RESEARCH REPORT

THE EFFICACY OF ENHANCED ALCOHOL USE MONITORING: AN EXAMINATION OF THE EFFECTS OF ETG/ETS SCREENING ON PARTICIPANT PERFORMANCE IN DRUG COURTS

Benjamin R. Gibbs — William Wakefield

[1] Effect of EtG/EtS Testing in Drug Court—*Participants subjected to weekly ethyl glucuronide/ethyl sulfate (EtG/EtS) alcohol testing completed the first two phases of a Drug Court significantly sooner than those undergoing standard ethanol urine testing.*

[2] Detecting Weekend Alcohol Use in Drug Court—*EtG/EtS testing in a Drug Court was more likely to detect alcohol use occurring over weekends than standard ethanol urine testing.*

[3] Efficient EtG/EtS Testing in Drug Court—*EtG/EtS testing is most likely to be cost-efficient when used with Drug Court participants diagnosed with an alcohol use disorder or suspected of recent alcohol use.*

SINCE THE INCEPTION of Drug Courts in the late 1980s, researchers have examined the Drug Court model to isolate the mechanisms that drive the successes and failures of these programs. One key element of Drug Court is supervision, and supervision has depended on alcohol and drug testing (NADCP, 1997). Such testing has played a significant role in participants' successes (Banks & Gottfredson, 2004; Gottfredson et al., 2007). Studies have found an increase in alcohol and drug screening improves the probability of participant abstinence and reduces recidivism (Banks & Gottfredson, 2004; Gottfredson et al., 2007).

Drug Court research has also focused on the profile of a successful Drug Court candidate, including categorizing them by type of drug used (Butzin et al., 2002; Deschenes et al., 2009; Hickert et al., 2009; Newton-Taylor et al., 2009). Previous research has shown that participants who use cocaine and other illicit stimulants are more often terminated from Drug Court (Hickert et al., 2009; Newton-Taylor et al., 2009); however, little is known about the effects of continued alcohol use on participant outcomes.

This deficiency may result in part from inadequate alcohol detection capabilities. Many Drug Courts monitor participant alcohol use through ethanol screens, which detect alcohol consumption for less than fifteen hours (Wurst et al., 2002). Because Drug Courts are not necessarily capturing alcohol use by their participants, data is minimal concerning continued alcohol use and its effect on participant performance. To overcome the limitations of ethanol screening, some Drug Courts and other professional agencies have turned to ethyl glucuronide/ethyl sulfate (EtG/EtS) testing. This advanced screening method has a detection capability vastly superior to that of standard ethanol testing (Hoiseth et al., 2008; Wurst et al., 2002). Ethyl glucuronide is a biomarker that remains detectable in bodily fluids longer than that of ethanol (Wurst et al., 2002) and allows for detection for up to ninety-six hours after consumption (Wurst et al., 2002).

We based this study on an evaluation of data from a Drug Court that turned to EtG/EtS testing for a better method than standard ethanol screening, which cannot detect alcohol consumption across an entire weekend. The underlying philosophy prompting the search for a better method was that enhanced detection of alcohol use could lead to better supervision and aid rehabilitation efforts within the Drug Courts, reducing both in-program violations and postprogram recidivism.

This preliminary research was intended to test that underlying philosophy and the effects of EtG/EtS testing on participant program performance. We used an experimental research design that followed 149 participants of the study Drug Court for eighteen months to answer our primary research question: *How does the EtG/EtS screening as an enhanced alcohol detection tool affect participant performance in Drug Court?*

