexual behavior that has been normed, validated, and published (Friedrich, Olafson, & Connelly, 2004). The ASBI extends the CSBI by assessing sexual risk taking and other sexual behaviors in older youth (i.e., 12 to 18 years) at risk for sexual aggression or other harmful or sexual risk-taking behaviors (Friedrich, Lysne, et al., 2004). In particular, the ASBI is used in clinical settings (e.g., Kolko, Noel, Thomas, & Torres, 2004) and in federally funded research (e.g., National Institute of Mental Health Study 057727, D. Kolko, primary investigator) for the assessment of juveniles who sexually offend. An initial principal components factor analysis indicated five scales for both the parent- and youth-report versions, accounting for 47% and 38% of the total variance for parent and youth reports, respectively (Friedrich, Lysne, et al., 2004). For purposes of the present study, two of five subscales were examined: Deviant Sexual Interests and Sexual Risk/Misuse (Risk). The three other scales (i.e., Concerns About Appearance, Fear, and Sexual Knowledge and Interest) were not viewed as key indices of treatment outcome. The youth and caregiver reports on the Deviant Sexual Interests scales include nine and five items, respectively (e.g., "has been accused of sexually abusing another person" and "peeps into windows or tries to see others in the bathroom"). The youth and caregiver reports on the Sexual Risk/Misuse scales include 8 and 10 items, respectively (e.g., "pushes others into having sex" and "gets used sexually by others"). In the original validation study, internal consistencies for these scales were .81 and .79 (caregiver report) and .77 and .65 (youth report), respectively. The extent to which these two scales measure distinct constructs is unclear. For example, in a more recent factor analysis, items from these scales loaded together (Wherry, Berres, Sim, & Friedrich, in press). Consequently, and for reasons of parsimony, the Deviant Sexual Interests and Sexual Risk/Misuse scales were combined into a single sexual behavior problem composite score for the present study. Mean internal consistencies for the composite scales across the three time points were .73 for caregiver reports and .57 for youth reports.

Measures of Hypothesized Mediators of Treatment Effects

As discussed previously, an extensive body of correlational and longitudinal research and a small body of research on the mediators of favorable outcomes of evidence-based treatments of antisocial behavior in adolescents suggest that key mediating constructs pertain to caregiver parenting practices and youth association with deviant peers.

Parenting. Scales from the Pittsburgh Youth Study (PYS; Loeber, Stouthamer-Loeber, Van Kammen, & Farrington, 1991) were used to evaluate youth and caregiver reports of parenting constructs separately for each informant. These scales included Lax Discipline (seven items for both caregiver and youth scales), Caregiver Supervision (five items for caregiver scale and four items for youth scale), and Communication (four items for caregiver scale and five items for youth scale). The Lax Discipline items (e.g., "Do you let your child get away with things?") come from the PYS Discipline Scale and assess caregiver follow-through on discipline practices. The supervision items (e.g., "If you or another adult are not at home, does your child leave a note or call you to let you know where she/he is?") come from the PYS Supervision/Involvement Scale and assess caregiver monitoring of the youth's whereabouts. The Communication items (e.g., "In the

past 90 days, about how often have you discussed with your child his/her plans for the next day?") come from the PYS Revised Parent–Adolescent Communication Form. Communication items tap caregiver–youth discussion about daily activities. The items that comprise these parenting scales are rated using a Likert response format. Higher values indicate better outcomes for the Communication and Caregiver Supervision scales and poorer outcomes for the Lax Discipline scale. These scales are well validated with established reliability and construct validity (e.g., Loeber et al., 2001; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998). In the current sample, the internal consistencies (Cronbach's alpha) for the parenting scales (youth and caregiver report) ranged from .64 to .84 across the three times of assessment.

Peer relations. Caregiver disapproval of the youth's friends and youth association with deviant versus conventional peers were assessed with three validated scales from the PYS (Loeber et al., 1991; Pardini, Loeber, & Stouthamer-Loeber, 2005). These scales assessed Bad Friends (combining four items from youth reports with four items from caregiver reports), Peer Delinquency (11 items, youth report), and Peer Conventional Activities (eight items, youth report). The Bad Friends items (e.g., "Were there any children among your group of friends of which your caregiver disapproved?") come from the PYS Parents and Peers Scale. The Bad Friends items are rated by both youth and caregivers using a yes–no response format and are summed to yield a total score, with higher scores reflecting greater caregiver disapproval of and concern about the negative influence of the youth's friends. The Peer Delinquency items (e.g., "During the past 90 days, how many of your friends have stolen something worth more than $5 but less than $100?") come from the PYS Peer Delinquency Scale. These items are rated on a Likert scale with higher scores reflecting more frequent peer engagement in delinquent behaviors. The Peer Conventional Activities items (e.g., "During the past 90 days, how many of your friends have been involved in school athletics?") were based on the PYS Conventional Activities of Peers Scale. The items that comprise this scale are rated using a Likert response format with higher scores reflecting greater involvement in prosocial activities among the youth's friends. In the current sample, the internal consistencies (Cronbach's alpha) for the peer relations scales ranged from .67 to .89 across the three times of assessment.

