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Adaptive Interventions in Drug Court: A Pilot Experiment

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Abstract

This pilot study (N = 30) experimentally examined the effects of an adaptive intervention in an adult misdemeanor drug court. The adaptive algorithm adjusted the frequency of judicial status hearings and clinical case-management sessions according to pre-specified criteria in response to participants' ongoing performance in the program. Results revealed the adaptive algorithm was acceptable to both clients and staff, feasible to implement with greater than 85% fidelity, and showed promise for eliciting clinically meaningful improvements in drug abstinence and graduation rates. Estimated effect sizes ranged from 0.40 to 0.60 across various dependent measures. Compared to drug court as-usual, participants in the adaptive condition were more likely to receive responses from the drug court team for inadequate performance in the program and received those responses after a substantially shorter period of time. This suggests the adaptive algorithm may have more readily focused the drug court team's attention on poorly-performing individuals, thus allowing the team to "nip problems in the bud" before they developed too fully. These preliminary data justify additional research evaluating the effects of the adaptive algorithm in a fully powered experimental trial.

Adaptive interventions adjust the dose or type of services that are administered to clients in response to clients' clinical presentation or on-going performance in treatment (e.g., Collins, Murphy & Bierman, 2004; Murphy, 2005; Murphy, Lynch, McKay, Oslin & TenHave, 2007). Matching services to clients' pre-treatment characteristics is perhaps the simplest form of adapting treatment to the needs of the individual. For example, tailoring services to the needs of youths or racial minorities is one common approach to adapting treatment for the individual. Similarly, a history of negative outcomes in prior treatment episodes might lead a program to offer a higher dosage or greater variety of services for a new client than would ordinarily be provided to new admissions. This, too, is a simple form of adapting treatment to the needs of the individual.

At a more sophisticated level of adaptive programming, the nature or intensity of services is readjusted over time according to pre-specified criteria as a consequence of clients' performance in treatment. For example, if a client falls below an effective threshold for engagement in treatment—by, for example, missing a pre-specified number of counseling sessions—he or she might be re-assigned to a motivational enhancement intervention. The term *matching* is commonly used to describe strategies that tailor treatment to clients' baseline characteristics whereas the term *adaptive* is commonly used for strategies that re-adjust the

interventions over the course of treatment (e.g., Marlowe, Festinger, Dugosh, Lee & Benasutti, 2007).

Adaptive interventions have been shown to be effective in treating a wide range of substance abuse disorders, including tobacco dependence (Reid, Pipe, Higginson, Johnson, D'Angelo, Cooke et al., 2003), opiate dependence (Brooner, Kidorf, King, Stoller, Peirce, Bigelow & Kolodner, 2004; Brooner, Kidorf, Stoller, Neufeld & Kolodner, 2007; Kidorf, Neufeld & Brooner, 2004; King, Stoller, Hayes, Umbricht, Currens, Kidorf et al., 2002), cannabis abuse (Kidorf, Neufeld, King, Clark & Brooner, 2007), alcoholism (O'Malley, Rounsaville, Farren, Namkoong, Wu, Robinson et al., 2003) and continuing-care interventions for drug dependence (McKay, Lynch, Shepard, Morgenstern, Forman & Pettinatti, 2005, McKay, Lynch, Shepard & Pettinatti, 2005). The specific content and structure of the adaptive interventions vary depending upon the nature of the disorder being treated; however, the findings from these studies suggest that employing standardized criteria for determining when and how to respond to clients' progress or lack thereof in treatment can yield significant improvements beyond that obtained when professionals exercise individualized judgment in specific cases. This is consistent with a longstanding body of evidence from correctional studies indicating that standardized assessments and interventions reliably outperform individualized professional judgment (e.g., Andrews & Bonta, 1998; Wormith & Goldstone, 1984).

Beginning in 1999, our research team initiated a planned sequence of experiments aimed at matching the intensity of judicial supervision in drug court programs to the risk level of participants. According to the criminological paradigm of the *Risk Principle*, intensive court monitoring would be expected to exert the greatest effects for high-risk offenders who have more severe antisocial propensities or treatment-refractory drug use histories, but may be unnecessary or contraindicated for low-risk offenders (e.g., Andrews & Bonta, 1998; Taxman & Marlowe, 2006). Low-risk offenders are less likely to be on a fixed antisocial trajectory and are apt to "adjust course" readily following a run-in with the law; therefore, due to a statistical ceiling effect, intensive court supervision may offer little incremental benefits for these individuals at a substantial cost (DeMatteo, Marlowe & Festinger, 2006). On the other hand, high-risk offenders often require intensive and sustained interventions to dislodge their entrenched, negative behavioral patterns.