LITERATURE REVIEW

The Drug Court model was built upon existing community-based correction programs in an effort to better serve substance-involved offenders (Hora et al., 1999). The model combines both rehabilitative and criminal justice elements that follow the Ten Key Components (NADCP, 1997). The fifth key component, recommending that abstinence be monitored by frequent alcohol and other drug testing, is considered vital to the Drug Court model (NADCP, 1997)—a claim well supported in the Drug Court literature (Flango & Chessman, 2009; Gottfredson et al., 2007; Harrell et al., 1998; Hawken & Kleinman, 2009; Kleinpeter et al., 2010). The effectiveness of this component was also supported by Drug Court participants who reported that alcohol and other drug monitoring may be the strongest component of the program (Goldkamp et al., 2002; Turner et al., 1999). Despite this, the traditional alcohol-monitoring method, ethanol testing, has a substantial drawback—supervision gaps exist within Drug Court protocols. Drug Courts often operate within the traditional Monday-through-Friday workweek and lack the ability to effectively monitor participants over weekends. Thus, programs using intermittent testing protocols and inferior screening methods are likely not capturing all participant substance abuses (Flango & Chessman, 2009; Goldkamp et al., 2002; Kleinpeter et al., 2010; Marlowe & Kirby, 1999; Wolfer, 2006).

Advancements in screening technology have increased the potential supervision coverage of Drug Courts. The sweat patch and SCRAM (Secure Continuous Remote Alcohol Monitoring) have provided the opportunity for Drug Courts to monitor participants continuously but with mixed results. Users of the sweat patch were not more likely to graduate; however, they had fewer violations for continued substance use (Kleinpeter et al., 2010). Flango and Chessman (2009) attempted to isolate the effects of the SCRAM device on alcohol-involved offenders. Users of SCRAM were less likely to recidivate than their counterparts (Flango & Chessman, 2009). These studies have demonstrated the value of evaluating advanced alcohol and other

drug monitoring tools in an effort to determine the relationship between continued alcohol use and participant performance.

Ethyl Glucuronide/Ethyl Sulfate (EtG/EtS) screening is another monitoring advancement that provides greater alcohol detection capabilities than standard methods (Hoiseth et al., 2008; Wurst et al., 2002). There is an obvious utility in the efforts of Drug Courts to diminish participant alcohol use. Continued alcohol use can act as a gateway to illicit drug use (Yamaguchi & Kandel, 1984) and can also lead to future criminality (Gottfredson et al., 2008). Beyond these considerations, Drug Court administrators may also want to thwart circumvention of the abstinence requirement. Goldkamp and colleagues (2002) relay an anecdote where Drug Court participants admitted that some participants substitute for illicit drug use with alcohol because of the inability of Drug Courts to effectively detect alcohol use.

The standard testing method, ethanol screening, has limited detection capabilities and is unlikely to detect alcohol fifteen hours after consumption (Wurst et al., 2002). EtG/EtS screening can potentially detect alcohol use up to four days after consumption (Hoiseth et al., 2008; Wurst et al., 2002). Thus, the EtG/EtS screening tool may effectively close the supervision gap (Helander et al., 2008). However, much of what is known concerning the capabilities of EtG/EtS screening comes from the medical arena and is reported in medical journals, leaving its efficacy within an operational Drug Court virtually unknown (Helander et al., 2008; Hoiseth et al., 2008; Wurst et al., 2002).

RESEARCH DESIGN/METHODOLOGY

Midwestern Metropolitan Adult Drug Court

The research venue for this study was a Midwestern metropolitan adult Drug Court with a post-plea program serving substance-involved offenders charged with felony offenses. At the time of our study, offenders had to meet the following eligibility criteria to participate in this Drug Court program: Only those charged with a drug-related offense, either directly or indirectly, were considered for admittance. Participants could have no previous violent convictions or

have been previously charged with a sex offense (DCADC, 2011). Program services were delivered by an operational staff known as the Drug Court team. This team consisted of a primary Drug Court judge, assistant district attorney, program coordinator, four substance abuse case managers, and a lab technician.

Similar to many Drug Court programs, this program had three phases. Participants advanced by achieving all therapeutic goals designated in respective phases. This made each phase completion a milestone of rehabilitative progress. Participants had to complete all three phases to graduate from the program, another milestone, which generally takes twelve to eighteen months.

