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Treatment Techniques and Outcomes in Multidimensional Family Therapy for Adolescent Behavior Problems

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Abstract

The link between treatment techniques and long-term treatment outcome was examined in an empirically supported family-based treatment for adolescent drug abuse. Observational ratings of therapist interventions were used to predict outcomes at 6 and 12 months posttreatment for 63 families receiving multidimensional family therapy. Greater use of in-session family-focused techniques predicted reduction in internalizing symptoms and improvement in family cohesion. Greater use of family-focused techniques also predicted reduced externalizing symptoms and family conflict, but only when adolescent focus was also high. In addition, greater use of adolescent-focused techniques predicted improvement in family cohesion and family conflict. Results suggest that both individual and multiperson interventions can exert an influential role in family-based therapy for clinically referred adolescents.

Keywords

family therapy; process–outcome research; treatment techniques; adolescent substance abuse

Psychotherapy process research examines in-session client and therapist behaviors with the goal of understanding the causes and course of change during treatment. The identification of process components that are favorably linked with outcome is instrumental to the development of efficacious treatment models (Orlinsky, Ronnestad, & Willutzki, 2004). Moreover, efforts to transport research-tested models into standard clinical settings will be greatly enhanced when more is known about which aspects of multifaceted treatments actually do the work of crafting change, and how. Theory-guided process research can advance treatment development and dissemination by illuminating the ingredients, mechanisms, and clinical conditions of effective therapy (Liddle, 2004), efforts that are also critical to successful dissemination and adoption of evidence-based psychotherapies (Weisz & Kazdin, 2003).

Process research in family therapy is on the rise. Friedlander, Wildman, Heatherington, and Skowron (1994) reported just over a decade ago that very few family therapy process studies

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had been conducted, and the bulk of these were descriptive reports with small samples. Since the Friedlander et al. review, family therapy process research has increased appreciably in size and rigor, with one recent review (Sexton, Alexander, & Mease, 2004) identifying 20 process studies that examined various mediators and moderators of family therapy effects. This recent surge has been fueled in large part by the emergence of family-based intervention as an empirically supported approach for treating juvenile delinquency (Drug Strategies, 2005) as well as substance abuse in adults (Fals-Stewart & O'Farrell, 2003) and adolescents (Williams, Chang, & Addiction Centre Adolescent Research Group, 2000).

The current study meets a need in family therapy research for process studies that (a) specify theoretically derived treatment techniques with widespread usage by front-line clinicians and (b) are conducted on research-based treatments under controlled conditions to maximize the generalizability and potential impact of findings. We examine key treatment techniques of multidimensional family therapy (MDFT; Liddle, 2002b), a family-based intervention with demonstrated efficacy in treating adolescent substance abuse and related behavioral problems in several randomized trials (Dennis et al., 2004; Liddle, 2002a; Liddle et al., 2001; Liddle, Rowe, Dakof, Ungaro, & Henderson, 2004). The intervention principles of MDFT emphasize that therapists focus on the individual problems, strengths, and goals of the adolescent in addition to focusing on parent issues, parenting and family relationships, and extrafamilial influences.

Specifically, MDFT contains four interdependent treatment domains: adolescents, parents and other family members, family interactional patterns, and extrafamilial systems of influence (described in the Method section). The four domains relate to empirically established areas of risk and protection for youth and families, as well as knowledge about the developmental psychopathology of adolescent drug abuse (Liddle et al., 2000). Each domain is considered critical to the change process, and MDFT therapists work simultaneously in each domain according to the particular risk and protection profile of the given adolescent and family (Liddle, 2002b). Multisource clinical assessment is used to create a blueprint for emphasizing therapist focus on specific issues within each domain and tracking case progress over time (Rowe, Liddle, McClintic, & Quille, 2002). For adolescents, primary risk factors include alienation/isolation, school failure, association with deviant peers, lack of bonding to prosocial institutions, and delinquent activities. MDFT adolescent-focused interventions include alliance building, academic planning with school staff and education resources, discussing friendship choices and consequences, engaging in positive extracurricular activities, drug refusal skills, and anger management and impulse control. For parents and families, primary risk factors include parental disengagement, parental substance abuse, inadequate parenting practices, parental stress and social isolation, family conflict and distancing, and poor communication. MDFT family-focused interventions include parental reconnection, engaging in self-help groups or drug counseling, enhancing monitoring and discipline skills, linking parents with social supports and resources, and working with teens and parents individually and conjointly on communication and interactional skills.