Among drug offenders, the most reliable and robust risk factors for failure in traditional rehabilitation programs include a younger age during treatment, male gender, early onset of delinquent activity, early onset of substance abuse, prior felony convictions, co-existing diagnosis of antisocial personality disorder (APD) or psychopathy, previously unsuccessful attempts at drug abuse treatment, and a history of violent offending against persons (Butzin, Saum, & Scarpitti, 2002; Gendreau, Little & Goggin, 1996; Hiller, Knight & Simpson, 1999; Marlowe, Patapis & DeMatteo, 2003a; Peters, Haas & Murrin, 1999; Roll, Prendergast, Richardson, Burdon & Ramirez, 2005). Therefore, in pre-planned interaction analyses, we hypothesized that participants with these risk factors would benefit most from intensive judicial monitoring.

In our first study, consenting participants in a misdemeanor drug court were randomly assigned either to attend judicial status hearings in court on a *bi-weekly* basis throughout their enrollment in the program (n = 82) or to be monitored by their clinical case managers who petitioned the drug court for status hearings only *as needed* in response to serious or repeated infractions (n = 99). The typical schedule of status hearings for this drug court was every 4 to 6 weeks; therefore, bi-weekly participants attended court hearings more frequently than usual and as-needed participants attended hearings less frequently.

Results revealed no main effects of status hearings on counseling attendance, substance use or criminal activity during participants' enrollment in drug court (Marlowe, Festinger, Lee, Schepise, Hazzard, Merrill, Mulvaney & McLellan, 2003b), in graduation rates (Festinger, Marlowe, Lee, Kirby, Bovasso & McLellan, 2002) or in substance use, criminal activity or psychosocial functioning at 12 months post-admission (Marlowe, Festinger, Dugosh, & Lee, 2005). As hypothesized, however, planned interaction analyses confirmed that high-risk participants who (1) met DSM-IV diagnostic criteria for APD or (2) had a prior history of drug abuse treatment, provided more drug-negative urine specimens and were more likely to graduate successfully from the drug court when they were assigned to bi-weekly court hearings (Festinger et al., 2002).

We replicated these findings using a prospective-matching design that brought the interaction effects under experimental control. Participants were randomly assigned either to be *matched* (n = 137) or *unmatched* (n = 142). Unmatched participants attended status hearings as-usual in the drug court, which as noted was every 4 to 6 weeks. Matched participants were scheduled either to attend bi-weekly court hearings or as-needed court hearings depending upon whether they met the above criteria for high risk or low risk. This design permitted us to examine the effects of matching participants to a specific schedule of court hearings based upon their risk status and to compare the effects of this baseline-matching procedure to drug court as-usual.

Results confirmed that high-risk participants attended significantly more counseling sessions and provided significantly more drug-negative urine specimens during their enrollment in drug court when they were matched to bi-weekly court hearings (Marlowe, Festinger, Lee, Dugosh & Benasutti, 2006). In addition, high-risk participants graduated at a significantly higher rate and provided more drug-negative urine specimens and reported less illicit drug and alcohol use at 6 and 12 months post-entry to the drug court when they were assigned to bi-weekly hearings (Marlowe et al., 2007). On the other hand, outcomes were generally equivalent for low-risk participants regardless of how often they were required to appear before the judge in court. These results provided convincing evidence for a reliable and robust matching effect in drug courts, in which intensive court supervision appears to be indicated only for certain types of high-risk participants.

Rationale for the Current Study

These previous studies represented only a first step in tailoring adaptive interventions for drug-abusing offenders. More research was needed to improve upon the procedures and elicit more robust effects. For one thing, no measurement tool is perfectly valid and reliable and there will often be an appreciable number of false positives and false negatives in any program. Some offenders with poor prognoses will be erroneously assigned to low-intensity conditions and others with good prognoses will be erroneously assigned to high-intensity conditions. Some mechanism must be established to adjust the initial placement as a consequence of their subsequent performance in treatment. For example, if a participant is performing poorly on a reduced schedule of as-needed court hearings, this should trigger a case review by the team to re-consider the initial disposition. Such an approach requires the specification of standardized performance-indicators for determining whether a client is demonstrating progress or lack thereof in the program, plus a set of *a priori* decision rules for determining how to respond to the clinical presentation (e.g., Collins et al., 2004). The utility of the decision rules for improving outcomes needs to be validated in controlled experimental studies (e.g., Murphy, 2005).

