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Money Matters: Cost Effectiveness of Juvenile Drug Court with and without Evidence-Based Treatments

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Abstract

The 12-month cost effectiveness of juvenile drug court and evidence-based treatments within Court were compared with traditional Family Court for 128 substance abusing/dependent juvenile offenders participating in a four-condition randomized trial. Intervention conditions included Family Court with community services (FC), Drug Court with community services (DC), Drug Court with Multisystemic Therapy (DC/MST), and Drug Court with MST enhanced with a contingency management program (DC/MST/CM). Average cost effectiveness ratios for substance use and criminal behavior outcomes revealed that economic efficiency in achieving outcomes generally improved from FC to DC, with the addition of evidence-based treatments improving efficiency in obtaining substance use outcomes.

Keywords

juvenile drug court; cost effectiveness; substance abuse; multisystemic therapy; contingency management

By and large, cost outcomes analyses of psychosocial interventions are conspicuously absent in treatment research. Economic evaluations have been conducted only for a handful of substance abuse or mental health interventions, such as Behavioral Couples Therapy (Fals-Stewart, O'Farrell, & Birchler, 1997), Assertive Community Treatment (Clark et al., 1998; Essock, Frisman, & Kontos, 1998; Latimer, 1999; Lehman et al., 1999; Rosenheck & Neale, 1998; Wolff, Helminiak, & Diamond, 1995), Cannabis Youth Treatments (French et al., 2002), and Multisystemic Therapy (Sheidow et al., 2004). Reviewers, consequently, have called for more extensive economic evaluations of clinical interventions, and recent articles present economic evaluation methodologies for use in treatment research audiences (e.g., Fals-Stewart, Yates, & Klostermann, 2005; Kaplan & Groessl, 2002).

The relative scarcity of economic evaluations for treatment models is understandable given several factors. Clinical researchers have focused historically on developing interventions primarily to maximize clinical effects. Likewise, practitioners usually make treatment decisions based on perceived therapeutic effectiveness rather than cost effectiveness (Lombard, Haddock, Talcott, & Reynes, 1998). In addition, treatment costs can be

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challenging to measure. For example, costs might not be captured completely (e.g., inaccurate costs compiled for capitated fee-service systems, administrative costs that are not billed directly to a program but are necessary for the program to operate), and measured costs can be inadvertently duplicated (e.g., group-based intervention costs not accurately divided among participants). Furthermore, multiple methods have been developed for evaluating cost effectiveness, and different methods can result in conflicting conclusions. Nevertheless, economic constraints often are a determining factor in "real world" treatment and services decisions, and therefore, economic evaluations of clinically effective programs are needed to support their transport to community settings (Eddy, 1992; Fals-Stewart, et al., 2005; Lombard, et al., 1998).

Adolescent Substance Use Problems and Treatment: A Ripe Area for Cost Evaluations

Compared to other adolescent problems, rates of adolescent substance use, abuse, and dependence are high (Armstrong & Costello, 2002; Substance Abuse and Mental Health Services Administration, SAMHSA, 2002). For example, national data for 12- to 17-year-olds indicate that 42% had used alcohol, 20% marijuana, 9% inhalants, 3% ecstasy, and 2% cocaine in their lifetime (SAMHSA, 2002). Further, 10% of 12- to 17-year-olds were current illicit drug users. Similarly, rates of abuse and dependence among adolescents (8%) have reached levels similar to rates of mental health problems, such as depression (SAMHSA, 2006).

Although some degree of adolescent substance use might be considered developmentally normative (Winters, Latimer, & Stinchfield, 2001), substance use has been associated with various deleterious consequences for adolescents and their families and communities. Such outcomes include automobile accidents (Centers for Disease Control and Prevention (CDC), 1996), drownings (Office of Technology Assessment, 1991), risky sexual behavior and increased risk of contracting sexually transmitted diseases (Deas-Nesmith, Brady, White, & Campbell, 1999; Kann et al., 2000), physical and sexual abuse (Clark, Lesnick, & Hegedus, 1997), school dropout and decreased college involvement (Mensch & Kandel, 1988; Newcomb & Bentler, 1988), unemployment and job instability (Kandel & Yamaguchi, 1985; Newcomb & Bentler, 1988), and suicide (Bukstein et al., 1993; Crumley, 1990; Fergusson, Horwood, & Swain-Campbell, 2002; Lewinsohn, Rohde, & Seely, 1998). These outcomes can result in substantial personal, social, and economic costs across multiple service sectors (e.g., treatment service system, judicial service system).