In practice, the four MDFT domains are implemented synergistically, with therapists using adolescent- and family-focused interventions in a complementary and reciprocal manner over the course of treatment and typically within the same session. In addition, adolescent-focused interventions can occur in sessions or session segments with the adolescent alone or in conjoint sessions that also involve family members; the same is true for family-focused interventions. Previous process research on MDFT has verified that clinicians can successfully adopt a multidomain focus on the individual adolescent and the family (G. M. Diamond, Liddle, Hogue, & Dakof, 1999; G. S. Diamond & Liddle, 1996; Hogue, Liddle, Dauber, & Samuolis, 2004; Schmidt, Liddle, & Dakof, 1996). This study looks at MDFT clinicians trained and supervised during a controlled trial of MDFT and cognitive–behavioral therapy (CBT) for adolescent

behavior problems. The main hypotheses of the current study are the following: (a) Both adolescent-focused techniques and family-focused techniques will predict longterm treatment outcomes; (b) greater utilization of prescribed MDFT techniques will be associated with improvement in both adolescent functioning and family relations. The outcomes examined include main MDFT intervention targets for this population: adolescent substance use, adolescent externalizing and internalizing symptoms, family cohesion, and family conflict.

This study expands previous process–outcome research conducted on participants in the same clinical trial. Hogue et al. (2004) investigated links between in-session therapeutic focus and adolescent outcomes at treatment discharge in MDFT versus CBT. We found that family-focused techniques, but not adolescent-focused techniques, predicted reductions in drug use, externalizing symptoms, and internalizing symptoms across both treatment conditions. The current study extends the previous work in several important ways. First, this study concentrates on the family therapy condition specifically. It includes a much larger sample of MDFT cases (63 vs. 25) and examines two family environment outcomes that are primary targets of most family-based treatments: family cohesion and family conflict. Second, whereas Hogue et al. examined outcomes at treatment termination only, the current study covers longitudinal outcomes at 6 months and 12 months after termination. Third, the current study contains several methodological upgrades, including sampling of multiple sessions per case and use of rigorous analytic methods to enhance statistical validity: data imputation, three-mode factor analysis, and control for therapist effects.

Method

Participants

The sample for this study was composed of 63 substanceabusing adolescents receiving MDFT during a randomized clinical trial (n = 224). Eligible adolescents were between the ages of 13 and 17, were currently using illicit drugs, and had a caregiver able to participate in assessment and treatment sessions. Exclusion criteria included a history of mental disability or organic disorder, the need for inpatient detoxification, and suicidal ideation. The 63 cases selected for inclusion in the current study were those MDFT cases that had completed a pretreatment assessment, at least one follow-up assessment (6- or 12-month), and at least one videotaped therapy session. Selected cases attended an average of 13.8 sessions (SD = 8.4); 37% of the sample dropped out of treatment before having completed 10 sessions. Active consent from care-givers and active assent from adolescents were collected in writing from all participants. The study was conducted with active approval of the governing Internal Review Board.

The sample for this study was 83% male, with an average age of 15.1 years (SD = 1.3). The ethnic composition was 71% African American, 19% European American, and 10% Hispanic American. Fifty-three percent of the adolescents were living in single-parent households, 25% were living with both biological parents, and 22% had various other family compositions. Seventy-one percent of mothers and 86% of fathers had completed at least a high school education. Yearly household income was less than $10,000 for 27% of the sample. The majority of adolescents were enrolled in school at intake (87%). Sixty percent had been arrested or had some other trouble with the law in the past year, and 14% had previously received treatment for alcohol or drug use.

According to parent and adolescent reports on the Diagnostic Interview Schedule for Children —2nd version (Fisher, Wicks, Shaffer, Piacentini, & Lapkin, 1992), 94% of the sample had at least one psychiatric diagnosis, 83% had at least two diagnoses, and 51% had at least three diagnoses. In terms of substance use, 21% met criteria for alcohol dependence, 73% met criteria for marijuana dependence, 13% met criteria for marijuana abuse, and 21% met criteria for dependence on other substances. In addition, 79% were diagnosed with an externalizing

disorder, most commonly conduct disorder or oppositional disorder, and 60% were diagnosed with an internalizing disorder.

Summary of Findings From the Original Clinical Trial

The original randomized clinical trial from which study participants were drawn (Liddle, 2002b) included 112 MDFT and 112 CBT cases. Overall, findings indicated that both CBT and MDFT significantly reduced substance use. But compared with CBT, youth in MDFT evidenced sustained treatment effects up to 1 year after termination from treatment, showing significantly greater reduction in psychological involvement with drugs and frequency of drug use other than cannabis. Also, compared with CBT, youths in MDFT were significantly more likely to be abstinent at 1-year follow-up.