Analytic Strategy

Data structure. The data are composed of three repeated measurements (Level 1) nested within 127 youth/caregivers (Level 2), yielding a two-level mixed-effects regression model (MRM). The outcome and mediator processes (i.e., slopes) were modeled according to a linear polynomial term with values of 0, 1, and 2 corresponding to the three evenly spaced measurement occasions, and treatment condition was coded such that $MST = 0$ and $TAU = 1$.

Variable distributions and model covariates. Because of a preponderance of 0 responses, scores on the SRD, PEI, and ASBI composite youth- and caregiver-report scales were dichotomized to reflect any report of delinquent behavior, substance use, or sexual behavior problems. Due to positively skewed distributions, scores on caregiver reports of the PYS Supervision and Communication scales were dichotomized to reflect low versus high levels of caregiver-reported supervision or communication. The remaining outcomes and mediators were modeled as continuous variables.

Statistical models. MRMs were performed using hierarchical linear modeling (HLM) software (Version 6.04; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) with restricted maximum likelihood estimation (continuous dependent variables) or penalized quasi-likelihood estimation using a Bernoulli distribution and logit link function (dichotomous dependent variables). Robust *SE*s were used to compute the Wald (i.e., *T* ratio) test statistic for the fixed effects (Maas & Hox, 2005), and population-average results were interpreted for dichotomous outcomes (Raudenbush & Bryk, 2002). A random effect was always modeled for initial status, and a random effect was modeled for slope when it improved fit according to the likelihood ratio test (continuous dependent variables) or when the Wald test for the slope variance component was significant (dichotomous dependent variables). To yield interpretable model intercepts, the linear polynomial term and treatment condition indicator were entered uncentered, and continuous covariates (described subsequently) were centered around their grand mean according to the method described by Raudenbush and Bryk (2002). Of note, this centering strategy affects only the interpretation of the model intercept, with the intercept value corresponding to the predicted baseline score for the youth in the MST condition who have an average score on the continuous covariate(s).

Tests of mediation. The product of coefficients test (i.e., A Path × B Path) with asymmetric confidence limits was used to test for mediation (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Asymmetric confidence limits and critical values for the product of coefficients were computed using the PRODCLIN program (MacKinnon, Fritz, Williams, & Lockwood, 2007; MacKinnon, Lockwood, & Williams, 2004).

The longitudinal nature of the outcome and putative mediator variables has important implications for the statistical method used to test for mediation. Specifically, the A Path addresses the question "Does treatment affect the mediator process?" and the B Path addresses the question "Does the mediator process affect the outcome process?" Analytically, the present data conform to the parallel process latent growth curve modeling approach described by Cheong, MacKinnon, and Khoo (2003). However, for several reasons, the methodology of Cheong et al. was adapted to the case of MRMs. Specifically, because the present investigation aims to identify mechanisms by which the treatment effects reported in the parent study (Letourneau, Henggeler, et al., 2009) operate, it was important to employ a consistent analytic methodology, to utilize the findings of the parent study in the tests of mediation (i.e., the C Path results), and to facilitate direct comparison and interpretation of the present findings with those of the parent study. Of note, this adaptation provides a relatively direct replication of the equations provided by Cheong et al. (p. 246). A key difference, however, and a limitation of this adaptation, is that it implicitly assumes that the mediator process for each youth was modeled without error.

Because conventional MRM software does not simultaneously model two change processes, the A and B Path models were estimated separately. The A Path model was specified according to

$$\text{Level 1: } M_{ti} = \pi_{0i} + \pi_{1i}(\text{LINEAR}) + e_{ti} \quad (1)$$

$$\text{Level 2: } \pi_{0i} = \beta_{00} + \beta_{01}(\text{TAU}) + \beta_{02}(\text{INTY}_i - \overline{\text{INTY}_\cdot}) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{TAU}) + \beta_{12}(\text{INTY}_i - \overline{\text{INTY}_.}) + r_{1i},$$

where LINEAR is the measurement occasion, TAU is treatment condition, INTY_i is each participant's initial status on the outcome process (centered around the grand mean initial status), and β_{11} provides the A Path coefficient and *SE*.

