MECHANISMS OF EFFECTIVENESS IN JUVENILE DRUG COURT: ALTERING RISK PROCESSES ASSOCIATED WITH DELINQUENCY AND SUBSTANCE ABUSE

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Using data from a recent randomized clinical trial, this study examines the underlying basis of the success of juvenile drug court (JDC) and of evidence-based treatments at enhancing JDC outcomes. Participants in the clinical trial and the present study were 161 juvenile offenders meeting diagnostic criteria for substance use disorders and their families. Measures of youth delinquency and substance use as well as measures of family- and peer-related risk factors were obtained at three points during a 12-month period. Results showed that the relative effectiveness of JDC and the evidence-based treatments was likely due, at least in part, to the capacity of these interventions to alter well-established family (e.g., parent supervision) and peer (e.g., association with deviant peers) risk factors for antisocial behavior in adolescents. Implications of the findings for further improvements in the effectiveness of JDCs are discussed.

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ARTICLE SUMMARIES

EFFECTS OF JUVENILE DRUG COURTS

[1] Juvenile drug courts are effective in addressing risk factors for adolescent drug use in family risk domains (e.g., low parental supervision) and peer risk domains (e.g., associating with drug using peers).

JUVENILE DRUG COURT INTERVENTIONS

[2] Juvenile drug court outcomes are enhanced when evidence-based treatments such as Multisystemic Therapy (MST) and Contingency Management (CM) are provided.

SUGGESTIONS FOR JUVENILE DRUG COURT PRACTICE

[3] Outcomes are likely to be further enhanced if juvenile drug courts facilitate youths' access to community-based, pro-social peer activities, such as clubs and sports teams.

POLICY IMPLICATIONS FOR JUVENILE DRUG COURTS

[4] Outcomes are enhanced when juvenile drug courts ensure that drug treatment providers use evidence-based practices, particularly those that are family-based.

INTRODUCTION

As described by Belenko and colleagues (Belenko & Dembo, 2003; Belenko & Logan, 2003), the emergence of juvenile drug courts (JDC) in the early 1990s was spurred by the influx of substance abusing youth into the juvenile justice system, the lack of effective services in that system for these youth, and the emerging success of adult drug courts (U.S. General Accountability Office, 2005; Wilson, Mitchell, & MacKenzie, 2006). Today, approximately 500 JDCs operate nationally (National Criminal Justice Reference Service, 2008), which is a testimony to their influence among stakeholders in the juvenile justice system.

[1] Although JDCs have increased in number during the past two decades, rigorous scientific evidence of their effectiveness has been obtained only recently. In a randomized trial with several intervention conditions, Henggeler and colleagues (2006) compared the nature of the court (JDC versus traditional family court) and the substance abuse treatment (usual substance abuse treatment versus evidence-based treatment) provided in collaboration with the court. Results at 12-months post recruitment showed that JDC, in conjunction with the usual substance abuse treatment, was more effective in decreasing rates of youth substance use and criminal behavior than was family court when used in conjunction with this same substance abuse treatment. The positive effects of JDC, however, were enhanced when evidence-based treatments for adolescent substance abuse (i.e. multisystemic therapy [MST]; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009; and contingency management [CM]; Higgins, Silverman, & Heil, 2008) were provided as the treatment component of JDC instead of the usual group-based community substance abuse treatment.

These findings support the effectiveness of JDCs and the integration of evidence-based treatment into JDC. The

reasons for the effectiveness, however, are not fully understood. One plausible explanation for the success of JDC is that participating youth are more likely to receive substance abuse treatment than their counterparts receiving traditional court services (Roman & DeStefano, 2004). Two alternative arguments suggest that linking youth to treatment alone does not explain the positive results of JDC. First, as noted by Henggeler et al. (2006), the combination of JDC and usual substance abuse treatment was more effective than the combination of family court and usual substance abuse treatment. Since youth in both treatment conditions received the same substance abuse treatment available in the community, the treatment could not fully account for the greater effectiveness of JDC. Second, studies of the national substance abuse treatment system (e.g., McLellan, Carise, & Kleber, 2003) and reviews of the services available for juvenile offenders with substance use disorders (Chassin, 2008) concluded that substance-abusing individuals are not likely to receive evidence-based treatments. Moreover, group-based treatments commonly provided to substance-abusing adolescents in community settings might actually be iatrogenic (i.e., may cause negative outcomes), due to the tendency for antisocial youth to reinforce one another's deviant behaviors when clustered together (Dodge, Dishion, & Lansford, 2006).