Research Sample

The research sample comprised 149 Drug Court participants, who entered the program during the 2010 calendar year. The sample population characteristics are as follows:

- Gender
  - 98 males (66%)
  - 51 females (34%)
- Race or ethnicity
  - 96 Caucasians (64%)
  - 42 African-Americans (28%)
  - 11 Hispanics (7%)
- Age
  - 19–70 years old (average of 34 years old)

Most of the participants ($n = 108$, or 72%) had earned a high school diploma or equivalency before entering into the program. One of the requirements for successfully completing the Drug Court program was to obtain employment if not already employed. At the time of group assignment, only 66 participants (44%) had gainful employment. Just under half (45%) of the research participants were still active in the Drug Court program when the study ended. Ninety-seven participants (65%) successfully completed phase I, and 70 participants (47%) completed phase II and entered into phase III during the study period. In addition, the host Drug Court graduated 34 research participants (23%) and terminated 49 participants (33%) from the program.

Data Collection

Data was collected from two sources, the Problem Solving Court Management Information System (PSCMIS) and hard-copy files located at the Drug Court. Demographic characteristics (gender, age, race or ethnicity, education, and employment status) were gathered for each participant, including criminogenic and chemical dependency characteristics. This information comprised participants' criminal histories, *Diagnostic and Statistical Manual (DSM-IV)* dependency diagnosis (if available), drug of choice, and any current charges.

Research Design

This study employed an experimental research design. When participants reported for orientation and submitted their baseline urine drug and alcohol screens, a lab technician placed participants into one of the two groups by one-to-one alternating assignment. Specifically, a participant was assigned to either the experimental ($n = 72$) or control group ($n = 77$) after they were deemed eligible for the program and officially referred by the court. The group assignment procedure was administered for all new Drug Court participants accepted into the program during the 2010 calendar year, ceasing December 31, although protocol continued until June 30, 2011. The final sample comprised 149 Drug Court participants. The unequal numbers between the experimental and control groups occurred because of a late recognition of ineligible participants initially assigned to the study. Participants deemed ineligible were subsequently removed from the study, and the 1:1 ratio of group assignment continued with no attempt to replace them.

The standard alcohol and other drug use monitoring protocol of the host Drug Court at the time of this study was to randomly screen participants approximately three times a week. This particular Drug Court used two screening tools, a pupilometer and urinalysis. A pupilometer (an eye-scanning tool) was used to detect recent alcohol or illicit drug use. In cases where the eye scan detected alcohol or drug use, the participant submitted to a 9-panel urinalysis test (which includes ethanol screening) for confirmation. However, each participant

assigned to the experimental group had a urinalysis test during his or her first random screen each week, regardless of the results of the pupilometer test, to complete the EtG/EtS testing required for this study. This pattern of testing in the experimental group provided a greater opportunity for detecting weekend alcohol consumption.

The control group was exposed only to the standard monitoring protocol. However, part of this protocol was that Drug Court counselors maintained the prerogative to order an EtG/EtS screen for any participant, including those assigned to the control group. As a result, control group participants were potentially exposed to the enhanced supervision tool when counselors suspected substance use. In this case, the EtG/EtS screening was not applied with the same consistency or to the same extent as with the experimental group. Half of those in the control group never received EtG/EtS screening at all. Participants were not formally informed they were being screened by an enhanced monitoring agent. The treatment incurred by the experimental group placed no greater obligation on them than potentially exists outside of the research protocol for any voluntary participant of the Drug Court. The research team received Institutional Review Board approval through an accredited university medical center (IRB #626-11-EX).

Once collected by Drug Court staff, the specimens were outsourced for analysis. The screening methodology was a quantitative confirmation analysis using LC/MS/MS, or liquid chromatography/mass spectrometry/mass spectrometry. Both ethyl glucuronide and ethyl sulfate levels were tested to guard against possible false positives derived from enzyme breakdown in the ethyl glucuronide. This potential instability is nonexistent in the ethyl sulfate compound (Forensic Laboratories, 2011). Because the Substance Abuse and Mental Health Services Administration (SAMHSA) recommends a testing cutoff to protect against false positives resulting from incidental alcohol exposure (SAMHSA, 2006), the screening laboratory implemented a 500-nanogram cutoff for ethyl glucuronide and a 300-nanogram cutoff for ethyl sulfate. No pre- and postscreening of samples occurred; they were screened only once.

