

Mechanisms of Change in Multisystemic Therapy: Reducing Delinquent Behavior Through Therapist Adherence and Improved Family and Peer Functioning

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The mechanisms through which multisystemic therapy (MST) decreased delinquent behavior were assessed in 2 samples of juvenile offenders. Sample 1 included serious offenders who were predominantly rural, male, and African American. Sample 2 included substance-abusing offenders who were predominantly urban, male, and Caucasian. Therapist adherence to the MST protocol (based on multiple respondents) was associated with improved family relations (family cohesion, family functioning, and parent monitoring) and decreased delinquent peer affiliation, which, in turn, were associated with decreased delinquent behavior. Furthermore, changes in family relations and delinquent peer affiliation mediated the relationship between caregiver-rated adherence and reductions in delinquent behavior. The findings highlight the importance of identifying central change mechanisms in determining how complex treatments such as MST contribute to ultimate outcomes.

The development of effective mental health interventions for youth relies on understanding the mechanisms through which children and families experience behavior change (Kazdin & Kendall, 1998). When a treatment proves effective, identification of processes central to improvement is important so that these “active ingredients” can be distilled and refined to further enhance therapy outcomes (Weisz, Huey, & Weersing, 1998). When a treatment fails to perform as intended, attention to change processes continues to be important. Although poor overall outcomes may challenge the theoretical foundation underlying a treatment paradigm, they may also reflect the presence of (a) differential treatment effects due to important moderating or mediating factors or (b) a failure to implement the treatment as intended. In either case, attention to change processes is central, as illustrated by the significant emphasis on these issues in the adult psychotherapy literature (Lambert & Bergin, 1994; Orlinsky, Grawe, & Parks, 1994).

Unfortunately, little is known about the mechanisms that contribute to change among children and families in treatment (Fried-

lander, Wildman, Heatherington, & Skowron, 1994; Greenberg, 1986; Pinosof, 1988; Russell & Shirk, 1998; Shirk & Russell, 1996; Weisz et al., 1998). Although a handful of studies have implicated the role of therapist behavior (Braswell, Kendall, Braith, Carey, & Vye, 1985; Patterson & Forgatch, 1985), individual cognitions (Guerra & Slaby, 1990; Treadwell & Kendall, 1996), and parenting behavior (Dishion, Patterson, & Kavanagh, 1992; Stoolmiller, Duncan, Bank, & Patterson, 1993) as determinants of change in child- and family-based interventions, much remains unexplored. For example, little attention has been given to multicomponent interventions or therapies that address very serious and complex problems of childhood. Moreover, few studies (e.g., Henggeler, Melton, Brondino, Scherer, & Hanley, 1997; Henggeler, Pickrel, & Brondino, 1999; Schoenwald, Henggeler, Brondino, & Rowland, 1999) have explored the role of treatment fidelity in influencing child treatment outcomes (Hogue, Liddle, & Rowe, 1996), and none, to our knowledge, have examined the impact of multiple, interrelated change processes as psychotherapy outcome determinants.

The present study addressed this gap in the literature by assessing therapist and contextual pathways through which multisystemic therapy (MST; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998) achieves reductions in delinquent behavior. Although substantial research supports the clinical effectiveness of MST in the treatment of juvenile offenders (Borduin, Henggeler, Blaske, & Stein, 1990; Borduin et al., 1995; Henggeler, Melton, & Smith, 1992; Henggeler, Melton, Smith, Schoenwald, & Hanley, 1993), little empirical attention has been given to identifying the mechanisms through which MST produces favorable outcomes (Mann, Borduin, Henggeler, & Blaske, 1990). These change mechanisms are suggested by theoretical models that provide the conceptual basis of MST. At its core, MST adopts Bronfenbrenner's (1979) social-ecological model of human development, which suggests that behavior problems are often maintained by problematic transactions within and across multiple systems of the child's

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social ecology (Henggeler & Borduin, 1990). Importantly, the perspective that problems are multidetermined is consistent with multivariate and longitudinal research highlighting the family, peer, and community correlates of delinquent behavior in children (Loeber & Farrington, 1998; Patterson, Forgatch, Yoerger, & Stoolmiller, 1998), as well as "causal" modeling studies of delinquency and substance use (Dishion, Patterson, & Skinner, 1991; Elliott, Huizinga, & Ageton, 1985; Patterson, Capaldi, & Bank, 1991; Patterson & Dishion, 1985). In light of social-ecological theory and supporting research, MST aims to impact antisocial behavior by altering key aspects of the youth's social context in ways that promote prosocial behavior rather than antisocial behavior. By adhering to a set of nine treatment principles (Henggeler et al., 1998), MST therapists work to reduce problem behavior by inducing change in the multiple systems in which the child is imbedded—in particular the family and peer domains. Rather than providing specific, session-by-session intervention procedures, the MST principles offer general guidelines that direct case conceptualization, treatment specification, and prioritization of interventions. Assuming that fidelity to the MST treatment protocol is central to achieving therapeutic change, clinical outcomes should correspond with the extent to which therapists adhere to these treatment principles.

At the family level, MST is designed to increase family structure and cohesion and provide parents with the skills and resources necessary to monitor and discipline their children effectively. To enhance family cohesion, MST therapists exercise a number of options, including helping caregivers open lines of communication with their children, assisting caregivers in developing skills to diffuse conflictual family interactions, and encouraging caregivers to spend more time with the youth engaging in mutually desired activities. In addition, therapists often use strategies based on social learning principles (see Munger, 1993; Patterson, 1979) to assist caregivers in effectively monitoring their children and enhancing the effectiveness of parental discipline. MST therapists, however, often face considerable barriers in their efforts to facilitate these caregiver skills, including substance abuse/dependence and psychiatric disturbance among caregivers, social isolation of the family, low social support, and maladaptive beliefs regarding parenting. In accordance with MST principles, therapists work to overcome these barriers by actively engaging the family in treatment, using systemic strengths as levers for change, and devising developmentally appropriate interventions, among other strategies (Henggeler et al., 1998).

At the peer level, MST focuses on increasing the youth's association with prosocial peers (e.g., through organized athletics or church youth groups) while helping parents disengage youth from deviant peers (e.g., gang members, school dropouts, or drug abusers; Henggeler et al., 1998). For example, therapists work primarily with caregivers to monitor the youth's whereabouts and increase parental contact with the youth's peers, identify the youth's talents and competencies and rearrange the ecology in ways that support these strengths, and provide unpleasant consequences to the youth for continued association with deviant peers. Decreased affiliation with deviant peers, in conjunction with consistent parental contingencies, is then expected to attenuate major sources of reinforcement for the youth's antisocial behavior. A more extensive description of the MST treatment protocol is delineated in a treatment manual (Henggeler et al., 1998).

Using multiple informants and latent variable modeling procedures, this study evaluated three primary hypotheses regarding the causal linkages between MST adherence and functional outcomes (see Figure 1). First, therapist adherence to the MST principles was hypothesized as a direct predictor of changes in family, peer, and youth functioning (Paths a, b, and c). Second, positive changes in family and peer functioning were hypothesized as predictors of change in delinquent behavior (Paths d, e, and f). Finally, we hypothesized that MST adherence contributes indirectly to reductions in delinquency by influencing family and peer functioning (Paths a, d, and f). Although therapist adherence—the extent to which therapist practices are consistent with the treatment protocol—is often evaluated using expert ratings of therapy sessions (e.g., Bright, Baker, & Neimeyer, 1999), in the present study we sought to elicit the perspectives of multiple informants (Moncher & Prinz, 1991), specifically the primary caregiver, youth, and therapist.

To extend the generality of the relationships under investigation, we tested models on two independent samples. Replication across multiple samples permits one to test the boundaries and robustness of a hypothesized set of relationships (Cook & Campbell, 1979; Rosenthal & Rosnow, 1984). In particular, replication increases confidence that outcomes are not artifactual but rather hold up across a wider range of conditions (Kazdin, 1992). These concerns are particularly important when considering child clinical populations where participants are often quite diverse with respect to demographic characteristics and referral problems (Phares & Lum, 1996).

Hence, we used data from two samples of juvenile offenders presenting serious clinical problems and explored two models for each sample. Study 1, the Diffusion Project, included predominantly rural, violent, and chronic juvenile offenders referred by juvenile justice authorities following arrest for a criminal offense (Henggeler et al., 1997). This study represented an effort to transport MST to community mental health settings without the high level of quality assurance (e.g., integrity checks and supervision of therapists by MST experts) used in previous MST clinical trials. Study 2, the Charleston Drug Abuse (CDA) Project, included adjudicated juvenile offenders who met the diagnostic criteria for a substance abuse or dependence disorder (Henggeler, Pickrel, & Brondino, 1999). The Diffusion Project was chosen as the derivation study because it represents the third randomized trial of MST with violent and chronic juvenile offenders. The CDA Project was used as a replication because it attempted to extend the success of the model with violent and chronic juvenile offenders to substance-abusing and substance-dependent juvenile offenders.

Because we were interested in how MST influences the quality of affective interactions within the family (i.e., family functioning and family cohesion), as well as the parent's capacity to supervise and monitor the youth (i.e., parent monitoring), we explored separate models for these constructs.