Sampling Bias

Sample bias analyses were conducted to determine whether the 63 MDFT participants selected for this study differed significantly from the overall clinical trial sample of 112 MDFT cases. For baseline variables, the larger sample had a significantly higher rate of alcohol abuse, $\chi^2(1, N = 112) = 5.33$, $p < .05$, whereas the subsample had a higher rate of abuse of other drugs, $\chi^2(1, N = 112) = 4.74$, $p < .05$. For the five outcome variables (drug use, externalizing, internalizing, cohesion, and conflict) across all three time points (intake, 6-month follow-up, and 12-month follow-up), only one significant difference was found: The study sample had lower externalizing scores at 12 months, $t(62) = -2.74$, $p < .01$.

Many clients in the study sample did not participate in follow-up assessments at one or both time points, and for some cases only the adolescent or the parent participated (i.e., missing by attrition). Also, in some instances clients failed to complete all required items for a given outcome variable (i.e., missing by incompletion). At 6-month follow-up, 21% were missing the drug use variable, 11% were missing the internalizing and externalizing variables, 14% were missing the cohesion variable, and 19% were missing the conflict variable. At 12-month follow-up, 18% were missing the drug use variable, 40% were missing the internalizing and externalizing variables, 13% were missing the cohesion variable, and 18% were missing the conflict variable. To maximize sample size for the current study, we used data imputation procedures to estimate missing data on the outcome variables. Data were imputed following the procedures of Multiple Imputation (MI; Rubin, 1987) using the computer software NORM (Schafer, 1999). MI carries out the imputation in a separate step from the data analysis, allowing variables that will not be included in the analyses (e.g., demographics that may be predictive of missingness, number of sessions completed) to be part of the imputation model, thereby strengthening its precision (Schafer & Graham, 2002). MI assumes that data are missing at random but is also extremely robust against possible violations of the missing-at-random hypothesis (Collins, Schafer, & Kam, 2001), and it corrects biases inherent in analyses with missing data (Schafer & Graham, 2002).

Descriptive statistics for each of the imputed variables were examined for each of the five imputed data sets. The distributional properties of the imputed variables did not differ from those of the observed data. Also, independent-sample *t* tests comparing the observed scores with imputed scores derived from combining results across the five imputed data sets (Rubin, 1987) found no significant differences on any variable. Therefore, imputed scores were used as outcome variables in all analyses.

Therapists and Treatment Fidelity

The five MDFT therapists (three female and two male) ranged in age from 29 to 54 years ($M = 40$) and included three African Americans and two European Americans. Four of the therapists had master's degrees and one had a doctorate, with an average of 7.7 years ($SD =$

4.5) postgraduate experience in family therapy. The five therapists treated between 9 and 17 cases apiece (M = 12.6, SD = 3.6). Treatment integrity for MDFT in the larger randomized trial was established in a previous study (Hogue et al., 1998), which contained an earlier version of the process measure used in the current study—the Therapist Behavior Rating Scale (TBRS). The fidelity study demonstrated that the TBRS reliably distinguished implementation of MDFT versus CBT, but it did not link implementation to outcome.

Description of the MDFT Model

Multidimensional family therapy (Liddle, 2002b) is a manualized treatment for adolescent drug abuse and related behavior problems that seeks to reduce psychological symptoms and enhance developmental functioning by facilitating change in several behavioral domains. In this clinical trial, the model was designed for office-based, weekly sessions conducted over 16–24 weeks. MDFT has four interdependent treatment domains that target multiple aspects of adolescent and family functioning. The *adolescent domain* includes interventions that aim to engage adolescents in treatment and build therapeutic alliance; help adolescents learn more about their feelings and thinking patterns, communicate effectively with parents and other adults, effectively solve social problems, and control anger and impulses; and help adolescents gain social competence and develop alternative behaviors to drug use. The *parent domain* includes interventions designed to engage parents in treatment, increase the level of behavioral and emotional involvement with their adolescents, and improve parental monitoring and limit setting. In the *interactional domain*, adolescents and their families attend sessions jointly, enabling the therapist to directly observe and facilitate change in family interactional patterns. The focus is on improving emotional attachments and patterns of communication. The *extrafamilial domain* seeks to establish collaborative relationships among all social systems in which the adolescent participates and to foster a greater sense of family competency and involvement in these key institutions.