OUTCOME AND TREATMENT VARIABLES

The primary purpose of this study was to explore the effects EtG/EtS screening had on participant program performance. This study established two measures to capture the performance of Drug Court participants: participant phase movement and program completion. Both program performance measures are supported in the literature (Banks & Gottfredson, 2004; Hepburn & Harvey, 2007; Hickert et al., 2009).

We used the number of days spent in phase I and in phase II as the outcomes for the participant phase movement measure. Studies have shown that even when they fail the program, participants benefit from participation through exposure to the program components (Banks & Gottfredson, 2004). Duration of time spent in each phase can also serve as an indicator of participants' resistance to the Drug Court program requirements (i.e., relapse, delayed treatment completion, etc.; U.S. GAO, 1997). Program completion captures the ultimate program outcome—whether a participant graduated or was terminated from the program.

As is the case in experimental research designs, the treatment experienced by participants is the primary independent variable. Consistent with the methods used in existing Drug Court literature (Butzin et al., 2002; Deschenes et al., 2009; Hepburn & Harvey, 2007; Hickert et al., 2009; Newton-Taylor et al., 2009), we analyzed participant characteristics, including gender, race, education, employment status, criminal history, and alcohol diagnosis (i.e., addicted, abuse, or no issue) using *DSM-IV* criteria to determine their relationship with our outcome measures.

Analysis

We used three statistical techniques to analyze the data.

Chi-Square Test—This test augments the reporting of raw numbers and can suggest that a relationship between two variables is a real one (e.g., between the education level of a participant and program graduation; Bachman & Paternoster, 1997).

T-Test—We examined the differences in participant phase performance with this technique to determine the statistical significance of the difference, in average days, between the two groups (Bachman & Paternoster, 1997).

Analysis of Covariance—We randomized the selection of participants for our experimental research design to eliminate unwanted differences between our two groups. The experimental and control groups were statistically similar in all individual characteristics, except for the age variable. A statistically significant difference exists between the average ages in the experimental group and the control group. The experimental group had an average age of 30 years, whereas the control group had an average age of 34 years. As a result of unintended differences between our experimental and control groups, we analyzed the performance between groups through analysis of covariance. This statistical technique allows for an examination between averages while controlling for an independent variable that may have influence over our outcome variables (Field, 2005).

RESULTS

The first set of results evaluated was outcome differences between the experimental and control groups. We explored program performance through these program outcomes:

- Days to complete phase I
- Days to complete phase II (including phase I)
- Program graduation or termination

We analyzed the differences in duration of phase participation between participants of the two groups as well as the differences in graduation and termination rates between groups. In conjunction with the analysis of this data, we also analyzed the relationships between program performance and participant characteristics (see Table 1 and Table 2 on pages 11 and 13).

The second set of results this study evaluated was the performance of the EtG/EtS screening tool and participant attributes most associated with detected alcohol consumption. For the study, we did the following:

- Compared positive screening results between EtG/EtS and ethanol
- Compared ratio of positive results between the experimental and control groups
- Described participant characteristics of those yielding positive EtG/EtS results

Experimental Design Measures and Outcome Results

Participant Phase Movement

This measure used the number of days a participant needed to complete a phase as its outcome data. As shown in Table 1, we found no statistically significant difference in the average number of days participants took to complete phase I. The time spent in this phase for participants in the experimental group was 161 days, whereas those in the control group took approximately 10% longer, or 178 days. During the study, 51 participants in the experimental group and 46 in the control group completed phase I of the program.

A similar difference was found between the groups in the duration spent completing phase II. The average number of days for phase II completion combines the number of days spent in both phase I and phase II. The research team believed this outcome significant because no person in this study who completed phase II was terminated during phase III. At the time of analysis, 70 participants (47%) in the study had completed phase II, 36 from the experimental group, and 34 from the control group. Participants not undergoing weekly EtG/EtS screening took 33 days longer to complete the first two phases of the program (280 days for the experimental group, 313 days for the control group). Although this is not statistically significant, the analysis of covariance indicates the difference nearly approaches significance at the .053 level (.05 is considered statistically significant).