Because the B Path represents the effect of the mediator slope on the outcome slope, a separate step was required to extend the Cheong et al. (2003) method to the MRM case, which we did by generating a participant-specific mediator slope to be used as a predictor of the outcome process. The HLM Level 2 residual file for each mediator process provided the empirical Bayes estimate (EBE) of each participant's initial status and rate of change on the mediator (Raudenbush & Bryk, 2002). EBEs provide accurate estimates and are robust to violations of random effects distribution assumptions in designs similar to that of the present study (Candel & Winkens, 2003). The B Path model was specified according to

$$\text{Level 1: } Y_{ti} = \pi_{0i} + \pi_{1i}(\text{LINEAR}) + e_{ti} \quad (2)$$

$$\text{Level 2: } \pi_{0i} = \beta_{00} + \beta_{01}(\text{TAU}) + \beta_{02}(\text{INTM}_i - \overline{\text{INTM}_.}) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{TAU}) + \beta_{12}(\text{INTM}_i - \overline{\text{INTM}_.}) + \beta_{13}(\text{SLOPEM}_i - \overline{\text{SLOPEM}_.}) + r_{1i},$$

where INTM_i is each participant's initial status on the mediator process (centered around the grand mean initial status). SLOPEM is each participant's slope on the mediator process (centered around the grand mean slope). β_{13} provides the B Path coefficient and *SE*. Product of coefficients tests were conducted using the A and B Path coefficients and *SE*s obtained in these models, with statistical significance of the mediated effect indicated by confidence limits that do not cross 0.

Results

Characteristics of Treatment Groups at Intake

The mean age of the adolescent sexual offenders was 14.6 years (*SD* = 1.7 years) at pretreatment, and only 3 (2.4%) of the youth were girls. Reflecting the makeup of the collaborating county, 54% of youth were Black, 44% were White, and of these, 31% indicated Hispanic ethnicity. The index sexual offenses (i.e., those offenses that made the youth eligible for this study) included aggravated criminal sexual assault (31%), criminal sexual abuse (24%), criminal sexual assault (18%), aggravated criminal sexual abuse (15%), sexual offenses that were pled (i.e., officially reduced) to nonsexual offenses (7%), and other sexual offenses (5%). In addition, 35% of the youth had a history of arrest for other nonsexual offenses (i.e., not pled from sexual offenses). Regarding primary caregivers, 64% were mothers, 19% were other female relatives, 15% were fathers, 2% were foster parents, and 1% was an "other" male relative. Seventy-two percent of the youth lived with two adult caregivers, and 28% lived with one adult caregiver. Overall, family socioeconomic status was relatively low: 41% of caregivers had not completed high school, 27% had graduated from high school, and 32% had completed 1 or more years of college. Likewise, 33% of families earned less than $10,000 per year, 38% earned $10,000 to $30,000 per year, and 29% earned $30,000 or more.

We used independent samples *t* tests and chi-square analyses to examine baseline differences between treatment conditions on the index offense, presence of nonsexual (prior) offenses, and demographic variables. In no case did a statistically significant between-groups difference emerge, supporting the randomization process.

Summary of Treatment Effects for the Outcome Variables and Putative Mediators

Tests of mediation were conducted for the significant outcomes (i.e., antisocial behavior, sexual behavior problems) reported in the parent study (Letourneau, Henggeler, et al., 2009) and for the putative mediators consistent with extant research (i.e., parenting practices, delinquent peer association). Youth age, race, and prior offense history were included as covariates for each of these models. Descriptive statistics for each of the outcome variables and putative mediators by treatment condition and assessment occasion are presented in Table 1.

Outcome variables (C Path). Youth and parents in the MST condition reported significantly greater reductions from pretreatment to 12 months postrecruitment on externalizing symptoms (YSR), $\beta_{11} = 2.49$, $SE = 1.08$, $T(333) = 2.31$, $p < .05$, 95% $\text{CI}_{\beta 11} = 0.37$ to 4.61; delinquency (SRD), $\beta_{11} = 0.92$, $SE = 0.27$, $T(358) = 3.38$, $p < .01$, 95% $\text{CI}_{\beta 11} = 0.40$ to 1.44; substance use (PEI), $\beta_{11} = 1.20$, $SE = 0.29$, $T(358) = 4.19$, $p < .001$, 95% $\text{CI}_{\beta 11} = 0.63$ to 1.77; youth-reported sexual deviance and risk taking (ASBI), $\beta_{11} = 0.70$, $SE = 0.25$, $T(367) = 2.76$, $p < .01$, 95% $\text{CI}_{\beta 11} = 0.21$ to 1.19; and caregiver-reported sexual deviance and risk taking (ASBI), $\beta_{11} = 0.67$, $SE = 0.24$, $T(367) = 2.82$, $p < .01$, 95% $\text{CI}_{\beta 11} = 0.20$ to 1.14 scores, relative to their TAU counterparts.