It was also noteworthy that our baseline-matching procedure elicited substantial improvements for high-risk participants but no such benefits were detected for low-risk participants who comprised roughly two-thirds of the samples. More research was needed to improve outcomes

for low-risk drug offenders. It is possible these individuals were low risk from a criminological perspective but still had serious treatment needs that could not be met by increasing their contacts with a judge. Superior outcomes might have been achieved, for example, by increasing their contacts with a clinical case manager (e.g., DeMatteo et al., 2006). Hitting an apparent ceiling effect on one intervention should not be interpreted as ruling out potential gains that could be achieved from other interventions that employ different mechanisms of action or are administered at subsequent treatment intervals.

When devising adaptive interventions for offenders, it is also important to distinguish between *non-compliance* with supervision requirements and *non-responsiveness* to clinical interventions (Marlowe, 2007; Marlowe & Wong, 2008). For example, if a participant fails to show up for counseling sessions or fails to deliver urine specimens when directed to do so, he or she is arguably engaged in willful misconduct (assuming the absences were unexcused and avoidable) and is failing to satisfy the minimal requirements of the program. Under such circumstances, it might be appropriate to apply a punitive sanction or increase supervision requirements as a consequence for the infractions. On the other hand, if a participant attends all of his or her required sessions but continues to provide drug-positive urine samples as a consequence of a compulsive addiction, the fault lies arguably not with the client but with the treatment plan. Rather than apply a punitive sanction, it would be preferable to adjust the treatment plan. For example, the client might require more frequent case-management sessions or mental health services to address a co-occurring psychiatric disorder. This requires different performance-indicators to be defined for non-compliance as opposed to non-responsiveness, with different adaptive responses specified for each of these different presentations.

Distinguishing between non-compliance and non-responsiveness addresses an important problem commonly encountered in drug courts. Some judges or probation officers may increase treatment requirements as a consequence for misconduct in the program. For example, a participant who misses multiple counseling sessions might be “sanctioned” with more frequent counseling sessions or a more restrictive modality of treatment, such as residential treatment. This practice could give the inadvertent message to clients that treatment is aversive and thus something to be avoided (e.g., Marlowe, in press). It also frequently fails to realistically address the problem. For instance, if a participant is failing to attend two counseling sessions per week, why should one now expect him or her to comply with a more stringent directive to attend even more frequent sessions? The typical outcome of such a course of action is for the participant to incur multiple and repetitive infractions for continued non-attendance, ultimately leading to adjudication or a return to custody. A better course of action would be to address the reason(s) for the non-attendance. If non-attendance is due to willful non-compliance, then a punitive response might be called for. If, on the other hand, it is due to an unrequited addiction-related impairment, then a clinical re-evaluation and adjustment of the treatment plan would be indicated.

Goals for the Current Study

The current study pilot-tested an adaptive algorithm that permitted us both to re-adjust the initial schedule of court hearings where indicated, and also to impose a treatment-oriented response (as opposed to a judge-oriented response) for participants who were compliant with the conditions of the program but continued to provide drug-positive urine samples. Importantly, this pilot study was *not* intended to be sufficiently powered to detect statistically significant effects. Rather, our goals were limited to determining (1) whether the adaptive algorithm would be acceptable to clients and staff, (2) whether it was feasible to implement with fidelity in a real-world drug court program, (3) whether it showed sufficient promise to justify the cost and effort of a fully powered experimental trial and (4) to estimate the sample sizes that would be required to supply adequate statistical power.

Methods

The study was conducted in a misdemeanor drug court located in the urban city of Wilmington, DE. Eligibility criteria for this drug court require defendants to be (1) 18 years of age or older; (2) a resident of or have committed their offense in New Castle County, DE; (3) charged with a misdemeanor offense including possession or consumption of cannabis, possession of drug paraphernalia, possession of hypodermic syringes or first-time driving under the influence (DUI) and (4) not have a history of a violent offense involving serious injury to a victim or use of a deadly weapon.

Consenting participants were randomly assigned at entry either to drug court as-usual ($n = 15$) or to an adaptive intervention condition ($n = 16$), both of which are described below. Individuals in the adaptive condition were eligible for all of the usual services in the drug court program, with the exception that responses from the court were scheduled to follow the adaptive algorithm. The randomization procedure did not equilibrate the samples on risk variables using an urn or stratification procedure; however, as will be discussed, the study conditions were determined to be equivalent on all baseline characteristics measured in this study, including the risk variables.

Drug Court As-Usual

In this pre-adjudication drug court, defendants are required to plead guilty to the initial charge (s) and the guilty plea is held in abeyance pending graduation or termination from the program. Graduates have their criminal charges withdrawn and are eligible to have the record expunged if they remain arrest-free for an additional 6 months. Record expungement ordinarily entitles the individual to respond truthfully on an employment application or similar document that the conviction did not occur for legal purposes (e.g., Festinger, DeMatteo, Marlowe & Lee, 2005). If the defendant fails to complete the program, the guilty plea is formally entered as a conviction. Convicted offenders lose their drivers license for a term of 2 years and are typically sentenced to probation with conditions similar to those imposed in drug court (e.g., drug abuse counseling and urine monitoring).

