Outcomes Evaluation Study
on
Services for Individuals
with
Driving While Impaired (DWI) Offenses

G.S. 122C-142.1(j)

Prepared for:
North Carolina General Assembly
Joint Legislative Commission on Governmental Operations

December 2011

North Carolina Department of Health and Human Services
Division of Mental Health, Developmental Disabilities and Substance Abuse Services

Introduction

The General Assembly of North Carolina enacted Session Law 2005-312, adding a new subsection to General Statute 122C-142.1 establishing a…"outcomes evaluation study on the effectiveness of substance abuse services provided to persons who obtain a certificate of completion under G.S. 20-17.6 as a condition for restoration of a drivers' license". This is the third report on outcomes. Additional reports are required every two years to the Joint Legislative Commission on Governmental Operations.

Background

The North Carolina legislative body has long supported laws that provide effective substance abuse interventions for individuals with driving while impaired (DWI) offenses. Statewide substance abuse interventions for individuals with DWI offenses were established in the early 1980s. Following the National Highway Traffic Safety Administration guidelines for Alcohol Safety Action Programs (ASAP), the State required that all persons convicted of a DWI attend Alcohol Drug Education Traffic School (ADETS) and persons completing ADETS received less stringent sanctions.

In 1988, the findings of a UNC study (Popkin et al, 1988), sponsored by the Division of Mental Health, Developmental Disabilities and Substance Abuse Services, indicated that people with more severe alcohol problems might benefit from directed treatment and that offenders should not be given lesser sanctions for completing ADETS. Several other studies indicated between 27 and 55 percent of those arrested for a DWI had a substance use disorder (Miller, et al, 1986; Scoles, et al, 1986; Iffland & Grassnack, 1995). These studies led to a return to tougher sanctions for 1st offenders and treatment for those individuals with substance use disorders.

A large proportion of those driving while impaired go undetected (Voas, et al, 2001) and estimates based on roadside surveys suggest that the number of times a person drives drunk before being arrested has ranged from 300 (Voas & Hause, 1987) to 2,000 (Borkenstein, 1975). Voas (2001) suggests that findings such as these have implications for both the courts and those assessing DWI offenders, "...few drivers coming before the courts for the first time are actually first-time offenders. Most have driven under the influence many times without being apprehended". Therefore, the front line substance abuse services for these individuals play a vital role in effectively reducing recidivism and other substance abuse-related costs in our communities by identifying and referring those with substance use disorders to treatment, and assisting all others in recognizing the seriousness of these offenses.

North Carolina had 8,767 injuries and 394 fatalities due to alcohol-related crashes in 2009 (NCAF, Highway Safety Research Center, UNC Chapel Hill, http://www.hsrc.unc.edu/ncaf/injuries.cfm). The Legislature takes great interest in this issue every year, while making significant improvements in DWI Services state-wide. Continued attention on effective substance abuse interventions to reduce the incidence of DWI is critical as a key element of the comprehensive plan.

Determining whether an individual arrested for DWI has a substance use disorder is a function of a clinical substance abuse assessment. The clinical substance abuse assessment is conducted within private DWI Service agencies across North Carolina; these providers are authorized by the Department of Health and Human Services (Department). The assessor uses a standardized clinical test in conjunction with a face to face clinical interview to determine if the individual has a substance use disorder.

If determined to have a substance use disorder the individual is required by law to complete substance abuse treatment. If determined not to have a substance use disorder, the individual is required by law to complete ADETS which is an educational intervention. However, if the individual is not identified to have a substance use disorder, he/she is still required by law to complete substance abuse treatment if any of the following apply: previous DWI conviction, an alcohol concentration of 0.15 percent or more at the time of arrest, and noncompliance with a breathalyzer test when requested.