Program Completion

Whether a participant graduates or terminates from the program was the outcome for this measurement. By the end of the research

TABLE 1	PARTICIPANT PHASE MOVEMENT					
Participant Characteristics	**Phase I Completion†**	**% Difference**	**t-test Score**	**Phase II Completion†**	**% Difference**	**t-test Score**
Group						
Experimental	161			280		
Control	178	10%	.312	313	11%	.053
Gender						
Male	157			279		
Female	193	19%	.019*	330	16%	.007*
Race/Ethnicity						
Caucasian	162			293		
Non-Caucasian	180	10%	.214	302	3%	.319
Education						
High School Diploma	168			287		
No High School Diploma	173	3%	.779	338	15%	.028*
Employment						
Employed	159			287		
Unemployed	178	11%	.190	306	6%	.322
Criminal Offense						
Possession	167		.730	297		.961
Distribution	166		.702	288		.483
Property Crime	190	12%	.274	319	10%	.347
Criminal History (Arrests)						
No Felony Arrests	171			298		
At least 1 Felony	166	3%	.732	295	1%	.878
Alcohol Abuse Diagnosis *(DSM-IV)*						
Alcohol Dependence	166		.799	306		.321
Alcohol Abuse	173		.797	311		.497
No Alcohol Issue	169	4%	.947	275	12%	.107

NOTE: An analysis of covariance was completed to compare the differences between the experimental and control groups to compensate for the unintended age difference between the two groups.

†Average number of days

*Denotes statistical significance at the .05 level.

period, 83 participants who entered the host Drug Court program in 2010 were no longer in the program. Of these 83 participants, 34 participants (41%) had successfully completed the program, whereas the other 49 participants (59%) were terminated from it for various violations. Seventeen participants, approximately 44%, of those screened weekly through EtG/EtS testing (the experimental group) graduated from the program, whereas 35% of their counterparts (17 participants) in the control group graduated. This does not represent a statistically significant difference as explored through a chi-square test (Table 2).

Participant Characteristics Correlated with Outcomes

Prior research has shown that specific participant attributes correlate with Drug Court performance outcomes (Butzin et al., 2002; Hepburn & Harvey, 2007). We contrasted participant characteristics within the context of our two study measures (participant phase movement, Table 1, and program completion, Table 2).

Demographic Characteristics—Males progressed through the program at a statistically significant faster rate than females. However, this performance difference did not hold true in the ultimate success of the participants. Females graduated at a comparable rate (37%) to males (43%). Consistent with prior Drug Court research (Hepburn & Harvey, 2007; Hickert et al., 2009), those with a high school diploma performed statistically better, both in phase movement and in graduation rates, than those with less education.

Criminogenic Characteristics—Of the criminogenic characteristics, only crime of record possessed a statistically significant relationship with program success. Those who were charged with a crime of distribution were more likely to graduate from Drug Court. This crime type may be more indicative of criminogenic activity rather than addiction behavior exhibited by those charged with drug possession. These participants may have had fewer issues with alcohol or other drugs and thus were able to maintain abstinence and complete the program.

Substance Abuse Diagnoses—Lastly, this study accounted for participants' substance abuse diagnoses as set forth by the DSM–IV.

TABLE 2	PROGRAM COMPLETION			
Participant Characteristics	**Graduates (n = 34)**	**Terminations (n = 49)**	**Graduation Rate**	**Chi-Square Test**
Group				
Experimental	17	22	44%	
Control	17	27	35%	.647
Gender				
Male	24	32	43%	
Female	10	17	37%	.613
Race/Ethnicity				
Caucasian	23	32	42%	
Non-Caucasian	11	17	39%	.824
Education				
High School Diploma	30	33	48%	
No High School Diploma	4	16	20%	.029*
Employment				
Employed	19	17	53%	
Unemployed	15	32	32%	.055
Criminal Offense				
Possession	16	32	34%	.098
Distribution	16	9	64%	.005*
Property Crime	2	8	20%	.154
Criminal History (Arrests)				
No Felony Arrests	14	24	37%	
At least 1 Felony	20	25	44%	.483
Alcohol Abuse Diagnosis *(DSM-IV)*†				
Alcohol Dependence	14	17	45%	.459
Alcohol Abuse	7	7	50%	1.000
No Alcohol Issue	12	9	57%	.428