An alternative explanation, which is the focus of the present study, is that the success of JDC and the evidence-based interventions is due to their ability to directly address the key risk processes associated with adolescent delinquency and substance abuse. Indeed, the principles and practices that define high-quality drug courts (National Association of Drug Court Professionals, 1997) also address known risk factors for antisocial behavior and drug use in family (e.g., poor monitoring and inconsistent discipline), peer (e.g., association with deviant peers), and school (e.g., low attendance) domains (for reviews, see Dishion & Patterson, 2006; Mayes & Suchman, 2006). For example, drug courts provide close

monitoring of youth behavior through community supervision, frequent review of treatment progress and regular drug testing, and issue rewards and sanctions based on youth drug use, compliance with rules at home, and school attendance. As a result of extensive contact with youth, JDC judges and associated stakeholders can tailor interventions, rewards, and sanctions to closely match the youth's individual needs (e.g., mandating no contact with peers with whom the youth has been arrested). Relative to traditional courts, JDCs are also more likely to engage caregivers of youth and include them in providing increased monitoring of the youth.

[2] The effectiveness of JDC on substance-related outcomes was enhanced with the integration of MST as an evidence-based substance abuse treatment (Sheidow & Henggeler, 2008) and CM used within the context of MST. As with JDC, MST focuses on key risk factors for serious antisocial behavior in adolescents. MST interventions place great emphasis on empowering caregivers to set limits on youth peer-group associations (i.e., prohibiting contact with deviant peers), and to monitor youth activities and whereabouts (e.g., verifying that the youth spends time only with approved peers, applying random drug testing of youth). Caregivers also are taught to issue sanctions (e.g., loss of privileges) for deviant behavior such as drug use and to provide rewards (e.g., access to privileges or increased freedom) for appropriate behavior such as school attendance. Consistent with JDC objectives, MST also facilitates collaboration between key systems involved with youth (e.g., family, school, parents of the youth's friends) to coordinate efforts to change youths' maladaptive behavior. CM also emphasizes close monitoring of substance use and the application of incentives (i.e. rewards) and sanctions based on use.

Presumably, JDCs and treatments such as MST and CM set into motion changes in the lives of youth (i.e.,

reductions in risk factors) that ultimately lead to a decreased rate of drug use and antisocial behavior. Intermediate changes that lead to the ultimate change of interest (in the case of JDCs, no additional drug use or drug offenses) are known in treatment outcome literature as "mechanisms of change." Understanding possible mechanisms of change can help identify the "active ingredients" necessary for the success of interventions. Additionally, it can point to refinements and improvements in areas that could make interventions more effective. For example, a research finding that links improved parental monitoring of youth with decreased drug use would suggest that teaching proper monitoring skills to caregivers of substance-abusing youth might provide a vehicle for enhancing youth outcomes.

To date, no studies exist that have examined mechanisms of change for JDCs. Given the similarities in intervention emphasis between JDC and evidence-based psychosocial treatments such as MST and CM, research on the mechanisms of change for these treatments provide a starting point for examining the mechanisms underlying JDC effectiveness. Although only a handful of studies have examined mechanisms of change for treatments targeting juvenile offenders (Eddy & Chamberlain, 2000; Henggeler et al., 2009) and substance-abusing juvenile offenders (Huey, Henggeler, Brondino, & Pickrel, 2000), results are very consistent. More effective caregiver parenting (e.g., increased monitoring and supervision) and decreased youth association with deviant peers were key determinants of decreases in youth antisocial behavior across these studies. These family- and peer-related variables are also well-established risk factors for the development and continuation of antisocial behavior in adolescents (Dishion & Patterson, 2006; Mayes & Suchman, 2006).

The purpose of the present study is to explore possible mechanisms of change associated with participation in JDC and with the integration of evidence-based treatment

into JDC using data from Henggeler et al. (2006). First, we examined whether improvement in key family and peer risk processes predicted reduced delinquent behavior and substance use across substance-abusing juvenile offenders under all treatment conditions. Finally, for risk processes that were related to decreased delinquent behavior and substance use, we explored whether participation in each of the three treatment conditions had a positive impact on these risk processes.

METHOD

Design and Procedures

In the original study, Henggeler et al. (2006) sought to evaluate the effectiveness of JDC relative to traditional family court services and to determine whether the inclusion of two evidence-based practices (MST and CM) would improve JDC outcomes. In the study, youth were randomly assigned to one of four intervention conditions: 1) Family court with usual community substance abuse services (FC); 2) JDC with usual community substance abuse services (DC); 3) JDC with MST (DC/MST), and 4) JDC with MST and CM (DC/MST-CM). The study by Henggeler et al. (2006) found that outcomes for youth in the DC/MST and DC/MST-CM conditions were similar; as a result, these two intervention conditions were combined (MST/MST-CM) for all analyses conducted in the current study.