Procedures

Videotape sampling design—To select a representative sample of sessions from each case, treatment was divided into three videotape sampling phases: Phase 1 (Sessions 1–5), Phase 2 (Sessions 6–14), and Phase 3 (Sessions 15–25). One session was randomly selected for coding from each sampling phase for which at least one session had occurred. In this way the totality of the treatment process for each case could be sampled, such that cases longer in duration had more sessions sampled. Study cases lasted a total of 14 sessions on average (SD = 8.38). Fifty-one percent of the sample (n = 32) had sessions in all three phases, 21% (n = 13) had sessions in two of the phases (usually Phases 1 and 2), and 28% (n = 18) had sessions in one phase only (usually Phase 1). Overall, there were 61 tapes in Phase 1, 48 in Phase 2, and 32 in Phase 3, for a total of 141 coded tapes.

Rater training—Raters were 11 undergraduate psychology students (9 female, 2 male), including 2 African Americans, 5 European Americans, and 4 Hispanic Americans. Raters were trained in weekly 2-hr meetings over 5 months and demonstrated acceptable item-level interrater reliability (intraclass correlation [ICC; Shrout & Fleiss, 1979] > .60) before coding study tapes. Raters met weekly throughout the study to reinforce key training elements and prevent rater drift. Sessions were coded in their entirety, which ranged from 30 to 90 min and averaged 60 min. Raters were naive to session number, and no rater coded more than one session per case.

Outcome Measures

Timeline Follow-Back Interview—The Timeline Follow-Back Interview (Sobell & Sobell, 1996) measures quantity and frequency of daily consumption of drugs using a calendar

and other memory aids to gather retrospective estimates. The Timeline Follow-Back Interview is reliable and valid for the measurement of alcohol consumption and cigarette and cannabis use (Sobell & Sobell, 1996). Criterion validity has been established by comparing self- and collateral reports, as well as self-reports and records of verifiable events such as hospitalization and incarceration (Fals-Stewart, O'Farrell, Freitas, McFarlin, & Rutigliano, 2000). The current study measured the number of days the adolescent smoked marijuana out of the previous 30 days.

Child Behavior Checklist (CBCL) and Youth Self-Report Externalizing and Internalizing dimensions—The Revised CBCL (Achenbach, 1991a) is a widely used parent-report measure that assesses children's behavioral problems and social competencies. The CBCL contains groupings of Externalizing (delinquent and aggressive) and Internalizing (withdrawn, anxious/depressed, somatic complaints) symptoms. One-week test–retest reliability of .93 and interparent reliability of .66 for Internalizing and .80 for Externalizing have been shown (Achenbach, 1991a). Content and criterion validity are supported by the ability of CBCL items to discriminate between matched referred and nonreferred youth (Achenbach, 1991a). Note that CBCL variables were examined at 6-month follow-up only because the rate of missing data at 12- month follow-up was prohibitively high. The Youth Self-Report (Achenbach, 1991b) is a youth-report version of the CBCL with equivalent items, dimensions, and psychometric properties. Because no overall change in Youth Self-Report internalizing symptoms was found for either treatment condition, that variable is not included in study analyses.

Family Environment Scale Cohesion and Conflict subscales—The Family Environment Scale (Moos & Moos, 1986) is a self-report measure completed separately by the adolescent and the parent(s). It contains 90 true-or-false items about family home life. Test–retest reliability estimates for its 10 subscales range from .68 to .86 over a 2-month period, and internal consistencies range from .61 to .78 (Moos & Moos, 1986). The Family Environment Scale has been used to distinguish between normal families and families with drug-abusing adolescents (Friedman & Utada, 1992). This study examined adolescent report data only, for three reasons. First, individual teen and parent reports of family functioning typically show low to moderate levels of agreement (Jacob & Windle, 1999), so that they can be practically regarded as independent appraisals. Second, arguably the most challenging and important task for family therapists working with this population is to facilitate positive change in the family system that is acknowledged by the adolescent. Third, the amount of missing parent report data in this sample was prohibitively high.