In light of the potential negative outcomes and resultant costs of adolescent substance abuse, developing effective means for addressing this problem is a priority (Belenko & Dembo, 2003). During the past 15 years, researchers have developed and evaluated treatments for substance-abusing youth, resulting in a growing evidence base for family-based interventions that use cognitive-behavioral and behavioral approaches (Azrin, Donohue, Besalel, Kogan, & Acierno, 1994; Bry & Krinsley, 1992; Henggeler, Clingempeel, Brondino, & Pickrel, 2002; Henggeler, Pickrel, & Brondino, 1999; Kaminer, Burleson, Blitz, Sussman, & Rounsaville, 1998; Liddle et al., 2001; Waldron, Slesnick, Brody, Turner, & Peterson, 2001; Waldron & Turner, 2008). Likewise, in light of the significant prevalence of substance use disorders among juvenile offenders (e.g., 49% of juvenile offenders had diagnosable substance use; Abram, Teplin, McClelland, & Dulcan, 2003) and the relatively poor long-term outcomes for such youth (e.g., Henggeler, et al., 2002), judicial initiatives also have aimed to curtail substance use in adolescents involved in the juvenile justice system (Belenko & Logan, 2003; Cooper, 2002). In particular, juvenile drug court (JDC) programs have become widespread, with nearly 500 JDCs implemented across all 50 states in the U.S. (Bureau of Justice Assistance Drug Court Clearinghouse, 2007). As with adult

drug courts, JDCs explicitly involve close collaboration between the court, criminal justice professionals, and drug treatment professionals to improve outcomes for justice-involved youth with substance use problems. In addition to close collaboration with treatment providers, several other features of drug courts are thought to facilitate outcomes, including intensive supervision of substance use and other behaviors (e.g., home, school, and community behavior), the application of graduated sanctions and rewards based on urine drug screens and behavioral reports, and continuity of judicial oversight through frequent appearances before the same drug court judge.

Although JDCs have proliferated nationally, evaluations of their effectiveness have not maintained pace with evaluations of the adult drug court model, where clinical and economic evaluations have demonstrated favorable outcomes (e.g., Aos, Phipps, Barnoski, & Lieb, 2001; Belenko & Dembo, 2003; Government Accountability Office, 2005; Logan et al., 2004; Wilson, Mitchell, & Mackenzie, 2006). One exception to the sparse JDC literature, and the focus of the present study, is a recent randomized trial (Henggeler, et al., 2006) that evaluated the effectiveness of JDC in comparison with family court, and examined whether the integration of evidence-based substance abuse treatment enhanced JDC outcomes. The study included 161 juvenile offenders who met diagnostic criteria for substance abuse or dependence and were followed for 12 months post referral. Overall, the results showed that JDC was more effective than family court at decreasing youth substance use and criminal activity, and that when evidence-based treatments (i.e., Multisystemic Therapy and Contingency Management; National Institute on Drug Abuse, NIDA, 1999) were integrated into JDC, substance use outcomes were enhanced.

The purpose of the present investigation is to provide an economic evaluation of the JDC trial conducted by Henggeler and his colleagues. The fundamental questions of this economic evaluation pertain to the most efficient use of intervention dollars for juvenile justice-involved youth with substance use disorders. For example, while JDC was more effective than family court at decreasing youth substance use and criminal activity, JDC is also likely more intensive and, therefore, more costly than family court. A cost evaluation can determine which intervention provides the most “bang for the buck.” Similarly, although the integration of evidence-based treatments into JDC enhanced substance use outcomes, these treatments likely cost more than the usual substance abuse services provided in JDC. Again, a cost evaluation can determine whether the improved outcomes are worth the increased expense of the evidence-based treatments.

Methodologies for Cost Evaluations

Several broad methods for conducting cost evaluations within clinical trials have been developed, with each using different types of data and having different purposes (cf. Fals-Stewart et al., 2005; Kaplan & Groessl, 2002). A brief overview of these methods is provided to orient the reader regarding the primary decision points for the present research.

When youth in a clinical trial are randomized to different treatment programs, costs for each program can be calculated and a *cost comparison* can be conducted. This process details the types of costs included across all programs and the perspective taken (e.g., payor, societal, parental). When both the costs of programs and information on clinical outcomes are available, *cost effectiveness analysis* (CEA) can be conducted. CEA examines the economic efficiency for each program. That is, a CEA conveys how efficient each program is for achieving the desired outcome and allows comparison between programs (e.g., Which program is most efficient at generating improvement in symptoms?) A CEA is particularly useful when programs need to be compared, but outcomes are measured in non-monetary

units (e.g., number of reduced days with symptoms or number of reduced crimes), such as in the present study.