Method

Participants and Procedures

Diffusion Project. The Diffusion sample included 155 violent and chronic juvenile offenders and their primary caregivers. Participants were referred to the project by intake officers at the South Carolina Department of Juvenile Justice (DJJ) following the juvenile's arrest for a criminal

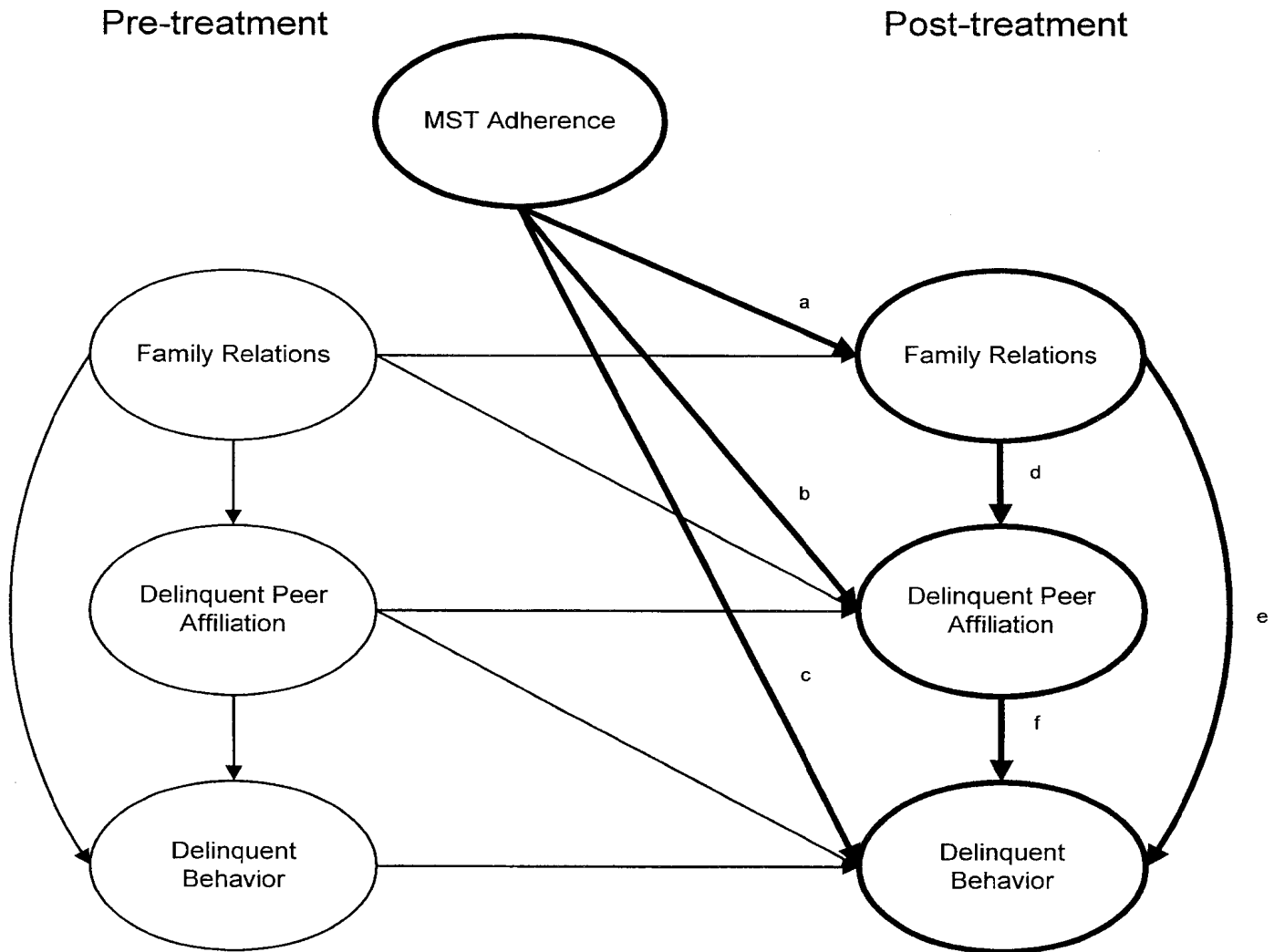


Figure 1. Hypothetical model representing direct and indirect effects of multisystemic therapy (MST) on delinquent behavior. Thick lines represent paths of central importance in the model.

offense. Following informed assent and consent, the family was randomly assigned to either the MST ($n = 82$) or usual-services ($n = 73$) condition, and the initial assessment was completed within 3 days. MST therapists were encouraged to apply a range of empirically supported therapeutic interventions that were tailored to the individual strengths and needs of each family and consistent with the principles that operationalize MST. Therapists had low caseloads (4–6 families per clinician) to allow for intensity of treatment services as needed and the provision of comprehensive services delivered in community settings (home, school, neighborhood, social service agencies). Families in the usual-services condition were placed on probation and referred to social service agencies, wherein they received various academic, vocational, and mental health services. In a previous analysis of these data (Henggeler et al., 1997), MST was demonstrated to significantly reduce length of incarceration and psychiatric symptomatology relative to youth in the usual-services condition.

For present purposes, the sample included only those 57 families who were treated in the MST condition and had completed pre- and posttreatment assessments. The significant loss of participants for analysis (from 82 to 57 families) is attributable largely to missing adherence data from either

the youth or the caregiver. If the youth or caregiver was not present at the randomly selected sessions during which adherence was evaluated, data were considered “missing” for that informant. The youth were predominantly male (83%), with an average age of 14.6 years ($SD = 1.5$). Seventy-seven percent were African American, and 23% were Caucasian.

MST was conducted by 10 master’s-level therapists with 1 to 15 years of prior clinical experience in social work or pastoral counseling. The therapists were employed at two community mental health centers. For most therapists, initial training consisted of 6 days of intensive didactic and experiential training in conducting MST. To promote treatment integrity, therapists received weekly, on-site clinical supervision from a mental health professional who was not an MST expert, and therapists attended quarterly booster trainings directed by one of the developers of MST. However, because the purpose was to determine whether MST outcomes could be maintained in a real-world mental health setting, therapists did not receive ongoing quality assurance oversight from an MST expert, which contrasts with previous and current MST protocols.

CDA Project. The CDA sample included 118 substance-abusing juvenile offenders and their primary caregivers. Adolescents were recruited

from the South Carolina DJJ and screened to identify offenders who met the diagnostic criteria for substance abuse or dependence. Through random assignment, participants received either MST ($n = 58$) or usual services through the DJJ ($n = 60$). The protocol for implementing MST was similar to that described for the Diffusion Project. Families in the usual-services condition were referred to community substance abuse (typically 12-step programs) or mental health services, although only 22% actually received such services during the first 5 months following recruitment into the project. Previous analyses of these data (Henggeler, Pickrel, & Brondino, 1999) showed that, compared with usual services, MST significantly reduced alcohol, marijuana, and other drug use, as well as total days in out-of-home placement. MST had a moderate but nonsignificant effect on criminal activity.

Again, only MST families with complete pre- and posttreatment assessments ($n = 54$) were included in this study. Youth in the CDA sample were predominantly male (80%) and had an average age of 15.0 years ($SD = 1.1$). Forty-six percent were African American, and 54% were Caucasian.

Therapists included two master's-level mental health counselors and one bachelor's-level mental health counselor who received 40 hr of training in MST. In addition, therapists received 1.5 hr of weekly clinical supervision from a child psychiatrist trained in MST, and clinical notes and cases were periodically reviewed by the principal investigator (Scott W. Henggeler), a developer of MST.

Measures: Diffusion Project

For families in the Diffusion Project, the initial assessment was completed prior to initiating treatment. An identical battery was administered within 72 hr of treatment termination. Assessments were completed in the home, with families paid \$50 for each assessment.

MST adherence. The 26-item MST Adherence Measure (Henggeler & Borduin, 1992) was completed by the primary caregiver, youth, and therapist to evaluate the extent to which therapists were engaged in behaviors consistent with the nine principles that operationalize MST. This measure was completed after randomly selected therapy sessions during the 4th and 8th weeks of treatment, and ratings were based only on the previous therapy session. Ratings from each time period, for each informant, were then averaged for all 26 items. As presented in the article by Henggeler et al. (1997), factor analyses yielded six factors based on caregiver ratings (Adherence, Nonproductive Sessions, Therapist-Family Problem-Solving Effort, Therapist Attempts to Change Interactions, Lack of Direction, and Family-Therapist Consensus), four factors based on youth ratings (Adherence, Family-Therapist Conflict, Therapist Attempts to Change Interactions, and Lack of Direction), and five factors based on therapist ratings (Family-Therapist Collaboration, Goal-Oriented Session, Nonproductive Session, Need to Focus on Noncompliance, and Family-Therapist Conflict). Coefficient alphas calculated for each factor ranged from .50 to .95. Sample items for the caregiver version include "The therapist's recommendations made good use of the family's strengths," "Not much was accomplished during the therapy sessions," and "The therapist tried to change some ways that family members interact with each other." Identical items (with some changes in pronoun referent) were completed by the youth and therapists. Preliminary analyses showed marginally positive (and mostly nonsignificant) correlations among these factors across the three informants (for the Diffusion sample, average $r = .19$; for the CDA sample, average $r = .18$). These results correspond with those obtained by other child process researchers who found poor agreement in therapy process ratings across sources (e.g., Eltz, Shirk, & Sarlin, 1995; Shirk & Saiz, 1992; Smith-Acuna, Durlak, & Kaspar, 1991) and suggest that attempts to find common variance across informants might result in an adherence construct with little practical meaning. For this reason, we decided to evaluate the two core models (i.e., family functioning/cohesion and parent monitoring) using alternative measures of adherence (i.e.,

caregiver, youth, and therapist). Thus, three distinct MST adherence latent variables were derived based on caregiver, youth, and therapist ratings.