Does treatment affect the mediator process (A Path)? To answer this question, we conducted a series of analyses to evaluate the treatment effect on the nine putative mediator variables, with the effect of the initial status of each of the five outcome variables held constant. The results from these models revealed significant treatment effects for two of the mediator variables (i.e., Bad Friends scale and Lax Discipline—youth report scale). For the Bad Friends scale, scores for the MST condition decreased significantly over time (βs ranged from -0.86 to -0.91, Ts > -4.70, ps $< .001$, $\text{CI}_{\beta s} = -1.28$ to -0.51), and, relative to the MST condition, scores for the TAU condition decreased significantly less over time (βs ranged from 0.57 to 0.69, Ts > 2.16, ps $< .05$, $\text{CI}_{\beta s} = 0.06$ to 1.29) when the effect of the initial status of each of the five outcome variables was held constant. Of note, the coefficient for the TAU condition represents a deviation from the slope for the MST condition. Given an MST slope of -0.86 and a TAU coefficient of 0.57, the TAU slope is computed as -0.29 (i.e., $-0.86 + 0.57$), and this difference is significant as indicated above. For the Lax Discipline—youth report scale, scores for the MST condition decreased significantly over time (βs ranged from -0.12 to -0.14, Ts > -4.31, ps $< .001$, $\text{CI}_{\beta s} = -0.20$ to -0.05), and, relative to the MST condition, scores for the TAU condition decreased significantly less over time (βs ranged from 0.05 to 0.14, Ts > 2.20, ps $< .05$, $\text{CI}_{\beta s} = 0.01$ to 0.21) when the effect of the initial status of each of the outcome variables, except the YSR, was held

Table 1
Pretreatment (T1), 6-Month (T2), and 12-Month (T3) Scores for Dichotomous (Percentage Responding Positive) and Continuous (Mean and Standard Deviation) Outcome and Mediator Variables

Instrument	Multisystemic therapy			Treatment as usual		
	T1 (n = 67)	T2 (n = 65)	T3 (n = 64)	T1 (n = 60)	T2 (n = 58)	T3 (n = 52)
Antisocial behavior						
YSR Externalizing T score[a], M (SD)	47.5 (12.8)	41.9 (11.1)	40.8 (10.0)	47.1 (9.7)	48.2 (10.3)	44.9 (9.7)
CBCL Externalizing T score[a], M (SD)	52.5 (13.2)	47.1 (12.9)	45.4 (12.7)	54.9 (11.4)	53.4 (11.3)	48.5 (10.3)
SRD Delinquent Behavior	74.6%	41.5%	29.7%	51.7%	53.4%	42.3%
PEI Substance Use Index	35.8%	24.6%	17.2%	23.3%	32.8%	38.5%
Sexual deviance and risk taking						
ASBI composite—youth report	62.7%	50.8%	37.3%	56.7%	63.3%	61.7%
ASBI composite—caregiver report	79.1%	50.8%	40.3%	71.7%	60.0%	61.7%
Parenting						
PYS Lax Discipline—youth report, M (SD)	1.5 (0.36)	1.4 (0.34)	1.3 (0.31)	1.6 (0.35)	1.5 (0.46)	1.5 (0.51)
PYS Lax Discipline—caregiver report, M (SD)	1.5 (0.36)	1.5 (0.34)	1.4 (0.30)	1.6 (0.33)	1.5 (0.39)	1.4 (0.36)
PYS Supervision—youth report, M (SD)	2.6 (0.49)	2.7 (0.48)	2.7 (0.49)	2.6 (0.50)	2.4 (0.55)	2.6 (0.47)
PYS Supervision—caregiver report	58.2%	64.1%	64.5%	48.3%	54.4%	57.7%
PYS Communication—youth report, M (SD)	2.4 (0.51)	2.5 (0.53)	2.5 (0.48)	2.3 (0.59)	2.3 (0.60)	2.4 (0.46)
PYS Communication—caregiver report	49.3%	57.8%	46.8%	56.7%	45.6%	40.4%
Peer relations						
PYS Bad Friends, M (SD)	4.1 (2.6)	2.9 (2.8)	2.2 (2.7)	3.2 (2.7)	2.9 (2.7)	2.7 (2.5)
PYS Peer Delinquency, M (SD)	4.3 (5.8)	3.4 (6.0)	2.5 (5.2)	4.1 (4.5)	2.9 (3.9)	3.2 (4.7)
PYS Peer Conventional Activities, M (SD)	23.4 (6.5)	25.0 (7.4)	25.6 (7.5)	23.4 (6.0)	24.5 (6.4)	24.7 (7.7)

