



Predicting success and failure in juvenile drug treatment court: A meta-analytic review

David M. Stein, Ph.D. ^{*}, Scott Deberard, Ph.D., Kendra Homan, M.A.

Utah State University, Logan, UT, USA

ARTICLE INFO

Article history:

Received 30 September 2011

Received in revised form 6 June 2012

Accepted 2 July 2012

Keywords:

Adolescent
Substance abuse
Delinquency
Treatment
Drug court
Meta-analysis
Review

ABSTRACT

This meta-analysis summarizes 41 studies that examined associations between characteristics of adolescent participants in juvenile drug treatment court and outcomes (i.e., premature termination, recidivism). A summary of within- and post-program recidivism rates was calculated, as was a global estimate of the premature drop-out rate. One clear trend in the available studies was the dramatic difference in recidivism rates for adolescents who succeed in graduating from drug court, relative to those who do not. In addition, the review revealed that behavior patterns evidenced during drug court participation were most strongly associated with both the probability of graduating successfully from drug court and recidivism (e.g., few in-program arrests, citations, detentions, and referrals; greater length of time in program or amount of treatment; lower use of drug and alcohol use, few positive urine screens, greater school attendance). Unfortunately, non-white participants tend to have a lower probability of graduation from drug court and experience higher recidivism during and following the program. Available juvenile drug treatment court studies confirm a number of reputed adolescent risk factors associated with substance abuse, criminality, treatment failure, and recidivism among adolescents (e.g., higher levels of emotional and behavioral problems, higher levels and severity of pre-program substance abuse, male gender). Suggestions for improving the effects of juvenile drug treatment court based on key results of the meta-analysis are offered.

© 2013 Elsevier Inc. All rights reserved.

Juvenile drug treatment courts are an increasingly popular approach to effecting change in the highly challenging, recalcitrant population of adolescent substance abusers who concomitantly engage in significant criminal behavior (Belenko, 2001). These specialized courts have been enthusiastically embraced by all 50 states, numerous U.S. territories (e.g., Guam, American Samoa) and many countries (e.g., Australia, New Zealand). The drug court model emphasizes formal contractual agreements between the adolescents, their family, mental health service organizations, and the juvenile court system. In this treatment modality, the judge, prosecuting attorney, defense counsel, and adolescent agree that the participant will complete a program that is approximately one year long and contains three, 4-month “phases” (National Association of Drug Court Professionals & Drug Courts Standards Committee, 1997). Activities commonly required include psycho-educational classes, counseling, psychotherapy, regular school attendance, random urine screening, and participation in other social or vocational services as needed.

In juvenile drug treatment court, a more intensive, personal relationship is developed between the judge and the adolescent which is facilitated through frequent court appearances. Based on consultation with other drug court staff, rewards and sanctions are used by the judge to help the adolescent comply with each aspect of

the program. Adolescents who fulfill the requirements and behavioral expectations associated with each phase of the programs are ultimately rewarded by having their sentence suspended or, in some cases, criminal charges dropped. In addition, formal “graduation” ceremonies are periodically held which capitalize on substantial social reinforcement (Belenko, 1998).

Juvenile drug courts are an extension of the adult drug court model developed in the 1990s (Belenko & Dembo, 2003). While outcome and evaluation studies of adult drug court programs suggest that the model may provide a cost-effective alternative to typical adjudication, many writers have lamented the lack of research on the effectiveness of adolescent drug treatment courts (e.g., Barnes, Mitchell, & Mitchell Miller, 2009; Belenko, 1998, 1999, 2001; Roman & DeStefano, 2004). Indeed, it may be erroneous to assume this evidence generalizes to juveniles enrolled in drug treatment court. The psychological attributes and developmental needs of adolescent offenders who enter the drug court system are substantially different from adult offenders and must be taken into account when planning any behavior change intervention (Cooper, 2001). First, the adolescent is a minor and, therefore, most treatment programs require parents and/or families to be involved in some capacity (Henggeler et al., 2006). In addition, research indicates that adolescent offenders are not as willing as adults to engage in substance abuse or mental health treatments (Cooper, 2001). They typically do not experience the health-related problems associated with substance use as is commonly seen in adults with chronic use patterns

^{*} Corresponding author.

E-mail address: dmstein9900@yahoo.com (D.M. Stein).

(Virginia Supreme Court, 2009; Drug Court Clearinghouse and Technical Assistance Project, 1998). Effective programs for adolescent offenders with substance abuse problems must also find ways of counteracting the uniquely powerful influences of peers, gangs, and family members as well as deficiencies in family structure and functioning. National leaders in this field suggest that examining the validity of applying an adult model of intervention to juveniles is critical in order to assure that the aforementioned concerns are being properly addressed (Drug Court Clearinghouse and Technical Assistance Project, 1998). Therefore, the positive or promising outcome data from adult drug treatment courts should not be assumed to be applicable to juvenile drug courts.

The question of who benefits from juvenile drug treatment courts and who does not is most salient. Two primary lines of research have sought to address this question. The first involves studies that compare juvenile drug treatment courts with a comparison group that is commonly, normal adjudication. A recent comprehensive review meta-analysis of 31 such studies (Stein, Homan, & Deberard, in preparation) shows that: (1) treatment effects vary greatly across studies, but that average effect sizes for recidivism are modest ($\phi = .07$, confidence interval [CI] = .01 to .13, for the pre-to-post program assessment period; and $\phi = .11$, CI = .03 to .20, for the post program follow-up period) i.e., the correlation between being in the drug court and traditional adjudication probably ranges at most, between .01 and .20; (2) premature termination rates from programs appear to be high –45% (based on 26 programs providing data); (3) a few participant factors are correlated with the size of effect (e.g., a handful of available studies suggest that ethnic minority adolescents do more poorly in terms of recidivism rates); and (4) when post-program rates of arrest for drug-related offenses are used as a proxy variable for substance use abstinence, something never directly assessed by programs, some studies indicate that juvenile drug courts may perform slightly better than traditional adjudication. Stein et al. (in preparation) discuss these results in light of other data on adolescent treatment programs and juvenile recidivism, noting that results for drug treatment court youth appear to be only modestly better than those associated with other approaches.

The results of studies comparing drug courts with comparison groups, while quite valuable, have important limitations. First, they offer average group comparison statistics. Within a drug treatment court cohort, a range of outcomes exists and some youth do well and others do not. Therefore, a compelling question has to do with the second line of research alluded to above: Given the variability in the effectiveness of juvenile drug treatment courts, a logical, related question is who benefits and who does not (e.g., Bouffard & Taxman, 2004; Cissner & Rempel, 2005; Longshore et al., 2001; Marlowe, DeMattero, & Festinger, 2003)? Greater knowledge about factors that account for variance in outcomes, and in particular, who benefits and who does not can be used to improve treatment programs. A reasonable number of investigations now exist that sought to address this question relative to two main outcome domains: (a) who successfully graduates versus prematurely terminates from the treatment; and (b) what participant and program factors correlate with recidivism either during or following drug court participation? For example, researchers studying individual drug court cohorts have addressed questions such as: Do adolescent substance-abusing offenders' age, gender, or ethnicity predict whether he or she is likely to graduate from the drug court program? Does an adolescent's prior criminal behavior, drug use preferences, or duration of time he or she spends in drug court relate to graduation or premature termination or to re-offending after drug court?

Juvenile drug court evaluation reports addressing the aforementioned questions are mostly a product of a federal/state drug court grant awarded to initiate or expand a drug court. While persons affiliated with the drug court occasionally conduct such evaluations, most often, faculty at regional colleges and universities or a private program evaluation company subcontract with the drug court to carry

out the work. As such research reports are rarely published in journals, they are often not readily available to stakeholders of such programs (i.e., other drug courts, academic researchers, and policy makers). In addition, on rare occasions, researchers comparing drug courts with a comparison group subsequently conduct accessory analyses, correlating program or participant characteristics with positive versus negative outcomes among drug court youth only.