Family functioning. Quality of family functioning was evaluated using parent and adolescent reports on the Family Assessment Measure (FAM-III; Skinner, Steinhauer, & Santa-Barbara, 1983). The FAM-III is a 50-item questionnaire that assesses seven domains of family functioning, including task accomplishment, role performance, communication, affective expression, affective involvement, control, and values and norms. These seven domains are subsumed by a General Scale, which provides an overall measure of health or pathology in family functioning. Skinner et al. estimated the internal consistency of the General Scale at .93 for adults and .95 for children. To ensure clarity in interpretation of the family scales across studies, we scored items such that higher General Scale scores corresponded with an increase in healthy family functioning. Sample items include "We spend too much time arguing about problems," "It's hard to tell what the rules are in our family," and "We feel close to each other." Youth and caregiver reports on the General Scale were used to form the family functioning latent variable. Coefficient alphas for the caregiver ($\alpha = .91$) and youth scales ($\alpha = .80$) were acceptable.

Parent monitoring. Parent monitoring behavior was assessed using parent and youth reports on the Monitoring Index. The 17-item parent version yields five distinct domains of monitoring that indicate how well caregivers control and supervise their children (e.g., "When your child is at a friend's house, how often do you think that the parents, or another adult, are there?"). The 14-item youth version yields four domains reflecting youth perceptions of parent monitoring behavior (e.g., "How often do you check in with your parents or another adult after school before going out?"). Although data supporting the psychometric properties of this particular measure is limited (G. Brown, Dishion, & Kavanagh, 1991), Dishion, Patterson, and colleagues have accumulated extensive evidence regarding the validity of the parent monitoring construct more generally (e.g., Chilcoat, Dishion, & Anthony, 1995; Dishion, 1990; Dishion & Loeber, 1985; Dishion et al., 1991; Loeber & Dishion, 1984; Patterson & Dishion, 1985; Patterson & Stouthamer-Loeber, 1984). Two youth factors were excluded from further analyses because of poor internal consistency ($\alpha = .11$ and $.38$). The remaining five parent factors (Parental Control, Parental Trust, Direct Supervision, Child Unsupervised, and Child Wandering) and two youth factors (Indirect Supervision and Monitoring Rules) were used to form the parent monitoring latent variable. Coefficient alphas ranged from .55 to .81.

Delinquent peer affiliation. To assess the degree to which youth associated with delinquent peers, we selected three peer-relevant items from caregiver ratings on the Revised Behavior Problem Checklist (RBPC; Quay & Peterson, 1987). The three items were "is loyal to delinquent friends"; "has 'bad' companions, ones who are always in some kind of trouble"; and "admires and seeks to associate with 'rougher' peers." Because the goal was to assess delinquent peer affiliation independent of the child's participation in antisocial activities, peer items that also implicated the child in delinquent acts (e.g., "steals in company with others" and "truant from school, usually in company with others") were excluded from this scale. These three items were summed to form the Delinquent Peer Affiliation scale ($\alpha = .70$).

Delinquent behavior. The frequency and severity of delinquent behavior were derived from two sources. First, adolescents provided self-reports of delinquent activity on the 40-item Self-Report Delinquency Scale (SRD; Elliott, Ageton, Huizinga, Knowles, & Canter, 1983; Elliott & Huizinga, 1983). Specifically, the General Delinquency subscale of the SRD was used, which provides a general summary of criminal offenses committed by the adolescent within the previous 3 months. Elliott et al. reported adequate reliability and validity for most of the SRD subscales, including the General Delinquency subscale, and alpha for this sample was adequate as well ($\alpha = .81$). Sample items include "How many times have you run

away from home?" and "How many times have you stolen something worth more than \$50?"

Second, items from the RBPC were used to derive caregiver evaluations of the youth's delinquent behavior. The following procedure was followed to ensure that the items accurately reflected the construct of interest. The first and third authors independently selected items from the RBPC, which, at face value, reflected aspects of delinquent behavior as measured by the SRD. When the raters agreed in their selection ($\kappa = .84$), those items were automatically included as part of a delinquent behavior composite. However, when disagreement occurred, the raters discussed discrepancies until consensus was reached. The final composite included 10 items, with an alpha of .82. Sample items include "destructive in regard to own and/or other's property" and "steals from people outside the home." Thus, data from both the youth and caregiver were used to form the delinquent behavior latent variable.

Measures: CDA Project

For CDA families, assessments were conducted in the home prior to therapy initiation and shortly following treatment termination. Families were reimbursed \$75 for each assessment.

MST adherence. Again, caregivers, youth, and therapists completed the MST Adherence Measure to assess therapist fidelity to MST during the 4th and 8th weeks of treatment. Factor analyses conducted on the averaged items yielded five caregiver factors (Therapist-Directed Sessions, Family-Therapist Collaboration, Family-Therapist Consensus, Therapist Encourages Responsibility, and Nonproductive Sessions), five youth factors (Adherence, Nonproductive Sessions, Therapist Attempts to Change Interactions, Lack of Direction, and Focus on Progress/Noncompliance), and four therapist factors (Family-Therapist Collaboration, Productive Sessions, Collaboration to Change Interactions, and Therapist Adherence). Coefficient alphas ranged from .56 to .96. The factors were then used to form three MST adherence latent variables based on caregiver, youth, and therapist report.

Family cohesion. Family cohesion refers to the emotional bonding that family members have toward one another. The Family Adaptability and Cohesion Evaluation Scale (FACES-III; Olson, Portner, & Lavee, 1985) was used to assess parent and youth perceptions of family cohesion. The Cohesion scale is composed of 10 items rated on a scale ranging from 1 (*almost never*) to 5 (*almost always*). Sample items include "Family members ask each other for help" and "We can easily think of things to do together as a family." Parent ($\alpha = .77$) and youth ($\alpha = .85$) scores were used to form the cohesion latent variable.

Parent monitoring. The procedures for assessing parent monitoring followed those used in the Diffusion Project. One youth factor was excluded from further analyses because of poor internal consistency ($\alpha = .38$). The remaining five parent and three youth scales ($\alpha = .56$ to $.77$) formed the parent monitoring latent variable.

Delinquent peer affiliation. Delinquent peer affiliation was, again, assessed using the three peer-related items from the RBPC (see above). These items were summed to form the Delinquent Peer Affiliation scale ($\alpha = .82$).

Delinquent behavior. Delinquent behavior was assessed in a manner identical to that used for the Diffusion sample. Data from both the RBPC ($\alpha = .88$) and the SRD ($\alpha = .95$) were then used to form the delinquent behavior latent variable.

Data-Analytic Strategy

Because our small sample sizes precluded the use of standard structural modeling approaches, we used latent variable path analysis with partial least squares (LVPLS; Falk & Miller, 1991; Lohmoeller & Wold, 1984; Wold, 1975) estimation procedures to explore the theoretical relationships of interest. In LVPLS, construct relationships may be assessed without the restrictive statistical and structural assumptions that underlie maximum likelihood estimation procedures often used in programs such as EQS or

LISREL (Falk & Miller, 1991). For this reason, LVPLS can be used for the analysis of data sets with small sample sizes, although the number of individuals must be adequate for the number of composited variables in the model (Falk & Miller, 1992). Nevertheless, similar to standard structural modeling approaches, LVPLS reduces the effects of measurement error and permits for the simultaneous assessment of both direct and indirect effects. However, LVPLS does contain several important limitations in comparison with EQS or LISREL, including the inability to model the effects of measurement error or fix parameters at specific values.

LVPLS is part of the family of statistical procedures known as component analyses, of which principal-components analysis and canonical correlation analysis are most familiar. In LVPLS, latent variables are derived by extracting the first principal component from the manifest (or measured) variables. These latent variables are, in essence, linear composites that maximally characterize the original manifest variables. As such, LVPLS modeling analyses yield parameter estimates that maximize the predictiveness of the overall model. Paths between the latent constructs are standardized path coefficients or beta weights. Evaluation of model relationships is based on the path coefficients between constructs, variance accounted for on the latent variables, and an overall index of model fit (Falk & Miller, 1992).

The coefficient RMS COV(E,U), which stands for the root-mean-square of the covariance between the residuals of the manifest and latent variables, served as the measure of the model's fit with the data. Specifically, the RMS COV(E,U) represents the correlation between the manifest and latent variables not accounted for by the model relationships (Falk & Miller, 1992). An RMS COV(E,U) value above .20 represents a model with inadequate fit, whereas a value of zero represents a perfect fit. For comparison, the root-mean-square residual statistic would be considered a parallel index of overall model fit within a LISREL or EQS framework.

Because LVPLS makes no assumptions about the distributional characteristics of the variables or sample size, evaluation of paths using traditional tests of significance is inappropriate. Thus, following the convention of Falk and Miller (1992), paths are deemed "adequate" and retained in the model when the predictor variable contributes at least 1.5% of the variance of a predicted variable.