Process Measure: Therapist Behavior Rating Scale (TBRS)

The TBRS (Hogue et al., 1998) is an adherence process coding instrument designed to identify therapeutic techniques prescribed by MDFT and CBT. Adherence process measures yield multivariate data on treatment implementation that can be used for fidelity evaluation and for quantitative research on psychotherapy process (Hogue, Liddle, & Rowe, 1996). The TBRS has previously demonstrated sound psychometric properties in studies of MDFT fidelity (Hogue et al., 1998) and process–outcome links (Hogue et al., 2004). Two categories of MDFT interventions were coded for this sample: 13 *therapist technique* items, based on therapist behavior only, and 5 *session focus* items, based on the content of therapist–client discussions. These scale items represent key interventions prescribed by MDFT; also, many of the family-focused items (see below) are common to other family therapies and ecological treatments. For both kinds of items, raters estimated the extent to which items were observed during an entire session using a 7-point Likert scale ranging from *not at all* (1) to *extensively* (7). Both thoroughness (depth, complexity, or persistence) and frequency were considered in each rating. Each TBRS item was scored by two raters, and scores were averaged to create one final score

for each item. Interrater reliability was estimated with ICC (Shrout & Fleiss, 1979). ICCs for each item ranged from .51 to .89, with one item at .31. This latter item was retained because it did not detract from the reliability of the averaged factor scores.

In a previous study (Hogue et al., 2004), a principal-components analysis of TBRS items was conducted on a small subsample (n = 51) from the larger randomized trial that included both MDFT sessions and CBT sessions. That analysis yielded two factors, Family Focus and Adolescent Focus. Given the small sample size of that study, we reanalyzed the factor structure of the TBRS to determine whether the previously established factors would retain for the expanded sample of the current study. We also increased the rigor of the factor analysis by using three-mode factor analysis (Gorsuch, 1983). Three-mode factor analysis incorporates all three sources of variance—person, variable, and occasion—and compensates for confounds related to nonindependence of observations and uneven distributions of observations within the sample (Gorsuch, 1983). The three-mode method allowed us to include sessions from multiple phases of treatment (Phases 1, 2, and 3) for each client, which enhances the power and generalizability of the analysis.

The three-mode factor analysis yielded basically the same two factors found in Hogue et al. (2004): *Family Focus* and *Adolescent Focus*. Moreover, the specific items loading on each factor were almost identical to those in the previous study. The 11 items composing the Family Focus scale, in order of highest factor loading, are “Encourages discussions about core relational themes”; “Enhances communication and attachment among family members”; “Session focus on family relationship issues”; “Arranges, coaches, and processes multiparticipant interactions in session”; “Discusses parental monitoring and family rules/caretaking”; “Discusses parental involvement in adolescent ecosystem”; “Targets participants other than the adolescent for change”; “Collaborates with parent(s) by instilling hope and involving them in treatment goals”; “Encourages client to experience and express affect in session”; “Presents knowledge about normative adolescent development”; and “Prepares various participants individually for upcoming in-session interactions.” The 7 items composing the Adolescent Focus scale are “Engages adolescent in conversation about non-familial ecosystem”; “Session focus on peer issues and youth culture”; “Session focus on drug use and drug culture”; “Focuses on parent’s non-parenting life as an adult person” (reverse scored); “Establishes and maintains adolescent investment in therapy and/or treatment goals”; “Session focus on school issues and prosocial activities”; and “Session focus on antisocial activities and juvenile justice system.”

Results

Part I: Preliminary Analysis of Process Data

Reliability of the process variables—Interrater reliability and internal consistency were strong for both factors. For Family Focus, $ICC_{(1,2)} = .74$ and Cronbach’s $\alpha = .77$; for Adolescent Focus, $ICC_{(1,2)} = .90$ and Cronbach’s $\alpha = .72$.

Process variable descriptive data—Descriptive statistics for Adolescent Focus and Family Focus were calculated for the 63 MDFT cases. For all cases with two (n = 13) or three (n = 32) observed sessions, scores were averaged across sessions to generate a single scale score for each case. Scores on Adolescent Focus ranged from 1.79 to 4.79 across cases, with a mean of 3.14 (SD = 0.64). Family Focus scores ranged from 1.41 to 3.64, with a mean of 2.64 (SD = 0.49). The two process variables were not correlated, Pearson’s $r(63) = -.14$, ns, in keeping with MDFT principles regarding the importance of independently emphasizing adolescent issues and family relations issues in sessions.

Therapist main effects—Therapist main effects refer to potential differences (i.e., heterogeneity) among multiple therapists in a given study with respect to mean scores for implementing treatment models or producing client outcomes (Crits-Christoph & Mintz, 1991). This study examined therapist effects for both process and outcome variables. First, therapist differences in utilization of adolescent- and family-focused techniques were examined in two separate analyses of variance, in which therapist was entered as a fixed-factor independent variable and the process variable as the dependent variable. Second, therapist differences in outcomes were examined in 10 separate analyses of covariance, one for each of five outcomes at both time points. In these analyses, therapist was entered as a fixed-factor independent variable, pretreatment score on the given outcome as a covariate, and posttreatment outcome score (at 6 or 12 months) as the dependent variable. No significant main effects for therapist were found for any variable.