The present review seeks to fill a major gap in the research literature by summarizing unpublished and published evaluation research that has examined predictors of outcome in juvenile drug treatment court. Specifically, this review involves studies that have concomitantly: (1) provided data sufficient to calculate graduation or premature termination rates for juvenile drug court participants, as well as, general recidivism estimates; and (2) examined participant characteristics that might predict these two juvenile drug court outcomes. The present meta-analysis was conducted to address two key questions regarding predictors and outcome. First, what participant factors best predict whether drug treatment court attendees graduate or fail to graduate? Second, what participant characteristics or factors typically predict recidivism both during and following the program? To our knowledge, no systematic review of this research has been conducted to date. The questions addressed in this study have important policy implications, given the fiscal austerity that has deeply affected the court and human service systems of many states in recent years. Available public funds must be directed toward programs that produce the strongest treatment effects and which pursue strategies to improve their program based on empirical evidence. There are now an adequate number of studies available in the literature to afford an examination of the trends regarding factors that predict juvenile drug court outcomes.

1. Method

1.1. Inclusion and exclusion criteria for selection of research and evaluation reports

Of interest in the present review were investigations of juvenile drug courts. Juvenile drug courts are easily differentiated from adult drug courts due to strict age limits for participation as they only involve substance-abusing offenders 17 years or younger. Fig. 1 summarizes the general literature search and study selection procedures used in this investigation.

Studies of mental health courts, DUI courts, or family drug courts are not included in the present review. Reports that provide only program descriptions or process evaluations (i.e., a description of the nature of a drug court and its operations) were also not included (e.g., Parker & Smith, 2010; Shaver & Helfer, 2000). To be considered for inclusion in the present review, studies had to report within-group correlations between various juvenile drug court participant characteristics or program features and at least one of two measures of outcome, graduation/non-graduation, or recidivism. That is, the investigators must have reported one or more correlations between participant/program variables and these outcome measures, or examined combinations of these variables (e.g., through multiple logistic regression analyses). Alternatively, investigators had to provide sufficient data for the present authors to produce such a correlation. As has been noted, most studies of interest in this review examined correlates of graduation status or pre-post recidivism within a single drug court. A few studies have also compared drug court with a control group and then conducted accessory analyses involving predictors of outcome within the drug court.

A number of programs included in this review conducted a series of outcome evaluations covering successive years of operation (e.g., Carey, Waller, & Marchand, 2006; Ferguson, McCole, & Raio, 2006; O'Connell, Nestlerode, Mille, & Miller, 1999; Thompson, 2004). In such cases, data from the final year of the evaluation were normally used, as

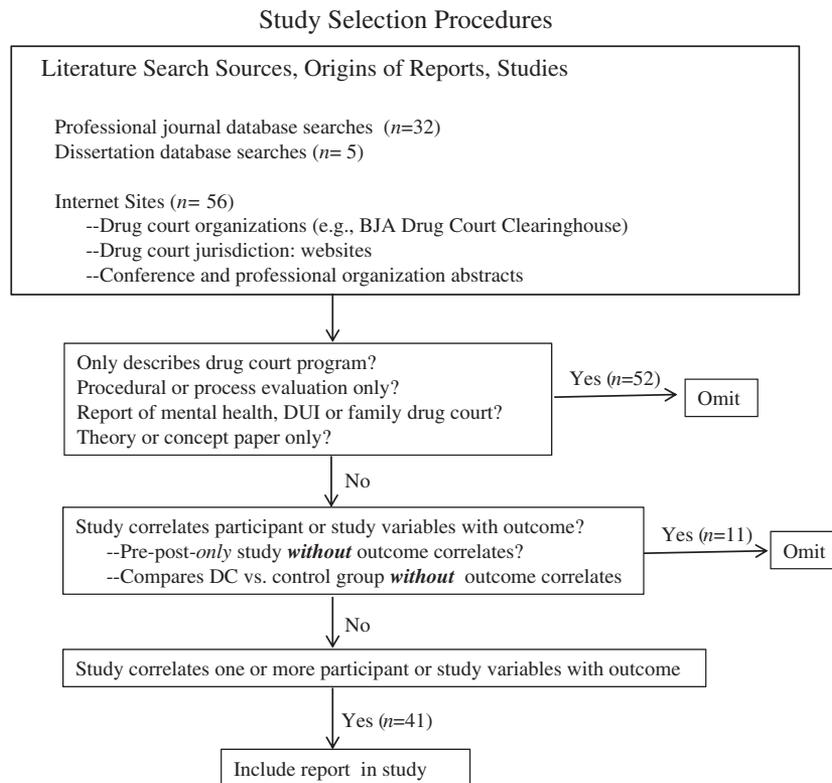


Fig. 1. Procedures and decisions used to select studies for present meta-analysis.

it typically included all participants treated during the entire period of the evaluation. In some cases however, an earlier evaluation provided better and more detailed data on the variable of interest than later reports (e.g., post drug court recidivism rates; [Virginia Supreme Court, 2003, 2009](#)). In such cases, separate reports might contribute data for different variables of interest. Occasionally, separate reports on a particular drug court provided different types of outcome data for different time frames (e.g., [Thompson, 2002, 2004](#)). For instance, one report might provide information about recidivism during a program, while another, following drug court participation. In such cases, separate effect sizes were calculated for each outcome period and reported separately.

1.2. Selection of studies

Literature searches were repeatedly conducted over a 4-year period (2008–2011 inclusive) to identify evaluation reports, journal publications, dissertations, and unpublished outcome studies that met the parameters of the present review. Psychology, criminal justice, and social science journal databases were searched (e.g., Criminal Justice Abstracts, Lexis-Nexis, PsychInfo, Dissertation Abstracts) using suitable keywords: “adolescent or juvenile drug court,” “alternative adjudication and adolescents or minor or teen,” and “adolescent drug or alcohol and treatment.” Internet searches also sought to locate Web sites purporting to offer information about factors that relate to juvenile drug treatment court outcomes (e.g., National Association of Drug Court Professionals, National Drug Court Institute, U.S. Department of Justice, Drug Court Clearinghouse). In addition, key words used to search academic journals were also applied to Internet search engines (e.g., Google). A total of 402 prospective articles purporting to provide evidence of drug court effectiveness and/or correlates of outcome were initially identified for further screening.

Some studies were rejected from consideration because data could not be utilized with confidence due to apparent contradictions, errors or discrepancies that could not be reconciled (e.g., [Medina, 2008](#)). The

studies from which effect sizes were calculated for the present review are cited in the reference list and in the listing at the end of this paper, *Additional Studies Used in Meta-Analysis*, with an asterisk (“*”) before authors' names. It should be noted that certain studies that correlated study or participant variables with drug court graduation versus nongraduation status only (and not recidivism) are not cited in any of the tables herein, but their inclusion in relevant meta-analysis calculations is documented in the Reference list via an asterisk (e.g., [Boghossian, 2006; Tranchita, & Stein, 2006](#)).

1.3. Coding of variables of interest

Over 25 predictor variables have been studied by various program evaluators. The present authors consolidated these variables into groups based on their similarity and the number of studies that utilized them. When three or fewer studies examined a particular variable, it was either excluded or an attempt was made to group it with a closely-related variable. Various screening procedures involving standardized measures of participants' risk or psychological status, for example, were all included in a predictor family. The major variables and consolidated categories of participant and study variables are listed in [Table 1](#).

