Multidimensional Family Therapy for Young Adolescent Substance Abuse: Twelve-Month Outcomes of a Randomized Controlled Trial

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Research has established the dangers of early onset substance use for young adolescents and its links to a host of developmental problems. Because critical developmental detours can begin or be exacerbated during early adolescence, specialized interventions that target known risk and protective factors in this period are needed. This controlled trial ($n = 83$) provided an experimental test comparing multidimensional family therapy (MDFT) and a peer group intervention with young teens. Participants were clinically referred, were of low income, and were mostly ethnic minority adolescents (average age = 13.73 years). Treatments were manual guided, lasted 4 months, and were delivered by community agency therapists. Adolescents and parents were assessed at intake, at 6-weeks post-intake, at discharge, and at 6 and 12 months following treatment intake. Latent growth curve modeling analyses demonstrated the superior effectiveness of MDFT over the 12-month follow-up in reducing substance use (effect size: substance use frequency, $d = 0.77$; substance use problems, $d = 0.74$), delinquency ($d = 0.31$), and internalized distress ($d = 0.54$), and in reducing risk in family, peer, and school domains ($d = 0.27, 0.67,$ and $0.35,$ respectively) among young adolescents.

Keywords: young adolescents, adolescent substance abuse, delinquency, Multidimensional Family Therapy

Substance use and abuse among early adolescents continue to be significant public health concerns. Although most recent national data trends show decreases in eighth-grade substance use, (Johnston, O'Malley, Bachman, & Schulenberg, 2008), 13% of

eighth graders have reported use of an illicit drug in the past 12 months, and 5.5% have reported having been drunk in the past 30 days. Age of onset is one of the most powerful predictors of later substance use disorders, and longitudinal studies confirm that early initiators are at extremely high risk for serious and chronic substance abuse problems and a range of deleterious developmental outcomes (Flory, Lynam, Milich, Leukefeld, & Clayton, 2004). In fact, initiation of substance use and conduct problems before 15 years of age are among the strongest and most consistent predictors of chronic offending, depression, school failure and unemployment, relational problems with peers and family members, and low self-esteem throughout adolescence and into adulthood (Anthony & Petronis, 1995; McGue & Iacono, 2005). There is also increasing concern about the strong links between early onset substance use and closely correlated risky sexual behaviors that may lead to unplanned pregnancies, sexually transmitted diseases, and HIV infection (Stueve & O'Donnell, 2005). Even moderate use in the early adolescent years may compromise motivation and school achievement (Baumrind & Moselle, 1985; Friedman, Bransfield, & Kreisher, 1994), and these early initiators may develop a pattern of regular use before they are cognitively able to assess risks and possible consequences of use (Johnston, O'Malley, & Bachman, 2003).

Examination of clinical samples reveals that the majority of individuals who go on to develop substance abuse problems initiated use in early adolescence (Dennis & Scott, 2007). With teens, 85% of the 600 youths entering outpatient treatment for marijuana

abuse or dependence in the Cannabis Youth Treatment Study started using before 15 years of age (Dennis et al., 2004). Looking retrospectively at clinical samples of adults from a "treatment careers" perspective, individuals who initiate substance use before 15 years of age take an average of 29 years to achieve 1 year free of substances (vs. 18 years for those who start using after 20 years of age); however, if treatment is initiated within 10 years of initial drug use, the average time to achieve a year of recovery is cut in half, that is, 14.5 years (Scott, Dennis, & Foss, 2005). On the basis of these data, early intervention with those who initiate substance use during the early adolescent years remains a missed opportunity for many individuals. For treatment researchers and providers, the clinical challenge is to slow or halt the progression of early stage problems before these destructive behavioral patterns become ingrained and highly resistant to change (Tucker, Ellickson, Orlando, Martino, & Klein, 2005). For these reasons, policy makers, researchers, and clinicians agree that early adolescence is a critical period for interventions to reduce early-stage drug use and delinquency (Lerner, 1993; Lynam, 1996).

Risk factors for early adolescent substance abuse have been identified (Hawkins, Catalano, & Miller, 1992), and this knowledge has been utilized by intervention researchers to develop interventions to target the most vulnerable individuals (Dishion, Kavanagh, Schneiger, Nelson, & Kaufman, 2002). Clustering into four important domains—individual, family, peer, and school influences—risk factors are interrelated, and they have cumulative effects on trajectories of drug abuse and delinquency (Brook, Whiteman, Finch, & Cohen, 1998). Experts in developmental epidemiology of substance abuse suggest that substance use during early adolescence disrupts necessary adolescent-stage developmental processes (Clayton, 1992), facilitating deviation from protective influences, such as family and school ties, and the adoption of a constellation of deviant attitudes, activities, associations, and behaviors (Anthony & Petrnois, 1995; Lynskey et al., 2003).

Treatment model developers now routinely adapt their interventions on the basis of risk factors and client characteristics (including individual and contextual factors) in different developmental stages (National Registry of Evidence-Based Programs and Practices [NREPP], 2007). However, despite these basic research and clinical advances, the well-established negative trajectories of early initiators, and subsequent policy recommendations (Carnegie Council on Adolescent Development, 1995), few adolescent drug abuse treatment studies have focused on young adolescents. In fact, Williams and Chang (2000) have reported that 90% of adolescent substance abuse treatment studies had samples with an average age of between 15 and 17 years, and most studies included few young adolescents. Although significant progress has been made in the adolescent substance abuse specialty over the past decade (Dennis, 2003), there remains an inadequate empirical basis from which to make informed clinical decisions about the most effective interventions for young teens who have initiated substance use. Although there is currently a wealth of knowledge about effective treatments for older adolescent substance abusers, these findings may not apply to young teens, who have unique developmental issues and needs (Steinberg, 1991). Clearly, research is needed on early interventions for those youths already showing symptoms—teens who are most vulnerable for chronic substance abuse and a host of other problems.

Group treatment for substance abuse continues to be the most widely used intervention in public sector clinical work with adults (National Institute on Drug Abuse, 2007) and teenagers (Kaminer, 2005). Although controversy exists about its potential because of demonstrated iatrogenic effects (Dishion, McCord, & Poulin, 1999), group therapy with teens has not been found to demonstrate negative effects by other investigators and reviewers (Burleson, Kaminer, & Dennis, 2006; Weiss et al., 2005). Group approaches can be well defined, are capable of being manual guided, have been tested in a variety of adolescent treatment studies, and have demonstrated clinical and cost effectiveness (Dennis et al., 2004; French et al., 2008). However, their success has been demonstrated mainly with middle and older adolescents (Dennis et al., 2004; Kaminer, 2005), with less research attention on younger teens.

Another approach is the use of comprehensive treatments to intervene with the family and the youth's natural environment. Research clearly shows that adolescent development occurs in an ecology of nested systems; critical familial influences (such as parental monitoring) as well as access to peers who use drugs and opportunities to use drugs are impacted by community contexts. Thus, ecological–contextual intervention models have been recommended (Biglan, 1995), particularly for early intervention efforts, given the importance of social contextual factors in shaping developmental trajectories (R. Cohen & Siegel, 1991). These family-based, multiple-systems-oriented interventions are strongly recommended and widely researched (Drug Strategies, 2005). In fact, with adolescents generally, family-based treatments targeting the multiple realms of the teen's functioning and social environment (e.g., Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998; Liddle, 2002) are recognized as among the most promising interventions for substance abuse and related problems. Most research on these models, however, has targeted youths with an average age of 16 years. Thus, although group treatments are widely used and have empirical support, and family-oriented interventions are also identified as among the most effective treatments for teen substance abuse problems (Austin, Macgowan, & Wagner, 2005), less is known about the potential of these treatments with young adolescent substance abusers.