The program is scheduled to be a minimum of 4 months in length and has no maximum time limit for enrollment. On average, participants require approximately 6 to 8 months to satisfy the conditions for graduation. The requirements for graduation include attending at least 12 weekly group-counseling sessions, providing at least 14 consecutive weekly drug-negative urine specimens, remaining arrest-free, obeying program rules and procedures, and paying a \$200 court fee. The group sessions are psychoeducational in format and cover a standard sequence of topics, including the pharmacology of drug and alcohol use, progression from substance use to dependence, the impact of addiction on the family, treatment options, HIV/AIDS risk reduction, and relapse prevention strategies.

Participants are assigned to a clinical case manager who coordinates any indicated treatment referrals and the case manager or a court liaison submits monthly progress reports to the judge and appears at all status hearings. Participants provide urine specimens on a random, weekly basis in direct observation of a same-gender treatment staff person. The urine drug screens are performed by an independent certified laboratory using the enzyme multiplied immunoassay technique (EMIT) with gas chromatography/mass spectrometry (GCMS) confirmation of positive results on a six-panel screen for cannabis, alcohol, opiates, amphetamines, cocaine, and phencyclidine (PCP) plus any additional substances believed to be used by the individual.

The judge is authorized to administer sanctions or remedial interventions to participants for inadequate performance in the program. These include verbal reprimands, written homework assignments, additional treatment or supervisory obligations, daylong attendance in court as

an observer and community service. The judge or treatment team may also administer rewards for good performance, including verbal praise, token gifts, certificates of recognition and reductions in participants' treatment or supervisory obligations.

Adaptive Intervention

Participants in the adaptive condition were eligible for all of the services that are typically available in this drug court program. However, consequences from the court were scheduled to be administered according to a pre-specified adaptive algorithm described below.

In developing the adaptive algorithm, several focus groups were held with all of the drug court staff members to determine what interventions would be acceptable to them and they believed would be likely to elicit beneficial outcomes. We settled on the final algorithm based upon the following factors:

- *Stakeholder buy-in.* The interventions would need to be acceptable to all of the drug court team members, including the judge, prosecutor, public defender and treatment providers.
- *Ecological relevance.* Interventions were selected that are currently at the drug court's disposal and commonly used in drug court programs nationally. Adding new interventions that are not commonly available in drug courts might improve outcomes but would be less likely to be adopted in day-to-day practice.
- *Due Process.* Judges have substantial discretion to place new conditions on offenders who fail to satisfy objective behavioral requirements of the program, such as treatment attendance or drug abstinence. Judges may be more restrained, however, in their ability to order new conditions based upon indicators that are not substantially validated. For example, if a participant was required to attend court hearings more frequently because his or her counselor felt the participant seemed unmotivated, the public defender could challenge the order as being based on non-objective and potentially unreliable criteria. Therefore, the performance-indicators would need to be objectively measurable and behaviorally based.

Employing these criteria, a consensus was reached on the adaptive algorithm depicted in Figure 1. Participants in the adaptive condition received the identical baseline-matching procedure as in our prior studies (Marlowe et al., 2006,2007). Thus, the adaptive procedures were initiated from the point of entry into the program. Participants who were determined to be high-risk were assigned to bi-weekly court hearings and those who were determined to be low-risk were assigned to as-needed court hearings. As in our prior research (Marlowe et al., 2006,2007), the *a priori* decision rule for assessing risk level was derived from two dichotomous measures employed on an either/or basis. If participants either met DSM-IV diagnostic criteria for APD (yes or no) or had a history of at least one prior drug abuse treatment episode excluding self-help groups (yes or no), they were determined to be high risk. If they had neither APD nor a prior drug treatment episode, they were determined to be low risk. The instruments used to make these assessments are described below.

Subsequently, participants were assessed at monthly intervals to determine how they were progressing in the program. Those who had two or more unexcused absences from scheduled counseling sessions, or two or more unexcused failures to provide a scheduled urine specimen, were determined to be *non-compliant* with the conditions of the program. For those individuals, the schedule of court hearings was increased. If they were previously on an as-needed schedule, they were reassigned to bi-weekly hearings. If they were already on a schedule of bi-weekly hearings, they were placed on a jeopardy contract. A jeopardy contract involves “zero tolerance” for further violations of the rules of the program. Any further violation leads to a

termination hearing, also known as a show-cause hearing. At the termination hearing, the individual is terminated from the program and sentenced on the original charge(s) unless he or she can provide a good cause reason to be given another chance. The decision whether or not to grant another chance is within the discretion of the judge.