Each study was reviewed by the primary author and a research assistant and independently coded for the first time in early 2010. Points of disagreement were assessed by another research assistant, who was asked to render an opinion. A final decision was made by the primary investigator. Between six months and one year later, each study was once again reviewed by the primary author without referencing the coding form or any effect size calculation information recorded from the first review. These procedures resulted in a range of agreement of between 88% and 100%, depending on the variable being coded. For example, 100% agreement was reached for such variables as affiliation of the authors (i.e., state agency employee, academic researcher, private evaluation company), while somewhat lower agreement occurred when deciding whether an association between an outcome measure and a participant or program variable reflected a

Table 1
Study and participant variable coding key.

Variable	Definitions or explanation (as needed)
Author affiliation	University; state government agency; private research co.
Publication date	
Publication outlet	Professional journal; dissertation/thesis; unpublished
Sample size	Total sample size from single, or multiple drug courts
Gender proportion	
Percent Caucasian/Non-Caucasian	
Mean age	
Number of pre-program arrests, referrals	
Pre-program arrest severity	Misdemeanors versus felony proportion
Within-program arrests, referrals	
No. of post-program arrests	Frequency or percent with one or more arrests or referrals
Percent non-graduated	Non-graduates/graduates + nongraduates
School attendance required	Yes/no
School attendance compliance	Percent of unexcused absences, days truant
Primary drug of choice	Marijuana, cocaine or meth, alcohol, opiates, other
Percent of sample primary drug of choice	
Mean age of first use	
Pre-program substance abuse problem	Standardized scores or evaluation
Preference for alcohol, marijuana versus other drugs	Marijuana versus other drug proportion, rate or percentage
Prior history of substance abuse treatment	Percent of sample with one or more treatment episodes
Living with both parents (%)	Both parents versus other
Percent of sample with parent criminal history	
Standardized drug/alcohol test scores	
Percent reported history of abuse	Physical, sexual abuse report
No. positive drug tests or Alcohol/Drug incidents during program	Ex. days intoxicated during program
Amount of treatment in program	Total days in individual, group, family or other therapy
Total length of time in program	Total days in program or total days of "treatment"

within-program association versus the post-program assessment time frame. In nearly all cases, an error in conducting a calculation, transcription error, or failure to follow a decision rule accounted for disagreements.

1.4. Calculations of outcome measures

1.4.1. Premature termination and recidivism rates

Though not of primary interest in the present review, it is nonetheless recognized that the most popular outcome measure in the drug court program literature is the premature termination rate (PTR) or alternatively, the graduation rate. Therefore, the present authors derived an overall, mean estimate of the proportion of juvenile drug court participants who fail to graduate from drug court (weighted by sample size of each study). Toward this end, PTRs were calculated or derived from 56 evaluation reports located through libraries or Internet sites. Unfortunately, the premature termination or graduation rates reported by many authors were biased. Specifically, authors frequently added current program participants to their frequency count of graduates (e.g., program completers). Of course, the ultimate status of any current participant is, in fact, unknown as some will graduate and others will not. In calculating the PTR for a given study, the present authors excluded all current drug court program participants and, thus, corrected biased graduation rates. As a result, the PTR is defined herein as the total number of prematurely

terminated participants, divided by the sum of all graduated plus prematurely terminated participants. The resulting graduation rate is 1 minus the PTR.

Relative to use of graduation as an outcome criterion, a somewhat less common outcome measure in these studies is recidivism. Variation exists across available studies regarding the criteria used to define this outcome measure. Investigators' definitions generally involved at least one re-arrest or referral back to court for violations of probation or status offenses. Occasionally, authors categorized recidivism based on different types of violations (e.g., misdemeanors versus felonies, non-drug-related versus drug-related offenses). Categorization schemes were not used consistently enough across studies to allow the present authors to use them as a possible predictor variable of outcome. Consequently, a global or overall recidivism index for each study was of interest. If a study reported multiple categories of offenses (e.g., drug and non-drug offenses), they were pooled and averaged to form a single effect size. Thus, examining predictors of misdemeanors versus felonies or drug versus non-drug offenses was desirable, but not feasible.

It was also of interest to examine the proportion of the drug court group that committed one or more offenses or recidivism events both during and following drug court. Separate effect sizes were calculated for each outcome period and are discussed separately in this review. In addition, a statistic such as the average number of recidivism events for each drug court group can be exaggerated by the excessive delinquent behavior of a few participants given the small sample size of many programs. Therefore, wherever possible all effect sizes involving recidivism were based on the total percentage of offenders in each group that engaged in one or more recidivism events.

1.4.2. Graduation versus premature termination

Frequency counts of the number of adolescents who successfully graduated from drug court and those who did not were calculated. Different drug court programs apply different graduation criteria and, unfortunately, these were often not reported in detail by authors. Generally, adolescents who graduated completed all of the required phases of a drug court program, each lasting approximately three months. As a rule, they became increasingly compliant with behavioral and treatment expectations. Our conclusions from the available literature was that the majority of youth who graduated from their particular juvenile drug court showed a solid track record of non-offending, were reasonably compliant with expectations of the judge (e.g., attending therapy), and produced clean drug urine screens for at least several months prior to graduating.

Criteria for premature termination vary across jurisdictions because some programs and judges are stricter than others. Generally, drug courts appear to avoid terminating participants unless they are consistently noncompliant and have regularly earned sanctions or have committed an offense (e.g., violent act against another person, sexual assault) that makes them ineligible for continuing in the program. Another reason juvenile drug courts may terminate participants is that they turn 18 years of age and become the responsibility of the adult court system. An attempt was made to not count those adolescents as prematurely terminated who moved or turned 18 and, thus, were lost to the program due to extenuating circumstances. Beyond taking into account the above qualifications, the present authors accepted the designations of graduate and nongraduate offered by each evaluation report without modification, with the exception that current participants were excluded from groups designated as graduated.

1.4.3. Meta-analysis and correlation coefficient as the size of effect

To best compare associations between predictors and outcome measures across studies (meta-analysis), Rosenthal's (1991) suggested use of the correlation coefficient r was adopted. This effect size has been commonly used in various drug court and adolescent delinquency

reviews (e.g., Cottle, Lee, & Heilburn, 2001; Koetzle-Shaffer, 2006). In some of the available research, relevant correlations were reported by authors (e.g., phi) but most often the correlations were calculated from the authors' statistics or data. It should be noted that if a study reported results on multiple drug courts in a region, a single average effect size for each type of outcome measure was calculated for that study. On the other hand, a given study could contribute up to three effect sizes per predictor (e.g., gender, race, prior drug use) if it was associated with: (1) termination/graduation; (2) within-program recidivism; or (3) post-program recidivism.

Meta-analyses can be based on either fixed effects or random effects models depending upon assumptions investigators make about the nature of how effect sizes reflect the population of published and unpublished reports (interested readers can review such guides as Hunter and Schmidt (2004) for an explanation of these assumptions). The averaged effect sizes reported herein are based on a random effects model as the total population of available studies has likely been utilized in the present review. In addition, the mean effect sizes reported herein are based on a weighting procedure which allows studies with larger sample sizes to influence the mean effect somewhat more than small-sample studies. Large-sample theory posits that studies with larger sample sizes tend to have smaller variances and, hence, more closely estimate the true population effect size (Cooper, 1998; Hedges & Olkin, 1985). As a result, individual studies were weighted by the reciprocal of their sample variance. Statistical tests exist in meta-analysis to assess the likelihood of abnormal dispersion of effect size values in a sample. Thus, in our review, we present *Q* values (*Q*Total) where relevant which assesses the likelihood of the presence of outlier values. These were computed in conjunction with mean effect sizes.