Assessments were conducted with each youth and his/her caregiver at three points in time during the study: 1) within 72 hours of recruitment into the study (pretreatment); 2) 4 months post-recruitment, which corresponds to the average end of MST/MST-CM treatment; and 3) 12 months post-recruitment, which corresponds to the average end of JDC. Research assistants administered assessment questionaires to families in their homes or in detention facilities for youth in juvenile justice custody. Families were

paid $75 for each completed assessment as compensation for their time.

Participants

Study participants were 161 adolescents recruited from the Department of Juvenile Justice (DJJ). DJJ is the public agency responsible for adjudicating and intervening with juvenile offenders in the community where the study took place (Charleston, South Carolina). All youth met *Diagnostic and Statistical Manual of Mental Disorders'* (4th ed.; DSM-IV; American Psychiatric Association, 1994) diagnostic criteria for alcohol or drug abuse or dependence. Additional inclusion criteria were (a) age of 12-17 years; (b) residence in Charleston County; and (c) residence with at least one parental figure. Adolescents were excluded if they were already involved in substance abuse treatment or if a family member had already received MST treatment. No youth were excluded due to mental health, physical health, or intellectual difficulties.

Participating youth averaged 15.2 years of age (*SD* = 1.1), and 83% were male. Youth in the study were 67% African-American, 31% White, and 2% biracial. Only 15% of study participants lived with both biological or adoptive parents, 21% lived with a biological parent and another adult caregiver, 52% lived with a single biological or adoptive parent, and 12% lived with other relatives. The median annual family income was between $10,000-$15,000; 38% of families were receiving financial assistance. The median education level of the primary caregiver was 12th grade. The youth averaged 3.6 arrests (*SD* = 2.5) prior to study entry, and 35% had previously received mental health or substance abuse treatment.

Recruitment and Randomization

All cases entering the DJJ as new referrals or repeat offenders from January 2000 to June 2003 (*N* = 2,123) were screened by probation staff for possible alcohol or drug abuse. If substance abuse was suspected and other inclusion criteria were met, the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 2001) was administered to both the caregiver and the youth offender. All inclusion criteria were met by 165 youth and their families. The families were recruited for study participation by a researcher who obtained consent. One hundred sixty-one families agreed to participate, yielding a recruitment rate of 98%. After securing agreement to participate and upon completion of the pre-treatment assessment questionaire, families were informed of the conditions to which they were assigned. Youth participants assigned to one of the JDC conditions were enrolled in drug court interventions, which began immediately.

Intervention Conditions

All youth were supervised by probation or parole staff. This included a minimum of two hours of juvenile justice contact per month for about one year. The three intervention conditions are described briefly and outlined in Table 1. For additional details, refer to Henggeler et al. (2006).

Table 1. Interventions and Services Provided by Condition

Intervention Component	FC	JDC	JDC + MST[a]	JDC + MST-CM[a]
Monthly 2-hour meetings with probation officer	X	X	X	X
Weekly drug testing (by court)		X	X	X
Court-provided incentives for positive behavior (e.g., for negative drug screens, school attendance, treatment attendance) and sanctions for substance use and negative behavior		X	X	X
Office-based community outpatient group therapy, family group therapy, and individual therapy. [b]	X	X		
Home-based empirically supported treatment (MST) for antisocial behavior			X	X
Home-based empirically-supported treatment (CM) for substance abuse				X

Note: FC = Family Court (n=42), JDC= Juvenile Drug Court (n=38), MST = Multi-Systemic Therapy (n=38), CM = Contingency Management (n=43)

[a] MST conditions were combined for analyses in the present study.

[b] Treatment was not manualized, and the content was left to the discretion of the treatment providers; hence, these treatments were not considered to be empirically-supported.

Family Court. Youth in the FC condition appeared before a family court judge approximately once or twice per year. These youth were referred by their DJJ intake representative to receive outpatient alcohol and drug abuse services from the local state-funded alcohol and drug treatment facility. Services typically lasted 12 weeks and included: 1) group treatment sessions focusing on risk reduction, peer influence, conflict resolution, and anger management (1.5 hours, 4 days per week); 2) individual sessions (once per week); and 3) family group therapy (1.5 hours, 2 days per week). In addition, youth concurrently received six weeks of group treatment (once per week) relating to drug-selling activities. The theoretical orientations of these services were based on cognitive-behavioral theory and systems theory. The specific interventions and selection of materials were left to the discretion of the therapists. Services were provided in the office, with minimal community outreach. Less intensive services were offered, if needed, following the completion of the 12-week program.