In the present study, we report 1-year outcomes of a controlled effectiveness trial that compared MDFT with peer group therapy with young teens (Liddle, Rowe, Dakof, Ungaro, & Henderson, 2004). In the initial publication, reporting only the pre–post results of this trial, MDFT outperformed a theory-driven, manual-guided peer group therapy model in reducing substance use and specific substance abuse–related problem behaviors over treatment. From pre–post treatment, MDFT youths improved more rapidly in all four targeted domains: individual, family, peer, and school. MDFT adolescents also demonstrated a trend toward comparatively greater reductions in delinquent behavior from pre–post treatment. Because the previously reported results addressed only the intake to treatment discharge period (3–4 months), longer term follow-up would be critical to determine sustainability of treatment effects. In this follow-up study, we hypothesized that through 12 months post-intake, MDFT youths would show less drug use, delinquency, and psychological distress than youths in group treatment; furthermore, given MDFT's greater effects on risk and protective factors in the family, peer, and school domains, outcomes would be sustained at the 1-year follow-up (Liddle et al., 2004).

Method

Participants

This study was implemented at The Village South, Inc., a nonprofit community drug abuse treatment agency in Miami, Florida. To be eligible for study participation, adolescents had to be (a) between the ages of 11 and 15 years; (b) referred for outpatient treatment for a substance abuse problem; (c) living with at least one parent or parent-figure who could participate in the assessments and therapy; (d) not in need of inpatient detoxification or other intensive services; and (e) not actively suicidal, demonstrating psychotic symptoms, or diagnosed as mentally retarded.

Referrals to the study came from juvenile justice (45%), schools (41%), substance abuse/mental health facilities (2%), or other sources such as parents (12%). A total of 130 adolescents and families were screened for the study (see Figure 1). The research coordinator determined whether there was sufficient evidence of substance use even if the adolescent did not self-report use within the past 30 days on standardized measures. For instance, parents may have discovered evidence of drugs in the home, school officials may have had strong reason to suspect substance use, legal charges may have implicated substance use (e.g., drug possession), or the adolescent may have tested positive for substances on urine screens. Of the 130 referrals, 83 (64%) were eligible and consented to participate. The remainder did not meet the study's eligibility criteria, either because their problems warranted more

intensive drug treatment ($n = 39$) or they did not have any indication of substance use but instead needed outpatient treatment strictly for behavioral problems ($n = 8$). These cases were referred to more appropriate services. There were no refusals to participate in the study from the sample of eligible cases ($N = 83$).

A total of 61 male adolescents (74%) and 22 female adolescents (26%) living in Miami, Florida—with an average age of 13.73 years ($SD = 1.1$)—participated in this study. Youths were ethnically diverse: 42% were Hispanic, 38% were African American, 11% were Haitian or Jamaican, 3% were White (non-Hispanic), and 4% were Other. Of the participants, 47% were involved in the juvenile justice system (on probation or awaiting a court hearing). Just over half (53%) resided in single parent homes, and the yearly median family income was $19,000. At intake, 47% of the participants met criteria for substance abuse, and 16% met criteria for substance dependence. Many youths met criteria for a comorbid psychiatric disorder (39% for conduct disorder, 29% for attention-deficit/hyperactivity disorder, and 9% for a depressive disorder).

Procedures

A telephone screening process with referral sources and subsequently with parents established initial study eligibility. Project staff then met with eligible youths and parents in their homes to describe the study and to obtain written informed consent prior to
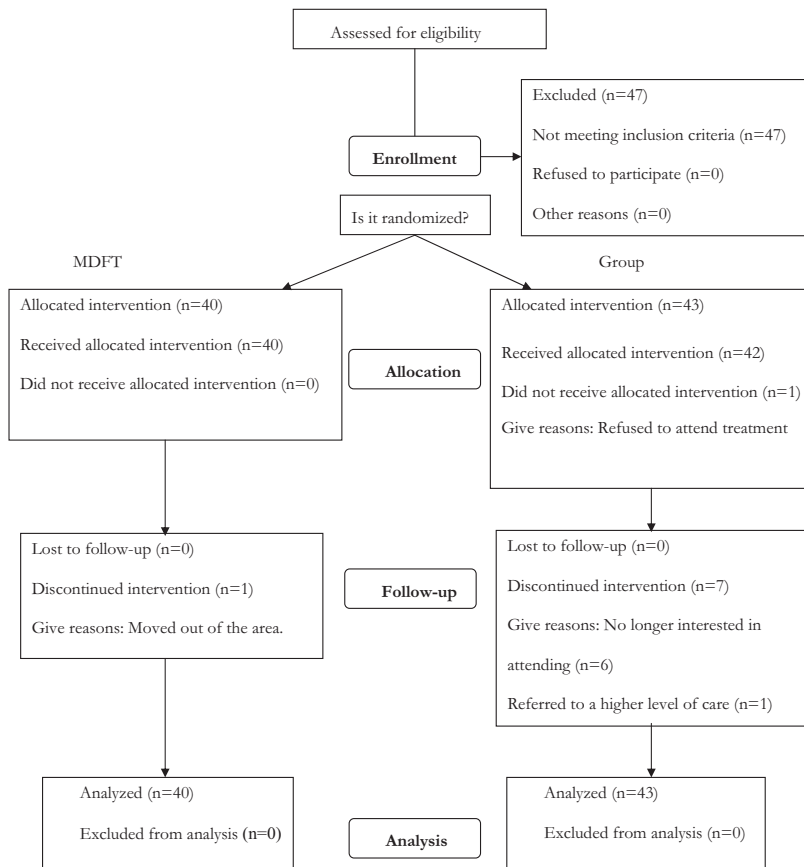

Figure 1. Flow diagram of the progress through the randomized controlled trial. MDFT = Multidimensional Family Therapy.

the first assessment session. Adolescents were randomly assigned to either peer-group therapy ($n = 43$) or MDFT ($n = 40$) after the baseline assessment. The research coordinator used an urn randomization program to ensure equivalence. On four key variables—gender, age, ethnicity, and family income—treatment conditions were confirmed equivalent by preliminary analyses of variance (for continuous variables) or chi-square tests (for categorical variables), which showed no significant between-groups (treatment condition) baseline differences ($p < .05$).

Therapists

Although all therapists were employed by the same community clinic, clinicians in the two intervention conditions had little contact because their offices were in different buildings. Nested within treatment condition, clinicians conducted therapy only in the modality in which they were trained. Therapists held a master's degree in counseling, social work, family therapy, or a related field, and they had equivalent prior experience ($M = 2$ years). Clinicians received 30 hr of initial training as well as ongoing supervision in their respective approaches. Therapists ranged in age from 26 to 47 years ($M = 33$ years) and were mostly female (71%). Of the therapists, 57% were Hispanic, 29% were Black, and 14% were White (non-Hispanic).

Treatment Conditions

Both treatments were conducted twice per week (90-min sessions) for 12–16 weeks. MDFT sessions were conducted mostly in the home, whereas the peer group therapy was conducted at clinic offices. Case management services were provided in both treatments as needed, and separate case managers were assigned to each treatment condition. Both treatments were free of charge, and transportation assistance (i.e., bus tokens) was provided to reduce treatment participation barriers.