Interpreting effect sizes remains a subjective process. Researchers, policy-makers, and clinicians are likely more familiar with Cohen's *d* as a size of effect compared to other indices such as a correlation. Conversions among effect sizes are generally straightforward, however, multiplying a correlation coefficient by two provides a very close estimate of the more traditional Cohen's *d* (size of effect). This fact may assist readers in the interpretation of the effect sizes reported herein.

1.4.4. Managing missing data

Program evaluators reported that they encountered missing data for variables of interest, due to such events as the failure of

adolescents or the families to complete paperwork or reports and changes of residence. Every attempt was made to base each effect size calculation on accurate sample sizes for each variable. Studies with missing data on particular variables were penalized in the calculation of the overall mean effect size because individual study effect size was then weighted by its sample size. This penalty serves as a modest proxy for lack of methodological rigor. No systematic patterns to missing data were apparent across studies (e.g., studies conducted by academicians versus private evaluation firms, large studies versus smaller studies). As a result, an effect size was not calculated if more than 8% of participants lacked data on a variable of interest.

2. Results

The literature search identified four theses and dissertations, eight professional journal publications and 29 unpublished program evaluation reports that met the inclusion criteria. Approximately 25% of unpublished reports were obtained by directly contacting state and federal agencies and private program evaluation firms while the remainder were downloaded from various Web sites. Authors of reports represented academic institutions (51%), private research firms (34%), and government agency employees (15%).

2.1. Overall recidivism and PTRs

The average PTRs for the 56 juvenile drug court programs were calculated. The 56 programs sampled herein involved 7559 participants. The mean number of juvenile drug court participants in studies investigating this variable was 130.25 (*SD* = 207.43). The unweighted mean non-graduation rate is 49% (*SD* = 0.14) and the weighted mean rate is 46%. Separate mean recidivism rates for drug treatment court graduates versus nongraduates for the "during program" outcome period and following participation in drug court are presented in Table 2. The heading "recidivism during" represents the assessment period covering the basic program period which was usually one year. Also included in this category are a few studies in which this period was defined by authors as covering the pre-program to a cumulative 18 month time frame. This latter operational definition was probably adopted so that evaluators could include participants whose time in drug court exceeded the usual one-year time frame or who began the program a few months later than a general cohort. The "recidivism

Table 2
Overall recidivism estimates (re-arrests, referrals, new charges, new convictions).

Author, (<i>n</i>)	Recidivism (%) during		Recidivism (%) following (1 year)	
	Graduates	Non-graduates	Graduates	Non-graduates
Anspach, Ferguson, and Phillips (2003) (105)	23	40	–	–
Carey et al. (2006), (53)	–	–	14	63
Cook, Watson, and Stageberg (2009) (105)	27	41	52	57
Deschenes, Moreno, Emani, Thompson, and Manatt (2001) (55)	0	25	8	11
Dickie (2002) (43)	33	40	–	–
Ferguson et al. (2006) (219)	–	–	33	48
Hickert, Becker, and Prospero (2010) (1524)	26	53	31	49
Kirchner and Kirchner (2007) (93)	35	66	–	–
Kralstein (2008) (100)	6	43	18	48
LeCroy, and Milligan Associates, Inc. (2003) (65)	12	34	36	22
Mackin et al. (2010a) (124)	39	59	44	65
Mackin et al. (2010b) (142)	30	55	50	63
Mackin et al., 2010c (69)	24	50	41	70
O'Connell et al. (1999) (140)	35	60	–	–
Parsons and Byrnes (2001) (61)	31	69	43	86
Polakowski, Hartley, and Bates (2008) (149)	12	27	33	92
Rubio, Fred Cheesman, Durkin, Kander, and Maggard (2007) (55)	28	54	–	–
Searle and Spier (2006) (34)	82	77	65	77
Tappin and McGlashan (2007) (84)	65	75	60	69
Thompson (2004) (90)	–	–	39	52
Virginia Supreme Court (2009) (278)	–	–	25	39
Weighted Mean, (<i>SD</i>)	27.2, (19.9)	51.4, (15.7)	33.6, (15.8)	52.7, (21.3)

following” column involves the one-year follow-up period which averaged approximately 12 months. A few authors, however, only reported cumulative data, that is, program-plus-one-year post period. The overall mean rates, weighted by sample size, are also presented. They show a nearly two-fold difference in the frequency of recidivism among participants who fail to graduate from drug court compared to those who do graduate regardless of whether violations are tracked during the program or following it.

Mean effect sizes contributed by 41 studies reflecting the major associations between participant and program variables and graduation/termination status are summarized in Table 3.

The mean effect sizes for recidivism both during and following the drug court program are cited, and CIs and the number of studies contributing to a mean effect size are reported. Although admittedly arbitrary, a mean effect size was created if at least six studies examined an association between the particular participant or program variables and at least one outcome measure, or a minimum of three studies examined the question across at least two of the three outcome measures (i.e., graduation/termination, recidivism during program, and recidivism following program).

3.2. Mean effect sizes: Highlights in predicting graduation/termination and recidivism

Programs included an average of 79% male ($SD=8.92\%$) and 60% Caucasian participants ($SD=20.81\%$) ($n=41$ studies). Most of the predictor variables cited in Table 1 were unrelated to either graduation/termination or recidivism either during or following programs. Authors' affiliations (i.e., university, state agency, private research company), for example, were not associated with the size of study correlations between graduation/termination status and age ($F(2,15)=1.54, p=.25$).

Some demographic characteristics of participants are more strongly related to juvenile treatment drug court graduation versus termination than others. The age of participants is generally unrelated to graduation/termination status or recidivism either during or following participation in drug court (see Table 2). As a rule, adolescent girls tend to graduate from juvenile drug court at slightly higher rates than boys. They also show lower delinquency problems both during and following participation in drug court. In addition, one of the stronger correlates of graduation is racial status with white participants graduating at higher rates than minority adolescents. Non-minority participants also show a lower frequency of recidivism both during and following drug court.

Juvenile drug treatment court programs tend to include one or more semi-formal or standardized screening/assessment procedures (e.g., problem behavior checklists, use of substance abuse evaluations). Available studies show that having more favorable psychological and behavioral problem profiles and low substance abuse severity test scores or ratings (e.g., SASSI, ASAM) prior to entering

drug court is generally positively related to graduation (Table 3). It is clear that the vast majority of juvenile drug court evaluation reports show that marijuana is by far the most frequently used drug among adolescent drug court participants. The average results of eight studies show that low levels of pre-program marijuana use or use of “softer drugs” (e.g., alcohol, marijuana versus cocaine) is modestly related to graduation. On the other hand, no compelling evidence demonstrates that the age at which participants first began using drugs/alcohol nor having a history of prior treatment for substance abuse relates to the likelihood of graduation from juvenile drug court (see Applegate & Santana, 2000; Polakowski et al., 2008).

Relatedly, if an adolescent has an extensive pre-drug court history of delinquency and arrest difficulties, they are less likely to graduate than those with less extensive histories. For instance, three studies (e.g., Applegate & Santana, 2000; LeGrice, 2003; Shaffer, Latessa, Pealer, & Taylor, 2002) suggest that having a prior history of more serious offenses (e.g., felonies versus misdemeanors) is related strongly to premature termination from drug court.

Higher frequency of persistent delinquency behaviors during drug court is modestly related to premature termination (Table 3). That is having few or no in-program arrests, citations, detentions, or arrests of high severity while participating in drug court is related to graduation ($n=16$ studies; mean $r=.24, SD=0.00, 95\% CI=.20$ to $.27$; $Q_{total}=10.43, df=15, p=.79$). Too few studies have examined this issue in relation to post-drug court program recidivism risk. Nevertheless, low rates of alcohol or other drug use or absence of positive drug tests while participating in juvenile drug court is positively related to graduation ($n=13$ studies; mean $r=.23, SD=0.00; 95\% CI=.19$ to $.27$; $Q_{total}=9.52, df=12, p=.66$).