Juvenile Drug Court. In the JDC condition, the aforementioned community services were also provided, but in the context of JDC proceedings. JDC hearings were held initially once per week, and procedures were typical of those provided in JDCs nationally. Prior to each court appearance, urine drug screens were conducted. During the hearing the youth, caregiver, and substance abuse counselor reported on the youth's behavior during the previous week. If the youth's drug screen was positive or if negative behavior was reported, sanctions could be imposed. Sanctions varied in intensity and ranged from community service to detention. If the youth's behavior was positive and he or she provided negative drug screens, the judge rewarded the youth with incentives that also varied with the achievement level (e.g., meals at fast food restaurants, tickets to sporting events). The participating JDC used a three-level system to determine how often a youth's attendance was required at court (i.e., weekly, biweekly, or monthly). Graduation from one level to the next

was dependent on negative drug screens and acceptable behavior in other areas. The standard duration of JDC was 12 months.

MST/MST-CM. In these two conditions, MST or MST-CM was provided within the context of JDC. MST is a manualized (Henggeler et al., 2009) evidence-based treatment that targets a comprehensive set of risk factors with interventions individualized to youth and family needs. These interventions integrate empirically based clinical techniques (e.g., family therapy, cognitive-behavioral therapy) into a broad-based ecological framework that addresses relevant factors across key domains (e.g., individual, family, peer, school, and neighborhood). MST interventions were focused on promoting behavioral changes in the youth's natural ecology by empowering caregivers with skills and resources to address difficulties that arise in raising adolescents. Intensive, standardized, and sustained quality assurance protocols are used to maintain fidelity to the treatment model. Services are delivered via a home-based approach, which facilitates a high level of engagement and low dropout rates. Therapists carry low caseloads (4 to 5 families per clinician) with services delivered in the home, school, and/or neighborhood settings at times convenient to the family. Therapists are available to respond to clinical problems 24 hours a day, seven days a week.

Youth and families in the MST-CM condition received full MST treatment plus CM (Budney & Higgins, 1998). CM is a behavioral treatment program that involves the following: 1) frequent urine drug tests with a voucher system that rewards negative screens, 2) functional analysis of drug use, and 3) self-management plans for coping with individual triggers based on functional analysis results. Consistent with MST treatment principles, the youth's caregivers were closely involved in all aspects of CM (e.g., taking urine samples, administering vouchers, and reinforcing youth's use of self-management plans).

Measures: Ultimate Outcomes

Ultimate outcomes are those common to all interventions for juvenile offenses and substance abuse cases. These outcomes are defined as reductions in the referral behaviors (i.e., reduced delinquent behavior and use of substances).

Alcohol, marijuana, and polydrug use. Substance use was assessed using the Form 90 (Miller, 1991), an interview based on a timeline look-back methodology. A calendar of the previous 90 days was first used to highlight important events. The calendar was then used to record specific quantities and types of substances consumed each day during the 90-day period. The total number of days during the period that alcohol, marijuana, and/or multiple drugs were used was summed at each point in time.

Delinquent Behavior. The 47-item Self-Report Delinquency Scale (SRD; Elliott, Ageton, Huizinga, Knowles, & Canter, 1983) was used to assess youth delinquent behavior. The SRD taps into a broad range of criminal behaviors and has the best supportive evidence among the various self-report delinquency scales (Thornberry & Krohn, 2000). Youth reported the total number of times they engaged in each behavior during the previous 90 days; these numbers were summed at each point in time.

Measures: Risk Processes

Risk process measures assessed family and peer influences, which are thought to be related to changes in ultimate outcomes. The risk processes examined in the present study were most consistent with existing research on the determinants of antisocial behavior in adolescents and on the change mechanisms of evidence-based treatments for such behavior. Risk processes were measured using scales developed for the Pittsburg Youth Study (PYS; Loeber,

Farrington, Stouthamer-Loeber, & Van Kammen, 1998). These scales are widely used in studies of juvenile offenders and have strong reliability and validity with this population (e.g., Pardini, Loeber, & Stouthamer-Loeber, 2005). The respondent for each scale (youth, caregiver, or both) varies based on whose report of the process has proven to be most reliable in previous research. For example, caregivers are unlikely to have full information regarding the criminal activity of their child's peers, making them unreliable respondents for this risk process. Other risk factors (e.g., caregiver disapproval of friends) are known to both the caregiver and youth thereby producing high agreement between respondents. Such scales have demonstrated adequate reliability when youth and caregiver reports are averaged together. Youth and caregiver ratings of other risk factors (e.g., parental supervision) might diverge, and thus cannot be reliably combined. In such cases, each perspective is considered valid and is analyzed separately.

Peer delinquency and drug activities. The Peer Delinquency and Peer Drug Activity Scales were used to assess the proportion of youths' friends who engage in various antisocial behaviors. The 11-item Peer Delinquency Scale assessed general delinquency/criminal behavior (e.g., strong armed robbery, destruction of property) committed by peers during the previous 90 days. The 4-item Peer Drug Activity Scale assessed peer drug related behaviors (e.g., used alcohol, sold drugs) during that same time period. For both scales, items were rated using a 5-point scale (from 0 = *none of them* to 4 = *all of them*) and were summed so that higher scores indicated higher proportions of friends involved in delinquent behavior or drug activity.