Adolescent group therapy. The adolescent group therapy was a manual-guided intervention based on social learning principles and cognitive–behavioral therapy. The approach used empirically established cognitive–behavioral therapy guidelines for adolescent substance abuse (Kaminer, 2005). One therapist led each session, and between 4 and 6 male and female adolescents participated. Groups were "open"—new members were admitted as previous members completed treatment; this approach was designed so that each adolescent could begin treatment as a new content module was beginning and could complete all six modules (each approximately 2 weeks long) in the 12–16 weeks of treatment without significant repetition of content over the course of treatment. Using a risk and protective factor framework, with this treatment we aimed to reduce substance use both by targeting it directly and by focusing on accompanying risk factors/behaviors, such as low self-esteem, school problems, and poor social functioning. Themes of self-management, self-efficacy, and coping with difficult and stressful everyday life events and circumstances were addressed throughout the treatment in six content modules: drug education, self-esteem, values and identity, decision making, personal control, and interpersonal communication. Education (e.g., about drug effects and consequences) was combined with interpersonal and relationship skills training and social support (peer sharing and feedback). Group participation, teaching, and practice (behavioral

rehearsal emphasizing repetition) were core principles. Worksheets and role-plays individualized the generic content. Therapists explored beliefs about drugs, and they used classical relapse prevention methods, including how to understand drug-use triggers, reevaluate and eventually avoid friends who use drugs, improve refusal techniques, recognize automatic thoughts about drug use, and increase prosocial, nondrug related ways to have fun and feel good. Handouts and videotapes (movies, drug use/abuse videotapes) supplemented group discussions. The therapist's stance was active and directive but not confrontational.

Multidimensional Family Therapy (MDFT). MDFT is an integrative, family-based, multiple systems oriented treatment system for adolescent drug abuse and related behavior problems (Liddle, 2002). As a treatment system, several versions of the approach—office-based, in-home, brief, intensive outpatient, day treatment, residential treatment—have been developed and tested (Liddle, Rodriguez, Dakof, Kanzki, & Marvel, 2005). MDFT can be delivered from one to three times per week over the course of 3–6 months depending on the treatment setting and the severity of adolescent problems and family functioning. Regardless of the version, therapists work simultaneously in four interdependent treatment domains according to the particular risk and protection profile of the adolescent and family. The *adolescent domain* helps teens engage in treatment, communicate and relate effectively with parents and other adults, and develop social competence and alternative behaviors to drug use. The *parent domain* engages parents in therapy, increases their behavioral and emotional involvement with the adolescents, and improves parental monitoring and limit setting. The *family interactional domain* focuses on decreasing conflict and improving emotional attachments and patterns of communication and problem-solving using multiparticipant family sessions. The *extrafamilial domain* fosters family competency and collaborative involvement within all social systems in which the teen participates (e.g., school, juvenile justice, recreational). Throughout treatment, therapists meet alone with the adolescent, alone with the parent(s), or conjointly with the adolescent and parent(s), depending on the treatment domain and specific problem being addressed.

Treatment Fidelity

We conducted rigorous treatment fidelity monitoring and evaluation on both interventions. Similar treatment monitoring procedures were followed for both conditions throughout the study. Supervisors for each intervention reviewed all active cases on a weekly basis during group supervision and reviewed technique and content checklists completed by therapists after each session. To demonstrate that therapists adhered to the basic parameters of the treatments (i.e., session frequency and duration, domains targeted), therapists completed therapeutic contact logs for every contact with clients. Adolescents in the group condition averaged 104 min per week of group treatment ($SD = 40.73$), consistent with the parameters of the group treatment. Youths in the family-based treatment condition averaged 133 min per week ($SD = 43.70$) of family and individual therapy, as prescribed in MDFT for this level of intervention. Although the length of time in treatment was equitable in absolute terms across the two treatments (3–4 months of treatment in both conditions), youths receiving MDFT received significantly more treatment in that period, $t(73) = 3.28$, $p = .002$.

Therefore, as described below, we adjusted for time in treatment in all analytic models. Consistent with MDFT parameters, therapeutic contacts included, on average, 30% of contacts with adolescents alone, 20% with parents alone, 33% with families together, and 17% with extrafamilial supports (e.g., school and courts). These results suggest achievement of a high degree of treatment fidelity to MDFT and group parameters.

Both self-report checklists and observational methods were used to document adherence to the interventions delivered in the group condition. Research assistants attended randomly selected group sessions and used an observational checklist to rate therapists on their adherence to basic principles and interventions of the manual-guided group approach. Both self-report and observational checklists included items such as whether the scheduled group activity was completed and whether the therapist encouraged participation from all group members. A total of 284 group sessions were rated using self-report checklists, and 13 group sessions were rated via observational methods over the course of the clinical phase of the study. These ratings indicated that across therapists and time, groups were conducted in line with the treatment's content and process guidelines. Specifically, according to self-reports, the scheduled activity was successfully completed in 91% of sessions, and adolescents completed their goals forms in 79% of sessions. On a 5-point Likert-type scale of specific dimensions of group functioning ($1 = $ *not true at all*, $5 = $ *completely true*), therapists rated the groups high ("pretty true") on "supporting members with waning interest in group" ($M = 4.14$), "avoiding power struggles with group members" ($M = 3.96$), and "facilitating discussions related to scheduled activities" ($M = 3.91$). No item had an average score lower than 3.0 (*somewhat true*). Observational ratings support these positive indicators of adherence to the group manual (e.g., completion of scheduled activity, $M = 4.33$; discussions relevant to session activities/themes, $M = 4.31$; encouraging members to participate, $M = 4.39$; positive stance, $M = 4.69$). Thus, in a random sample of group sessions as well as self-reports across sessions, the prescribed group interventions were at least somewhat present.

For the MDFT condition, we selected videotapes of family sessions for rating using a revised version of the Therapist Behavior Rating Scale (TBRS; Hogue, Rowe, Liddle, & Turner, 1994)—an observational adherence coding system used in previous MDFT studies. A total of 20 (50%) MDFT cases were randomly selected for adherence ratings. For each of these cases, one session from the middle stage of therapy was randomly selected for rating. The raters were two female doctoral-level clinical researchers trained extensively by TBRS developers. They rated the therapy sessions on the extensiveness with which the therapists adhered to core MDFT interventions. Raters demonstrated good interrater reliability—$ICC_{(1,\ 2)} = .86$—using a subset of five MDFT sessions coded by both raters before coding study tapes.

Equivalence testing procedures (Tryon, 2001) were used to compare the mean MDFT adherence score obtained in the current study with the mean MDFT adherence score reported in a previous MDFT fidelity study establishing the validity of the TBRS (Hogue, Liddle, Dauber, & Samuolis, 2004). Following Fals-Stewart and Birchler's (2002) procedures, we used an equivalence interval (EI) of $\pm 10\%$ around the mean MDFT adherence score obtained by Hogue et al. (2004; i.e., the reference group mean). The reference group mean was 31.09 ($SD = 8.37$), and the EI was ± 3.10. A 90% confidence interval (CI) was calculated around the mean MDFT adherence score obtained in the current study (i.e., the test group mean). The obtained test group mean was 31.20 ($SD = 6.69$), making the 90% CI ± 2.44. The two scores were judged to be statistically equivalent, as the 90% CI for the test group mean fell within the preestablished EI around the reference group mean. Thus, we concluded that the therapists delivered MDFT with adequate fidelity.

Measures

Assessments were conducted at intake, at 6-weeks post-intake, at discharge, and at 6 and 12 months following treatment intake. Measures described below were administered at all assessment points—except the Global Appraisal of Individual Needs (GAIN; Dennis, 1999), which was collected only at intake, 6-, and 12-month follow-ups. Of scheduled assessments, 97% were completed at follow-up time points. Measures were administered separately to youths and parents by extensively trained assessors, who were blind to treatment assignment and to study hypotheses.