Although several recent applications of LVPLS are evident in the fields of family psychology and developmental psychopathology (Brody, Arias, & Fincham, 1996; Brody, Stoneman, Flor, & McCrary, 1994; Brody, Stoneman, Flor, McCrary, Hastings, & Conyers, 1994; Cowan, Cohn, Cowan, & Pearson, 1996; Dumas & Wekerle, 1995; Ketterlinus, Bookstein, Sampson, & Lamb, 1990; N. B. Miller, Cowan, Cowan, Hetherington, & Clingempeel, 1993), to our knowledge, LVPLS has not been used to evaluate treatment outcome data.

Although the analysis began with the inclusion of all the manifest variables, a number of indicators were removed from the models because of low component loadings. Falk and Miller (1992) recommended removing indicators with loadings of less than .55 because of their "questionable" value in defining components. However, because this criterion would have eliminated several variables of theoretical importance in this study (e.g., youth report of family functioning), the exclusion criterion was modified to accommodate the present data. Thus, indicators with loadings of less than .40 for two or more of the models under consideration were eliminated from further consideration. This process resulted in the exclusion of a number of adherence and parent monitoring indicators.¹ Generally, the remaining indicators loaded highly on their relevant latent constructs, and only the modified models are presented below.

¹ For the Diffusion sample, one caregiver adherence item, two youth adherence items, and two monitoring items were eliminated. For the CDA sample, three caregiver adherence items, two youth adherence items, and three monitoring items were omitted.

Results

Initial Analyses

Mean scores, standard deviations, and ranges for the indicator variables retained in the final models are presented in Table 1 for both the Diffusion and CDA samples. One-way analysis of variance (ANOVA) tests revealed that, at pretreatment, the CDA sample reported lower levels of functioning than did Diffusion participants across many of the outcome domains. Compared with Diffusion participants, CDA parents exhibited significantly less monitoring behavior, whereas CDA youth affiliated more often with delinquent peers and reported more delinquent behavior. These differences persisted through posttreatment. Additional analyses indicated that the CDA sample included a significantly higher proportion of Caucasian youth, $\chi^2(1, N = 111) = 11.25, p < .001$. The ranges in Table 1 also indicate that, for both samples and across all the informants, there was considerable variability in therapist performance for each of the adherence indices—a finding that is consistent with previous work (Henggeler et al., 1997; Henggeler, Pickrel, & Brondino, 1999).

Because youth and caregivers who were included in our modeling analyses (because they completed the adherence measures) may differ systematically from those who were not, one-way ANOVAs were run to test for such differences. For Diffusion participants, youth included in the modeling analyses were significantly younger than their excluded counterparts (mean age of 14.60 years vs. 15.81 years), $F(1, 80) = 13.45, p < .001$, and reported receiving more indirect supervision from caregivers, $F(1, 80) = 8.23, p < .01$. These results suggest that within families who completed the adherence measures, target youth were younger and were more carefully monitored by parents. No differences were found within the CDA sample.

Correlations between the adherence and outcome indicators, and correlations among all of the outcome indicators, were run for both samples.² Several patterns were apparent. First, for both samples, several adherence indicators were significantly correlated with post- and pretreatment indicators of family, peer, and youth functioning. These data suggest that adherence was not only a predictor of outcome but may partially be influenced by these variables as well. However, no clear pattern emerged regarding whether adherence appeared to be facilitated or hindered by families who were easier to work with (e.g., higher initial cohesion and lower initial delinquent behavior). Second, the correlations between adherence and posttreatment outcomes were generally in the anticipated direction, although two significant anomalies were apparent. Counter to expectations, youth-rated Family–Therapist Conflict (Diffusion sample) was associated with lower delinquent peer affiliation at posttreatment ($r = -.28, p < .05$). Similarly, caregiver-rated Therapist-Directed Sessions (CDA sample) was associated with lower parental control ($r = -.27, p < .05$) and higher delinquent behavior ($r = .33, p < .05$) at posttreatment. Third, correlations within constructs between caregiver and youth ratings (i.e., family functioning/cohesion, parent monitoring, and delinquent behavior) were mostly in the low to moderate range ($r = .04$ to $.56$) in magnitude. This finding was not unexpected and reflects the common problem of low agreement across multiple informants (Achenbach, McConaughy, & Howell, 1987).

Table 2 indicates that the manifest variables in the Diffusion models generally loaded highly on their respective latent variables

for both the family functioning (mean communality [h^2] range = .61 to .66) and parent monitoring (mean h^2 range = .57 to .71) models. The loadings for family functioning, parent monitoring, delinquent peer affiliation, and delinquent behavior that are presented in the table are based on models using caregiver ratings of adherence.³

For family functioning, parent monitoring, delinquent peer affiliation, and delinquent behavior, loadings were fairly consistent from pre- to posttreatment. Loadings for delinquent peer affiliation at pre- and posttreatment were necessarily 1.00 because they were measured by a single manifest variable. Overall, the manifest variables appeared to be reasonable indicators of the latent constructs examined in this study.

Table 3 indicates that the manifest variables for the CDA Project loaded moderately on their respective latent variables for both the family cohesion and parent monitoring models. Again, the loadings for family cohesion, parent monitoring, delinquent peer affiliation, and delinquent behavior that are presented in the table are based on model versions using caregiver ratings of adherence. Loadings for delinquent peer affiliation at pre- and posttreatment were necessarily 1.00 because they were measured by a single manifest variable.

Tables 4 and 5 present the correlations between the latent constructs presented in the models. Correlations for the Diffusion Project are found below the diagonal, and correlations for the CDA Project are above the diagonal. For both the Diffusion and CDA data, correlations were generally consistent with earlier hypotheses. High adherence was associated with higher postintervention quality of family functioning, family cohesion, and parent monitoring behavior and with lower postintervention delinquent behavior and antisocial peer affiliation.

The structural models tracing the links between MST adherence and posttreatment changes in outcomes are described subsequently. The presentation focuses primarily on the relationships of interest in this study: (a) how MST adherence is associated with changes in family, peer, and youth outcomes over time and (b) how changes in family and peer functioning are associated with changes in delinquent behavior. For each study, three versions of the family functioning/cohesion and parent monitoring models are presented, which represent caregiver, youth, and therapist ratings of adherence.

To assess change in the outcome variables over time, posttreatment scores were, in essence, regressed on their pretreatment counterparts (represented schematically by a one-way arrow from the pre- to posttreatment scores). In doing so, the posttreatment scores on the family, peer, and delinquency variables represented independent change in the relative rank order of individuals on each of these variables over time (Falk & Miller, 1991). Thus, paths from adherence to the posttreatment constructs represented the effects of therapist adherence on changes in the outcome variables. Similarly, the paths among posttreatment outcome variables reflected how changes in one outcome variable were associated with changes in another.

² The correlation matrices are available on request from Stanley J. Huey, Jr.

³ However, in most cases, loadings based on youth and therapist reports of adherence were nearly identical to those based on caregiver report.

Table 1
Means, Standard Deviations, Ranges, and Between-Group Differences for Manifest Variables: Diffusion and CDA Samples