Peer conventional activities. The Conventional Activities of Peers Scale is an 8-item youth-report measure designed to assess the proportion of participants' friends who engage in pro-social activities. Youth were asked how many of their friends engage in positive activities at school (e.g.,

athletics, clubs), in the community (e.g., church groups), and at home (e.g., doing things with family members). Youth participants rated how many of their friends engaged in these acts during the previous 90 days using a 5-point scale (from 0 = *none of them* to 4 = *all of them*). Items were summed so that higher scores indicated more peers engaged in conventional activities.

Bad friends. Youth and caregivers were asked to report on the extent to which the youth had contact with peers who were disapproved of by caregivers. The Bad Friends Scale consists of five youth and five caregiver *yes-no* items (e.g., "Were there any children among your group of friends of which your caregiver disapproved?") that were summed to give a single-scale score, with higher scores indicating more association with disapproved peers.

Parental supervision. Caregiver supervision was measured using four caregiver and four youth items pertaining to parental knowledge of the youth's whereabouts and activities. An example of an item for the youth report was, "Does (do) your parent(s) know who you are with when you are away from home?" A comparable item for the parent version is, "Do you know who your son's/daughter's companions are when s/he is not at home?" Respondents rated each item using a 3-point rating scale (1 = *almost never*, 2 = *sometimes*, 3 = *often*). Items were summed so that higher scores indicated better supervision.

Consistent discipline. Consistent caregiver discipline was measured using the Discipline Scale, which consists of four caregiver and four youth questions pertaining to parental persistence in disciplining. An example of a caregiver item was, "If you warn your child that s/he will be punished if s/he does not stop doing something, do you actually punish her/him if s/he does not stop?" An example of a youth item was, "If your mother/father warns you that you will get punished if you do not stop doing something, does s/he do

what s/he says and punish you?" Responses to these items were measured using a 3-point rating scale (1 = *almost never*, 2 = *sometimes*, 3 = *often*). All items were summed so that higher ratings indicated more consistent discipline.

Communication. The Revised Parent-Adolescent Communication Form asks youth (29 items) and caregivers (30 items) how often they communicate about their emotions, problems, and disagreements. Adolescent questions included, "Is your parent a good listener?" and "Does your parent insult you when he/she is angry with you?" Examples of caregiver questions included, "Do you and your child try to come to a solution when talking about a problem?" and "When you are having a problem with your child, do you give him the silent treatment?" For each item, the respondent indicated how frequently the behavior occurred using a 3-point scale (0 = *almost never*, 1 = *sometimes*, 2 = *always*). Some items were reverse-scored before being summed so that higher scores indicated better parent-child communication.

Statistical Methodology

Latent growth curve modeling (LGM) techniques and the MPlus Version 5.1 software package (Muthen & Muthen, 2008) were used for all analyses. LGMs analyze patterns of change (i.e., slopes or "growth factors") in a variable that is measured repeatedly to determine whether there has been no change (i.e., values are virtually the same at every time point), linear change (i.e., values consistently go up or down), or nonlinear change (e.g., values go up at first but then level off) over time. For example, height measured over a 4-year period would be captured as a slope (or "growth") of zero (i.e., no change) for adults, as linear with a positive slope (i.e., taller every year) for a child, and as positive but nonlinear for an adolescent (i.e., progressively taller in years 1-3, but leveling off in year 4). LGMs use several statistics (model fit indices) to determine which overall model shape is best suited for the data. These fit indices and their accepted

values for a good fit are: the Comparative Fit Index (CFI; .95 or greater), the Tucker-Lewis Index (TLI; .95 or greater), and the Root Square Error of Approximation (RMSEA; .06 or smaller). In addition, a statistical *z* score is used to determine the degree to which slopes for each process of interest differ from zero (no change).

In the present study, we expected all risk processes and ultimate outcomes would show significant linear improvements over the three assessment time points (i.e., baseline, 4 months, and 12 months). We also expected that changes in risk processes would be significantly related to changes in ultimate outcome processes (e.g., that increased parental supervision would be associated with decreased marijuana use). To test these associations, parallel process LGMs, which involve estimating two separate LGM processes (e.g., parental supervision and marijuana use) in the same model and examining the degree of association between their slopes, were used. In addition, and most importantly, based on the results of Henggeler et al. (2006), we also expected more improvements on risk processes in the JDC conditions than in the FC condition, and more improvements in the MST/MST-CM conditions than in the JDC condition. To examine the differential improvements between intervention conditions, multiple group LGMs, which provide an estimate of slope for each intervention condition, were used. Multiple group LGMs were conducted only for those risk processes found to be related to ultimate outcomes. Finally, it should be noted that although random assignment was used in the present study, all LGM results are correlational and thus, causality cannot be determined from the results.