Other valuable cost evaluation methods, though not used in the present study, include *cost-benefit analysis* and *cost-offset analysis*. Cost-benefit analysis aims to simplify findings by "monetizing" the value of each outcome and creating an overall monetary figure, allowing for a single comparison value. That is, clinical gains (or losses) are converted into a value of dollar units and combined with program costs, making it possible to determine which program had the greatest financial benefit after accounting for the cost of the program. Monetizing clinical outcomes, however, requires identifying a myriad of benefits that result from changes in clinical outcomes and being able to identify a realistic estimate of the dollar benefit. For example, a substance using delinquent adolescent can impact the family, peer, school, community, judicial, policing, and school domains, but it is a highly complex task to monetize the benefit of a reduced day of substance use for each of these domains and to ensure no double-counting. *Cost-offset analysis* focuses on the savings or the costs reduced by the program, determining whether spending in one program would reduce expenses in other areas. Such analyses, however, ignore the desired clinical benefit of a program, such as the reduced incidence of substance use and criminal behavior of the youths in the present case. Thus, cost-offset analyses are not the recommended strategy for treatment research, where clinical improvement is paramount over reduced spending (Kaplan & Groessl, 2002).

The Present Evaluation

In summary, the purpose of the present investigation was to leverage data from the aforementioned clinical trial to provide an economic evaluation of the JDC program for reducing adolescent substance use and criminal behavior among juvenile offenders with substance use disorders, as well as to conduct an economic evaluation for the integration of evidence-based treatments and practices into the JDC. As described previously, the CEA was the most appropriate methodology given the data available and economic questions of interest. To provide a comprehensive evaluation, average cost effectiveness ratios were examined for multiple outcomes, including substance use (marijuana, polydrug, alcohol, and heavy alcohol) and criminal behavior (status offenses, theft, and crimes against persons). A payor perspective was utilized (Gold, Siegel, Russell, & Weinstein, 1996), representing the costs to a local community's service system. To the best of our knowledge, this is the first cost effectiveness evaluation of a JDC program and the use of evidence-based treatments in any court system.

Method

Sample

As detailed in the parent study (Henggeler et al., 2006), 161 juvenile offenders meeting DSM-IV diagnostic criteria for alcohol or drug abuse or dependence were randomly assigned to one of four treatment conditions. The target participants in the study were adolescents between 12–17 years, on probation, approved for entry to a drug court program, and having a research-confirmed diagnosis of alcohol or drug abuse or dependence. Youth were not excluded due to preexisting physical, intellectual, or mental health difficulties. The average age of adolescent participants was 15.2 (SD = 1.1) years at the time of referral, with 83% male, 67% African-American, 31% Caucasian, and 2% biracial. Fifty-two percent lived in single-parent households. In general, the families were economically disadvantaged: 38% of families were receiving financial assistance, median income was in the $10,000–$15,000 range, and the primary caregiver median education level was 12th grade. Prior to study entry the youth averaged 3.6 arrests (SD = 2.5) and 35% had received mental health or substance abuse treatment in the past.

Recruitment

All new cases and repeat offenders referred to the Department of Juvenile Justice and residing in Charleston County (South Carolina) from January 2000 to June 2003 (N = 2,123) were screened by probation staff for possible alcohol or drug abuse. If substance use was suspected and the youth and family met the other inclusion criteria, the substance use disorders section of the Structured Clinical Interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon, & Williams, 1996) was administered to both the caregiver and the youth by a trained researcher. If the youth met criteria for a substance use disorder, the family was recruited for study participation by the researcher. After obtaining parental informed consent and youth assent, the researcher opened a sealed envelope that informed the family of the study condition to which they were assigned. One hundred and sixty-one youth and families who qualified agreed to participate (98% recruitment rate). The Institutional Review Board at the Medical University of South Carolina approved all procedures.

Study Conditions

The study's conditions are described in more detail by Henggeler et al. (2006). Briefly, the four conditions were:

Family Court with Community Services (FC)—Youth appeared before a family court judge on average once or twice per year and received outpatient alcohol and drug abuse services from the local center of the state's substance abuse commission. These services included intensive outpatient, traditional outpatient, and home-based services. Services were delivered based on the center's assessment of youth and family needs.

Juvenile Drug Court with Community Services (DC)—The services provided by the Charleston JDC were consistent with those in JDCs nationwide. Youth appeared before the drug court judge once a week with their therapist for monitoring of drug use via urine screens and behavior via stakeholder reports. The judge provided graduated rewards or sanctions based the results of this monitoring. In addition, youth were required to participate in the same outpatient alcohol and drug abuse services from the local center of the state's substance abuse commission described previously for youth in the FC condition. JDC was approximately a 12-month program, with decreasing drug court appearances for demonstrated progress by the adolescent.