Variable	Diffusion sample (n = 57)			CDA sample (n = 54)			F
	M	SD	Range	M	SD	Range	
Adherence manifest variables (Diffusion)							
Caregiver-rated MST adherence							
Adherence	4.93	0.80	1.76 to 5.83				
Therapist-Family Problem-Solving Effort	3.65	0.72	0.83 to 4.84				
Therapist Attempts to Change Interactions	4.55	1.13	2.05 to 6.38				
Lack of Direction	1.15	0.94	-0.53 to 3.32				
Family-Therapist Consensus	1.38	1.06	-1.77 to 3.22				
Youth-rated MST adherence							
Family-Therapist Conflict	0.87	1.02	-1.84 to 2.53				
Therapist Attempts to Change Interactions	1.69	0.87	-0.32 to 3.98				
Therapist-rated MST adherence							
Family-Therapist Collaboration	4.28	0.83	1.96 to 5.44				
Goal-Oriented Session	4.66	0.76	2.57 to 5.50				
Nonproductive Session	0.95	0.93	-0.38 to 2.92				
Need to Focus on Noncompliance	3.31	1.24	0.98 to 4.93				
Family-Therapist Conflict	2.39	0.74	0.90 to 4.06				
Adherence manifest variables (CDA)							
Caregiver-rated MST adherence							
Therapist-Directed Session				4.59	0.92	2.11 to 6.39	
Nonproductive Session				2.34	0.96	0.72 to 5.14	
Youth-rated MST adherence							
Adherence				4.57	0.97	1.53 to 6.07	
Nonproductive Session				3.23	0.98	1.35 to 5.64	
Lack of Direction				0.54	0.86	-1.47 to 2.01	
Therapist-rated MST adherence							
Family-Therapist Collaboration				4.72	0.85	2.72 to 5.86	
Productive Session				3.49	0.69	2.06 to 4.36	
Collaboration to Change Interactions				2.60	1.32	0.60 to 4.70	
Therapist Adherence				4.19	0.72	2.49 to 5.74	
Manifest variables							
Pretreatment							
Quality of family functioning							
Parent	3.95	1.94	-0.43 to 8.86				
Youth	3.72	1.28	0.43 to 7.57				
Family cohesion							
Parent				29.63	3.42	23.00 to 36.00	
Youth				28.98	5.63	19.00 to 40.00	
Parental Control (parent)	3.68	1.08	1.00 to 5.00	3.21	0.83	1.00 to 5.00	6.63*
Parental Trust (parent)	3.02	1.07	1.00 to 4.75	2.74	0.67	1.50 to 4.25	2.74
Direct Supervision (parent)	3.57	1.02	1.00 to 5.00	2.80	0.90	1.00 to 5.00	17.82**
Child Wandering (parent)	0.44	0.50	0.00 to 1.00	0.69	0.58	0.00 to 3.00	5.80*
Indirect Supervision (youth)	3.74	0.72	1.50 to 5.00	2.74	0.86	1.00 to 4.80	43.52**
Delinquent peer affiliation (parent)	0.74	0.66	0.00 to 2.00	1.01	0.66	0.00 to 2.00	4.74*
Delinquent behavior (parent)	0.42	0.43	0.00 to 1.70	0.66	0.50	0.00 to 1.80	7.82**
General delinquency (youth)	0.93	0.55	0.00 to 2.00	1.65	0.45	0.00 to 2.00	56.54**
Posttreatment							
Quality of family functioning							
Parent	4.60	1.66	0.14 to 8.71				
Youth	3.76	1.70	1.00 to 9.71				
Family cohesion							
Parent				31.54	4.41	19.00 to 40.00	
Youth				28.17	4.81	18.00 to 40.00	
Parental Control (parent)	4.00	1.04	1.00 to 5.00	3.46	0.91	1.50 to 5.00	8.19**
Parental Trust (parent)	3.42	1.10	1.00 to 4.75	2.59	0.69	1.00 to 4.00	22.11**
Direct Supervision (parent)	3.69	1.08	1.00 to 5.00	2.94	0.95	1.00 to 4.67	15.11**
Child Wandering (parent)	0.33	0.48	0.00 to 1.00	0.57	0.50	0.00 to 1.00	6.77*
Indirect Supervision (youth)	3.40	0.88	1.00 to 5.00	2.99	0.74	1.00 to 5.00	7.20**
Delinquent peer affiliation (parent)	0.45	0.59	0.00 to 2.00	0.81	0.66	0.00 to 2.00	9.30**
Delinquent behavior (parent)	0.26	0.37	0.00 to 1.67	0.44	0.40	0.00 to 1.50	6.16*
General delinquency (youth)	0.52	0.57	0.00 to 2.00	1.32	0.60	0.00 to 2.00	51.39**

Note. CDA = Charleston Drug Abuse; MST = multisystemic therapy.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Table 2
Component Loadings and Residuals on Manifest Variables for Diffusion Sample

Variable	Family functioning model		Parent monitoring model	
	Loading	Residual	Loading	Residual
Caregiver-rated MST adherence				
Adherence	.80	.36	.74	.45
Therapist–Family Problem-Solving Effort	.65	.57	.58	.66
Therapist Attempts to Change Interactions	.44	.81	.51	.74
Lack of Direction			.45	.80
Family–Therapist Consensus	.64	.59	.61	.63
Youth-rated MST adherence				
Family–Therapist Conflict	.80	.37	.78	.39
Therapist Attempts to Change Interactions	–.70	.52	–.71	.49
Therapist-rated MST adherence				
Family–Therapist Collaboration	.80	.37		
Goal-Oriented Session	.55	.69	.70	.51
Nonproductive Session	–.87	.24		
Need to Focus on Noncompliance	.64	.58	.97	.07
Family–Therapist Conflict	.67	.55		
Pretreatment				
Family functioning				
Quality of family functioning				
Parent	.72	.48		
Youth	.79	.37		
Parental monitoring				
Parental Control (parent)			.93	.14
Parental Trust (parent)			.86	.26
Direct Supervision (parent)			.86	.25
Child Wandering (parent)			–.59	.65
Indirect Supervision (youth)			.48	.77
Delinquent peer affiliation				
Delinquent peer affiliation (parent)	1.00	.00	1.00	.00
Delinquent behavior				
Delinquent behavior (parent)	.98	.04	.98	.04
General delinquency (youth)	.46	.79	.46	.79
Posttreatment				
Family functioning				
Quality of family functioning				
Parent	.86	.26		
Youth	.84	.29		
Parental monitoring				
Parental Control (parent)			.92	.15
Parental Trust (parent)			.88	.22
Direct Supervision (parent)			.92	.15
Child Wandering (parent)			–.65	.57
Indirect Supervision (youth)			.37	.87
Delinquent peer affiliation				
Delinquent peer affiliation (parent)	1.00	.00	1.00	.00
Delinquent behavior				
Delinquent behavior (parent)	.97	.06	.95	.09
General delinquency (youth)	.43	.81	.48	.77

Note. MST = multisystemic therapy.

Diffusion Models

Family functioning. Table 6 shows the structural paths between the latent variables representing MST adherence, pre- and posttreatment family functioning, peer affiliation, and delinquent behavior for the Diffusion sample. Results indicate that for caregiver and therapist reports, MST adherence was directly associated with improvement in family functioning over time (e.g., the coefficient of .30 in column 1, row 1 of Table 6). In addition, caregiver-rated adherence was directly associated with decreases

in delinquent behavior (i.e., the coefficient $-.08$ in column 1, row 3 of Table 6), whereas youth-rated adherence was directly associated with decreases in delinquent peer affiliation (i.e., the coefficient of $-.29$ in column 2, row 2 of Table 6).

Consistent across the three versions of the family functioning model, improvement in family functioning was directly associated with decreases in both delinquent peer affiliation and delinquent behavior over time. Decreases in delinquent peer affiliation were, in turn, associated with decreases in delinquent behavior. The total

Table 3
Component Loadings and Residuals on Manifest Variables for CDA Sample

Variable	Family cohesion model		Parent monitoring model	
	Loading	Residual	Loading	Residual
Caregiver-rated MST adherence				
Therapist-Directed Session	-.85 ^a	.28	-.73 ^a	.47
Nonproductive Session	-.72 ^a	.48	-.84 ^a	.29
Youth-rated MST adherence				
Adherence	.93	.13	.65 ^a	.57
Nonproductive Session			-.46 ^a	.78
Lack of Direction	-.63	.60	-.56 ^a	.69
Therapist-rated MST adherence				
Family-Therapist Collaboration	.80	.36	.97	.05
Productive Session	.74	.46		
Collaboration to Change Interactions	.88	.23	.77	.40
Therapist Adherence	.74	.45		
Pretreatment				
Family cohesion				
Parent	.77	.40		
Youth	.75	.44		
Parental monitoring				
Parental Control (parent)			.83	.31
Parental Trust (parent)			-.77	.41
Direct Supervision (parent)			.83	.32
Child Wandering (parent)			-.45	.80
Indirect Supervision (youth)			.46	.79
Delinquent peer affiliation				
Delinquent peer affiliation (parent)	1.00	.00	1.00	.00
Delinquent behavior				
Delinquent behavior (parent)	.99	.02	.99	.03
General delinquency (youth)	.31	.90	.32	.89
Posttreatment				
Family cohesion				
Parent	.84	.30		
Youth	.69	.53		
Parental monitoring				
Parental Control (parent)			.85	.28
Parental Trust (parent)			-.75	.44
Direct Supervision (parent)			.91	.18
Child Wandering (parent)			-.64	.60
Indirect Supervision (youth)			.48	.77
Delinquent peer affiliation				
Delinquent peer affiliation (parent)	1.00	.00	1.00	.00
Delinquent behavior				
Delinquent behavior (parent)	.95	.10	.93	.14
General delinquency (youth)	.54	.71	.59	.66

Note. CDA = Charleston Drug Abuse; MST = multisystemic therapy.

^a Indicates that the factor valence was reversed to aid in interpretability.

effects of caregiver- and therapist-rated adherence on delinquent behavior were adequate as well, suggesting that adherence contributed indirectly to reductions in delinquent behavior through its direct effect on family functioning and indirect effect on peer affiliation. Between 61% and 73% of the youth's delinquent behavior was explained by the relationships among the variables in the alternate versions of this model. Furthermore, the family functioning path model yielded RMS COV(E,U) values ranging from .05 to .07, indicating an adequate fit between the model and data.