RESULTS

[3] This section is divided into three parts. The first section shows how the single-process LGMs used in the parallel process and multiple group models were derived. The second section examines the associations between risk and ultimate outcome processes (i.e., parallel process model results). The third section explores the effects of each treatment condition on those risk processes (i.e., multiple group LGM results) found to have significant associations with reductions in ultimate outcomes.

Preliminary Analyses: Risk and Ultimate Outcome Processes

These analyses showed that the model fit was adequate for all risk and outcome processes. For each process, the linear slope model was the best fit for the given data and was retained for further analysis. Interested readers can obtain, upon request to the first author, a table showing estimates of all model parameters and details regarding the model specification for variables (i.e., peer delinquency and peer drug activity) that violated normality assumptions (i.e., were positively skewed) at one or more points in time as well as for variables (i.e., delinquency and substance use) that involved count data (for which negative binomial LGMs were used).

Association between Risk and Ultimate Outcome Processes

A parallel process model was fit for each pair of risk and ultimate outcome processes. A positive (i.e., both processes increasing) or negative (i.e., as one process increases the other decreases) association between two processes was identified when the estimate of the covariance parameter was statistically significant. As shown in Table 2, analyses supported many of the hypothesized associations

between risk and outcome processes. Twenty-one (21) of 40 possible associations were statistically significant.

The significant findings in Table 2 show that the decreased association of youth with delinquent peers and with drug using peers was associated with reduced delinquent behavior, alcohol use, marijuana use, and polydrug use. Similarly, increased youth association with conventional peers was associated with decreased delinquent behavior, alcohol use, and polydrug use. Several of the risk processes that involved family relations were also associated with reduced adolescent antisocial behavior and drug use. The most consistent associations were observed for caregiver and youth reports of parental supervision. Both youth and caregiver reports of increased parental supervision were associated significantly with reduced delinquent behavior, alcohol use (youth report only), marijuana use, and polydrug use. In addition, reductions in youth polydrug use were associated with both caregiver and youth reports of more consistent parental discipline (i.e., increased enforcement of rules). Youth reports of increased consistent discipline was also associated with reduced alcohol use. Changes in caregiver-adolescent communication or caregiver concern about the youth's bad friends were not associated with reductions in youth antisocial behavior.

Table 2. Parallel Process Latent Growth Models: Association between Changes in Risk and Outcome Processes

	Ultimate Outcome Process			
Risk Process	Delinquent Behavior	Alcohol Use	Marijuana Use	Polydrug Use
Peer delinquency	1.69**	2.22***	1.78*	2.80***
Peer drug activity	0.09***	0.18**	0.12**	0.20***
Peer conventional activities	-0.54**	-1.44*	-1.01†	-1.99*
Bad friends	0.13	0.20	0.29	0.32
Supervision (parent report)	-0.02***	-0.03†	-0.05**	-0.07**

Table 2 continues…

Supervision (youth report)	-0.05***	-0.11***	-0.06*	-0.10**
Consistent discipline (parent report)	-0.01	-0.03	-0.03	-0.06*
Consistent discipline (youth report)	-0.01	-0.04*	-0.02	-0.06*
Communication (parent report)	0.00	0.01	0.02	0.02
Communication (youth report)	-0.01	-0.05†	-0.03	-0.06†

Note. Risk processes were measured using scales from the Pittsburg Youth Study (Loeber et al, 1998). Delinquent behavior was measured using the Self Report of Delinquency instrument (Elliott et al., 1983); Alcohol, marijuana, and polydrug use were measured using the Form 90 (Miller, 1991). Sample size for all analyses was $N = 161$.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Change in Risk Processes by Intervention Condition

Multiple group models were used to examine changes in risk processes by treatment condition. Only risk processes that were significantly related to one or more ultimate outcome process (i.e., peer delinquency, peer drug activity, peer conventional activities, supervision, and consistent discipline) were examined. A separate multiple group model was generated for each risk process. Table 3 shows the group-specific change for each risk process over time relative to zero (i.e., no change). Due to the reduced statistical power for the analyses and an objective to reduce Type 2 errors, marginal results are noted.