Dose of treatment technique across therapy phases—To examine the dose of treatment techniques over the course of therapy, we conducted within-group analyses separately on Adolescent Focus and Family Focus scores for the 32 cases with sessions in all three sampling phases. Dependent *t* tests compared Phase 1 versus Phase 2 and then Phase 2 versus Phase 3 of therapy. There was no change in Adolescent Focus across phase: Phase 1 ($M = 2.94$, $SD = 0.75$), Phase 2 ($M = 3.02$, $SD = 0.87$), and Phase 3 ($M = 3.02$, $SD = 0.81$). There was a significant effect for Family Focus: Phase 1 ($M = 3.01$, $SD = 0.61$), Phase 2 ($M = 2.62$, $SD = 0.72$), and Phase 3 ($M = 2.39$, $SD = 0.62$), with Phase 1 scores being greater than Phase 2 scores, $t(31) = 2.53$, $p < .05$. Overall, degree of Adolescent Focus remained constant across treatment for cases that remained in treatment for at least 13 sessions, whereas Family Focus declined over time.

Part II: Process–Outcome Analyses

Overview of the analytic strategy—Hierarchical regressions were conducted to investigate whether the two process variables predicted treatment outcome for each outcome variable separately at each follow-up time point. In all regression equations, pretreatment level of the outcome variable was entered in Step 1, the two process variables (Family Focus and Adolescent Focus) in Step 2, and the interaction between the two process variables in Step 3; 6- and 12-month outcomes were the dependent variables. This order of entry permits strong inference about how well a given process variable (Step 2) and interaction term (Step 3) predict change in a given outcome. Step 2 of the regressions revealed the effect of intervention focus on treatment outcome across all levels of baseline symptomatology. Step 3 revealed whether Adolescent Focus moderated the impact of Family Focus on outcome. Each regression was run five times, once on each of the five imputed data sets. The parameter estimates and standard errors from the five sets of results for each regression were combined using NORM (Schafer, 1999) to yield one final result. Note that entering both process variables simultaneously in Step 2 allows each variable to be tested while controlling for the effects of the other. This yields a conservative test of process–outcome relations, because the process variable being controlled is a generic control for intervention dose that also serves as a proxy for overall level of therapist activity.

Because clients were not all treated by the same therapist, therapist clustering effects were a concern. Therapist clustering effects (or the inverse: client nesting effects) refer to the fact that the error terms of outcome data from clients treated by the same therapist are likely to be correlated, which can lead to biased standard errors of parameter estimates and inflated Type I error rates when using ordinary least squares regression (Wampold & Serlin, 2000). Mixed effects modeling addresses this problem by directly analyzing the covariance structure of the data using maximum likelihood estimation, incorporating estimates of random error into standard error calculations. We used SAS Proc Mixed (SAS Institute, 2000) to model random

error for the therapist factor and thereby control for clustering effects in all process–outcome analyses.

Regression diagnostics—Extensive regression diagnostics were carried out to screen for multivariate outliers. For each regression, Studentized residuals, leverage, Cook's *D*, and standardized dfbeta were examined (Tabachnick & Fidell, 2001). These indices were examined within each of the five imputed data sets. Within each data set, cases above the critical value on at least two indices were determined to be outliers in that data set. Only cases that were outliers in all five data sets for a particular regression were labeled as confirmed outliers. Each equation produced between one and four outliers, all belonging to different cases. All regressions were run twice, with and without the outliers. The results reported are those with outliers removed. Removing outliers increased the *p* value of two outcomes from $p < .05$ to $p < .10$ and increased the *p* value of one outcome from $p < .10$ to nonsignificance.

Process–outcome results—Results of process–outcome analyses are summarized in Table 1 (results from testing the squared multiple correlation [R^2] are not reported because they are not directly relevant to study hypotheses, which focus exclusively on the salience of the process variable predictors). With regard to adolescent symptomatology, at 6-month follow-up there was a trend-level effect for Family Focus on parent-report externalizing ($B = -4.79$, $p < .10$, Cohen's $d = .45$) and internalizing symptoms ($B = -3.45$, $p < .10$, Cohen's $d = .48$). In each case, greater use of family-focused techniques predicted symptom improvement. There was also an interaction between Family Focus and Adolescent Focus for externalizing symptoms ($B = -9.29$, $p < .05$). This interaction was probed following procedures outlined by Aiken and West (1991) for two continuous predictor variables. Results showed that greater use of family techniques predicted reduced externalizing when Adolescent Focus was also high ($B = -10.74$, $p < .01$, $d = .76$) but not when Adolescent Focus was low ($B = 1.16$, $p = .75$).