Background and demographic information. The GAIN (Dennis, 1999) is an integrated biopsychosocial model of treatment assessment, planning, and outcome monitoring divided into eight areas: background and treatment, substance use, physical health, risk behaviors, mental health, environment, legal, and vocational (sample item: "On how many days did you use any alcohol, marijuana or other drugs?"). With adult and adolescent samples, the GAIN scales show excellent internal consistency, test–retest reliability, and discriminant validity; furthermore, the Substance Use scale has been validated with laboratory confirmed urine tests for drugs (Dennis, White, Titus, & Unsicker, 2006; Lennox, Dennis, Scott, & Funk, 2006).

The Parent and Adolescent Interviews (Center for Treatment Research on Adolescent Drug Abuse, 1998) gathered information on family composition, history of familial drug use and mental health problems, adolescent substance use history and court involvement, treatment history, school problems, and peer relationships.

Substance use. Adolescents' substance use was measured with the timeline follow-back method (Sobell & Sobell, 1992) as adapted and validated with adolescents (Waldron, Slesnick, Brody, Turner, & Peterson, 2001). The timeline follow-back method obtains retrospective reports of daily substance use by employing a calendar and other memory prompts to stimulate recall. Youths reported on specific substances used daily for the 30-day period prior to each assessment.

The Problem Oriented Screening Instrument for Teenagers (POSIT; Rahdert, 1991) is a self-report multiproblem screening instrument designed to screen for substance use and other problems. It is a well-validated and reliable instrument that is widely used in mental and medical heath care settings, schools and social service agencies, drug treatment programs, and juvenile justice assessment centers (Rahdert, 1997). We used the 17-item Substance Use and Abuse subscale in this study (sample item: "Do you get into trouble because you use drugs or alcohol at school?").

Delinquency. Juvenile justice records were collected for participating youths for the year prior to and following treatment intake to provide an objective measure of arrests and probation status. In addition, a well-validated instrument that has been used

extensively with African American and Hispanic juvenile justice samples, the National Youth Survey Self-Report Delinquency Scale (SRD), was administered to youths at all time points. This scale, part of the National Youth Survey (Huizinga & Elliot, 1984), produces a total delinquency score (sample item: "How many times have you stolen (or tried to steal) a motor vehicle, such as a car or motorcycle?"). The SRD scale is well validated with clinical samples and serious offenders (Henggeler, 1989).

Internalized distress. The GAIN (Dennis, 1999) General Mental Distress Index was used to measure internalized distress, including anxiety and depressive symptoms (sample item: "Have you had *SIGNIFICANT* problems with . . . headaches, faintness, dizziness, tingling, numbness, sweating or hot or cold spells?").

Family risk and protective factors. The Adolescent Daily Interview is a self-report checklist of family interactions that occurred during the previous 24 hr, and it was adapted from the Oregon Social Learning Center's Adolescent Daily Report (Chamberlain & Reid, 1987; sample item: "Did your parent[s] talk to you before leaving the house in the morning?"). It was administered to teens over the phone on 3 days within a 1-week period at each assessment point. Each participant received an average score for each item at each assessment point. Exploratory factor analyses indicated a well-defined factor measuring positive family interactions with a coefficient alpha of .78.

Peer risk factors. The National Youth Survey Peer Delinquency Scale (Elliot, Huizinga, & Ageton, 1985) assessed youths' association with deviant peers (sample SRD item from above asked in relation to peers: "How many of your friends did this in the last 90 days—all, most, some, very few, or none?"). The scale has been well validated with a range of young populations.

School risk factors. Public school records were collected for all participating youths for the year prior to intake and through the 12-month follow-up. School records provided an objective measure of (a) academic grades, (b) conduct grades, and (c) absences.

Data Analytic Approach

In this study, we examined the comparative effects of two treatments for early adolescent substance abuse: MDFT and peer group treatment. We conducted this comparison using a 2 (treatment condition) $\times$ 5 (time) repeated measures intent-to-treat design. We examined the differential treatment effects in reducing substance use and related problems, delinquency, and internalized distress, and in reducing risk in three domains: family interactions, peer delinquency, and school achievement and behavior.

We analyzed individual client change with the latent growth curve (LGC) modeling method (Duncan, Duncan, Strycker, Li, & Alpert, 1999). Missing data, which were rare (97% of follow-up assessments were completed), were handled with full information maximum likelihood estimation, under the assumption that the data were missing at random (Little & Rubin, 1987).

LGC modeling was conducted using Mplus software (Version 3.1; L. K. Muthén & Muthén, 1998–2004) and proceeded in three stages. First, we tested a series of growth curve models, representing possible forms of growth (e.g., no change, linear change, discontinuous change), to determine the overall shape of the individual change trajectories. Second, we added treatment condition to the models to test the impact of treatment type on initial status and change over time (i.e., the intercept and slope growth param-

eters). Treatment effects were demonstrated by a statistically significant slope parameter, as tested by the pseudo z test—calculated by dividing the coefficient by its standard error—associated with treatment condition. Finally, covariates—adolescent age, gender, ethnicity, referral source, and number of sessions attended—were added to the model to determine whether they were associated with change in the outcome variable and whether they moderated treatment effects. To control for therapist nesting effects, we used the sandwich variance estimator (Diggle, Heagerty, Liang, & Zeger, 2002) available in Mplus. The sandwich estimator produces corrected standard errors in the presence of nonindependent data due to nested data structures, in this case, clients nested within therapists. In all LGC models, we adjusted for baseline values of the outcome in question by regressing the slope latent variable (reflecting change over time) on the intercept latent variable (reflecting initial status).

For dependent variables that deviated substantially from normality, we used two-part growth curve modeling. Thus, in the same analysis, we estimated separate but correlated continuous and categorical LGC models. We selected a two-part growth curve modeling strategy (see Brown, Catalano, Fleming, Haggerty, & Abbott, 2005) because the nonnormal data were caused in large part by a substantial number of participants reporting absence of the outcome variable (i.e., no substance use, substance use problems, or delinquent acts occurring in the previous month; see Olsen & Shafer, 2001). For dependent variables that were approximately normally distributed, in which scores of zero were either not possible or not frequent, we used a conventional LGC modeling approach, initially testing a piecewise growth model with two distinct phases of growth representing in-treatment and postdischarge change (Crawford, Pentz, Chou, Li, & Dwyer, 2003). We used an intent-to-treat model for all analyses; all randomized participants were included in the analyses regardless of the number of sessions of therapy they received.

Results

Descriptive Statistics

The distributions for substance use problems, frequency of substance use, and delinquency showed significant departure from normality (see Table 1). We created binary variables for two-part models, separating the zero responses from the continuous outcomes. However, the distributions for the continuous outcomes remained nonnormal. Therefore, we used natural log transformation to improve the normality of these distributions (Olsen & Schafer, 2001), bringing skewness and kurtosis within acceptable ranges. Peer delinquency was also log transformed to achieve adequate normality.

Treatment Retention

We examined intervention acceptability and feasibility by comparing each treatment's retention rates. MDFT demonstrated better treatment completion rates than group, $\chi^2(1, N = 83) = 4.94, p < .05$. A total of 97% of youths in MDFT completed treatment (approximately 120 days), compared with 72% in group therapy.