Juvenile Drug Court with MST (DC/MST)—Youth randomized to this condition attended the same JDC as counterparts in the DC condition, but received MST instead of the treatment services provided by the local substance abuse commission center. MST (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998) is an intensive family- and community-based treatment approach guided by ecological and systems theory. The MST assessment and treatment processes identify specific interventions that can be utilized to focus on the individual, family, peer, school, and social network variables that are linked with the identified problems. Thus, MST aims to effect change in antisocial youth behavior through attenuating risk factors in the youth's social ecology. Importantly, MST has extensive empirical support in the treatment of adolescent substance and criminal behavior (Sheidow & Henggeler, 2008).

Juvenile Drug Court with MST enhanced with CM (DC/MST/CM)—Youth in this condition attended JDC and participated in MST, but MST therapists also integrated contingency management (CM) techniques into treatment. These techniques are compatible with the clinical emphases of both JDC and MST, and included functional assessment of substance use (i.e., antecedents, behaviors, consequences related to substance use), a voucher system linked with results from frequent urine analyses, self-management planning,

and development of drug refusal skills (see Cunningham et al., 2003). As with MST, CM has extensive empirical support for the treatment of substance abuse (Higgins, Silverman, & Heil, 2008).

Instruments

Data for the present investigation were based on assessments conducted within 72 hours of recruitment into the study (baseline) and at 12 months post-recruitment. Interviews were conducted by trained research assistants in the families' homes or with youth in juvenile detention facilities. Families were compensated $75 per completed assessment for their time.

Drug and alcohol use—Adolescent self-reported substance use was assessed with the Timeline Follow-Back Form 90 (TLFB) interview (see Miller, 1991), that quantifies specific amounts of substances consumed by an individual on a daily basis. At each assessment, a calendar of the previous 90 days was first used to highlight important events, and then used to record specific quantities and types of substances consumed on each day during the period. Based on the TLFB data, the number of days of marijuana, poly-drug, alcohol, and heavy alcohol use (i.e., more than 4 standard drinks) was calculated for each youth for the 90 days prior to study entry and the 90 days prior to the 12-month post-recruitment assessment.

Criminal activity—Criminal behavior was assessed through youth reports on the 47-item Self-Report Delinquency Scale (SRD; Elliott, Ageton, Huizinga, Knowles, & Canter, 1983), a well-validated and widely used self-report measure of delinquency (Thornberry & Krohn, 2000). The SRD taps a broad range of criminal behavior perpetrated during the past 90 days and includes subscales that pertain to status offenses, theft, and crimes against the persons (e.g., assault). Summary scores for each of these subscales were calculated by summing the number of incidents a youth reported committing during the 90 days prior to study entry and the 90 days prior to the 12-month post-recruitment assessment.

Missing Data

The original data set had 161 participants with some missing data at the 12-month post-recruitment assessment. There was no systematic reason for the missing data and the number of missing observations was similar across treatment conditions (FC = 9, DC = 9, DC/MST = 9, DC/MST/CM = 6). An intent-to-treat approach was used. That is, participants were not excluded from the follow-up assessment due to treatment drop-out, missed sessions, or not otherwise collaborating with the requirements of the treatment condition to which they were assigned. Probit regression indicated that missing observations and condition were uncorrelated. As a further test of the impact of the intent to treat assumption, we imputed missing data using multivariate imputation. The models were re-run using the imputed data, and results were unaffected in terms of parameter statistical significance, sign and approximate magnitude. However, since imputation can introduce some degree of multicollinarity, we present the results from the baseline, intent to treat, analysis. The final sample had 128 observations

Results

The initial step in the economic evaluation was to determine the cost of each program. Next, cost effectiveness calculations are described, followed by presentation of the cost effectiveness evaluation.

Costs of Providing Services

An average cost per case was determined by identifying and summing all program costs and dividing by the number of cases treated in a year. This was done separately for each component of each intervention condition. Thus, JDC costs were applied to each youth in the three JDC conditions (i.e., DC, DC/MST, DC/MST/CM); MST costs were applied to each youth in the two MST conditions. Although individualized cost of treatment for each youth was not available for all components (i.e., researchers did not have access to detailed court and usual community services records on a per youth basis), the use of average costs may be preferable for a randomized clinical trial because it focuses on the costs for an average youth rather than being weighted by heterogeneity in a small sample (e.g., influence of outliers). In addition, costs for each program were based on the capacity that would be found in "real world" implementation (e.g., full capacity, adjusted for no-shows and staff turnover), thereby increasing generalizability to stakeholders most interested in cost evaluations (e.g., community service providers, juvenile justice officials). Finally, all costs were collected in or converted to 2004 dollars.