Building on participants' education and basic work/job skills is positively related to juvenile drug court graduation. School attendance and, to a lesser degree, having employment at admission or by the end of drug court are modestly related to graduating from drug court (e.g., for school attendance, $n=7$ studies; mean $r=.16, SD=0.00, 95\% CI=.07$ to $.26$; $Q_{total}=5.13, df=6, p=.53$). The length or amount of time in treatment or drug court is also modestly related to graduation rates ($n=12$ studies; mean $r=.15, SD=0.12, 95\% CI=.05$ to $.25$; $Q_{total}=17.20, df=11, p=.10$). Finally, across 24 studies, higher rates of post-program arrests or referrals are consistently related to premature termination from programs.

With regard to accessory results, several variables show potentially promising associations with drug court outcome but require further investigation because they have not been studied adequately to date. For example, Gilmore, Rodriguez, and Webb (2005) found that changes in guardianship during drug court was a modest predictor of poorer drug court outcomes ($r=-.13, p=-.13$). Anspach et al. (2003) reported that more utilization of accessory support services by adolescents improved outcomes as well ($r=.43, p=.001$). LeCroy, and Milligan Associates, Inc. (2003) found that time

Table 3
Mean effect sizes: Juvenile drug treatment court (Drug Ct.) participant and program variables: Association with graduation and recidivism.

Variable	Weighted mean effect size (r), 95% CI; No. of studies (n)		
	Graduation/termination	Low recidivism during Drug Ct.	Low recidivism following Drug Ct.
Age (younger age)	$r=.04, CI=.00$ to $.07; n=18$	$r=.02, CI=-.27$ to $.30; n=6$	$r=.02, CI=-.19$ to $.24; n=6$
Gender (female)	$r=.10, CI=.05$ to $.12; n=22$	$r=.29, CI=.06$ to $.52; n=8$	$r=.14, CI=.06$ to $.22; n=13$
Ethnicity (Non-white)	$r=-.15, CI=-.18$ to $-.11; n=23$	$r=-.27, CI=-.73$ to $.19; n=4$	$r=-.12, CI=-.20$ to $-.04; n=9$
Low prior arrest record	$r=.13, CI=.05$ to $.22; n=17$	$r=.11, CI=-.06$ to $.27; n=4$	$r=.13, CI=.04$ to $.21; n=5$
Low pre-program substance use	$r=.19, CI=.11$ to $.27; n=8$		
Low emotional, behavioral or assessment	$r=.16, CI=.00$ to $.27; n=17$	$r=.18, CI=-.17$ to $.54; n=3$	
Few in-program arrests, detentions, referrals	$r=.24, CI=.20$ to $.27; n=16$		
Length of time in program or treatment	$r=.15, CI=.05$ to $.25; n=12$		$r=.06, CI=-.10$ to $.22; n=4$
Low drugs, alcohol use in DC; positive urine tests	$r=.23, CI=.19$ to $.27; n=13$		
School attendance during DC	$r=.16, CI=.07$ to $.26; n=7$		
Low post-program recidivism rates	$r=.21, CI=.14$ to $.27; n=2$		

delays in admitting adolescents into the drug court program are related to lower graduation rates ($r = .26, p = .05$). Finally, Applegate and Santana (2000) reported that when higher motivation and positive attitudes by parents toward drug court are present, graduation rates tend to improve ($r = .29, p = .05$).

As each study included in the meta-analysis could contribute an effect size for each variable of interest, the overall pattern of results might be influenced by a few studies contributing many effect sizes compared to studies contributing only two or three. No clear guidelines exist regarding how to best examine this issue of non-independence of effect sizes for the variables of interest in the present study. The authors identified six studies that each contributed six or more effect sizes to this study (i.e., Crumpton et al., 2006; Deschenes et al., 2001; Dickie, 2002; Mackin et al., 2010a, 2010b, 2010c; Tappin & McGlashan, 2007). To assess a possible bias in their influence, they were individually and then collectively excluded from the calculation of the mean effect size for relevant variables. In no case were the mean effect sizes generated through inclusion versus exclusion of these studies significantly different.

4. Discussion

Several important trends in results associated with the recidivism, graduation rates, and associations between participant characteristics and program graduation are worthy of contextual discussion. First, the data show that the variance in recidivism outcomes within both drug court graduate and premature termination subgroups is substantial. This probably reflects such factors as differences in program criteria for success, the severity of participants' substance abuse and delinquency problems, and the different operational definitions of recidivism that program evaluators have used. Despite this variance, however, adolescents who graduate from juvenile drug court have dramatically lower recidivism rates, both during program participation and in the year following it, than youth who terminate prematurely. In fact, it appears that adolescents who fail in drug court apparently benefit little from their admission and limited participation because the number who commit additional offenses is nearly the same during and after the program.

Second, this review affirmed that slightly more than half of all juvenile drug court youth who initially enrolled in a juvenile drug court end up graduating. When publicly reporting the positive value of juvenile drug courts, most programs showcase only the relatively lower recidivism rates observed among program graduates. This statistic may be misleading if the rate includes current participants (which the present review cautions against). Nonetheless, taken at face value, the PTR reported here appears to be quite high, but is probably not outside the range of PTRs associated with other intervention modalities for children and adolescence. For instance, Kazdin, Mazurick, and Bass (1993) found that around 35% of antisocial children and their families failed to complete an outpatient therapy program and that dropping out could be predicted by several key family risk factors. In their literature review of adolescent substance abuse treatment outcomes Williams and Chang (2000) cited program drop-out rates ranging between roughly 30% and 65%. Therefore, it can be suggested that the PTR for drug court is not abnormally high relative to treatment modalities for adolescents in general. Yet, at an absolute level, it is clear that substantial work needs to be done to find ways to improve retention and promote higher graduation rates. In their qualitative review of the literature Block and Greeno (2011) offer speculations about factors contributing to premature termination in mental health therapy based on developmental theory and available research. Briefly, they suggest that adolescents may tend to drop-out because of a failure to form strong therapeutic alliances with their primary therapist, and due to unsupportive parental attitudes or lack of engagement in their child's therapy. In addition, adolescents' belief that they do not need therapy, family financial distress, and

parent preferences for type of services they want for their child probably impact drop-out rates.

These issues, if valid for premature termination from drug court, might be addressed through: (1) greater emphasis on achieving a therapeutic relationship between the teen and the primary therapist, counselor or caregiver assigned to their case; (2) increasing interest and motivation for therapy, possibly by ongoing use throughout drug court of periodic, motivational interviewing sessions during treatment; (3) requiring and reinforcing greater parental involvement in drug court and particularly, family counseling. Promising efforts have begun in some research circles, such as incorporating specific empirically-validated treatments into drug courts that emphasize parental involvement (e.g., Henggeler et al., 2006).

Third, a number of trends or themes are readily apparent from the meta-analysis of participant characteristics and graduation/premature termination. The average associations (effect sizes) reported herein are consistent with Cohen's general suggested interpretations of "small," "medium," and "large", effect sizes. Table 3 reflects "small" to "medium" relationships across programs. These effects are larger than those reported in studies comparing juvenile drug treatment court with a comparison or control group (Stein et al., in preparation). In addition, the results are in general agreement with large scale national studies of community-based treatments and interventions for adolescents who evidence co-occurring substance abuse problems and criminal behavior. A general conclusion to be drawn from the present review is that adolescents with fewer drug, emotional, and behavioral offense profiles tend to do better in adolescent drug treatment court in terms of the likelihood of graduating from programs and recidivism than adolescents with more severe problems. In addition, drug courts appear to contain components of other well structured, modestly effective interventions for adolescents including behavioral monitoring, clear contingencies, and family involvement (Farabee, Shen, Hser, Grella, & Doublas Anglin, 2001; Henggeler et al., 2006).