This report will focus on those individuals who were required to attend short-term and longer-term outpatient treatment in order to be considered for reinstatement of their drivers' license. Short-term treatment is an outpatient service that is required to be at least 20 hours over at least a 30 day period. The majority of individuals participating in this service have a substance abuse diagnosis. Longer-term treatment is an outpatient service that is extended over at least a 60 day time frame with at least 40 hours of contact. Individuals with a substance dependence diagnosis are required to complete this level of service or a more intensive level of care. The majority of individuals completing substance abuse treatment as a result of DWI offense(s) complete either short or longer-term outpatient treatment. When these services are not sufficient, individuals are referred to a more intensive level of substance abuse treatment such as Day Treatment, Intensive Outpatient or Residential services. The remainder of this report provides detailed information regarding the methodology and data sources used, tables and graphs that illustrate the study findings, and study implications.

Study Design and Methodology

The research objectives of this study are to:

(1) Define the DWI recidivism rate of individuals completing short-term and longer-term substance abuse treatment in North Carolina; and

(2) Describe individual characteristics that statistically may lead to a DWI-related re-arrest, including substance use diagnostic data.

There are limited studies that provide a solid methodology for doing recidivism research. The most common definition of recidivism, and the definition most widely supported, is a subsequent DWI arrest (Chang et al, 2002). It is the most frequent method used to evaluate countermeasure interventions and effectiveness (Wells-Parker, 1995). The Department defined recidivism as either an arrest or an arrest and conviction of a DWI offense, a strategy that is heavily supported in the literature and recommended by the

AAA Foundation for Traffic Safety in their 2002 report (Chang et al, 2002). Although including both groups (those with a DWI arrest as well as those with a DWI conviction) tends to increase the recidivism rate slightly, providing both offers a more informative and accurate assessment of recidivism. Including only DWI convictions would exclude an important subset of the population who were arrested, but never convicted of a DWI (e.g., plea bargaining, court leniency, etc.) (Chang et al, 2002). In addition, the absence of a conviction does not always indicate the absence of a substance use disorder.

This study is a follow up to the 2009 outcomes report on individuals, with a DWI offense, who completed short-term or longer-term substance abuse treatment. This follow up is to determine if the rates of recidivism increase substantially with time or continue to be relatively low. The cohort consists of individuals with a DWI offense completing short-term or longer-term treatment from October 1, 2006 through March 31, 2007. Two automated data sources were used to collect information on the cohort of individuals with DWI convictions:

- The Department's web-based "DMH Certificate of Completion" (E508) database provided verification of completion of substance abuse services.
- The North Carolina Administrative Office of the Courts (AOC) provided arrest and conviction data entered into the Automated Criminal Information System (ACIS) by court clerks.

The individuals in this study were followed for a fixed three year period to track DWI recidivism.

The Department collects data on all individuals with DWI offenses who complete substance abuse services in order to obtain a "DMH Certificate of Completion' (E508) to be considered for reinstatement of their driver's license. The E508s are reviewed for accuracy and completeness and then forwarded to the Division of Motor Vehicles. The electronic data includes information such as individual demographics, prior offenses, and blood alcohol content (BAC) levels. The web-based system verifies completion of an appropriate clinical substance abuse assessment and either an educational intervention or an appropriate level of substance abuse treatment.

The Administrative Office of the Courts (AOC) provided the Department with arrest and conviction information for "DWI-related offenses". The selection of "DWI-related offenses" was based on the offenses the AOC uses to report its recidivism statistics. However, seven additional offenses were included to give a more accurate appraisal of the recidivism rate. Related offenses that were included in the recidivism analysis are listed in **Appendix 1.** Data from the Departments' web-based database was matched with the arrest data from the AOC. The match rate was 81%. The final sample for this study includes 4,265 short-term treatment completions and 1,796 longer-term treatment completions for a total of 6,061 cases. (Note: The AAA Foundation report by Lapham et al (2000), recommends exclusion of any out of state cases; these were removed from the sample because comparable data was not available).