Table 3. Changes in Risk Processes by Treatment Group Condition: Multiple Group Latent Variable Growth Models

	Linear Growth Factor Estimates (Standardized) by Intervention Condition			Model Fit		
Risk Process[a]	FC	DC only	DC + MST/MST-CM	CFI	TLI	RMSEA
Peer delinquency	-0.09*	-0.12†	-0.09*	1.00	1.03	.000
Peer drug activity	-0.10	-0.17*	-0.15**	1.00	1.04	.000
Peer conventional activities	-0.15	0.32	0.69	1.00	1.09	.000
Supervision (parent report)	0.00	0.00	0.01	.963	.970	.081
Supervision (youth report)	*-0.08**	0.10**	0.05*	.946	.959	.070

Table 3 continues…

Consistent discipline (parent report)	0.00	0.01	0.05[†]	1.00	1.04	.000
Consistent discipline (youth report)	0.02	0.02	0.00	.877	.926	.075

Note. Values in italics represent iatrogenic effects, i.e., functioning declined over time. FC = Family Court (n = 42); DC = Juvenile Drug Court (n = 38); MST = Multisystemic Therapy; CM = Contingency Management (MST/MST-CM; n = 81). Sample size for all analyses was N = 161.

[a] Only those risk processes that were related to ultimate outcome processes were examined (see Table 2).

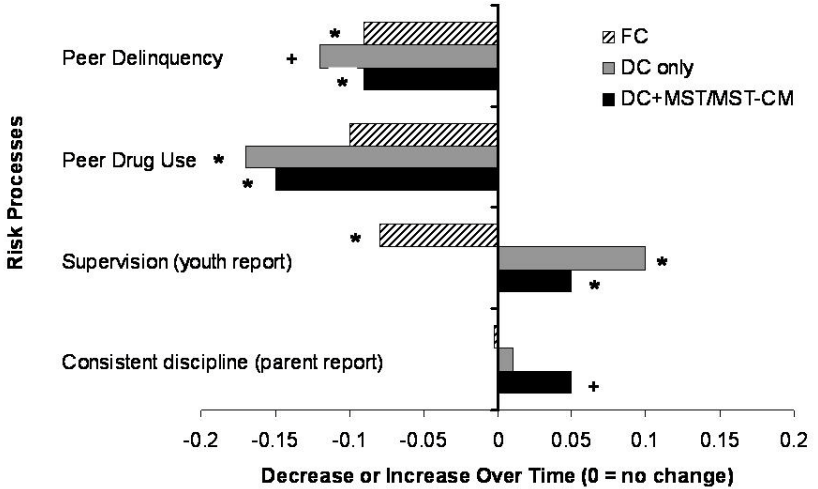
[†]$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Significant and marginally significant intervention effects are summarized in Figure 1. The FC condition showed a significant positive effect on one risk factor and a significant negative (i.e., iatrogenic) effect on another. Although youth in the FC condition reported a decreased association with delinquent peers from pre-treatment to 12 months post-recruitment, they also reported a decrease in caregiver supervision during the same time period.

Youth in the DC condition reported significant or marginally significant improvements in three risk factors. Similar to their FC counterparts, youth in the DC condition reported decreased association (albeit marginally significant) with delinquent peers. In contrast with their FC counterparts, however, youth in the DC condition reported *increased* caregiver supervision and decreased association with drug using peers over time.

The MST/MST-CM condition, which integrated evidence-based substance abuse treatments into DC, demonstrated the most favorable changes in risk factors from pre-treatment to 12 months post-recruitment. Youth in this condition reported significant reductions in association with delinquent peers and drug using peers as well as significant increases in caregiver supervision. In addition, caregivers reported a marginally significant increase in applying consistent discipline.

Figure 1. Changes in risk processes by intervention condition



+p < .10 *p < .05 **p < .01

DISCUSSION

[4] JDCs have proliferated during the past two decades. The purpose of this study was to examine the underlying basis for the emerging success of JDC in addressing the problems of substance-abusing youth in the juvenile justice system. The present study examined why JDC was more effective than family court at reducing youth delinquent behavior and substance use. The study also addressed why the integration of evidence-based substance abuse treatment enhanced the capacity of JDC to reduce youth substance use. Study results showed that the relative effectiveness of JDC and the evidence-based treatments were likely due to the ability of these interventions to alter well-established risk factors for antisocial behavior in adolescents.

Youth in the DC condition experienced more consistent reduction in risk factors than did their FC counterparts. During the typical course of JDC involvement (i.e., 12 months), youth reported significant increases in parental supervision and significant or marginally-significant declines in time spent with peers engaged in delinquent and drug activities. In contrast, youth who received services through family court showed significant improvement in only one risk process (peer delinquency), and showed a significant decline over time in parental supervision. Association with deviant peers and low parental supervision are well established as the strongest predictors of adolescent criminal behavior and substance use (Loeber & Farrington, 1998; Mayes & Suchman, 2006). Thus, the capacity of DC to impact these processes provides a viable explanation for the relative effectiveness of DC.