Note. YSR = Youth Self-Report; CBCL = Child Behavior Checklist; SRD = Self-Report Delinquency Scale; PEI = Personal Experiences Inventory; ASBI = Adolescent Sexual Behavior Inventory; PYS = Pittsburgh Youth Survey.
[a] Total sample sizes were reduced by 5 at T2 and by 15 at T3 due to administration of an alternate measure to youth aged 18 years and older.

constant. Significant treatment effects were not detected on the other variables ($ps > .05$); thus, they were eliminated from consideration as potential mediators in the present investigation.

Does the mediator process affect the outcome process (B Path)? Next, analyses were conducted to explore the effect of the Bad Friends and Lax Discipline—youth report putative mediator slopes on the outcome slopes. Results (see Table 2) revealed significant mediator slope effects of Bad Friends on the SRD, PEI, and ASBI composite youth-report scales. These models indicated that the rate of change on the Bad Friends scale was significantly associated with improvement on these three outcome scales from pretreatment to 12 months postrecruitment (SRD, 95% $CI_{\beta 13}$ = 1.44 to 11.04; PEI, 95% $CI_{\beta 13}$ = 1.54 to 10.97; ASBI composite youth report, 95% $CI_{\beta 13}$ = 1.14 to 11.34). For the Lax Discipline—youth report scale, results (see Table 2) showed significant mediator slope effects on the YSR Externalizing, SRD, and both ASBI composite scales. These models indicated that the rate of change on the Lax Discipline scale was significantly associated with improvement on these four outcome scales from pretreatment to 12 months postrecruitment (YSR Externalizing, 95% $CI_{\beta 13}$ = 19.32 to 39.16; SRD, 95% $CI_{\beta 13}$ = 2.28 to 7.46; ASBI composite youth report, 95% $CI_{\beta 13}$ = 1.36 to 6.92; ASBI composite caregiver report, 95% $CI_{\beta 13}$ = 0.04 to 5.80).

Testing Bad Friends and Lax Discipline as Mediators of MST Effects on Outcomes

As described by Cheong et al. (2003), mediation is implied when there is a significant treatment effect on the mediator process (A Path) combined with a significant effect of the mediator process on the outcome process (B Path). The models tested above that were characterized by this pattern of results are summarized in Table 3. For these models, the product of coefficients test was used to determine the point estimate of the mediated effect and the corresponding 95% asymmetric CIs according to the data analytic procedures described previously. A mediated effect is considered statistically significant when the CI does not include zero (MacKinnon et al., 2007). As shown in Table 3, none of the lower and upper confidence limits based on the distribution of the products contained zero. This indicates that Bad Friends and/or Lax Discipline significantly mediated the MST outcomes for the SRD, PEI, and ASBI composite scales.

Discussion

The purpose of this study was to examine the mechanisms by which MST decreased the antisocial behavior and deviant sexual interest/risk behaviors of juvenile sexual offenders participating in a randomized effectiveness trial. Outcome analyses showed MST treatment effects on youth delinquency, substance use, externalizing symptoms, and deviant sexual interest/risk behaviors. Several potential parenting and peer-related mediators were examined, and two revealed significant MST treatment effects. Caregivers in the MST condition evidenced significantly decreased concerns about the youths' association with bad friends throughout the 12-month follow-up relative to their TAU counterparts, based on youth and caregiver reports. Also, on the basis of youth reports, caregivers in the MST condition evidenced significantly increased disciplinary follow-through on youth misbehavior (i.e., decreased lax discipline) during the follow-up compared to caregivers in the TAU condition. Bad friends and lax discipline were examined as possible mediators of MST effects on youth antisocial behavior and

Table 2
Mixed-Effect Regression Models Evaluating the PYS Bad Friends and Lax Discipline—Youth Report Scales as Mediators of Treatment Outcome