Parent monitoring. For the parent monitoring model, Table 6 indicates that caregiver- and youth-rated adherence were directly linked to improvement in parent monitoring and that youth-rated adherence was associated with reductions in delinquent peer affiliation. Surprisingly, youth-rated adherence was also associated

with an increase in delinquent behavior (i.e., the coefficient of .10 in column 5, row 3 of Table 6). Across each version of the parent monitoring model, increased monitoring contributed to decreases in delinquent peer affiliation, which, in turn, predicted decreases in delinquent behavior. Increases in monitoring were also directly associated with decreases in delinquent behavior. For caregiver-based ratings, the total effect of adherence on delinquent behavior was adequate, suggesting an indirect effect on delinquent behavior through its effects on parent monitoring and peer affiliation. Between 68% and 73% of the variance in delinquent behavior was explained by the variables in the alternative versions of this model. The RMS COV(E,U) values ranged from .06 to .07, suggesting an adequate fit to the data. For illustrative purposes, path diagrams representing the full, caregiver-based versions of the family func-

Table 4
*Latent Variable Correlation Matrix for Diffusion and CDA Samples:
 Family Functioning/Cohesion Model*

Variable	1	2	3	4	5	6
1. Caregiver-rated MST adherence	—			.14	-.28	-.25
2. Youth-rated MST adherence		—		.37	-.16	-.18
3. Therapist-rated MST adherence			—	.13	-.11	-.07
4. Family functioning or cohesion (Time 2)	.38	.08	.35	—	-.38	-.46
5. Delinquent peer affiliation (Time 2)	-.16	-.35	-.02	-.29	—	.77
6. Delinquent behavior (Time 2)	-.34	-.19	-.03	-.39	.69	—

Note. Coefficients for the Diffusion sample are shown below the diagonal, and coefficients for the CDA sample are shown above the diagonal. Empty cells represent the correlations among the adherence latent variables had they been calculated. However, our method of analysis did not allow for such calculations. CDA = Charleston Drug Abuse; MST = multisystemic therapy.

tioning and parent monitoring models are presented in Figures 2 and 3.

Overall, the Diffusion models support the hypothesis that therapist adherence to MST principles contributes both directly and indirectly to reductions in delinquent behavior. However, on closer inspection of the individual factors, findings based on youth reports of adherence may appear counterintuitive. Based on the factor labels and direction of the loadings (see Table 2), the youth-rated construct appears to represent a negative adherence factor and suggests that greater therapist–family conflict and fewer efforts by therapists to change family interactions contributed to increased caregiver monitoring and reduced affiliation with delinquent peers. This issue is explored in greater detail in the Discussion section.

CDA Models

Overall, replication using the CDA sample yielded results quite similar to those observed for the Diffusion sample. Table 6 reveals that five of the six CDA paths from adherence to the cohesion and monitoring domains were adequate and in the expected direction, whereas none were explicitly contrary to expectations. Three of the six paths from adherence to peer affiliation were adequate and in the expected direction, and one in a direction counter to expectations. Only one direct path from adherence to delinquent behavior was significant and in the expected direction. However, for three of the six versions of the family cohesion and parent monitoring models, the total effects of adherence on delinquent behavior were

adequate, suggesting that adherence contributed indirectly to reductions in delinquency. Results also revealed that, without exception, improvement in family cohesion and monitoring was associated with decreased affiliation with deviant peers, which, in turn, was associated with a reduction in delinquent behavior. The model fit was adequate for each version of the models, and R^2 values ranged from .78 to .79. Thus, the CDA models appear to provide general support for the indirect effects of MST adherence on delinquency outcomes.

Finally, one apparent anomaly should be noted for CDA caregiver ratings of adherence. The Therapist-Directed Sessions and Nonproductive Sessions factors loaded in the same direction on the adherence latent variable. Intuitively, one would have expected a negative association between the two factors given that MST therapists are expected to be directive and provide structured, action-oriented sessions (Henggeler et al., 1998)—a requirement that would indicate productive sessions. However, therapists are also expected to actively engage family members in treatment, ensuring that caregivers are instrumental in defining treatment goals and implementing treatment strategies that conform with their strengths and capacities. Without the engagement component, it might be argued that therapist directiveness could actually be counterproductive because families would be poorly invested in implementing therapist-imposed strategies that did not meet the perceived needs of the family. These concerns may be particularly important in the context of working with “difficult-to-treat” families, who often face many initial barriers to effective treatment

Table 5
Latent Variable Correlation Matrix for Diffusion and CDA Samples: Parent Monitoring Model

Variable	1	2	3	4	5	6
1. Caregiver-rated MST adherence	—			.26	-.29	-.21
2. Youth-rated MST adherence		—		.42	-.19	-.31
3. Therapist-rated MST adherence			—	.14	-.21	-.02
4. Parent monitoring (Time 2)	.29	.19	-.16	—	-.63	-.57
5. Delinquent peer affiliation (Time 2)	-.21	-.35	.07	-.52	—	.75
6. Delinquent behavior (Time 2)	-.36	-.19	.06	-.68	.69	—

Note. Coefficients for the Diffusion sample are shown below the diagonal, and coefficients for the CDA sample are shown above the diagonal. Empty cells represent the correlations among the adherence latent variables had they been calculated. However, our method of analysis did not allow for such calculations. CDA = Charleston Drug Abuse; MST = multisystemic therapy.

Table 6
Structural Coefficients and Summary Indices for Model Versions Using Caregiver, Youth, and Therapist Reports of MST Adherence

Path	Diffusion sample						CDA sample					
	Family functioning			Monitoring			Family cohesion			Monitoring		
	Caregiver (n = 57)	Youth (n = 48)	Therapist (n = 57)	Caregiver (n = 57)	Youth (n = 48)	Therapist (n = 57)	Caregiver (n = 54)	Youth (n = 52)	Therapist (n = 54)	Caregiver (n = 54)	Youth (n = 52)	Therapist (n = 54)
Structural coefficients												
Adherence to family/monitoring	.30 ^a	-.06	.27 ^a	.09 ^a	.14 ^a	.05	.21 ^a	.35 ^a	.12 ^a	.18 ^a	.32 ^a	.02
Adherence to peers	-.01	-.29 ^a	-.06	-.03	-.29 ^a	-.11	-.14 ^a	.01	-.02	-.15 ^a	.13 ^{ab}	-.13 ^a
Adherence to delinquency	-.08 ^a	.07	.01	-.05 ^a	.10 ^{ab}	-.06	-.07 ^a	.04	.03	-.05	.00	.09
Family/monitoring to peers	-.17 ^a	-.18 ^a	-.16 ^a	-.32 ^a	-.20 ^a	-.34 ^a	-.36 ^a	-.40 ^a	-.39 ^a	-.62 ^a	-.69 ^a	-.65 ^a
Family/monitoring to delinquency	-.21 ^a	-.21 ^a	-.25 ^a	-.44 ^a	-.43 ^a	-.44 ^a	-.15 ^a	-.16 ^a	-.16 ^a	-.20 ^a	-.21 ^a	-.21 ^a
Peers to delinquency	.47 ^a	.46 ^a	.46 ^a	.33 ^a	.34 ^a	.33 ^a	.52 ^a	.56 ^a	.54 ^a	.42 ^a	.43 ^a	.44 ^a
Total effect of adherence on delinquency	-.17 ^a	-.04	-.10 ^a	-.11 ^a	-.06	-.12	-.22 ^a	-.08	-.02	-.19 ^a	-.11 ^a	-.02
Summary indices												
RMS COV(E, U)	.06	.05	.06	.07	.06	.06	.09	.08	.07	.08	.06	.06
Mean <i>h</i> ²	.61	.66	.63	.57	.61	.71	.65	.65	.65	.59	.54	.61
R ²	.61	.65	.61	.69	.73	.68	.79	.78	.78	.78	.78	.78
R ² difference test for mediation	.00	NA	NA	.03	NA	NA	.05	NA	NA	.00	NA	NA
Nature of mediation	partial			partial			partial			full		

Note. MST = multisystemic therapy; CDA = Charleston Drug Abuse; NA = not applicable.

^a Indicates a predicted path that accounted for an "adequate" proportion of the variance (1.5%) based on Falk and Miller's (1992) recommendations. ^b Indicates the relationship was in a direction counter to prediction.

implementation (Henggeler & Santos, 1997). From this perspective, the similar loadings for these two factors appear reasonable.

Treatment Mediation Effects

Although the above analyses suggest that adherence to the MST protocol contributes indirectly to reductions in delinquent behavior, they do not represent a test of mediational hypotheses (Baron & Kenny, 1986). Thus, we conducted a mediation analysis following the steps outlined by Holmbeck (1997).⁴ During preliminary analyses, 8 of the 12 versions of the models represented in Table 6 (i.e., all of the therapist and youth adherence versions of the models) were eliminated from consideration for one or both of the following reasons: (a) in a reduced model (i.e., the paths between adherence and the mediators were eliminated), paths between adherence and the criterion variable were not adequate or (b) paths between adherence and the mediator or criterion variable were in a direction counter to that hypothesized.

In the next step, conducted with the remaining four versions of the two models, the fit of the full model was compared with the fit of a model that constrained the path (i.e., the path was set to 0) between adherence and delinquent behavior. If a strong mediation effect is present, the addition of the adherence/delinquent behavior path to the constrained model should not improve the fit (Holmbeck, 1997). An R² change test (Chin, 1998; R. F. Falk, personal communication, May 12, 1999)⁵ was used to determine whether the models differed in fit. The resulting value can be interpreted as an effect size, with a value of .02 representing a small or insignificant effect, .15 a medium effect, and .35 a large effect (Chin, 1998). Table 6 presents the data resulting from the mediation analyses. Results indicated that excluding the adherence/delinquent behavior path did not result in a reduced fit for the remaining versions of the models, suggesting a mediation effect for each. However, for three of the four versions, the adherence/delinquent behavior path remained adequate in the full model, whereas for the fourth this path was not adequate. Thus, it would be more accurate to state that the former demonstrated partial mediation effects, whereas the latter demonstrated a full mediation effect (see Table 6).