With regard to family functioning, at 6 months there was an interaction between Family Focus and Adolescent Focus for family conflict ($B = -2.14$, $p < .05$). Probing revealed that Family Focus predicted reduced conflict at trend level when Adolescent Focus was high ($B = -1.57$, $p = .11$, $d = .42$); in contrast, when Adolescent Focus was low the effect of Family Focus did not reach trend level ($B = 1.16$, $p = .21$) but nevertheless suggested that greater use of family techniques was somewhat associated with *increased* conflict. At 12 months, Family Focus predicted increase in family cohesion ($B = 1.36$, $p < .01$, $d = .68$). In addition, greater use of adolescent techniques predicted increase in family cohesion ($B = 0.91$, $p < .05$, $d = .61$) and a trend for decrease in family conflict ($B = -0.79$, $p < .10$, $d = .48$).

Discussion

This study found that the central therapeutic techniques of a manualized, empirically supported family-based therapy for adolescent drug abuse and related behavior problems predicted long-term outcomes for both adolescent behavioral symptoms and family process characteristics. Greater use of family-focused techniques during treatment was related to decrease in adolescent internalizing symptoms at 6 months after treatment and increase in family cohesion at 1 year. Family focus also predicted reduced externalizing symptoms and family conflict at 6 months, but only when adolescent focus was high. Greater use of adolescent-focused techniques was related to increase in family cohesion and decrease in family conflict at 1 year after therapy. All significant effect sizes were in the medium or large range, indicating that reported findings are relatively robust.

As hypothesized, family-focused techniques that are traditional staples of family therapy—articulating core relational themes with parents and teens, enhancing family communication and attachment, shaping family interactions (i.e., enactment), and so forth (see G. S. Diamond

& Liddle, 1996, 1999)—predicted long-term improvement in adolescent symptoms and family functioning. These results extend the findings from Hogue et al. (2004), which reported a relation between MDFT family techniques and internalizing symptoms at treatment discharge. Also, these process–outcome findings linking family techniques to improved family cohesion complement family therapy outcome studies that report clinical gains in family functioning as well as youth outcomes.

An important finding was the fact that adolescent-centered interventions featured within a family-based treatment model uniquely predicted improvements in some client outcomes and moderated the impact of family interventions on others. A hallmark of the MDFT model is the emphasis placed on working directly with the individual teen in conjunction with individual work with the parent, the family as a unit, and extrafamilial influences (Liddle, Rodriguez, Dakof, Kanzki, & Marvel, 2005). Thus, in addition to meeting conjointly with family members, MDFT therapists meet alone with adolescents on a regular basis, work to establish and maintain a therapist–adolescent alliance, focus on drug use and alternatives to same, build individual social skills, and address other developmental tasks as needed. Within-group analyses across therapy phases revealed that clients in this study received a consistent dose of adolescent techniques on a par with or even greater than family techniques. Moreover, for some outcomes family focus had potent effects only when adolescent focus was strong as well. Taken together, study results indicate that therapists were maximally effective across several domains of functioning when blending a high-dose mix of both family and adolescent techniques, per MDFT protocol specifications.

The clinical impact of both family and adolescent focus in this sample not only confirms a key MDFT intervention principle (need for a variety of individual and systemic foci) but also supports continued development of integrative approaches to adolescent drug abuse that target the individual, family, and larger ecosystem in a coordinated manner (e.g., Latimer, Winters, D'Zurilla, & Nichols, 2003). Although we found that neither adolescent nor family techniques as measured in this study predicted reductions in drug use, main outcomes from the randomized trial show that MDFT significantly reduced substance use up to 1 year following treatment. This is hard evidence that the MDFT therapist interventions measured by the TBRS instrument did not fully capture all curative aspects of the treatment model. Also, adolescent interventions —therapeutic focus on the adolescent's antisocial and prosocial activities, peer relations, and personal agenda in therapy—were primarily associated with gains in family relationship outcomes: cohesion and conflict. There are at least two plausible explanations for this connection between adolescent focus and family change. A concurrent explanation holds that promoting prosocial behavior and community citizenship in high-risk adolescents has direct spillover effects into family citizenship domains. A sequential explanation holds that early improvement in adolescent behavior outside the family has later salutary effects on family relations by means of positive family attributions and reduced family stress. Whatever the case, family therapists have long argued that therapeutic focus on broad-based adolescent development produces tangible payoffs in family harmony down the road. To this end, a few studies (e.g., Huey, Henggeler, Brondino, & Pickrel, 2000) have empirically linked change in adolescent functioning to change in family functioning during family therapy.