*Denotes statistical significance at the .05 level

†Numbers in this row do not add up to the total number of participants as indicated in the column heading owing to missing data in some participants' records.

This information was collected from substance abuse reports located in the participant files on 130 of the 149 persons included in this re-

search (19 participants had no such record in their files). The majority of those participants (71%, $n = 92$) with a documented diagnosis suffered from alcohol-related issues, 54% ($n = 70$) were alcohol dependent, and 17% ($n = 22$) were diagnosed with alcohol abuse issues. Not surprisingly, participants not diagnosed with an alcohol-related issue moved through phase II more quickly.

EtG/EtS Performance

We compared a total of 2,669 urine samples screened through both the EtG/EtS and ethanol tests. These screens yielded 76 positive results. In only six instances did a standard ethanol screen detect alcohol consumption. In all six instances, the EtG/EtS screen was also positive. This finding directly supports the superior detection window that EtG/EtS screening purports to have over ethanol testing. Further supporting this assertion, the majority of positive urine samples were collected on Mondays, presumably detecting weekend alcohol consumption. Of the 76 total positive screens, 46 were samples collected on Monday. Predictably, Tuesday's samples were second with 13 positive screens (because of the host Drug Court's randomized screening procedures, in combination with the research design, participants in the experimental group most frequently submitted to urinalysis screens on Mondays or Tuesdays). *These results, consistent with prior research, suggest EtG/EtS is a superior tool for alcohol-use detection.*

When comparing the experimental group samples with those of the control group, the difference in detection rate was notable. Mandated weekly screens only detected alcohol use in 2% (66 out of 2,582 screens) of all tests administered. However samples screened based on counselor suspicion had a detection rate of 11% (10 out of 87 screens). The difference in the rate of positive screens may be explained by examining the counselors' initial suspicions of participants' noncompliance. Those participants screened based on counselor suspicion may have previously demonstrated patterns of noncompliant behavior that influenced the counselors' requests for EtG/EtS screens. Future research may attempt to ascertain counselor reasoning for increasing monitoring efforts on specific clients.

Detected Alcohol Consumption and Program Success

For this analysis, we did not consider the comparison research design, but rather focused on those participants who yielded positive EtG/EtS screens (from both the experimental and control groups). In all, 45 participants tested positive. Their progress through phase I of the program was not significantly different than those who had no positive screens of either type. However, it took these participants 320 days to complete phase II of the program compared with 274 days for those participants who never screened positive. *The difference in days spent in the first two phases of the Drug Court program was 14%—a statistically significant difference.*

The data revealed no differences in graduation rates. Sanctions imposed in response to positive screens were the probable cause for the delay in phase progression. Participant relapse in Drug Court programs is met with incremental punishment (Harrell et al., 1998; Hawken & Kleinman, 2009); however, it is also met with a reevaluation of intervention that slows participant progression though the phases (U.S. GAO, 1997).

Participant Characteristics Most Associated with Detected Alcohol Consumption

We analyzed the characteristics of those who tested positive for alcohol use (see Table 3). Continued alcohol use was, for the most part, evenly distributed across participant characteristics. Only persons with an alcohol issue diagnosis demonstrated a relationship with detected alcohol use. Those who had been diagnosed with an alcohol dependency composed nearly 61% of participants who screened positive, yet these participants made up only 50% of those who underwent EtG/EtS screening. Similarly, just over 50% of participants diagnosed with alcohol abuse yielded positive results.