Court costs—The costs for implementing JDC were provided by the drug court staff and included the salary, fringe benefits, and overhead costs for all involved positions. Annual salaries were prorated for the amount of time the court personnel devoted to the drug court program (e.g., two judges each spent one day per week adjudicating drug court). The drug court positions included: juvenile probation officers (two at 100% full-time equivalent, FTE), public defender (10% FTE), solicitor (10% FTE), drug court coordinator (100% FTE), judges (40% FTE), legal secretary (40% FTE), sheriff deputies (50% FTE), clinical screeners (25% FTE), and court clerks (25% FTE). Appearance of the therapist, a mandatory component of drug court, was included in the treatment costs rather than as part of the JDC costs. Sheriff transport for youth being brought from detention to petition the judge for release and for youth being sentenced by the JDC judge to be placed in short-term detention (e.g., as a consequence for substance use or other problem behaviors) cost $17,780 for one year. The frequent urine drug screens ordered by the court cost $5 per screen. With an overhead rate of 30%, the total cost of JDC was $326,410 per year.

Youth can begin and end drug court at differing times, so weekly "caseload" was used to estimate the cost per person. Approximately 60 cases were served by the drug court each week. This included research participants and non-participants, youth who had to be present weekly, and those who had advanced in the program and were allowed to attend less frequently (but were still on the court's casedload). The program costs were converted to a weekly cost, divided by the 60 cases, and then converted back into a total cost per youth given the expected 12-month duration of JDC. The average cost per person for the drug court program, therefore, was approximated at $5,720. This amount was applied to youth in each of the three drug court conditions.

For youth in family court, contact with the court was minimal and required fewer resources (e.g., a court coordinator position and clinical screeners were not necessary). Court personnel, however, reported that more individual meetings were held with juvenile probation officers since youth were not being monitored as frequently within the court. The salary figures provided by JDC staff were used as the bases for estimating the costs for involvement with family court, with modifications for the infrequent court appearances and the greater contact with juvenile probation officers. Thus, involvement with family court for 12 months was estimated to average $260 per youth, including the costs of urine drug screens conducted by juvenile probation officers. This amount was applied to youth in the FC condition.

Treatment costs—Average treatment costs were determined for the usual community services interventions provided within the FC and DC conditions, the MST interventions within the DC/MST and DC/MST/CM conditions, and for CM within the DC/MST/CM condition. These were added to the respective court program costs of each condition. The local center of the state's substance abuse commission provided the values for implementation of their community-based outpatient alcohol and drug abuse services. The average cost per youth treated was based on the cost for implementation of the adolescent treatment programs and the overall number of youth served within the programs during a year. The costs for program implementation included assessment and evaluation, therapist and supervisor salary, fringe benefits, overhead rates, local travel and travel for training, incentives used in treatment programs, training costs, urine drug screens used as part of treatment, and assistance of a mental health therapist. This latter cost was paid for through JDC, but for ease of interpretation was placed under treatment costs. The average program cost was $3,458 for youth receiving usual community services and was applied to youth in the FC and DC conditions.

The same procedure was followed for determining the average cost per youth for implementation of MST and CM. The costs for implementing MST included salary and benefits for MST therapists as well as an MST supervisor, program manager, and administrative assistant. MST is a home-based treatment, so local travel costs were included. The cost for a year of standardized training and licensing for MST, as well as travel related to training was included, with travel of trainers estimated based on the trainer being in the same state (i.e., program costs for travel might increase by $1,000–$2,000 for programs that do not have an MST training program within their state). In addition, the cost for mandatory tracking of treatment fidelity (i.e., monthly calls to each family to complete the MST Therapist Adherence Measure) was included, as was a minimal (i.e., $100 per case) amount for “flexible funds,” which were typically used for assisting caregivers with incentives, providing family meals during sessions, and so forth. Based on the 5.3-month average length of treatment in this study, the number of cases served in a year by the MST program would be 45 with an average cost per case of $6,779. This figure is consistent with the cost of MST programs nationwide (SAMHSA, 2005).

Integrating CM into MST required additional training costs to prepare therapists to implement CM techniques, more frequent urine testing, and additional resources for incentives used to reward abstinence (e.g., gift certificates). These additions resulted in an estimated $495 increase in treatment costs for each youth receiving CM, bringing the cost for MST/CM to $7,274. Notably, this figure does not include the cost of the urine screens conducted by drug court (one per week) so as not to duplicate costs. Thus, the treatment cost for MST/CM not associated with a drug court program would be slightly higher, since the MST/CM program would be responsible for the cost of all urine screens.