Table 1
Descriptive Statistics for Primary Outcome Variables

| | Intake | | | | 6-week FU | | | |
| | MDFT | | Group | | MDFT | | Group | |
Variable	M	SD	M	SD	M	SD	M	SD
Substance use problems[a]	0.63	0.78	0.64	0.71	0.13	0.37	0.37	0.52
Any problems n (%)	20	50	22	51	5	12	17	40
30-day substance use frequency[a]	0.78	1.02	1.20	0.98	0.21	0.56	0.75	0.98
Any use n (%)	18	45	31	72	6	15	20	47
Delinquency[a]	0.80	1.01	0.88	1.05	0.19	0.58	0.54	0.95
Any delinquency n (%)	19	48	22	51	4	10	14	33
Internalized distress	3.74	4.29	3.95	4.64	N/A	N/A	N/A	N/A
Positive family interactions	13.83	2.07	13.75	2.23	14.36	2.34	15.03	2.04
Negative family interactions	7.33	1.15	7.15	0.90	7.46	0.75	7.30	0.88
Peer delinquency[b]	99.07	15.90	100.26	15.45	112.28	12.38	114.67	14.11
Academic grades	1.70$_{BL}$	0.77$_{BL}$	1.71$_{BL}$	0.73$_{BL}$	1.85$_{AP1}$	0.76$_{AP1}$	1.48$_{AP1}$	0.73$_{AP1}$
Conduct grades	2.31$_{BL}$	0.69$_{BL}$	2.41$_{BL}$	0.89$_{BL}$	2.43$_{AP1}$	0.86$_{AP1}$	2.11$_{AP1}$	0.80$_{AP1}$
Absences[a]	1.80$_{BL}$	0.75$_{BL}$	2.07$_{BL}$	0.77$_{BL}$	1.64$_{AP1}$	0.72$_{AP1}$	1.72$_{AP1}$	0.93$_{AP1}$

Note. Internalized distress was assessed at intake, 6-month follow-up, and 12-month follow-up only. For academic variables, abstracted records were summarized for each academic period rather than tying school performance to a specific follow-up assessment. FU = follow-up; MDFT = Multidimensional Family Therapy; N/A = not applicable; values with the BL subscript indicate the baseline academic period; values with the AP subscript indicate Academic Periods 1, 2, 3, and 4, respectively.
[a] Variable log transformed.   [b] Higher scores indicate less affiliation with delinquent peers.

Primary Outcomes: Substance Use, Substance Use Problems, Delinquency, and Internalized Distress

Two-part growth models were used to examine change in (a) substance use problems, (b) substance use frequency, and (c) self-reported delinquency. As a first step, we examined the functional form of growth for each part of the unconditional (i.e., excluding intervention status and background variables) two-part LGC following procedures outlined in B. Muthén (2001). First, we determined the functional form for trajectories in the categorical part of the model (e.g., abstinence vs. any substance use) using likelihood ratio difference tests for nested models. Having established the functional form for the categorical part of the model, we determined the functional form of the model's continuous part (e.g., substance use frequency) by selecting the two-part model that produced the smallest Bayesian Information Criterion. The functional form of the continuous model would typically be selected from a series of nested models. However, there were too few participants in this study reporting substance use problems to produce a proper solution.

Substance use problems. Linear models produced the best fit to the categorical part of the two-part model (i.e., presence vs. absence of substance use problems), and linear growth produced the best fit for the continuous part (i.e., number of substance use problems). Both treatments showed reductions in the number of youths reporting any substance use problems during the 1-year follow-up (pseudo $z = -4.29$, $p < .001$). Overall, adolescents reported an average of 2.5 substance-related problems at intake and showed significant decreases in the number of problems over the 12-month follow-up (log transformed; mean slope = -0.24, pseudo $z = -8.35$, $p < .001$).

We then examined treatment effects by adding intervention condition to the model. With respect to the report of the number of substance-related problems (i.e., the continuous part of the model), results showed a significant intervention effect ($b = -0.14$, pseudo $z = -10.47$, $p < .001$, 95% CI = -0.16, -0.11), indicating more rapid decreases in substance problems over the 12-month follow-up period in MDFT. Results for any substance-related problems (i.e., the categorical part of the model) were not significant ($b = -0.34$, pseudo $z = -1.27$, ns). Model estimated mean trajectories for the two treatments are shown in Figure 2. The effect size for the continuous part of the model was $d = 1.36$, a large effect (J. Cohen, 1988; see Brown et al., 2005, for procedures on calculating effect sizes for LGC models).

Frequency of substance use. Similarly, the functional form for trajectories of substance use frequency was best represented by linear growth in both the categorical (using or not using) and continuous parts of the model (i.e., number of days used in the past 30; with a fixed variance for the slope). At intake, participants who reported substance use averaged 4.66 days of use out of the last 30, with 18 youths receiving MDFT reporting using drugs at intake and 31 youths receiving group treatment reporting drug use. The proportion of youths abstaining from alcohol and drug use increased overall in the 12-month follow-up period (mean slope = 2.05, pseudo $z = 4.39$, $p < .001$).

We found a significant intervention effect for the continuous part of the model ($b = -0.13$, pseudo $z = -3.51$, $p < .001$, 95% CI = -0.19, -0.05), as well as the categorical part of the model ($b = -0.73$, pseudo $z = -2.98$, $p = .003$, 95% CI = 0.24, 1.23). Youths in MDFT reported fewer days of substance use as well as a tendency to report increased abstinence from drugs and alcohol. Model-estimated mean trajectories for the treatments are shown in Figure 3. The intervention effect size for the continuous part of the model was $d = 0.77$ (large), and the odds ratio (OR) = 2.20 (moderate, 95% CI = 0.77, 6.33) for the categorical part of the model.

Variable	Discharge				6-month FU				12-month FU			
	MDFT		Group		MDFT		Group		MDFT		Group	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Substance use problems[a]	0.11	0.28	0.37	0.69	0.08	0.25	0.44	0.70	0.13	0.30	0.47	0.72
Any problems n (%)	6	15	12	28	4	10	14	33	7	18	15	35
30-day substance use frequency[a]	0.14	0.54	0.95	1.13	0.22	0.62	0.85	0.88	0.12	0.35	0.86	0.88
Any use n (%)	4	10	21	49	6	15	25	58	5	13	23	54
Delinquency[a]	0.15	0.38	0.58	1.03	0.41	0.73	0.68	1.15	0.36	0.73	0.66	1.04
Any delinquency n (%)	6	15	14	33	11	28	13	30	9	23	14	33
Internalized distress	N/A	N/A	N/A	N/A	0.47	0.62	3.18	3.95	0.36	0.92	1.75	3.19
Positive family interactions	14.26	2.18	15.17	2.02	14.85	2.36	15.07	2.28	15.16	2.01	14.88	2.31
Negative family interactions	7.38	0.74	7.60	0.65	7.43	0.78	7.61	0.60	7.53	0.72	7.69	0.52
Peer delinquency[b]	113.11	4.80	105.23	14.52	113.50	3.47	109.52	9.57	112.56	8.13	106.27	20.14
Academic grades	1.72_{AP2}	0.78_{AP2}	1.55_{AP2}	0.81_{AP2}	1.97_{AP3}	0.65_{AP3}	1.42_{AP3}	0.90_{AP3}	1.83_{AP4}	0.75_{AP4}	1.30_{AP4}	0.98_{AP4}
Conduct grades	2.43_{AP2}	0.89_{AP2}	2.34_{AP2}	0.96_{AP2}	2.56_{AP3}	0.64_{AP3}	2.10_{AP3}	1.04_{AP3}	2.59_{AP4}	0.72_{AP4}	2.16_{AP4}	1.14_{AP4}
Absences[a]	1.58_{AP2}	0.78_{AP2}	1.99_{AP2}	0.85_{AP2}	1.43_{AP3}	0.69_{AP3}	2.14_{AP3}	0.94_{AP3}	1.77_{AP4}	0.76_{AP4}	2.19_{AP4}	0.98_{AP4}