As courts, probation departments, and mental health service providers must increasingly function under the constraints of budget and staff reductions, it is critical to identify key risk factors associated with program success or failure so that improvements can be introduced to make them as cost effective as possible. One paradox in the present findings is the fact that far more males are admitted to juvenile drug court but that females fare a bit better in terms of graduation rates and, to a lesser degree, post-program recidivism. This finding is inconsistent with other research that has examined the long-term outcome trajectories for adolescents with behavioral and/or delinquency problems. For instance, Miller, Malone, and Dodge (2010) conducted a longitudinal study of young teenagers and found that boys outnumber girls in terms of more serious and chronic problem behavior trajectories across the course of development. Within the subgroups of girls and boys with significant problems who were followed for 6 years, however, the actual proportion of boys and girls that continue into late adolescence with serious delinquency and substance use problems is quite similar. It is unclear whether girls are treated differently than boys in drug court, which might account for this difference in outcome trends, or whether certain program components have a greater impact on girls than boys (e.g., random urine screening, reinforcement value of particular incentives). Differential outcomes for boys versus girls is an issue worthy of future research, as uncovering the cause of the differences may prompt useful procedural or policy changes.

Of likely concern to drug court directors, judges, and policy-makers is the fact that there is a modest relationship between being a non-Caucasian participant in juvenile drug court and lower probability of graduating. This appears to occur even though the proportion of non-white participants in juvenile drug court is fairly high (mean of 40%). It is beyond the scope of the present review to offer all of the most plausible speculations regarding the cause of this bias.

Additional study regarding factors that may account for this difference is needed. These factors may, for example, include inadequate numbers of ethnic minority staff in drug court programs or among the ranks of therapists offering treatment in programs serving a high number of minority youth. In addition, a problem could exist involving low engagement of minority families in program services such as parenting skills training and family therapy (e.g., Henggeler et al., 2006). Like the issue of gender, differential outcomes due to race is both a practical and politically sensitive issue that is worthy of additional investigation because current programs are not sustaining minority adolescents' engagement in these programs as they should.

The results of this study are consistent with the findings of researchers who have investigated the general problem of re-offending in delinquent adolescent populations. In a meta-analysis of 23 studies, Cottle et al. (2001) found that such factors as severity of conduct problems, having delinquent peers, serious family problems, and substance abuse were modestly related to re-offending. To a lesser extent, they found that being male and having academic problems (i.e., low achievement, learning disabilities, and special education involvement) were also associated with re-offending. Similar to Cottle et al. we found that a history of prior treatment does not seem to be consistently related to re-offending. On the other hand, unlike the present study, Cottle et al. did not find an association between racial status or prior arrest history and re-offending. Differences in the types of studies used in these two reviews are numerous (e.g., Cottle et al. focused on general re-offending while the present study examined predictors of outcome of a particular intervention). Still, the parallels that do exist are important and confirming.

The present study reinforces the view (e.g., Hawkins et al., 1998; Lipsey & Derzon, 1998) that certain risk factors consistently contribute to the likelihood of lower juvenile drug court success (e.g., ethnic minority status, being male, lack of affiliation with school, history of antisocial behavior and substance use, poor psychological functioning). A particular strength of the present review is that it showcases the key juvenile drug court success/failure predictors firmly established by multiple studies.

Finally, the present review offers some possible clues for improving juvenile drug treatment courts (e.g., improving graduation rates and successful outcomes). For instance, persistent misbehavior during drug court, both in the form of ongoing delinquency incidents and substance use is by definition, grounds for premature termination from most drug court treatment programs. It also serves as a predictor of post-program recidivism. Some of the studies presented in this review showed that higher frequencies of urine screening may be related to higher graduation rates (see Anspach et al., 2003; Gilmore et al., 2005; Polakowski et al., 2008). Therefore, some programs may want to consider the use of higher rates of testing if they suspect that their present program retention rate may be normatively low. Admittedly, urine screening is one of the more significant costs incurred by drug courts and, thus, this suggestion entails additional expense. In addition, helping juvenile participants connect with social institutions is a well-documented protective factor and has been shown by data in this review to improve graduation rates (e.g., school engagement, low school problems, part-time employment). Our subjective impression is that school personnel are rarely involved directly with drug court personnel or treatment staff and future research might profitably investigate whether greater collaboration might lead to improved graduation rates. Overall, the results of the present study should prompt local jurisdictions to revisit the well-known debate about whether scarce resources should be directed to its low risk youth, versus its highest risk youth with more chronic problems, as juvenile drug treatment courts are not dramatically more effective on average, than traditional adjudication, drop-out rates correlate with high risk profiles, etc.

This review of studies examining predictors of outcome prompts the present authors to recommend a number of variables worthy of

further investigation because we suspect that examination of their relation to outcome may eventually lead to program improvement. They may represent common shortcomings relative to recommended national performance standards (Drug Court Clearinghouse and Technical Assistance Project, 1998). The first variable is whether drug courts use empirically supported treatments versus generic or unspecified counseling, drug education. A closely related variable is the presence or absence of family interventions. An emphasis on providing comprehensive treatment services, use of evidence-based therapy, and engagement of families in therapy has certainly been emphasized in juvenile drug treatment court "best-practice" manuals (e.g., Hills, Shufelt, & Cocozza, 2009). Subjectively, the present investigators observe that most programs require only minimal family engagement and there is little evidence that programs adopt the best empirically supported individual therapy approaches.

In addition, while use of incentives to reinforce positive behavior is widely recommended (e.g., Cooper, 2003), subjective appraisal of programs' discussions of sanctions, and their lists of examples showed they were longer than those for rewards or incentives. Data from adult drug courts have suggested that ratios of incentives to sanctions appear to be lower than is optimal (e.g., Marlow & Wong, 2008). The use of incentives and sanctions is considered to be a core feature of drug courts and as such examination of the ratio of these interventions and its relation to outcome are clearly warranted. Future research may support other tentative findings drawn from studies included in this meta-analysis. Efforts to rapidly enroll adolescent participants in drug court, for example, may be a useful improvement strategy as might steps to enhance the level of motivation of parent and prospective participants. We suspect that more clearly defining criteria for "graduation" from drug court, consistent differentiation of recidivism offenses into relevant categories (e.g., misdemeanors, felonies, status offenses; drug-related versus non-drug-related arrests) might help program evaluators and stakeholders better identify predictors of outcomes. Some limited data uncovered in the present literature review hint that each of these might provide pathways to improving drug treatment courts.