Total costs—The average cost for a youth in each condition was calculated by summing the components (i.e., FC, JDC, MST, CM) implemented within the respective condition. As shown in Table 1, the FC condition incurred the lowest average cost, while the DC/MST/CM had the highest average cost. Table 1 also presents descriptive statistics for the seven outcomes (number of days of marijuana use, polydrug use, alcohol use, and heavy alcohol use; SRD status offenses, theft, and crimes against persons) for youth in each condition at baseline and 12-month follow-up. These data were used to compute cost effectiveness ratios.

Cost Effectiveness Analyses

A CEA was used to compare the economic efficiency of the four conditions in achieving the seven outcomes of interest. CEA helps to compare costs and outcomes of two or more

treatment programs when outcomes are measured in non-monetary units (e.g., number of reduced days with symptoms or number of reduced crimes). A CEA is conducted by comparing an average cost effectiveness ratio (ACER) for each outcome within each condition. In the present study, the ACER for a behavior avoided is defined as,

$$\text{ACER} = \frac{Cost}{mean\ number\ of\ incidences\ reduced},$$

where *Cost* represents the average cost of the intervention condition, and the *mean number of incidences reduced* refers to the difference between the mean number of incidences before treatment and at the time of follow-up (e.g., drop in the days of substance use or number of crimes). That is, the ACER reflects the average cost to achieve a one unit decrease in the outcome compared to pre-treatment behavior, such as a day free of marijuana use, for the given intervention condition. The ACER indicates the efficiency of the intervention condition in achieving outcomes, independent of the other conditions.

An example is provided here to demonstrate this calculation:

$$\text{Days of Marijuana Use ACER}_{FC} = \frac{\$3,718}{28.52 - 13.09} = \$241$$

Thus, each "day of marijuana use avoided" cost, on average, $241 per youth for the FC condition to achieve. This value is then compared to the cost for the other conditions to achieve the same decrease in behavior to determine which program is most efficient in obtaining the outcome of interest.

Table 2 presents the ACERs and 95% confidence intervals for each of the seven outcomes for the four intervention conditions. Confidence intervals were calculated using the bootstrap method. It is important to note that a negative value in ACER indicates that the behavior at follow-up was more frequent than before the treatment. Thus, any negative value would indicate that the program was inefficient in obtaining the particular outcome.

Family Court with Community Services—For reducing marijuana use and theft, the FC condition was the most cost effective (on average) of the four interventions. On the other hand, as indicated by the five negative ACERs, FC was inefficient in obtaining reduced poly-drug use, alcohol use, heavy alcohol use, status offenses, and crimes against persons.

JDC with Community Services—With four positive ACERs, the DC condition was relatively efficient (on average) in reducing delinquent behavior (i.e., status offenses, theft, and crimes against persons) and marijuana use. On the other hand, DC was inefficient in obtaining reduced poly-drug use, alcohol use, and heavy alcohol use. Compared to other intervention conditions, DC was not the most efficient program for obtaining any outcome, but was more cost effective than the two MST conditions (integrated into JDC) in reducing theft and had comparable cost effectiveness to the MST conditions in reducing marijuana use, status offenses, and crimes against persons.

JDC with MST—The DC/MST condition was efficient (on average) for reducing all outcomes except for alcohol use, and was the most cost effective program, though only by a small amount, for reducing status offenses and crimes against persons. The primary

advantages that DC/MST had over DC were the positive ACERs observed for poly-drug use and heavy alcohol use.

JDC with MST enhanced with CM—The most intensive and costly intervention, DC/MST/CM, was efficient (on average) for reducing all the outcomes of interest and was the most cost effective program in reducing polydrug use, alcohol use, and heavy alcohol use. DC/MST/CM had the same advantages over DC as did DC/MST, though to a greater degree (i.e., much more cost effective for reducing polydrug use and heavy alcohol use). Also, in contrast with each of the other intervention conditions, DC/MST/CM was cost effective in reducing adolescent alcohol use.

Discussion

The present investigation evaluated the 12-month cost effectiveness of four intervention conditions for reducing substance use and criminal behavior for juvenile offenders with substance use disorders. Overall, the results showed that cost effectiveness tended to improve with increasing intensity of interventions. Five of seven ACERs were negative for the FC condition and three of seven were negative for the DC condition. Only one of seven ACERs was negative for MST/DC, while all the ratios were positive for the DC/MST/CM condition. Thus, assuming an intervention context in which cost constraints are not primary, the integration of evidence-based treatments into JDC provides a program that is broadly cost effective in decreasing offender substance use and delinquent behavior. On the other hand, although the least costly intervention (i.e., FC) clearly had its limitations (i.e., cost inefficient for most outcomes), FC was the most cost effective for decreasing youth marijuana use and theft. Regarding marijuana use, for example, FC was considerably less clinically effective than the JDC conditions with the evidence-based treatments, but its much lower cost (about 25% the cost) resulted in the best cost effectiveness ratio.