A major limitation of the current study is its exclusive focus on the technical aspects of treatment. Nontechnical process components, such as therapeutic alliance, may be equally or more responsible for good outcomes (Horvath & Symonds, 1991) and may interact with treatment techniques in complex ways (Feeley, DeRubeis, & Gelfand, 1999). Likewise, this study measured only the extensiveness, not the quality, of therapist interventions. The study measured randomly selected sessions only—between one and three per case—providing only a snapshot of the full course of treatment for any given client. Also, the study used an adherence process measure that examined therapist behavior only and thus did not capture the dynamic,

bidirectional process of therapist–client interactions that is at the heart of theories of change in family therapy (Sexton et al., 2004). This study did not address the issue of the causal relation between changes in family functioning and changes in individual functioning. To disentangle questions about mechanisms of treatment effect, new measurement designs are required that assess processes and outcomes repeatedly over the course of treatment and beyond (Kazdin & Nock, 2003). In addition, only adolescent-report data were available for measuring family functioning, which is a significant deficit in the measurement of family-level phenomena. Finally, with regard to study generalizability, it is important to note that study participants were a hard-to-engage, hard-to-treat sample of inner-city, juvenile-justice-involved, primarily male, primarily ethnic minority adolescents and their families.

The process–outcome correlations found in this study do not imply that, when it comes to specific treatment techniques, “more is better” in a linear dose–response fashion (Stiles & Shapiro, 1994). Results indicate only that relatively extensive use of these techniques was associated with relatively large changes in key outcomes for this sample. These findings provide empirical validation for the salience of commonly used family therapy techniques that are practiced to some degree by family therapists of almost every persuasion. Results also endorse the potential utility of adolescent interventions in family therapies other than MDFT, especially treatments for adolescents whose developmental problems include substance abuse and related behavioral symptoms.

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Table 1

Results of Process–Outcome Analyses for Adolescent Outcomes and Family Functioning at 6- and 12-Month Follow-Up

	Pretreatment symptoms			Family focus (FF)			Adolescent focus (AF)			FF × AF		
Variable	***B***	***SE B***	***t***	***B***	***SE B***	***t***	***B***	***SE B***	***t***	***B***	***SE B***	***t***
6-mo. drug use[a]	0.21	0.14	1.54	1.12	2.77	0.40	−2.52	1.73	−1.46	−2.76	4.14	−0.67
6-mo. externalizing[b]	0.76**	0.11	6.83	−4.79†	2.77	−1.73	−1.56	2.03	−0.77	−9.29*	3.90	−2.38
6-mo. internalizing[b]	0.56**	0.12	4.61	−3.45†	1.85	−1.87	−1.32	1.41	−0.93	−4.57	2.89	−1.58
6-mo. externalizing[a]	0.56**	0.11	5.20	0.88	2.63	0.34	0.57	1.67	0.34	3.56	3.84	0.93
6-mo. cohesion[a]	0.31*	0.13	2.37	−0.05	0.51	−0.09	0.29	0.44	0.65	0.54	0.77	0.70
6-mo. conflict[a]	0.23	0.17	1.41	−0.38	0.72	−0.52	−0.56	0.45	−1.23	−2.14*	0.98	−2.19
12-mo. drug use[a]	0.15	0.11	1.39	−0.64	1.82	−0.35	0.94	1.34	0.70	−4.28	2.81	−1.53
12-mo. externalizing[a]	0.40	0.12	3.33	0.96	2.30	0.42	−1.44	1.68	−0.86	−5.68	3.35	−1.70
12-mo. cohesion[a]	0.19	0.17	1.11	1.36**	0.51	2.68	0.91*	0.38	2.42	−0.27	0.77	−0.35
12-mo. conflict[a]	0.24†	0.14	1.78	−0.09	0.58	−0.17	−0.79†	0.42	−1.89	−0.58	0.85	−0.68

Note. All *B* coefficients are values generated from the predictor's original point of entry into the equation.

[a] Adolescent-report measure.

[b] Parent-report measure.

† p < .10.

* p < .05.

** p < .01.