References

- *Anspach, D., Ferguson, A., & Phillips, L. L. (2003). *Evaluation of Maine's statewide juvenile drug treatment court program: Fourth year outcome evaluation report*. Augusta, ME: College of Arts and Sciences, University of Southern Maine.
- *Applegate, B., & Santana, S. (2000). Intervening with youthful substance abusers: A preliminary analysis of a juvenile drug court. *Justice System Journal*, 21, 281–300.
- *Barnes, J. C., Mitchell, H. V., & Mitchell Miller, J. (2009). Identifying leading characteristics associated with juvenile drug court admission and success. *Youth Violence and Juvenile Justice*, 7, 350–360.
- Belenko, S. (1998). Research on drug courts: A critical review. *National Drug Court Institute Review*, 1, 3–44.
- Belenko, S. (1999). Research on drug courts: A critical review 1999 update. *National Drug Court Institute Review*, 2, 1–58.
- Belenko, S. (2001). *Research on drug courts: A critical review 2001 update*. New York: Columbia University Press, The National Center on Addiction and Substance Abuse.
- Belenko, S., & Dembo, R. (2003). Treating adolescent substance abuse problems in the juvenile drug court. *International Journal of Law and Psychiatry*, 26, 87–110.
- Block, A. M., & Greeno, C. (2011). Examining outpatient treatment drop out in adolescence: A literature review. *Child Adolescence and Social Work Journal*, 28, 393–420.
- *Boghossian S. (2006). *Juvenile drug courts: using participant characteristics to predict outcome*. (Masters thesis). Logan, UT: Department of Psychology, Utah State University.
- Bouffard, J., & Taxman, F. (2004). Drug courts in the juvenile justice system. In J. A. Butts, & J. Roman (Eds.), *Juvenile drug courts and teen substance abuse* (pp. 1–25). Washington, DC: The Urban Institute.
- *Carey, S., Waller, M., & Marchand, G. (2006). *Clackamas County juvenile drug court enhancement: Process, outcome/impact and cost evaluation: Final report*. Portland, OR: NPC Research.
- Cissner, A., & Rempel, M. (2005). *The state of drug court research: Moving beyond "do they work"?* New York: Center for Court Innovation.
- *Cook, M., Watson, L., & Stageberg, P. (2009). *Statewide process and comparative outcomes study of 2003 Iowa adult and juvenile drug courts*. Des Moines, IA: Division of Criminal and Juvenile Justice Planning, Statistical Analysis Center, Iowa Department of Human Rights.
- Cooper, C. (2001). *Juvenile drug court programs*. Juvenile Accountability Incentive Block Grants Program Bulletin, Office of Juvenile Justice and Delinquency Prevention. Washington, D.C.: U.S. Department of Justice.

- Cooper, H. (1998). *Synthesizing research: A guide for literature reviews*. Thousand Oaks, CA: Sage.
- Cooper, S. C. (2003). *The carrot and the stick: How effective sanctions and incentives succeed in overcoming addiction*. Michigan Bar Journal, January, 20–24. Retrieved from: <http://www.michbar.org/journal/pdf/pdf4article527.pdf>.
- Cottle, C., Lee, R., & Heilburn, K. (2001). The prediction of criminal recidivism in adolescents: A meta-analysis. *Criminal Justice and Behavior*, 28, 367–394.
- *Crumpton, D., Carey, S., Mackin, J., Finigan, M., Pukstas, K., Weller, J., et al. (2006). *Harford County juvenile drug court performance evaluation: Program process, outcome and cost analysis final (final report)*. Portland, OR: NPC Research.
- Deschenes, E. P., Moreno, K. S., Emani, V. M., Thompson, E., & Manatt, K. (2001). *Evaluation of the Los Angeles County juvenile drug court program: A preliminary process and outcome evaluation*. Long Beach, CA: Cal State University, Long Beach.
- Dickie, J. (2002). *Summit County juvenile drug court: Evaluation report July 1, 2000–June 30, 2001*. Akron, OH: The Institute for Health and Social Policy, The University of Akron.
- Drug Court Clearinghouse and Technical Assistance Project. (1998). *Looking at a decade of drug courts*. Washington, D.C.: American University.
- Farabee, D., Shen, H., Hser, Y. -I., Grella, C. E., & Douglas Anglin, M. (2001). The effect of drug treatment on criminal behavior among adolescents in DATOS-A. *Journal of Adolescent Research*, 16, 679–696.
- *Ferguson, A., McCole, B., & Raio, J. (2006). *A process and site-specific outcome evaluation of Maine's juvenile drug treatment court programs*. Augusta, ME: College of Arts and Sciences, University of Southern Maine.
- Gilmore, A. S., Rodriguez, N., & Webb, V. (2005). Substance abuse and drug courts: The role of social bonds in juvenile drug courts. *Youth Violence and Juvenile Justice*, 3, 289–315.
- Hawkins, J. D., Herrenkohl, T. L., Farrington, D., Brewer, D., Catalano, R. F., & Harachi, T. (1998). A review of predictors of youth violence. In R. Loeber, & D. P. Farrington (Eds.), *Serious and violent juvenile offenders: Risk factors and successful interventions* (pp. 106–146). Thousand Oaks, CA: Sage Publications.
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Henggeler, S., Halliday-Boykins, C., Cunningham, P., Randall, J., Shapiro, S., & Chapman, J. (2006). Juvenile drug court: Enhancing outcomes by integrating evidence-based treatments. *Journal of Consulting and Clinical Psychology*, 74, 42–54.
- *Hickert, A. O., Becker, E., & Prospero, M. (2010). *Evaluation of Utah juvenile drug courts: Final report*. Salt Lake City, UT: Utah Criminal Justice Center, University of Utah.
- Hills, H., Shufelt, J., & Coccozza, J. (2009). *Evidence-based practice recommendations for juvenile drug courts*. Delmar, NY: National Center for Mental Health and Juvenile Justice, Policy Research Associates, Inc.
- Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Kazdin, A. E., Mazurick, J., & Bass, D. (1993). Risk for attrition in treatment of antisocial children and families. *Journal of Clinical Child Psychology*, 22, 2–16.
- *Kirchner, R., & Kirchner, T. (2007). *Successful implementation of a model juvenile treatment drug court program: Anne Arundel county, MD juvenile treatment court program: Producing community outcomes*. Annapolis, MD: Glacier Consulting, Inc.
- Koetzle-Shaffer D. (2006). *Reconsidering drug court effectiveness: A meta-analytic review*. (Doctoral dissertation). Available from Proquest Information and Learning Company (UMI Microform 3231113).
- *Kralstein, D. (2008). *Evaluation of the Suffolk County juvenile treatment court: Process and impact findings*. New York: Center for Court Innovation.
- *LeCroy & Milligan Associates, Inc. (2003). *Juvenile drug court program evaluation: Final report*. Tucson, AZ: LeCroy & Milligan Associates, Inc.
- *LeGrice, L. (2003). *Effectiveness of juvenile drug court in reducing delinquency*. (Doctoral dissertation). Available from Proquest Information and Learning Company (UMI Microform 3117572).
- Lipsey, M., & Derzon, J. (1998). Predictors of violent or serious delinquency in adolescence and early adulthood: A synthesis of longitudinal research. In R. Loeber, & D. P. Farrington (Eds.), *Serious and violent juvenile offenders: Risk factors and successful interventions* (pp. 86–105). Thousand Oaks, CA: Sage Publications.
- Longshore, D., Turner, S., Wenzel, S., Morral, A., Harrell, A., McBride, D., et al. (2001). Drug courts: A conceptual framework. *Journal of Drug Issues*, 31, 7–25.
- *Mackin, J., Lucas, L., Lambarth, C., Waller, M., Allen Herrera, T., Carey, S., et al. (2010a). *St. Mary's County juvenile drug court outcome and cost evaluation*. Portland, OR: NPC Research.
- *Mackin, J., Lucas, L., Lambarth, C., Waller, M., Herrera, T. A., Carey, S., et al. (2010b). *Anne Arundel County juvenile treatment court outcome and cost evaluation*. Portland, OR: NPC Research.
- *Mackin, J., Lucas, L., Lambarth, C., Waller, M., Herrera, T. A., Carey, S., et al. (2010c). *Baltimore County juvenile drug court outcome and cost evaluation*. Portland, OR: NPC Research.
- Marlow, D. B., & Wong, C. (2008). Contingency management in adult criminal drug courts. In S. T. Higgins, K. Silverman, & S. Heil (Eds.), *Contingency management in substance abuse treatment* (pp. 334–354). New York: Guilford Press.
- Marlowe, D. B., DeMattero, D. S., & Festinger, D. S. (2003). A sober assessment of drug courts. *Federal Sentencing Reporter*, 15, 153–157.
- Medina, R. (2008). *El Paso County juvenile drug court program: comprehensive report, June 2004 through December 2007*. Reno, NV: School of Social Research and Justice Studies, University of Nevada, Reno.
- Miller, S., Malone, P., & Dodge, K. (2010). Developmental trajectories of boys' and girls' delinquency: Sex differences and links to later adolescent outcomes. *Journal of Abnormal Child Psychology*, 38, 1021–1032.
- National Association of Drug Court Professionals, & Drug Courts Standards Committee (1997). *Defining drug courts: The key components*. Washington, D.C.: OJP Drug Court Office, U.S. Department of Justice.
- *O'Connell, J. P., Nestlerode, E., Mille, M. L., & Miller, M. L. (1999). *Evaluation of the Delaware juvenile drug court diversion program*. Dover, DE: Statistical Analysis Center (Publication No. 100703991005). Retrieved from: <http://www.state.de.us/budget/sac/default.shtml>.
- Parker, S., & Smith, J. W. (2010). Annual report on North Carolina's drug treatment courts. Administrative Office of the Courts. Web access from National Criminal Justice Reference Service, U.S. Department of Justice. <http://www.nccrc.org/Citizens/CPrograms/DTC/Documents/NDlegRp2010.pdf>.
- *Parsons, B. V., & Byrnes, E. C. (2001). *Byrne evaluation partnership program final report*. Salt Lake City, UT: University of Utah, Social Research Institute.
- *Polakowski, M., Hartley, R., & Bates, L. (2008). Treating the tough cases in juvenile drug court: Individual and organizational practices leading to success or failure. *Criminal Justice Review*, 33, 379–404.
- Roman, J., & DeStefano, C. (2004). Drug court effects and the quality of existing evidence. In J. A. Butts, & J. Roman (Eds.), *Juvenile drug courts and teen substance abuse* (pp. 107–135). Washington, DC: Urban Institute Press.
- Rosenthal, R. (1991). *Meta-analytic procedures for social research* (revised ed.). Newbury Park, CA: Sage Publications.
- *Rubio, D., Fred Cheesman, I. I., Durkin, M., Kander, N., & Maggard, S. (2007). *Wyoming drug court performance measures project*. Williamsburg, VA: NCSC National Center for State Courts. Retrieved from: http://www.ncsconline.org/D_Consult/Wyoming/Wy_panels6.pdf.
- *Searle, W., & Spier, P. (2006). *Christchurch youth drug court pilot: One-year follow-up study*. Wellington, NZ: Ministry of Justice 0-478-29019-5.
- *Shaffer, D. K., Latessa, E. J., Pealer, J., & Taylor, C. Y. (2002). Cuyahoga County juvenile drug court process evaluation. Retrieved from: <http://www.uc.edu/criminaljustice/ProjectReports/CuyahogaJuvenileDCpdf.pdf>.
- Shaver, D. K., & Helfer, T. (2000). Stanislaus county adult and juvenile drug court: Annual report 2000. Available from: Justice Programs Office, School of Public Affairs, American University. <http://www.american.edu/spa/jpo/>.
- Stein, D. M., Homan, K., & Deberard, S. (in preparation). The effectiveness of juvenile drug treatment courts: A meta-analytic review of literature.
- *Tappin, R., & McGlashan, L. (2007). *Evaluating "reclaiming futures": Final performance review*. Concord, NH: New Hampshire Public Policy Studies, www.nhpolicy.org.
- *Thompson, K. M. (2002). *Statistical summary of North Dakota Juvenile Drug Court—May 2000 to June 2002*. Fargo, ND: North Dakota State University, Department of Sociology.
- *Thompson, K. M. (2004). *An adult recidivism outcome evaluation of North Dakota's juvenile drug court*. Fargo, ND: North Dakota State University, Department of Sociology.
- *Tranchita, A., & Stein, D. M. (2006). Predictors of graduation in a contemporary juvenile drug court program. Unpublished manuscript, Utah State University, Department of Psychology.
- *Virginia Supreme Court. (2003). *Program evaluation of Virginia's drug courts: Phase I*. Richmond, VA: Executive Secretary of the Supreme Court of Virginia.
- *Virginia Supreme Court. (2009). *Program evaluation of Virginia's drug courts: 2008 report*. Richmond, VA: Executive Secretary of the Supreme Court of Virginia.
- Williams, R., & Chang, S. (2000). A comprehensive and comparative review of adolescent substance abuse treatment outcome. *Clinical Psychology: Science and Practice*, 7, 138–166.