Participants who provided two or more drug-positive urine specimens were determined to be *non-responsive* to the clinical interventions in the program. Those individuals were referred to an intensive clinical case management program administered by the local TASC (Treatment Accountability for Safer Communities) Office. Participants in the TASC program are required to meet twice weekly with an intensive clinical case manager who provides individual substance abuse counseling with an emphasis on motivational enhancement, relapse prevention and cognitive restructuring (“criminal thinking”) techniques. This differs from the standard treatment regimen delivered in the drug court program in that it is administered individually as opposed to predominantly in groups. In addition, the case manager performs a re-assessment of the individual's treatment needs and makes indicated referrals as necessary.

Because the failure to provide a urine specimen was deemed to be an indicator of non-compliance in the program, missing specimens were not presumed to be drug-positive. If they were counted as drug-positive, then a missed specimen would be double-counted as both an indicator of non-compliance and non-responsiveness. Of course, some individuals may fail to provide a urine specimen simply because they know it is likely be drug-positive. The adaptive algorithm addresses this issue, first, by improving the participant's adherence to urine monitoring by increasing his or her contacts with the judge. Subsequently, if the urine specimens turn out to be drug-positive when provided, the individual is then referred to intensive clinical case management.

Participants who were assigned to drug court as-usual were assessed on a monthly basis in the same manner as in the adaptive condition. However, the drug court team was free to respond to the participant's presentation in the usual manner with no influence or communication from research staff.

Recruitment Procedures

At the initial entry hearing, defendants were instructed by the judge to report to the Brandywine Counseling, Inc. (BCI) treatment program on a specified date the following week for an intake appointment and initial assessment. Defendants were told that the required schedule of judicial status hearings would be determined at a later date once they had begun treatment at BCI. This gave our research coordinator the opportunity to approach them about potential participation in the study. Immediately following a group orientation session conducted by BCI treatment staff, the research coordinator provided a brief oral description of the study, including participation requirements, payment incentives, confidentiality protections, and the right to refuse or withdraw from the research at any time without negative repercussions. Clients who indicated a potential interest in the study went through an individualized informed consent procedure before any research data were collected. If a client consented to random assignment, the research coordinator informed the judge about the assigned schedule of status hearings and the judge entered an order making that assignment an official condition of participation in the program. If the client declined to be in the study, the judge ordered the routine schedule of status hearings for the drug court, which is every 4 to 6 weeks.

Human Subjects Protections

The study was approved and continuously monitored by the Institutional Review Boards (IRBs) of the Treatment Research Institute and the Delaware State Department of Health and Social Services. All participants provided voluntary, written informed consent to be in the study,

including a Health Insurance Portability & Accountability Act (HIPAA) Research Subject Authorization of Confidentiality & Privacy Rights. Monthly oversight meetings were held to monitor the course of the research. These meetings were attended by the drug court judge and representatives of the Public Defender's Office, Attorney General's Office, Delaware Association of Criminal Defense Lawyers, Delaware State Division of Substance Abuse and Mental Health, and the BCI treatment program. One purpose of the meetings was to review the study procedures and correct any adverse reactions that might have been experienced by research participants or program staff (none were reported during the course of the study). The continuous presence of defense counsel and treatment providers helped to ensure participants' legal rights and clinical needs were continuously addressed.

Data Sources

A baseline assessment was administered immediately after obtaining informed consent to research participation. Participants received a \$40 money order for completing the entire battery, which took approximately 70 minutes. The baseline battery included an Antisocial Personality Disorder Diagnostic Interview (APD-DI). The APD-DI is a 29-item structured interview that assesses official DSM-IV (APA, 2000) diagnostic criteria for APD. A dichotomous (yes or no) diagnosis of APD was used as one of the two risk-assessment variables in our prior studies (Marlowe et al., 2006, 2007) and was used in the identical manner in the current pilot study. In inter-rater reliability scoring trials, there was between 90% and 100% exact agreement for dichotomous diagnoses of APD among our research assistants.

Participants also completed a Prior Treatment Questionnaire (PTQ). This questionnaire inquires about the number of prior treatment episodes participants experienced, the density of services for each episode, discharge status, satisfaction with treatment, and the longest interval of abstinence attained during and after each treatment episode. A single dichotomized (yes or no) item inquiring whether the participant experienced any prior drug abuse treatment episode (excluding self-help) was used to match participants to the study conditions in our previous studies (Marlowe et al., 2006, 2007) and was used in the same manner for this pilot study. Inter-rater reliability and test-retest stability for this item were consistently above 95% in all of our prior studies.