	Does the Bad Friends mediator process affect the outcome process? (B Path)			Does the Lax Discipline mediator process affect the outcome process? (B Path)		
Parameter	*B*	*SE*	*df*	*B*	*SE*	*df*
YSR Externalizing						
Intercept (π_{0i})	45.17***	1.71	119	45.96***	1.68	119
Initial status (β_{01})[a]	2.49**	0.86	119	20.44***	4.67	119
Condition (β_{02})	3.63	2.05	119	−0.08	1.88	119
Linear (π_{1i})	1.44	3.10	121	−2.09*	0.85	121
Initial status (β_{11})[a]	−0.40	0.59	121	−1.04	2.69	121
Condition (β_{12})	−7.25	6.45	121	0.08	1.14	121
Mediator slope (β_{13})	14.30	9.52	121	29.24***	5.06	121
SRD						
Intercept (π_{0i})	0.37	0.28	119	0.44	0.28	119
Initial status (β_{01})[a]	0.18	0.15	119	1.06	1.02	119
Condition (β_{02})	−0.71*	0.36	119	−0.88**	0.33	119
Linear (π_{1i})	0.62	0.80	351	−0.92***	0.17	121
Initial status (β_{11})[a]	−0.06	0.15	351	0.53	0.75	121
Condition (β_{12})	−2.94	1.67	351	0.51	0.26	121
Mediator slope (β_{13})	6.24*	2.46	351	4.87**	1.32	121
PEI						
Intercept (π_{0i})	−1.50*	0.40	119	−1.47***	0.35	119
Initial status (β_{01})[a]	0.14	0.22	119	−1.98	1.02	119
Condition (β_{02})	−0.40	0.41	119	−0.37	0.38	119
Linear (π_{1i})	0.95	0.81	351	−0.66**	0.22	351
Initial status (β_{11})[a]	−0.01	0.13	351	2.10**	0.70	351
Condition (β_{12})	−2.55	1.65	351	0.81*	0.32	351
Mediator slope (β_{13})	6.24*	2.39	351	3.87	2.14	351
ASBI composite—youth report						
Intercept (π_{0i})	−0.07	0.32	119	0.10	0.29	119
Initial status (β_{01})[a]	0.33	0.17	119	0.98	0.94	119
Condition (β_{02})	0.22	0.41	119	−0.14	0.36	119
Linear (π_{1i})	1.20	0.84	365	−0.46*	0.18	365
Initial status (β_{11})[a]	−0.22	0.15	365	1.00	0.74	365
Condition (β_{12})	−3.29	1.73	365	0.39	0.28	365
Mediator slope (β_{13})	6.24*	2.59	365	4.14**	1.42	365
ASBI composite—caregiver report						
Intercept (π_{0i})	0.57*	0.27	119	0.53	0.27	119
Initial status (β_{01})[a]	0.21	0.16	119	0.11	0.86	119
Condition (β_{02})	−0.17	0.39	119	−0.32	0.34	119
Linear (π_{1i})	0.17	0.76	365	−0.78***	0.16	121
Initial status (β_{11})[a]	−0.03	0.14	365	0.60	0.55	121
Condition (β_{12})	−1.70	1.63	365	0.41	0.25	121
Mediator slope (β_{13})	3.85	2.40	365	2.94*	1.48	121

Note. The *T* ratio test statistic for each effect (omitted) was computed as β/SE. Condition was coded as 0 = *multisystemic therapy*, 1 = *treatment as usual*. Youth age, race, and history of prior offenses were included as covariates in each model. YSR = Youth Self-Report; SRD = Self-Report Delinquency Scale; PEI = Personal Experiences Inventory; ASBI = Adolescent Sexual Behavior Inventory; PYS = Pittsburgh Youth Survey.
[a] Initial status represents the intercept value for the mediator variable.
* $p < .05$. ** $p < .01$. *** $p < .001$.

deviant sexual interest/risk behaviors. The corresponding results were relatively consistent, with six mediational analyses showing significant effects. Bad friends mediated MST effects on offender delinquency, substance use, and deviant sexual interest/risk behaviors—youth reports. Lax discipline mediated MST effects on delinquency and both youth and caregiver reports of deviant sexual interest/risk behaviors.

Together, the findings suggest that MST empowered caregivers to better identify friends who were having a negative influence on their adolescents, advise them to stop associating with such friends, and follow through on planned discipline. These behaviors, in turn, led to decreased antisocial behavior and deviant sexual interest/risk behaviors on the part of the adolescent sexual offenders. Assuming that this conceptualization of the mediational processes is at least partially correct, these findings support a central emphasis of MST—the empowerment of caregivers to provide more consistent discipline to their delinquent youth and to attempt to extract these youth from their deviant peers. Before interpreting the present findings further, it is valuable to review the methodology and findings of the present study in consideration of