Delinquency. We examined both self-reported delinquent activity in the previous 30 days and official legal records from Miami-Dade's court system as indicators of delinquency. Like the substance use outcomes, self-reported delinquency was substantially skewed with an excess of zeros; therefore, we analyzed self-reported delinquency using two-part growth curve modeling. For self-reported delinquency, change trajectories for presence/absence of delinquent acts were best represented by a piecewise model and frequency of delinquent activity by a linear slope. The overall sample did not significantly improve in either the proportion abstaining from delinquent behavior (i.e., the categorical part of the model) or frequency of delinquent behavior (i.e., the continuous part). However, when intervention condition was added to

the model, a significant intervention effect was found for the continuous part of the model (i.e., number of delinquent acts in the past 30 days; $b = -0.09$, pseudo $z = -2.43$, $p < .05$, 95% CI = $-0.17, -0.02$), indicating that youths receiving MDFT decreased their (log) delinquent behavior more rapidly than youths receiving peer group treatment. Whereas MDFT participants decreased their delinquent behavior over the 12-month follow-up, group participants increased their delinquent behavior over the same period (see Figure 4). The effect size associated with the treatment effect was $d = 0.31$, a small-medium effect.

Consistent with self-reports, results from court records indicated that youths in MDFT were less likely to be arrested (23% vs. 44%), $\chi^2(1, N = 83) = 4.36$, $p = .037$, OR = 2.73, or placed on
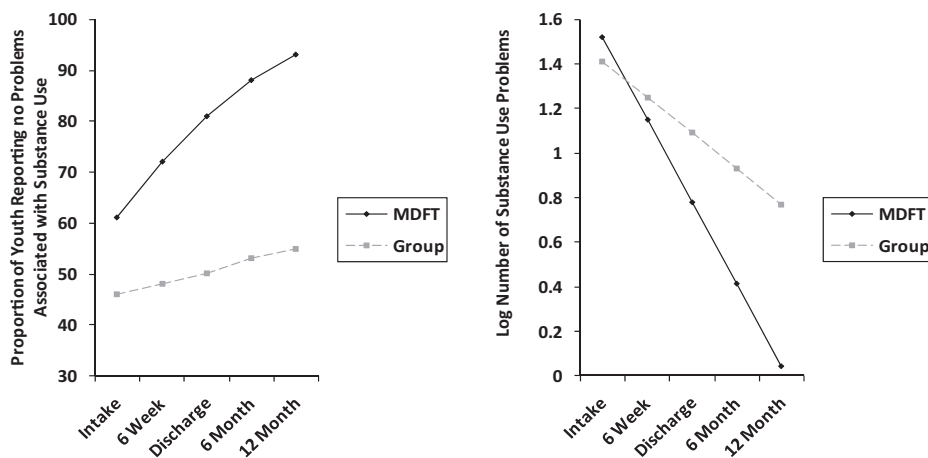

Figure 2. Estimated mean trajectories for the probability of youths reporting no problems associated with substance use ($n = 83$, left pane) and the log number of substance use problems ($n = 83$, right pane) by intervention status. MDFT = Multidimensional Family Therapy.
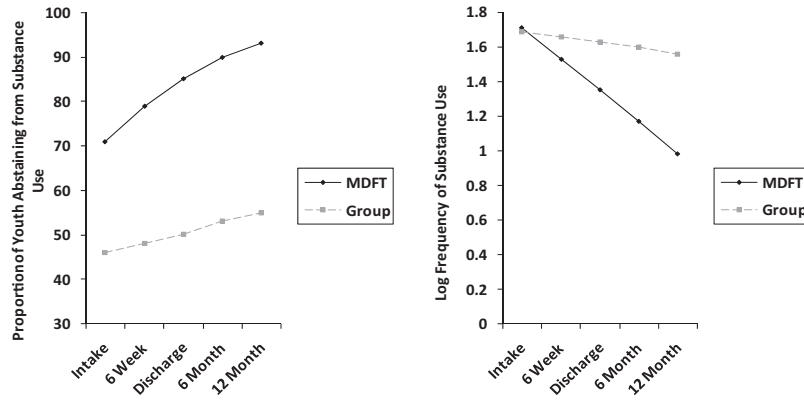
Figure 3. Estimated mean trajectories for the probability of youths abstaining from substance use (*n* = 83, left pane) and the log frequency of substance use (*n* = 83, right pane) by intervention status. MDFT = Multidimensional Family Therapy.

probation (10% vs. 30%), $\chi^2(1, N = 83) = 5.21$, $p = .022$, OR = 4.35, during the 12-month follow-up.

Internalized distress. The GAIN was administered at only three points (intake, 6 months, and 12 months); thus, we could not fit the GAIN's General Mental Distress Index (GMDI) data using piecewise models. Visual inspection of the mean trajectories suggested that the GMDI scores decreased in nonlinear fashion. A model including intercept, linear, and quadratic factors was assessed with fixed variances for slope and quadratic growth factors. MDFT youths decreased their GMDI scores more rapidly than group treatment adolescents over the 12-month follow-up period ($b = -1.11$, pseudo $z = -2.40$, $p = .01$, 95% CI = -2.04, -0.19). The effect size for the treatment comparison was $d = 0.54$ (moderate).

Secondary Outcomes: Family Functioning, Peer Delinquency, and School Functioning

Family functioning. We measured treatment effects on family functioning using adolescent reports from the Adolescent Daily Interview. Analyses of the unconditional growth curves for ado-lescent reports of positive family interactions revealed that the growth trajectories were best fit by piecewise growth curve models. As a whole, the sample did not report statistically significant increases in positive family interactions. However, when intervention condition was added to the model, a significant intervention effect was found in which youths receiving MDFT reported greater improvements in youth-reported positive family interactions during treatment ($b = 0.45$, pseudo $z = 2.14$, $p < .05$, 95% CI = 0.03, 0.86), and these effects were maintained in the follow-up period (as indicated by a nonsignificant slope parameter for the second piece of the model; $b = -0.44$, pseudo $z = -1.95$, *ns*). Correspondingly, MDFT participants reported greater decreases in negative family interactions during treatment ($b = -0.28$, pseudo $z = -2.25$, $p < .05$, 95% CI = -0.03, -0.86), and these effects were maintained in the follow-up period. The effect size for treatment effects from intake to discharge for positive family interactions was $d = 0.27$ (small effect), and the effect size for negative family interactions was $d = 0.53$ (moderate effect).