Finally, participants provided written informed consent granting the research team access to their clinical records in the drug court treatment program. These records contained information on participants' weekly urine drug-screen results, counseling attendance and program completion status.

Results

Participants

Participants in the study were predominantly male (77%) and most self-identified as Caucasian (50%) or African American (43%). Their mean age was 27.60 years ($SD = 11.65$). They had an average of 11.77 ($SD = 1.96$) years of education, 66% were employed full or part time and 90% were unmarried. They were currently charged with possession of marijuana (73%), possession of drug paraphernalia (23%), consumption of marijuana (3%), underage consumption of alcohol (7%) or DUI (3%) (participants could have more than one charge). They were represented by a public defender (47%), private defense counsel (13%) or were *pro se* (self-represented) (40%). Within the previous thirty days, participants reported abusing marijuana (47%), alcohol to intoxication (43%), opiates (13%) or cocaine/stimulants (6%) and 37% reported abusing multiple substances concurrently.

Ten percent of the sample had at least one prior drug abuse treatment episode, 17% met criteria for APD, and 13% had both prior drug treatment and APD. Thus, 40% were determined to be high-risk according to an either/or decision rule. This is consistent with our prior studies (Marlowe et al., 2003, 2006, 2007) in which rates of high risk were approximately 30% to 40%. Setting a liberal p-value of $< .15$ due to the small cell sizes in the current pilot study, there were no significant differences between the two study conditions on any of the above baseline characteristics, including risk level.

Acceptance and Feasibility

Results of the pilot trial indicated the research design was acceptable to clients and feasible to implement. The consent rate for the study was 65%. This consent rate is comparable to what we attained in our previous research (Marlowe et al., 2003, 2006, 2007) and is commonly seen in research studies in which offenders are asked to potentially increase their contacts with a judge or treatment professionals (e.g., Marlowe, 2003). Attrition following random assignment was low. Only one participant (3%) dropped out of the study leaving a final cohort of 30 participants (adaptive $n = 16$, asusual $n = 14$). No adverse events or serious adverse events as defined by U.S. Food and Drug Administration (FDA) criteria were reported during the course of the study.

Adaptations were implemented as intended 88% of the time. Errors in implementation included both instances in which the judge failed to order a response that should have been implemented, and instances in which the judge ordered a response that was not called for in the adaptive algorithm. In most cases, errors in implementation involved miscommunication between research staff and the judge leading to a failure to order an intervention that was called for. There were two instances in which the judge ordered a response (jeopardy contract) that was not called for in the adaptive algorithm. Both of these instances concerned clients who engaged in provocative interactions with staff members.

Outcomes

Outcomes at 20 weeks post-entry are presented in Table 1. Participants in the adaptive condition graduated more often, were issued a capias (bench warrant) less often and provided more drug-negative urine specimens than participants in drug court as-usual. Although these differences were not statistically significant due to the small cell sizes, the estimated effect sizes (ES's) ranged from 0.4 to 0.6, which is in the "moderate" range as defined by Cohen (1988). There were minimal differences in counseling attendance across the conditions, with all clients attending an average of approximately 80% to 95% of their scheduled counseling appointments.

Positive outcomes were observed for both the low-risk and high-risk participants. In fact, some effects appear to have been greatest for the low-risk participants. This is in contrast to what was observed from the prior baseline-matching procedure alone, in which positive effects were found for high-risk participants only (Marlowe et al., 2006, 2007).

Possible Mechanism of Action

Data from the pilot study also suggested a possible mechanism of action for the adaptive algorithm. The interventions employed in the adaptive condition are the same as those ordinarily available to and used by the drug court team in their day-to-day practice. Why should the effects be any better simply because the team followed standardized decision rules rather than rendering decisions on a case-by-case basis? The answer appears to be in the *timing* and *fidelity* of the team's responses. Employing the same definitional criteria for non-compliance and non-responsiveness as in the adaptive condition, participants in the as-usual condition were substantially less likely to receive a response for inadequate performance and received

responses after a substantially longer period of time. This suggests the adaptive algorithm might have focused the drug court team's attention more readily on poorly-performing individuals, thus allowing the team to “nip problems in the bud” before those problems developed more fully.

Discussion

The purpose of this pilot study ($N = 30$) was to determine whether an adaptive algorithm could be successfully implemented in a drug court program and whether it showed promise for improving client outcomes. Results confirmed the adaptive intervention was acceptable to both clients and staff, feasible to implement with greater than 85% fidelity, and showed promise for eliciting statistically significant and clinically meaningful effects on graduation rates and illicit drug use. The estimated effect sizes ranged from 0.40 to 0.60 across these dependent measures, which appear to represent an incremental improvement beyond that obtained from baseline-matching alone. Given these findings, there appears to be ample justification for moving forward with a fully powered experimental trial of the effects of the adaptive algorithm.