Although not specifically examined in this study, several standard components of JDC are well-positioned to address family- and peer-related risk factors both directly (i.e., in their interventions with youth) and indirectly (i.e., by supporting caregivers and treatment providers in their work

with the youth). For example, judges can order youth not to associate with specific peers who are involved in illegal behavior and can assist caregivers in their supervision of youth by helping them to identify which peers their child should avoid. In contrast with traditional juvenile court, youth compliance with such orders can be monitored closely and appropriate rewards or sanctions can be applied. Thus, JDCs can empower caregivers to address youth problems at home, a critical component of almost all evidence-based treatments of adolescent delinquency (Henggeler & Sheidow, 2003) and substance abuse (Schaeffer, Chang, & Henggeler, 2009).

The results also suggest why the integration of evidence-based treatment of substance abuse (i.e., MST and CM) into JDC enhanced substance-related outcomes. As with results observed for the DC condition, the MST/MST-CM condition was effective at significantly decreasing youth association with drug using peers and increasing caregiver supervision. The integration of the evidence-based treatments was also significantly effective at decreasing youth association with delinquent peers (DC was marginally effective here) and marginally effective at enhancing caregiver consistent discipline. Together, these findings are consistent with the mechanism of change research observed for MST (Henggeler et al., 2009; Huey et al., 2000) and other evidence-based treatments of antisocial behavior in adolescents (Eddy & Chamberlain, 2000). In summary, although causality cannot be inferred in the present study, the findings suggest that the positive changes resulting from youth involvement in JDC and evidence-based treatments might be due, in part, to the capacity of these interventions to influence key risk factors.

Limitations

Several study limitations should be noted. First, and most important, although state-of-the-art longitudinal statistical techniques were used to explore changes in risk and

outcome processes over time, it was not possible to conduct formal tests of mediation using techniques suggested by some methodologists (e.g., Cheong, MacKinnon, & Khoo, 2003). Such tests would have required larger numbers of participants within each intervention condition to obtain adequate power to detect mediation effects. Second, delinquent behavior and drug use were measured through youth self-reports rather than through more objective means such as arrest records and urine drug testing. Third, as the nature and quality of JDCs differ from site to site, the results observed in this study may not extend to other JDCs. Finally, other potential mechanisms of effectiveness (e.g., specific court sanctions and rewards, individually-oriented risk factors) were not examined in this study, but are potentially important for understanding and improving JDC interventions.

Future Directions

The results of this study suggest two possible directions for future research. First, JDC outcomes might be enhanced by an explicit emphasis on the risk factors shown to be malleable through JDC interventions. For example, research could compare outcomes from traditional JDC services with outcomes from JDCs in which interventions directly aim to reduce youth association with deviant peers and increase caregiver supervision. Secondly, as shown in Table 2, youth involvement with peers engaged in conventional activities was consistently associated with reductions in all measures of delinquency and substance use. However, as shown in Table 3, none of the interventions examined in this study had a significant impact on youth association with non-problem peers. Because of their histories of antisocial behavior, many youth involved in JDC are disconnected from and, in some cases, prohibited from participating in conventional prosocial activities. Finding opportunities for prosocial activities for these youth and reducing barriers to their participation might provide another vehicle for enhancing JDC outcomes.

Conclusions and Suggestions for Practice

The present study extends the knowledge base regarding what effects can be expected from youth participation in JDCs. Findings suggest that improvements in peer associations and parental supervision are key factors in the success of JDC. These findings support the core tenents of JDC, namely, the importance of family involvement and individualized interventions. When JDCs link families to empirically supported interventions for delinquency and substance abuse, even greater change in caregiver behavior (e.g., improving discipline techniques) occurs. Based on these results, several recommendations for JDC practitioners are suggested:

- Use empirically supported treatments, such as those recommended by the Substance Abuse Mental Health Services Administration (SAMHSA, 2009), to address adolescent drug use. Inquire as to whether contracted providers deliver such treatments, and if not, advocate that they do so.

- Consider empirically-supported treatments that, in addition to targeting substance abuse, address a range of pertinent risk factors in peer and family domains for greatest positive impact.

- Promote policies and interventions that disconnect youth involved in drug court from other drug- or court-involved peers. For example, in terms of policy, JDCs can avoid clustering court-involved youth together in their own practices and in the treatment services they broker for participants (e.g., referring youth to individual- or family-based services rather than group-based services).

- Encourage policies and interventions that promote youth access (e.g., paying registration fees, assisting with transportation) to prosocial peer activities with adult supervision such as community-based clubs, service organizations, sports teams, and faith-based youth groups.

- Support caregivers in improving their supervision and consistency of discipline with their children. Court-imposed curfews and other restrictions can empower some caregivers to modify youth behavior, but other more intensive interventions (e.g., parent training classes) might be necessary to ensure that supervision and discipline responsibilities are transferred to and sustained by the caregiver after JDC involvement ends.

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