Discussion

Although there are increasingly vocal calls for research on the specific components of child and family therapy that contribute to change (Kazdin, 1997; Russell & Shirk, 1998), little empirical work in this area has been conducted. The few studies that do exist have examined important domains of therapy process, including the role of therapist behavior on parenting outcomes (e.g., Patterson & Forgatch, 1985) and the influence of changes in parenting behavior on youth outcomes (Dishion et al., 1992; Schmidt, Liddle, & Dakof, 1996; Stoolmiller et al., 1993). The present study expanded on this work by exploring the effects of therapist adher-

⁴ We thank Grayson Holmbeck and an anonymous reviewer for suggesting this strategy.

⁵ In traditional structural equation model analysis, a chi-square test is used to test the difference in fit between two models. However, chi-square tests are not appropriate within the context of the PLS program.

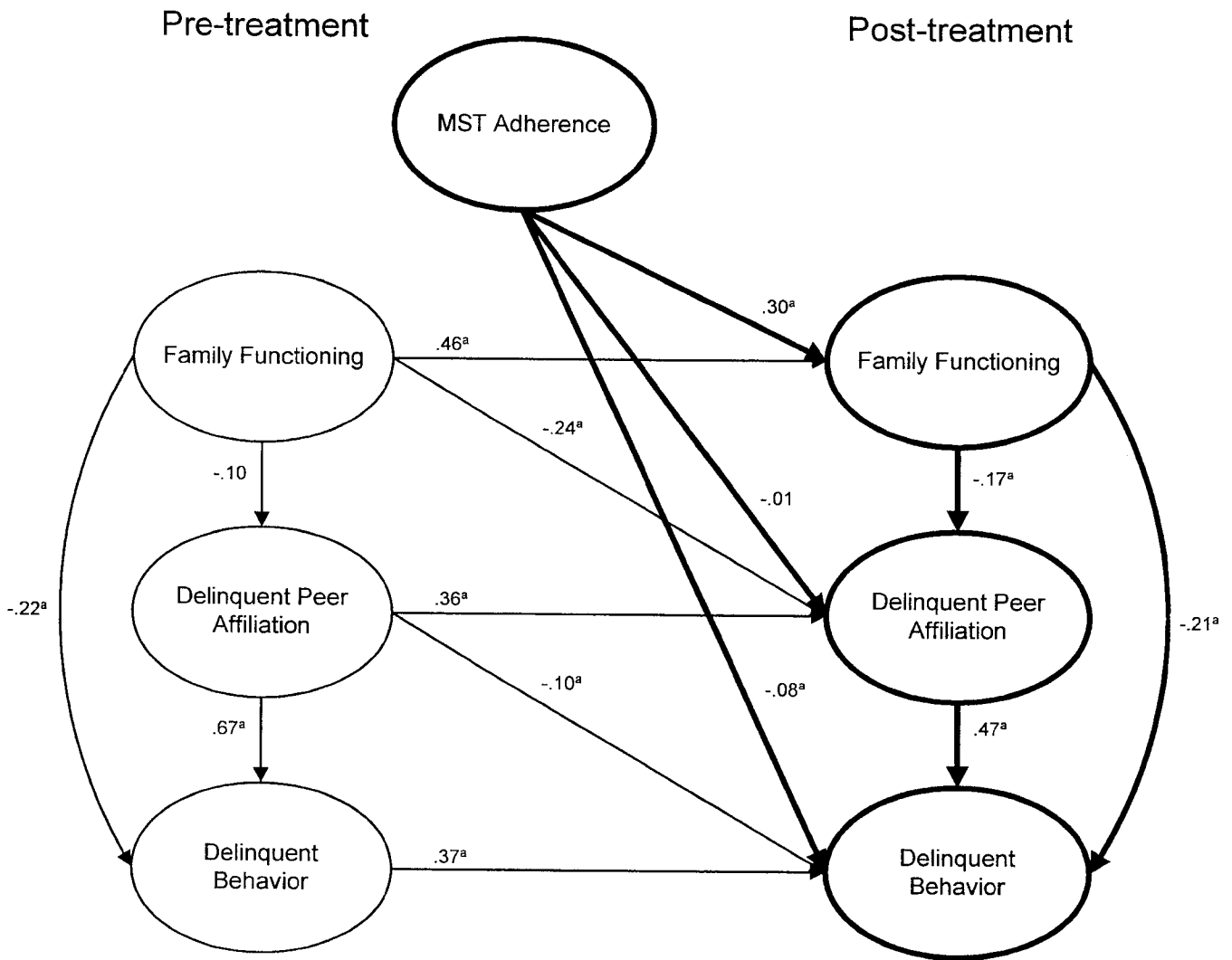


Figure 2. Impact of adherence to multisystemic therapy (MST; caregiver rating) on delinquent behavior: Indirect effects through family functioning and delinquent peer affiliation—Diffusion Project. Thick lines represent paths of central importance in the model—direct and indirect effects of MST adherence on delinquent behavior. Mean $h^2 = .61$, RMS COV(E, U) = .06, $R^2 = .61$. ^aIndicates a predicted path that accounted for adequate variance (1.5%) based on Falk and Miller's (1992) recommendations.

ence on delinquency outcomes through changes in family and peer functioning.

One of the questions posed by this study addressed whether positive changes in family functioning predicted changes in delinquent behavior. Results clearly supported a family-centered mediational model in which improved family relations (i.e., quality of family functioning, family cohesion, and parent monitoring) predicted decreased delinquent peer affiliation and delinquent behavior. Of the 12 separate versions of the family functioning/cohesion and parent monitoring models tested across two independent samples and three respondents, all supported the sequence from improved family functioning, to decreased delinquent peer affiliation, to decreased delinquent behavior. Buttressed by results from previous MST clinical trials (Borduin et al., 1995; Henggeler et al., 1986, 1992), the findings presented here provide significant evi-

dence for a core assumption among family systems theorists and researchers—that improvement in family functioning contributes to reductions in problem behavior among disturbed youth (Henggeler & Borduin, 1990; Mann et al., 1990; G. E. Miller & Prinz, 1990).

In addition, this study incorporated another important mediating domain not typically addressed in individual- or family-based treatment models—peer relations. Although research suggests that delinquent peers are powerful reinforcers of antisocial behavior in youth (Elliott et al., 1985; Hanson, Henggeler, Haefele, & Rodick, 1984; Henggeler, 1989; Loeber, 1991), many extant treatment approaches fail to give sufficient attention to the role of peer relations in behavior change. By treating target youth in groups with their antisocial peers or simply ignoring the peer context altogether, current interventions often fail to alter the antisocial