Importantly, the adaptive intervention appears to have benefited low-risk participants equally or more so than high-risk participants. This is in contrast to our previous research (Marlowe et al., 2006, 2007) in which low-risk participants enjoyed minimal benefits from the baseline-matching procedure. There are several possible explanations for this finding:

- Some participants might have been misidentified as low risk at baseline because of errors in measurement or under-reporting. The opportunity to correct this error might have led to improved outcomes for those individuals.
- The adaptive algorithm included a treatment-oriented component in addition to a judge-oriented component. Some individuals might have been low risk from a criminological perspective but still had serious treatment needs that could not be addressed by increasing their contacts with a judge. The opportunity to increase treatment might have led to improved outcomes for those individuals.
- Some individuals might have started out as low risk but new events may have transpired in their lives that increased their risk level. For example, they may have experienced new stressors or psychiatric symptoms. The opportunity to respond to changing circumstances might have led to improved outcomes for those individuals.

It is also noteworthy that participants in the adaptive condition were more likely to receive responses from the drug court team for poor performance in the program and received those responses after a substantially shorter interval of time. This suggests the adaptive algorithm might have more readily focused the drug court team's attention on poorly-performing individuals, thus allowing the team to address problems quickly before the problems developed more fully.

Future Directions

Assuming the adaptive algorithm is demonstrated to be effective in an adequately powered experimental trial, there will still be considerable room for improvement. For one thing, at this juncture we have made no effort to standardize or influence what transpires during the court hearings or case management sessions. Our research, to date, suggests that simply increasing the dosage of services, where needed, may be sufficient to elicit substantial improvements in outcomes without altering the content of the interventions or the nature of the professionals' interactions with the offenders. This is not to suggest, however, that training judges or TASC case managers on specific interactional strategies (e.g., motivational interviewing techniques) is unimportant or unlikely to elicit even greater benefits. Looking forward, additional research

should be conducted focusing on adaptations to the content of the interventions. For example, research suggests that hostility or a lack of readiness for change predict negative treatment outcomes among drug offenders (e.g., Hiller, Knight, Leukefeld & Simpson, 2002; Hiller, Knight, Saum & Simpson, 2006). It may be useful to develop adaptive counseling strategies designed specifically to ameliorate these risk factors. Once piloted for feasibility, these clinical adaptations could be added to the adaptive algorithm at successive stages and experimentally evaluated.

Note also that our adaptive algorithm does not ratchet services downward in response to evidence of good performance in the program (apart from assigning low-risk clients to as-needed court hearings at entry). Unfortunately, there is scant evidence in the research literature suggesting what a stable interval of responding should look like before it is safe to ratchet services downward. In many respects, that is a different question from the one we have been addressing. The issue of scaling services downward relates to the best way to move clients along a continuum of care from intensive treatment to aftercare or continuing care. That is a different matter than devising methods for redressing inadequate progress during the course of an active treatment episode. Addressing both issues simultaneously is apt to confound the results; however, future research should evaluate adaptive responses designed to taper down the provision of services and prepare clients for long-term maintenance of abstinence and other positive behavioral changes.

Finally, it should be noted that the adaptive algorithm used in this study differs fundamentally from another type of adaptive approach known as the “stepped care” model. According to the stepped care model, it is considered to be most cost-efficient to intensify treatment after less intensive interventions have proven insufficient. For example, several studies have reported superior outcomes by starting clients in drug-free outpatient counseling and then referring them for more intensive counseling or medication management in response to inadequate progress (e.g., Breslin, Sobell, Sobell, Cunningham, Sdao-Jarvie & Borsoi., 1999; Brooner et al., 2007; Sobell & Sobell, 2000). This has the obvious benefit of conserving scarce treatment resources while also placing the least burden on clients commensurate with their clinical needs.

However, evidence among offender populations suggests that each treatment failure may increase the likelihood of failure in future treatment episodes (e.g., Rothbard, Alterman, Rutherford, Liu, Zelinski & McKay, 1999). This may explain why a history of previous drug abuse treatment episodes has been associated in many research studies with negative outcomes in correctional rehabilitation (Marlowe et al., 2003a). Each disappointing episode might undermine offenders' confidence in treatment professionals or generate counterproductive feelings of pessimism or despondency. In addition, failure on one treatment regimen might lead a judge or correctional officer to impose a punitive sanction on the client, such as incarceration. Criminal justice professionals might, correctly or incorrectly, interpret a lack of response to treatment as evidence of poor motivation or incorrigibility. Because they are responsible for protecting public safety, it may be unrealistic to expect many criminal justice professionals to abide multiple regimen failures before symptom remission is achieved. Thus, contrary to the assumptions underlying the stepped-care model, it may be preferable to begin drug offenders on the proper treatment regimen from the beginning rather than risk unanticipated negative repercussions from trial-and-error treatment planning.