DISCUSSION

By enhancing detection capabilities of participant alcohol consumption through the use of EtG/EtS screening, the host Drug Court hoped to deter participant alcohol use, thus improving participant

TABLE 3	CHARACTERISTICS OF PARTICIPANTS WITH POSITIVE ETG/ETS SCREENS			
Participant Characteristics	**No. of Positives (n = 46)**	**No. of Participants tested with EtG/EtS (n = 110)**	**% of Positives**	**Chi-Square Test**
Gender				
Male	31	76	40%	
Female	15	34	44%	.744
Race/Ethnicity				
Caucasian	30	71	42%	
Non-Caucasian	16	39	41%	.901
Education				
High School Diploma	34	84	41%	
No High School Diploma	12	26	46%	.640
Employment				
Employed	24	47	51%	
Unemployed	22	63	35%	.090
Criminal Offense				
Possession	27	60	45%	.459
Distribution	15	37	41%	.847
Property Crime	4	13	31%	.390
Criminal History (Arrests)				
No Felony Arrests	25	58	43%	
At least 1 Felony	21	52	40%	.773
Alcohol Abuse Diagnosis *(DSM-IV)*†				
Alcohol Dependence	28	55	50%	.046*
Alcohol Abuse	8	15	53%	.335
No Alcohol Issue	6	30	20%	.004*

*Denotes statistical significance at the .05 level.
†Numbers in this row do not add up to the total number as indicated in the column heading owing to missing data in some participants' records.

performance in the program. Prior research has validated the effectiveness of the EtG/EtS screening tool and suggests a need to promote

alcohol abstinence because alcohol use may contribute to poor program outcomes and increased criminality (Gottfredson et al., 2008), which is not only grounds to terminate a participant from the program but an increased burden on courts and communities. This study sought to evaluate the premise that better monitoring of alcohol use would improve program outcomes by examining how EtG/EtS screening affected participant performance and evaluating its detection capabilities.

This study used an experimental design to compare participants screened weekly through EtG/EtS testing with those who underwent screening only upon counselor suspicion in relation to two measurements: participant phase movement and program completion. As reported, analysis of phase movement and graduation rates revealed no statistical differences in participant performance between our experimental and control groups. However, patterns do begin to emerge within the data. Participants screened weekly through EtG/EtS testing progressed through phase I and phase II more quickly than those within the control group. Participants in the control group took 11% longer to complete the first two phases of the program. This pattern did not appear in the program completion measure where the groups graduated at similar rates.

The performance of all participants who yielded positive EtG/EtS screens was compared with those who had only negative screens. Not surprisingly, participants who continued their alcohol use spent more time in both phase I and phase II than those who did not provide a positive sample. Despite these performance differences, these participants still graduated at similar rates. This is consistent with the key components of Drug Court. The model requires Drug Courts to use alcohol and other drug monitoring as a mechanism to gauge treatment progress while recognizing relapse is a part of recovery (NADCP, 1997). These outcomes may be explained by this recognition of relapse as part of the process. Relapse can plausibly delay the progress of participants through program phases; however, Drug Courts use graduated sanctions, not program revocation, as a therapeutic response (Taxman et al., 1999). Subsequently, this study reveals differences in phase movement, but not in graduation.

We found no statistically significant performance differences in cases of weekly EtG/EtS screening exposure. Although those in the experimental group performed incrementally better, pinpointing the exact cause of this performance is difficult. Future research needs to evaluate the sanctioning responses to continued participant alcohol use as compared with illicit drug use.

Limitations

Because of the nature of our data and the supervision protocols of the host Drug Court, we encountered limitations to our design and study. This study was preliminary in nature using bivariate analysis to compare the outcome measures between our randomly assigned groups and participant characteristics. This research was limited, in part, by the constrained research period, which limited analyzable numbers from our outcome variables. Of the 149 participants, only 83 completed their participation during the 18-month research period. Subsequently, we could not control for covariates through a multivariate analysis when analyzing participant characteristics.

Ideally, the control group would have had no exposure to the EtG/EtS screening; however, a few participants assigned to the control group were sometimes exposed to EtG/EtS screening because of counselor suspicion. We could not rectify this in our initial research design because the research team did not wish to interfere with this supervision protocol of the Drug Court.