Special attention should be devoted to the findings for the DC condition, as JDCs have proliferated and the vast majority do not integrate evidence-based treatments. Although DC was almost three times as expensive as FC, the analyses supported the cost effectiveness of DC over FC regarding criminal behavior – a critical outcome for youth in the juvenile justice system. With estimates for a single crime against persons ranging from $2,630 for a minor assault to $111,431 for an aggravated assault (French, McCollister, & Reznik, 2004; Rajkumar & French, 1997), each incident avoided has potential for substantial economic return (i.e., avoiding victim costs, crime career costs, criminal justice system costs, and costs associated with a victim's pain and suffering). The substance related ACERs were similar for FC and DC. Thus, assuming the availability of the necessary resources, DC seems to have clear advantages in the treatment of juvenile offenders with substance use disorders. Moreover, the results suggest that adding another three or four thousand dollars to JDC for the integration of evidence-based substance abuse treatment buys the program cost effectiveness in treating substance use as well.

In sum, the initial reporting of the clinical trial (Henggeler et al., 2006) provided important information regarding substance use and behavioral outcomes for court-involved substance abusing and dependent youth, and it supplied the first rigorous examination of the effectiveness of a juvenile drug court. Agencies and communities selecting a program to implement, however, also must consider the substantial difference in resources that would be needed to implement the various programs as well as the opportunity costs (i.e., spending money on one program usually reduces the money available to spend on alternative programs). Thus, the present investigation provides an important addition to the clinical findings reported previously, introducing results that might facilitate policy decisions for both treatment and judicial service sectors.

Limitations

The limitations to this study pertain primarily to methodological considerations in conducting cost evaluations and to issues of external validity. First, although the analyses presented here represent a comprehensive approach to cost effectiveness evaluation, additional methodologies, as noted in the introduction, exist for conducting cost evaluations within clinical trials (Kaplan & Groessel, 2002). Future investigations, for example, might pursue cost-benefit evaluations in which costs from all domains (e.g., direct, opportunity, family, societal costs) are monetized. More accurately monetizing the value of reduced adolescent substance use would be particularly pertinent. Second, as also noted previously, per-person costs used in the present investigation were not individualized for each youth so that cost effectiveness ratios could represent the average cost for avoiding problem behaviors and not be overly influenced by heterogeneity in the small sample. Larger sample sizes could be used to avoid this limitation. Third, longer term cost effectiveness might differ from the cost effectiveness at 12-months post-recruitment. This possibility is particularly relevant given that the drug court portion of the program typically lasted for 12 months (treatment could be shorter or longer), so a drop in the intensive surveillance provided by JDC might result in an escalation of negative behaviors and possibly a reversal in the cost effectiveness of the JDC conditions. Although findings from existing drug court research suggest that effects do not decay following drug court (Wilson, Mitchell, & Mackenzie, 2006), data currently being collected in a 5-year follow-up will allow for evaluation of this issue in the present study.

Regarding limitations pertaining to external validity, first, JDC programs are diverse and do not follow a strictly prescribed format. Thus, the findings of the present investigation cannot be generalized to all JDCs. Second, the present findings cannot be generalized to adolescents in drug court programs who do not demonstrate problematic levels of substance use, as the present sample was limited to youth with substance use disorders. Third, the cost effectiveness findings regarding the conditions that included MST and CM might not generalize to other evidence-based practices integrated into JDC. Fourth, the costs for the interventions examined here, and corresponding ACERs, might differ for other locales where salaries are higher or lower. Finally, the results are necessarily confined to the types of interventions examined in this clinical trial. It is entirely possible that juvenile justice interventions that are even less intensive than family court (e.g., diversion) could produce favorable cost effectiveness findings.

Conclusions and Policy Implications

The present investigation provides an important step in the evaluation of treatment programs for substance abusing delinquents. JDCs have proliferated during the past decade, but little research has addressed their effectiveness. Further, the integration of evidence-based practices for treating substance use into drug court and other judicial programs has been under-researched. In fact, the judicial system usually assumes that the available treatments in the community are effective, though little evidence supports this assumption (e.g., Institute of Medicine, 1998; McLellan, Carise, & Kleber, 2003). The present findings support the view that juvenile justice programs should have access to evidence-based treatments and that such treatments can provide desired outcomes cost effectively.

The present investigation also provides an example of a cost evaluation within psychosocial research, an area in which few cost evaluations have been undertaken. The complexity of such evaluations is great, requiring collaborations across fields and working through layers of difficulties in identifying costs and monetizing variables. Cost evaluations are needed, however, to facilitate decision making at the program and policy levels.