Table 3
Product of Coefficients Tests for Mediated Effects

Mediator–outcome pairing	A Path coefficients		B Path coefficients				
	α	*SE*	β	*SE*	α × β	*SE*	95% CI
PYS Bad Friends							
SRD	.68	.32	6.24	2.46	4.23	2.59	0.26, 10.19
PEI	.65	.28	6.24	2.39	4.04	2.32	0.43, 9.36
ASBI composite—youth report	.60	.26	6.24	2.59	3.73	2.22	0.31, 8.86
PYS Lax Discipline							
SRD	.14	.04	4.87	1.32	0.67	0.28	0.20, 1.28
ASBI composite—youth report	.09	.04	4.14	1.42	0.38	0.22	0.04, 0.88
ASBI composite—caregiver report	.10	.04	2.94	1.48	0.31	0.20	0.01, 0.76

Note. CI = confidence interval; PYS = Pittsburgh Youth Survey; SRD = Self-Report Delinquency Scale; PEI = Personal Experiences Inventory; ASBI = Adolescent Sexual Behavior Inventory.

the criteria for demonstrating mediators of change described by Kazdin (2007). First and most obvious, significant associations must be demonstrated between the therapeutic intervention, the hypothesized mediators, and the outcome measures. These associations are discussed extensively in the *Results* section.

Second, a demonstration of specificity is useful, where therapeutic change is accounted for by a limited number of constructs rather than by many plausible constructs. Several parenting- and peer-related measures were not identified as mediators in the present study, including caregiver Communication and Supervision and the Peer Delinquency and Peer Conventional Activities scales. A close, post hoc review of the items that comprise these scales might help to explain the specificity observed for this study. For example, the Communication scale assesses caregiver–youth discussion about the activities of the day and those planned for the next day—with no emphasis on the appropriateness of the activities or attempt to change them. Similarly, the Peer Delinquency scale assesses the extent of delinquent behavior among the youth's friends during the past 90 days—with no indication of the degree to which the youth was associating with these friends. In contrast, the Lax Discipline and Bad Friends scales identified as mediators in the present study tapped caregiver attempts to influence peer association and discipline problem youth behavior. Thus, these latter scales might better reflect the clinical emphases of MST.

Third, Kazdin (2007) noted that the consistency of replication of results across studies, samples, and conditions contributes to inferences about mediators. In this regard, the results of the present study are consistent with the aforementioned findings for MTFC (Eddy & Chamberlain, 2000) that caregiver (i.e., foster parent) behavior management practices and juvenile offenders' association with deviant peers were key mediators of subsequent criminal activity. Likewise, the present results are consistent with the aforementioned findings of Lochman and Wells (2002) regarding the mediational role of inconsistent parent discipline for the Coping Power program. Finally, though this was not a formal mediational study, the results are consistent with those of Huey et al. (2000) across two MST randomized trials with juvenile offenders. Together, these studies suggest that changes in caregiver discipline practices and youth association with deviant peers are critical factors in the attenuation of antisocial behavior in adolescents.

Fourth, the timeline of the causal relationship must be established. The temporal relation between change in the Bad Friends and Lax Discipline mediators and change in the outcomes was difficult to discern due to the limited number of assessment occasions in the current study. As noted by Kazdin (2007), multiple, repeated assessments of the mediators and outcomes over the course of treatment are needed to effectively evaluate time sequence (i.e., whether change in the mediator precedes change in the outcome or whether change in the outcome precedes change in the mediator). Although more frequent measurements of the mediator and outcome, particularly during the course of treatment, would permit greater flexibility in modeling the two change processes (e.g., through the application of discontinuous change models), the data analysis strategy used here represents a notable improvement over previous studies that have exclusively focused on cross-sectional associations between mediator and outcome constructs. Nevertheless, in light of the well-established bidirectionality of family relations, perhaps decreased youth behavior problems led to decreased caregiver disapproval of the youth's bad friends and made it easier for caregivers to follow through on disciplinary practices (i.e., decreased lax discipline). The correlational nature of the data do not preclude this interpretation, in contrast with our preferred view that improved parenting led to decreased behavior problems.

Kazdin's (2007) fifth recommendation for demonstrating mediation is to show a gradient whereby greater activation of the proposed mediator is associated with greater change in an outcome. The current approach is consistent with this recommendation, as it involved a direct test of the relation between the magnitude of change on the mediator (defined here as each youth's slope on the mediator) and growth or change on a given outcome over time.

Finally, the plausibility and coherence of how a mechanism operates and fits with findings from the broader research literature contributes to inferences regarding the mediator. The important roles that caregiver discipline and youth association with deviant peers play in the development and maintenance of antisocial behavior have been supported consistently by an extensive correlational and longitudinal literature (Loeber & Farrington, 1998; U.S. Public Health Service, 2001). The present results fit well with that literature and most closely replicate the findings of Eddy and Chamberlain (2000).