The lack of distinction between the two groups may be attributed to the amount of alcohol and other drug monitoring both groups experienced. As stated previously, the standard protocol for the host Drug Court was to randomly screen participants three to four times a week. Thus, it is possible the maximum effect of monitoring was already achieved, making enhanced alcohol-testing protocols (i.e., EtG/EtS screening) superfluous. However, because of the fifteen-hour limitation of ethanol screening, we contend its use, even five days a week, would be insufficient to capture all participant alcohol use, particularly over the weekends.

Policy Implications

This study confirms EtG/EtS screening as a superior monitoring tool to standard ethanol screening. The EtG/EtS tool allows for greater supervision of participants. For Drug Courts using the traditional ethanol screening method, participant use of alcohol over weekend periods is more likely to be detected through EtG/EtS screening. More accurate screens provide greater opportunity for intervention, limiting participant relapse, and reevaluating participant treatment. However, no statistical outcome differences existed between the two groups, suggesting that complete implementation of weekly EtG/EtS screening might not be the optimal use of the test. EtG/EtS screening is relatively expensive. In 2010, a standard 9-panel screen cost this program $7 and an EtG/EtS screen cost approximately $18, making a full screen $25 total. For many Drug Courts, adding EtG/EtS screening to all testing of participants is impractical.

However, the EtG/EtS screening tool might be managed more efficiently to achieve an optimal application. The study implications are that targeting specific participants for EtG/EtS screening would be a more efficient administration of this tool. Testing participants at counselor request provided a greater return on the investment with the more expensive EtG/EtS screening tool. Additionally, participants with diagnosed alcohol-related issues yielded positive screens at a statistically greater rate than their counterparts, suggesting this population should be screened more closely for alcohol use. Finally, the EtG/EtS test could be used to better effect at the participant's first screening of the week since, as this study showed, the greatest number of positive screenings occurred then.

Alcohol can lead to illicit substance use progression (Yamaguchi & Kandel, 1984), increased criminogenic behavior (Gottfredson et al., 2008), and poorer outcomes in Drug Courts (Gottfredson et al., 2007). EtG/EtS screening allows for better supervision of alcohol use, making it a productive tool for Drug Courts' standard or supplemental monitoring procedures. Information gleaned from using this enhanced alcohol and other drug monitoring tool would enable Drug Courts to assist in improving participant program performance as has been

found in previous research (Flango & Chessman, 2009; Kleinpeter et al., 2010). While cost may prohibit a comprehensive application of this method across all Drug Courts, judicious application could prove prudent. Despite the lack of differences in participant performance, this study demonstrated the utility and effectiveness of EtG/EtS screening and how it might be employed efficiently in a Drug Court program. Emerging differences between the groups suggest further research is necessary to fully understand and leverage the benefits of the EtG/EtS screening tool.

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Benjamin R. Gibbs, *PhD, is an assistant professor at the University of Central Missouri. He recently participated in a two-year evaluation of a metropolitan Drug Court with a focus on examining enhanced-supervision techniques and graduated-sanctions protocol. Dr. Gibbs has several professional presentations to his credit, including at conferences for the American Society of Criminology and the Academy of Criminal Justice Sciences. His research and teaching interests include community-based corrections, courts, international human rights, and international criminal tribunal processing.*

William Wakefield, *PhD, is a professor at the University of Nebraska at Omaha, where he is active in teaching, research, and community service. He has taught undergraduate and graduate courses and is highly involved in the criminal justice doctoral program. His research concerns comparative cross-cultural criminal justice and agency research evaluation, focusing on Drug Court process and outcome measures. Dr. Wakefield is author of numerous articles and coauthored and published* Criminal Justice in England and the United States Editions I *(1998) and* II *(2007).*

Direct correspondence to Benjamin R. Gibbs, PhD, University of Central Missouri, Department of Criminal Justice, Humphreys 302b, Warrensburg, MO 64093. (660) 543-4294. gibbs@ucmo.edu