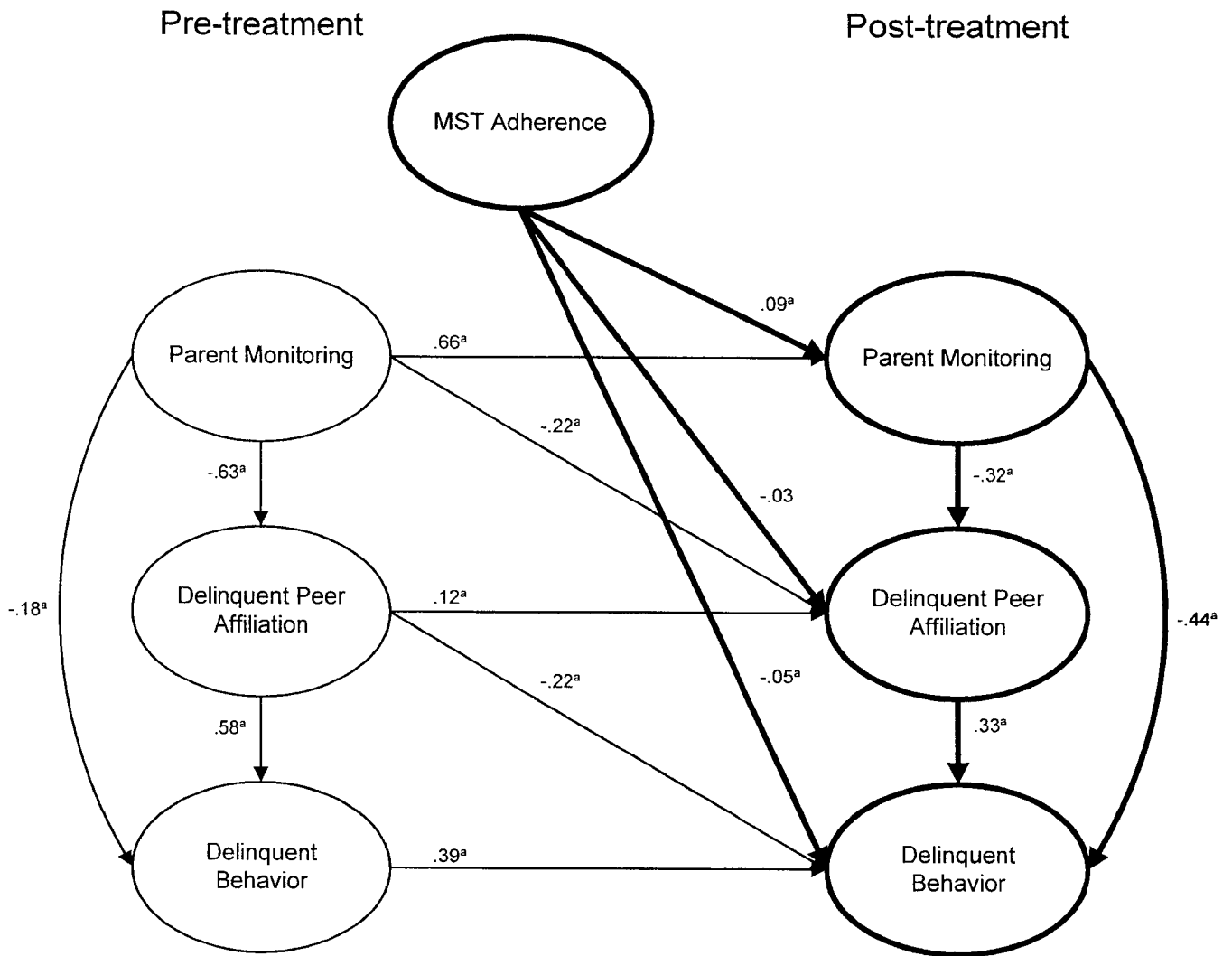


Figure 3. Impact of adherence to multisystemic therapy (MST; caregiver rating) on delinquent behavior: Indirect effects through parent monitoring and delinquent peer affiliation—Diffusion Project. Thick lines represent paths of central importance in the model—direct and indirect effects of MST adherence on delinquent behavior. Mean $h^2 = .57$, RMS COV(E, U) = .07, $R^2 = .69$. ^aIndicates a predicted path that accounted for adequate variance (1.5%) based on Falk and Miller's (1992) recommendations.

trajectory, or worse, may exacerbate the frequency and breadth of antisocial behavior (see, e.g., Dishion & Andrews, 1995; Eddy, Dishion, & Stoolmiller, 1998; Gottfredson, 1987). MST addresses this concern primarily by using caregivers as agents to engage the youth in mainstream activities with prosocial peers and disengage the youth from associations with delinquent peers. Results from the present study suggest that such interventions regarding peer relations, conducted in collaboration with caregivers, may be instrumental in reducing rates of delinquent behavior.

Furthermore, it is crucial to discern whether key intervention processes actually affect those domains critical to one's theoretical model of change (Kazdin, 1997). Hence, a "dosage" effect of sorts was hypothesized in which higher levels of adherence to MST treatment principles would result in greater decreases in delinquent behavior by altering problematic inter-

actions within the family and peer domains. In 4 of the 12 models, outcomes supported this mediational model. The models based on caregiver ratings of MST adherence suggested that the effect of adherence is partly direct and partially mediated through its effects on family functioning and cohesion, parent monitoring, and delinquent peer affiliation. In the context of treatment outcome research, many investigators appear to assume that participants within a particular condition receive treatment with the same degree of integrity (Boruch & Gomez, 1977; Moncher & Prinz, 1991). Results from this study argue against such an assumption. Even with significant clinical oversight and training (i.e., booster trainings, treatment manuals, weekly supervision of therapists, and review of case notes), considerable variation in adherence existed for both studies, and was associated with differential treatment outcomes.

As others have noted, however, treatment adherence is not a unitary construct (Dobson & Shaw, 1988; Moncher & Prinz, 1991) and may best be understood when evaluated from multiple perspectives. The multifaceted nature of adherence may be particularly applicable for complex interventions such as MST, in which the guidelines for intervention are flexible and intended to fit the individual needs and strengths of the family. Adherence for flexible and complex treatment models may vary considerably depending on the meaning ascribed by treatment participants. For this reason, the present study improved on traditional means of evaluating fidelity by asking caregivers, adolescents, and the therapists to rate how well therapists were adhering to MST in their family sessions. Results indicated that the factor structure of adherence varied considerably depending on the source of information, suggesting that informants held distinct notions regarding how adherence should be construed. In light of previous research showing that various informants tend to demonstrate different perceptions of treatment process (e.g., Eltz et al., 1995), the lack of interrespondent agreement among participants in the present study was not surprising. Nevertheless, models based on therapist evaluations of adherence should be viewed with caution because therapists often possess many biases that could influence ratings of their own in-session behavior (e.g., Weissman, Rounsaville, & Chevron, 1982). In fact, some researchers argue that therapist adherence is best evaluated through objective ratings of recorded samples of treatment (Elkin, Pilkonis, Docherty, & Sotsky, 1988). For these reasons, future efforts at discerning therapist adherence to child and family treatment models should consider the perspectives of multiple informants that include objective observers as well.

A multi-informant approach was also taken with regard to evaluating outcomes. Because variance specific to a reporting agent could have conceivably accounted for outcomes (i.e., single-respondent bias), information was derived from multiple perspectives whenever possible. As others have demonstrated in the context of family-based treatment, latent variable modeling procedures offer an ideal way to effectively use information from various informants (e.g., Spoth, Redmond, & Shin, 1998). However, the multi-informant approach was limited in that there was often low to moderate agreement between youth and caregivers within the constructs, and the component loadings (see Tables 2 and 3) suggested that, generally, caregiver ratings accounted for most of the variance within the models. Also, a potential confound across both studies was that peer and delinquency variables were derived from the same respondent (caregiver ratings on the RBPC). Furthermore, the peer index was derived from a single source (caregiver), composed of only three items, and constructed based on the face validity of the items. However, these problems were mitigated by the fact that the pattern of results were replicated in an independent sample that differed in terms of age, ethnic composition, urban residence, problem severity, and substance abuse history.

Interestingly, two findings, although initially counterintuitive, are partially clarified with a deeper conceptualization of the MST adherence principles. Both findings suggested that requiring family effort in treatment without appropriately engaging family members may be detrimental to outcomes. For youth-rated adherence in the Diffusion sample, results suggested that the indicator Therapist Attempts to Change Interactions contributed negatively to family and peer outcomes. A similar outcome was found in the CDA

sample for the caregiver-rated indicator Therapist-Directed Sessions. Although both factors appeared to reflect positive aspects of adherence as defined by the MST treatment principles, an examination of the items that composed the factors provides some clarification of the issue. For the first factor, Therapist Attempts to Change Interactions, items suggested that therapists were attempting to alter family interactions (e.g., "The therapist tried to change some ways that family members interact with each other" and "The therapist tried to change some ways that family members interact with people outside the family") without adequately gaining the trust of family members (e.g., negative loading for "The family and therapist seemed honest and straightforward with each other"). For the second factor, Therapist-Directed Sessions, items suggest that therapists were requiring the family members to work in treatment (e.g., "The therapist's recommendations required family members to work on their problems every day" and "the therapist recommended that family members do specific things to solve their problems"), but not necessarily in a collaborative fashion. Importantly, low levels of these particular factors were associated with favorable outcomes. Therefore, these results suggest that if therapists take control of sessions without sufficiently engaging family members in treatment, efforts are likely to be unsuccessful or perhaps even detrimental.

Several additional limitations should be noted. First, for logistical reasons, we were unable to examine the mediating role of other important systems (i.e., school setting and neighborhood environment). In recent studies (T. L. Brown, Henggeler, Schoenwald, Brondino, & Pickrel, 1999; Henggeler, Rowland, et al., 1999), however, MST has significantly increased school attendance among youth presenting serious clinical problems. Future studies would benefit from an exploration of the impact of changes across a wider range of ecological settings.

In addition, initial correlations between adherence and the pre-treatment dependent variables suggest that therapist in-session behavior is not only a predictor of outcomes but may also be influenced by initial characteristics of the youth and family. However, because the correlation pattern was ambiguous, it is unclear what the nature of this influence might be. Research by Patterson and colleagues (e.g., Chamberlain, Patterson, Reid, Kavanagh, & Forgatch, 1984; Patterson & Chamberlain, 1988, 1994; Patterson & Forgatch, 1985) has suggested that families who show "resistance" in treatment may "teach" therapists to remain emotionally distant, refrain from implementing skills training, and avoid efforts at engagement. Patient "difficulty" has also been shown to hamper performance among therapists treating adult clients (e.g., Foley, O'Malley, Rounsaville, Prusoff, & Weissman, 1987). It is possible that MST therapists are more likely to withdraw from the client and to stray from core treatment principles when treating families with particularly challenging problems; given the limitations of our data, we were able to examine this possibility at a cursory level only. Clearly, more detailed work is needed regarding how the characteristics of children and families in treatment influence the attitudes and behaviors of therapists.

Another concern relates to the psychometric appropriateness of the adherence measure. Whereas most of our family, peer, and delinquency constructs were derived from well-validated, reliable scales, the adherence measure is an instrument undergoing development. Among the difficulties encountered in the use of this instrument were ceiling effects across a number of items, nonop-

timal item representation for several MST treatment principles, and sample-specific adherence factors that may not generalize to other populations. In spite of these difficulties, the adherence measure performed quite well yielding results across two samples that were consistent with hypotheses regarding the impact of MST. A primary goal for future research is to further refine and validate the MST Adherence Measure.

Finally, a focus on mean adherence scores risks oversimplifying critical aspects of psychotherapeutic process. Because process varies significantly within sessions and throughout the course of treatment, a mean index of therapist adherence may actually obscure sources of variation that may be most related to outcome (Greenberg, 1986; Pinsof, 1988, 1989). Future studies of MST change mechanisms would likely benefit from the use of more complex and labor-intensive procedures for assessing adherence/process than were available for this study. For these reasons, the present study should be considered an initial step toward discerning the complex mechanisms through which MST contributes to behavior change.

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