This has important implications for designing and evaluating adaptive algorithms for drug offenders. The stepped-care model employs a *funneling* approach, in which a large proportion of the eligible population receives the same lower-intensity intervention, with smaller and smaller proportions of clients receiving progressively escalating densities of services. In contrast, a *branching* approach may be preferable for drug offenders, in which sorting procedures are initiated from the outset. The current study piloted a branching approach and

did not compare outcomes against a stepped-care approach. Future research should examine whether a stepped-care approach can elicit comparable benefits at reduced cost and complexity.

Limitations

The limitations of this study are self-evident. The small sample size raises questions about whether the results are likely to be stable in a larger cohort and whether these 30 subjects were adequately representative of the target population of participants in the drug court program. Moreover, there is no way to know whether the results would generalize to other offender populations (e.g., felony drug offenders, juvenile offenders or mentally ill offenders) or to other geographic locations (e.g., rural communities).

In addition, we only piloted the intervention for 20 weeks. More research is needed to determine whether the effects can be sustained over longer time periods and after participants are no longer under the jurisdiction of the drug court program. Most drug court evaluations have analyzed outcomes over periods ranging from 1 to 3 years post-entry (e.g., Belenko, 2002); therefore, the results of this 20-week pilot trial cannot be contrasted against outcomes that are commonly achieved in drug courts. Future studies should follow participants over longer time periods to determine how the results compare to typical drug court practices.

Finally, although there may be a logical rationale for distinguishing between non-compliance and non-responsiveness, additional research is needed to determine whether and how these presentations may call for different adaptive responses. As was noted earlier, some participants may fail to provide urine specimens because they expect them to be drug-positive. This could blur the distinction between non-compliance and non-responsiveness, or make it difficult to determine whether a particular individual is engaging in willful disobedience as opposed to manifesting clinical dysfunction. More work is needed to clarify the distinction between non-compliance and non-responsiveness and to finetune performance indicators that can effectively distinguish between these two presentations.

Clearly, more research is required before this adaptive approach could be fairly characterized as a best practice or evidence-based practice for drug-abusing offenders. However, the promising evidence emerging from this pilot trial is sufficient to justify examining the effects of the adaptive intervention in adequately powered drug court studies.

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Figure 1.
Adaptive Algorithm.

Table 1

Outcomes by condition: n (%) or mean (SD)

Outcome	Sample	ADAPTIVE	AS-USUAL	p-value	Estimated effect size
Graduated	Total	8 (50%)	3 (21%)	.14	0.6
	High Risk	2 (33%)	0 (0%)		
	Low Risk	6 (60%)	3 (38%)		
Ever on capias [*]	Total	2 (13%)	4 (29%)	.27	0.4
	High Risk	1 (17%)	3 (50%)		
	Low Risk	1 (10%)	1 (13%)		
Proportion of drug-negative urine specimens	Total	.64 (.38)	.48 (.42)	.28	0.4
	High Risk	.48 (.36)	.40 (.41)		
	Low Risk	.74 (.38)	.54 (.46)		
No. of consecutive drug-negative urine specimens	Total	8.94 (5.47)	6.86 (6.11)	.33	0.4
	High Risk	6.50 (5.12)	5.83 (6.11)		
	Low Risk	10.40 (5.36)	7.62 (6.41)		
Proportion of counseling sessions	Total	0.87 (0.19)	0.90 (0.13)	.57	0.2
	High Risk	0.81 (0.20)	0.83 (0.15)		
	Low Risk	0.90 (0.19)	0.96 (0.08)		

Notes: P-values are derived from the t-statistic for continuous variables and Fisher's Exact test for binary outcomes. Effect sizes for continuous variables are presented as *d* and for proportional data as *h*.

Adaptive condition

High-risk n = 6
Low-risk n = 10
Total n = 16

As-Usual condition

High-risk n = 6
Low-risk n = 8
Total n = 14

* Capias = bench warrant for absconding from the program.

Table 2

Fidelity and timing of court responses by condition.

	ADAPTIVE	AS-USUAL
Number of participants requiring at least one response for non-compliance or non-responsiveness:	5	9
Number of responses called for:	8	13
Response implemented when called for:	88%	31%
Days from determination of non-compliance or non-responsiveness to ordering of a response: mean (SD)	16.25 (24.66)	89.67 (79.61)