Clinical Implications

In light of the small extant literature noted previously and the degree to which the findings meet Kazdin's (2007) criteria for demonstrating mediators of clinical change, the present findings have important clinical implications for MST and other interventions aimed at reducing antisocial behavior in adolescents. First, the findings that lax discipline and bad friends mediated both youth antisocial behavior and deviant sexual interest/risk behaviors supports the contention that the determinants of general antisocial behavior in adolescents have much in common with the determinants of adolescent sexual behavior problems (Butler & Seto, 2002; Letourneau, Borduin, & Schaeffer, 2009; van Wijk et al., 2005). This suggests, for example, that treatments that are effective for delinquency also hold promise in treating adolescent sexual offending. Second, these results, in conjunction with those of Huey et al. (2000), suggest that reducing deviant peer affiliation is critical to the success of MST. As discussed in the MST treatment protocols (e.g., Henggeler et al., 1998), several clinical emphases are assumed important to achieving the aim of reduced association with deviant peers. These include caregiver sanctions for continued association with deviant peers, caregiver support of youth involvement with more prosocial peers, caregiver support of youth participation in prosocial peer activities that have adult supervision (e.g., sports, church youth groups, clubs), and the development of increased social and academic competence in school. Third, consistent with the extensive body of research synthesized by Dodge, Dishion, and Lansford (2006), the findings suggest that group-based interventions that increase youth association with deviant peers while ignoring caregiver discipline strategies might be less effective than family-based approaches such as MST. We should caution, however, that some reviewers (e.g., Waldron & Turner, 2008) have concluded that well-specified cognitive–behavioral approaches delivered in group settings can attenuate adolescent antisocial behavior.

Future Research

Assuming the veracity of the present findings, the most important goal of future research should be to determine the specific components of treatment (e.g., in-session behaviors, protocols) that lead to improved caregiver discipline and disengagement of youth from deviant peers. The MST model assumes that an essential precursor to caregiver empowerment and improved discipline is the effective identification and amelioration of barriers to parenting effectiveness (e.g., caregiver substance abuse, untreated mental health problems, high stress, despair). The hypothesized determinants of these barriers are identified and addressed by the therapist before treatment moves on to provide the resources (e.g., parenting knowledge, parenting skills, indigenous social support to sustain those skills) needed to address the youth's serious antisocial behavior. Although the empirical analysis of such complex clinical processes is daunting, progress has been made by researchers of other evidence-based treatments of antisocial behavior in children (e.g., Patterson & Chamberlain, 1994) and adolescents (e.g., Robbins, Alexander, & Turner, 2000) in examining in-session links between therapist behaviors and caregiver behaviors.

Limitations

Study limitations pertain primarily to issues of external validity and the circumscribed nature of the measurement methods. First, although juvenile sexual offenders share many characteristics with other juvenile offenders, studies comparing these groups have failed to include measures of deviant sexual beliefs and arousal patterns, putative specific causes of sexual offending in adolescents (Ronis & Borduin, 2007). Thus, the observed findings do not necessarily generalize to other types of serious juvenile offenders or to offenders who have been incarcerated or placed in residential facilities for their offenses. Second, the ASBI is a promising measure of adolescent sexual behavior that enjoys several advantages over the limited set of alternative measures (e.g., the ASBI was created within a developmental framework rather than adapted from an adult measure and includes both parent and youth reports). This measure, however, is relatively new, and further research is needed to more completely delineate its psychometric properties. Third, it is possible that other measures (e.g., observational) of the family and peer constructs assessed as mediators in this study, other outcomes (e.g., sexual recidivism), or other potential mediating constructs (e.g., problem solving skills) might have yielded different results. As noted earlier, however, the individualized nature of MST interventions creates challenges in examining potential mediators because interventions do not always target the same mediators in each case. Finally, the statistical methodology was adapted from an approach used to model two simultaneous change processes. One consequence of this adaptation is that the mediator change process for each youth was modeled without error. The mediator slope estimates used for each youth were generated using a robust method (i.e., empirical Bayes estimates) for estimating each youth's slope. It is possible, however, that other statistical approaches could lead to different conclusions regarding the mediator and outcome processes. Of note, the confidence intervals for some of the mediator process effects covered a wide range of values, suggesting a level of imprecision in these effects. As a result, the confidence intervals should be considered when interpreting the findings.

In conclusion, the findings support the MST theory of change and are consistent with the small extant literature in this area of research. Improvements in caregiver disciplinary practices, especially pertaining to youth association with problem friends, were key mediators of decreased antisocial behavior and deviant sexual interest/risk behaviors. These findings have important clinical implications for the community-based treatment of juvenile sexual offenders and possibly for the treatment of adolescent antisocial behavior in general.

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