Peer delinquency. Change in affiliation with delinquent peers (log transformed) was analyzed with conventional growth curve
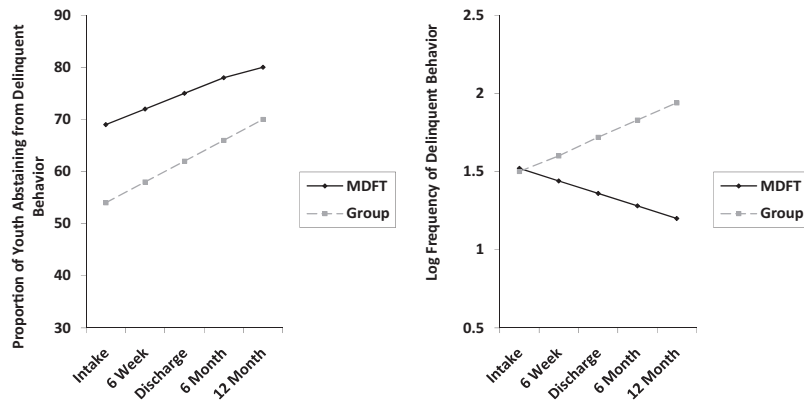

Figure 4. Estimated mean trajectories for the probability of youths abstaining from delinquent behavior (left pane) and the log frequency of delinquent behavior (right pane) by intervention status. MDFT = Multidimensional Family Therapy.

modeling and was best represented by a piecewise growth curve model. Across treatments, participants as a group reported less affiliation with delinquent peers during treatment (mean slope = −6.01, pseudo z = −4.78, p < .001) and maintained these gains in the follow-up period (mean slope = −0.76, pseudo z = −1.02, ns). Youths in both treatment conditions showed decreases in affiliation with delinquent peers. Therefore, although we observed an increase in delinquency for youths assigned to the group treatment, there was not a concomitant increase in deviant peer association. When intervention condition was added to the model, results indicated that youths in MDFT more rapidly decreased their affiliation with delinquent peers during treatment (b = −3.58, pseudo z = −4.03, p < .01, 95% CI = −5.34, −1.80) and maintained these gains through the 12-month follow-up (b = −0.79, pseudo z = −0.50, ns). The effect size for treatment effects from intake to discharge was d = 0.67, a moderate-large sized effect.

School functioning. We examined school outcomes using records obtained from the public school's database of three indicators: (a) academic grades, (b) conduct grades, and (c) absences. Academic grade point averages, conduct grades, and frequencies of absences were calculated for each participant for each period of the academic year. LGC modeling was used to examine change in each of the school outcomes over the duration of the study, in which the 1-year study period corresponded to four academic periods, plus a baseline period representing the academic period prior to entry to the study. In these analyses, data from 25% of participants were missing from the school's database. These data were assumed to be missing at random, an assumption that is not directly testable; however, using full information maximum likelihood estimation, even when the missing at random assumption is violated, superior estimates are produced when compared with other methods for accommodating missing data (e.g., listwise deletion, mean substitution; Collins, Schafer, & Kam, 2001).

Analyses of the unconditional growth curves for the school outcomes revealed that the growth trajectories were best fit by linear growth models. As a whole, the sample had an average academic grade point average of 1.58 (approximately failing grades) in the baseline period, which slightly increased through the follow-up period (mean slope = 0.16, pseudo z = 1.15, ns). Whereas the academic performance of youths receiving group treatment actually declined over time, grades of participants receiving MDFT improved significantly (b = 0.15, pseudo z = 2.99, p = .003). For conduct grades (also on a 4-point grade point average scale), the sample overall had an average conduct grade of 2.32 at intake, which also remained relatively stable through the 12-month follow-up period (mean slope = −0.18, pseudo z = −1.45, ns). However, conduct grades improved for youths receiving MDFT and declined for youths receiving group treatment (statistically significant treatment effect: b = 0.14, pseudo z = 2.83, p < .05, d = 0.21, 95% CI = 0.04, 0.24).

Additional covariates. Finally, we examined whether demographic factors—such as age, gender, ethnicity, and referral source, as well as number of treatment sessions attended—acted as important between-subjects covariates, and we explored the extent to which any statistically significant covariates moderated treatment effects. Across domains, the only significant predictor of change was the impact of age on self-reported delinquent behavior. Results indicated that younger adolescents were more likely to

report no delinquent activity across all assessments (pseudo z = 1.98, p < .05). However, a moderator analysis in which the interaction between treatment condition and age was added to the model was not statistically significant, indicating that age did not moderate the relationship between treatment condition and change in delinquent behavior. Likewise, none of the other covariates listed above moderated treatment effects.

Clinical Significance

We also assessed the clinical significance of these outcomes using normative comparisons. We chose two sources of normative comparisons for substance use problems, frequency of substance use, and self-reported delinquent activity. For substance use problems, we used the standardization sample on which the POSIT was developed (Rahdert, 1991), and for frequency of substance use and delinquent behavior, we used the Monitoring the Future (MTF) survey findings (Johnston et al., 2008).

With respect to substance use problems, we conducted a one-sample t-test in which the obtained scores of youths in both treatments were compared with the score of the "medium risk" group of the POSIT standardization sample consisting of youths receiving outpatient substance abuse treatment (equivalence testing against the "low-risk group" was not possible because these youths all received scores of 0). Results of one-sample t-tests indicated that youths receiving both treatments obtained significantly lower scores on the POSIT Substance Use/Abuse scale: MDFT, $t(38)$ = −36.25, p < .001, d = 5.82; group, $t(41)$ = −4.49, p < .001, d = 0.69. Further, the average number of substance problems reported at the 12-month follow-up for the youths receiving MDFT was comparable with Rahdert's (1991) low-risk sample (0.17 vs. 0.0).

In terms of substance use frequency, 7% of youths in MDFT reported using drugs in the previous 30 days at the 12-month follow-up. In comparison, 8.5% of eighth-grade youths participating in the MTF survey reported illicit drug use in the same time period. Results of the equivalence test revealed that the two values were not clinically equivalent because a *smaller* proportion of youths receiving MDFT reported using drugs than the national sample of MTF youths. A chi-square test of proportions indicated that youths receiving MDFT were significantly less likely to report drug use (p = .05) than the MTF sample. In contrast, 45% of youths in group treatment reported substance use in the previous 30 days at the 12-month follow-up, which was a significantly larger proportion than the MTF sample (p < .001). It is also clinically notable that youths in group treatment increased their delinquent acts over the follow-up period, whereas youths in MDFT decreased delinquent behaviors.

Discussion

Results of this 12-month follow-up study provide support for the effectiveness of MDFT with an understudied and vulnerable population—clinically referred young adolescents. Previously, we reported the pre–post treatment results of this community-based randomized clinical trial, which largely favored MDFT (Liddle et al., 2004). The current study offers evidence that MDFT with clinically referred young teens reduced substance use and delinquency, decreased risk for future problems, and promoted protec-

tive processes to a greater extent than group treatment over the 12-month follow-up period. Next, we summarize the findings and discuss the implications of these results.

First, both treatments demonstrated high treatment retention rates: 97% for MDFT and 72% for group treatment. Given the national average of only 27% completion (90 days) in standard outpatient treatment programs (Hser et al., 2001), both treatments in this study demonstrated much higher than average treatment retention rates. MDFT's ability to engage and retain almost all of the youths and families who were assigned to treatment is a sign of progress from early reports of family-based interventions and is consistent with more recent studies of family-based treatments utilizing home-based delivery methods. The engagement methods of both treatments offer hope to clinicians and researchers who have found adolescents unlikely to access services and difficult to engage and retain in treatment (D'Amico, McCarthy, Metrik, & Brown, 2004).

Second, although MDFT demonstrated superior results on multiple outcomes than did the peer group treatment, it is important to recognize that the peer group treatment also was effective. Not only did this treatment have high retention rates compared with previous reports of community-based substance abuse treatment (Hser et al., 2001) but it also showed improvements in substance use, affiliation with delinquent peers, and internalized distress up to 12-month follow-up. The peer group treatment, however, did not appear to improve delinquency, family, and school outcomes.

Third, youths who were assigned to MDFT showed more improvement than youths assigned to the peer group treatment on a variety of outcome measures. From intake to 12 months later, youths in MDFT demonstrated more improvement than youths in peer group therapy in substance use, delinquency, internalized distress, affiliation with delinquent peers, and family and school functioning. Similarly, in terms of problems related to substance use—including psychological, interpersonal, school, legal, and familial consequences of use—results favored the family-based over group treatment. Youths in MDFT reported almost no substance-related problems by the 1-year follow-up. Large effects support MDFT's ability to reduce substance use and the negative consequences of substance use among young adolescents.