Additional Studies Used in Meta-Analysis

- *Acentares J. (2011). Factors predicting drug court success for European American/-White and Latino adolescents. Dissertation Abstracts International: Section B: The Sciences and Engineering, 71(7-B), 4497.
- *BJA Drug Court Clearinghouse Project. (2010). *Summary of drug court activity by state and county: Juvenile and family drug courts*. Washington, DC: School of Public Affairs.
- *Byrnes, E., & Hickert, A. (2004). *Process and outcome evaluation of the third district juvenile drug court in Dona Ana County, New Mexico*. Annapolis, MD: Glacier Consulting, Inc.
- *Cervantes-Chisholm I. (2007). Juvenile drug court outcomes: predictor variables for graduation and termination for adolescents participating in an outpatient drug treatment program. (Masters Thesis). ProQuest, LLC: UMI Microform 3290070.
- *Eardley, T., McNab, J., Fisher, K., Kozlina, S., Eccles, J., & Flick, M. (2004). *Evaluation of the New South Wales youth drug court pilot program: Final report*. Sydney, AU: Social Policy Research Center, School of Social Science and Policy.
- *Latessa, E., Shaffer, D. K., & Lowenkamp, C. (2002). *Outcome evaluation of Ohio's drug court efforts: Final report*. Cincinnati, OH: Center for Criminal Justice Research, University of Cincinnati. Retrieved from: <http://www.uc.edu/criminaljustice/ProjectReports/July02Drugcourtreport.pdf>.
- *Nebraska Commission on Law Enforcement and Criminal Justice. (2004). *The tri-county juvenile drug court evaluation study: Final report*. Retrieved from: www.ncc.ne.gov/pdf/juvenile_justice_materials/2004_DTC_Report_Executive_Summary.pdf.
- *Organizational Research Services. (2005). *King County juvenile drug court program evaluation*. Seattle, WA: Organizational Research Services.
- *Pitts, W. J. (2006). Measuring recidivism in a juvenile drug court: Systematic outcome study of a juvenile drug court using historical information. *Southwest Journal of Criminal Justice*, 3, 17–34.
- *Rodriguez, N., & Webb, V. (2004). Multiple measure of juvenile drug court effectiveness: Results of a quasi-experimental design. *Crime and Delinquency*, 50, 292–314.

- *Shaffer, D. K., & Latessa, E. (2002). Delaware county juvenile drug court process evaluation. Retrieved from http://www.uc.edu/criminaljustice/ProjectReports/Delaware_process_eval.pdf
- *Shaw, M., & Robinson, K. (1998). Summary and analysis of the first juvenile drug court evaluations: The Santa Clara County drug treatment court and the Delaware juvenile drug court diversion program. *National Drug Court Institute Review*, 1, 88–100.
- *Sloan, J., Smykla, J., & Rush, J. (2004). Do juvenile drug courts reduce recidivism?: Outcome of drug court and an adolescent substance abuse program. *American Journal of Criminal Justice*, 29, 95–115.