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Table 1

Summary Statistics for Condition Costs and for Substance Use and Criminal Behaviors at Baseline and 12-Month Follow-Up

	Family Court(FC)	Drug Court(DC)	Drug Court with MST(DC/MST)	Drug Court with MST & CM(DC/MST/CM)
Observations:	33	29	29	37
Average Treatment Cost:	$3,718	$9,178	$12,499	$12,994
Marijuana use				
Mean # Days Before Treatment (*SD*)	28.52 (26.84)	28.48 (24.95)	33.86 (27.76)	34.70 (29.96)
Mean # Days at 12-Month Follow-Up (*SD*)	13.09 (24.13)	11.83 (26.02)	3.69 (16.66)	6.84 (19.92)
Polydrug use				
Mean # Days Before Treatment (*SD*)	1.94 (3.98)	0.90 (1.54)	1.21 (3.37)	7.08 (15.72)
Mean # Days at 12-Month Follow-Up (*SD*)	4.21 (12.30)	2.31 (5.79)	0.10 (0.41)	0.32 (1.81)
Alcohol use				
Mean # Days Before Treatment (*SD*)	2.55 (4.64)	1.10 (1.54)	1.28 (3.34)	7.86 (16.30)
Mean # Days at 12-Month Follow-Up (*SD*)	5.52 (16.45)	1.59 (4.97)	1.55 (7.23)	0.30 (0.78)
Heavy alcohol use				
Mean # Days Before Treatment (*SD*)	1.39 (3.60)	0.55 (1.12)	0.55 (2.41)	4.32 (13.10)
Mean # Days at 12-Month Follow-Up (*SD*)	2.15 (5.78)	1.41 (4.64)	0.10 (0.41)	0.19 (0.57)
SRD status offenses				
Mean # Incidents Before Treatment (*SD*)	8.48 (7.34)	8.62 (10.63)	13.79 (22.33)	13.92 (22.60)
Mean # Incidents at 12-Month Follow-Up (*SD*)	17.70 (38.55)	1.38 (2.38)	2.69 (5.80)	3.54 (6.40)
SRD theft				
Mean # Incidents Before Treatment (*SD*)	10.15 (15.37)	5.21 (9.80)	4.69 (6.42)	4.41 (6.43)
Mean # Incidents at 12-Month Follow-Up (*SD*)	4.61 (13.19)	1.93 (7.15)	1.90 (6.56)	1.22 (2.47)
SRD crimes against persons				
Mean # Incidents Before Treatment (*SD*)	10.09 (17.54)	3.69 (4.89)	6.90 (11.52)	4.24 (6.61)
Mean # Incidents at 12-Month Follow-Up (*SD*)	10.58 (27.73)	1.00 (2.20)	3.00 (8.25)	1.84 (4.46)

Table 2

Average Cost Effectiveness Ratios (ACER)[a] and 95% Confidence Interval (CI) for Each Outcome and Condition

	Family Court (FC)	Drug Court (DC)	Drug Court with MST (DC/MST)	Drug Court with MST & CM (DC/MST/CM)
	ACER (CI)	ACER (CI)	ACER (CI)	ACER (CI)
Days of marijuana use	$241 (217 – 265)	$551 (479 – 623)	$414 (381 – 447)	$466 (439 – 493)
Days of polydrug use	−$1,636[b] (−8,932 – 5,660)	−$6,492[b] (−27,830 – 14,846)	$11,327 (−3,796 – 26,450)	$1,923 (1,641 – 2,205)
Days of alcohol use	−$1,252[b] (−6,615 – 4,111)	−$19,012[b] (−42,475 – 4,451)	−$45,309[b] (−61,655 – 28,963)	$1,717 (1,502 – 1,932)
Days of heavy alcohol use	−$4,908[b] (−10,744 – 928)	−$10,646[b] (−29,106 – 7,814)	$27,882 (−14,790 – 70,554)	$3,142 (1,726 – 4,558)
SRD status offenses	−$404[b] (−1,210 – 402)	$1,267 (1,144 – 1,390)	$1,126 (917 – 1,335)	$1,252 (1,020 – 1,484)
SRD theft	$670 (432 – 908)	$2,802 (−2,467 – 8,071)	$4,475 (−1,237 – 10,187)	$4,074 (1,217 – 6,931)
SRD crimes against persons	−$7,668[b] (−10,779 – −4,557)	$3,412 (3,007 – 3,817)	$3,208 (238 – 6,178)	$5,402 (4,773 – 6,031)

[a] Indicates the average cost to achieve a one unit decrease in the outcome compared to pre-treatment behavior.

[b] A negative ACER indicates that the program was inefficient in obtaining the outcome.