With respect to delinquency outcomes, the results clearly demonstrate through the use of self-reports as well as objective court records that MDFT more significantly reduced delinquency than the group treatment. Frequency of self-reported delinquent acts was significantly reduced among MDFT youths over the 12-month study period, in comparison with an increase in delinquency among group treatment participants. Court record analyses showed that MDFT youths were less likely than group treatment teens to be arrested or placed on probation during the 12 months following intake. Given that delinquency and substance abuse are closely linked throughout different developmental stages (Paradise & Cauce, 2003), MDFT's reduction on both forms of problem behavior is noteworthy.

Internalized distress was also more significantly reduced in MDFT than group treatment. Examining trajectories from intake to 12 months showed a moderate effect of MDFT over group treatment in reducing symptoms of general mental distress. Because internalizing problems are linked to initiation and exacerbation of substance abuse over time, treatment relapse, and interpersonal problems in young adulthood (Capaldi & Stoolmiller, 1999; Clark,

2004), reduction of mental distress is not only a key primary outcome but it also has important prevention implications as well.

Results reveal essential differences in youths' views of their family interactions over time according to treatment condition. MDFT youths reported more significant increases in positive family interactions than group treatment youths from pre- to posttreatment, and these gains were maintained at the 12-month assessment. These changes include core relationship characteristics (such as parental involvement and acceptance) as well as parenting practices (such as monitoring and consistency in discipline and limit setting). Despite the group treatment's primary focus on changing peer relationships, MDFT influenced affiliation with delinquent peers more significantly than the group treatment. Although both conditions demonstrated certain reductions in youths' affiliation with delinquent peers over treatment, the large effect size for the treatment effect indicates the significantly greater impact of MDFT on youths' peer affiliation. Substance abusing young adolescents are particularly vulnerable to negative peers as they become removed from prosocial extracurricular activities that provide opportunities for positive identity formation and the development of self-esteem (Shilts, 1991). Because of the strong influence of the peer group on young adolescents' substance use and problem behaviors, change in the peer environment is a predictor of long-term intervention success (Dishion & Medici-Skaggs, 2000).

Of all the outcomes investigated, those for school functioning are the weakest. Youths in group treatment fared poorly on school outcomes. Group treatment youths had increased absences and had declining conduct grades from the year prior to treatment and the year following treatment intake. Although MDFT youths did not show a decline in school functioning, they did not show much improvement either. They showed very little improvement in absence rates and academic grades over the 12-month period, but they did improve their conduct grades. A previous MDFT study did show significant changes in school attendance and grades with a sample of slightly older, but similarly ethnically diverse adolescents (Liddle et al., 2001).

Strengths

In this study, we addressed previous criticisms of treatment research (Austin et al., 2005). We tested two theoretically and clinically distinct interventions, representing the two most commonly used types of adolescent substance abuse treatments. In addition to treatment target differences (i.e., family relationships in MDFT vs. changes in individual functioning brought about through group therapy participation), the intended scope of the treatments differed as well. The family-based intervention addressed the literature's recommendation that treatments should be more comprehensive—targeting more areas of the adolescent's social context than previous treatments have done. Assessments included state of the science measures and theory-related assessments of youth and family in a broad range of developmentally important domains (Weisz, Sndler, Durlak, & Anton, 2005). The study also included multiple methods (archived records and self-report) and different reporters (youth and parent).

Both conditions were manual-guided and led by experts in each treatment. Study therapists were not graduate students or research therapists but community agency-employed clinicians, and cases

were clinically referred—the usual cases in the agency's caseload. Therapists were monitored to ensure adherence to model-specific interventions, and we conducted a formal adherence evaluation using standardized fidelity instrumentation. In one review of adolescent and child treatment research, only 32% of published studies trained the therapists formally, and only 32% used supervision procedures or adherence checks to ensure treatment fidelity (Weisz et al., 2005). We used intent-to-treat design and analyses (analyses of treatment completers showed identical findings to those reported in the Results section), and study retention and data capture rates (97%) were excellent. This is not insignificant given the documented difficulties of obtaining adequate follow-up data with clinically referred, diverse adolescent samples (Meyers, Webb, Frantz, & Randall, 2003). Effect sizes are reported to demonstrate clinical significance of the findings.

Limitations

The findings may apply only to urban, low-income African American and Hispanic male youths because this is the predominant description of the present sample. An increased sample size may have uncovered more reliable and stable effects in the targeted domains as well as reduced the number of potentially spurious findings, which may have resulted from the large number of statistical tests performed relative to the small sample size. Also, although we were able to implement a fully randomized trial with adequate methodological safeguards to maximize internal validity, we conducted only a single-site study. A multisite study would permit site difference tests and could also increase the heterogeneity of setting and sample variables and thus expand the study's generalizability even further. Also, we cannot deny the fact that although the comparative treatment, peer group therapy, was manualized, delivered by experienced and skilled community clinicians, and resulted in certain positive outcomes (i.e., retention, and improvement in drug use, affiliation with delinquency peers, and internalized distress), MDFT has been more thoroughly researched, and its developer (Howard A. Liddle) is an investigator on this study. Although we took extreme care to minimize investigator bias (e.g., Howard A. Liddle was not involved in the delivery of the intervention; research and clinical teams were completely separate; and we used other standard scientific methods such as random assignment), we cannot completely discount the possibility of investigator bias.

In conclusion, the results provide evidence that MDFT can alter progression of a negative developmental trajectory (Kandel, Davies, Karus, & Yamaguchi's, 1986, *cascade effect*) with youths evidencing multiple risk factors—circumstances that can set the stage for chronic substance abuse and delinquency. This study adds to the body of knowledge about the outcomes (Liddle, 2002; Liddle et al., 2001; Liddle, Dakof, Turner, Henderson, & Greenbaum, 2008) and mechanisms of action (Diamond & Liddle, 1996; Robbins et al., 2006) previously recognized with the MDFT approach (Austin et al., 2005; Brannigan, Schackman, Falco, & Millman, 2004; NREPP, 2007; Vaughn & Howard, 2004; Waldron & Turner, 2008). Early substance use and delinquency are among the most robust predictors of severe substance use, criminality, and pervasive difficulties across life domains in later adolescence and adulthood, and current estimates indicate about 60% of adolescents relapse within 3–12 months of completing substance use treatment

(Burleson & Kaminer, 2007). Thus, the fact that a comprehensive but relatively brief, family-based treatment can alter the trajectories of clinically referred youths for at least 12 months gives cause for optimism.

The adolescent drug treatment field has been influenced by the research on the effectiveness of family-based therapies for teen drug abuse (Williams & Chang, 2000). These interventions are based on an ecological–contextual view of drug and behavior problems (Biglan, 1995). However, despite recommendations for practice changes to include parents and implement family-based therapies with substance abusing and juvenile offender samples (Drug Strategies, 2005), progress remains minimal. The availability of training to use these approaches in usual care settings is a major stumbling block. Treatment settings are often not organized to work with families, do home visits, work evening hours, or make appearances at school or juvenile justice/court meetings. Although treatment models have been found to be effective, the same cannot be said for implementation models. As these therapies' clinical effectiveness becomes more widely known, stronger support for early intervention, a topic of particular relevance for the current sample, may become an item on the national policy agenda (Cullen, Vose, Jonson & Unnever, 2007; Liddle & Frank, 2006). Time will tell.

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