Results

Comparison of Individuals Completing Short-term and Longer-Term Treatment

Demographic Characteristics: In **Table 1** below, the demographics data of the study group is presented. The largest percentage of individuals completing either the short-term or longer-term treatment services was single, Caucasian males with at least high school education and full time employment. The next largest racial group completing services was African Americans at 18% for short-term and 19% for longer-term treatment. Only six percent of individuals completing short-term treatment were Hispanic/Latino while the longer-term treatment sample had slightly more Hispanic/Latino representation (10%).

With regard to education and employment, the treatment groups were fairly similar. However, individuals completing short-term were slightly more likely to have a high school education or more and slightly more likely to have full-time employment. In addition, over half (52%) of the individuals completing short-term treatment had never been married compared to 43% of longer-term clients.

Table 1.
Profile of Individuals Completing Short-Term and Longer-Term Treatment

	Short-Term	**Longer-Term**
Number of Individuals in Sample:	4,265	1,796
Age at Time of Arrest:	%	%
Mean	33	36
Median	30	35
Gender:	%	%
Male	79.0	84.3
Female	21.0	15.7
Race:	%	%
Caucasian	73.1	73.8
African-American	18.3	19.2
Native-American / Alaska Native	1.3	1.1
Other / Unreported	7.3	5.9
Ethnicity:	%	%
Hispanic	5.5	10.0

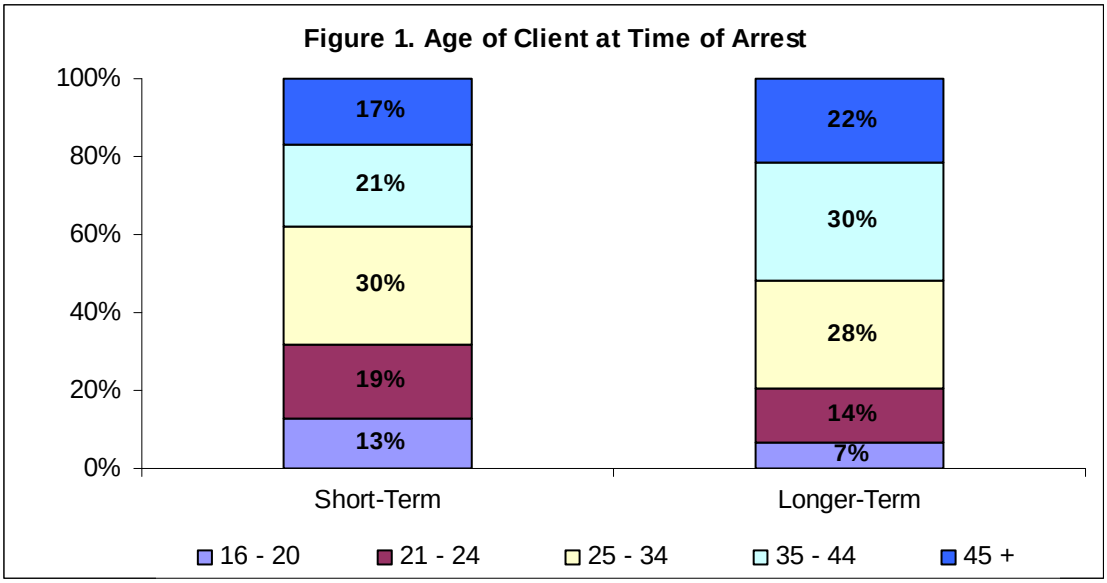
Table 1. (Continued)

Profile of Individuals Completing Short-Term and Longer-Term Treatment	**Short-Term**	**Longer-Term**
Education Status:	%	%
12th Grade (no diploma) or less	25.6	28.9
Completed High School / GED	39.0	42.2
Some College	25.5	22.4
Graduate Degree	1.5	1.0
Employment Status:	%	%
Full-Time	82.0	78.6
Part-Time	8.9	5.3
Unemployed	0.0	5.1
Not in Labor Force	8.6	10.1
Unknown	0.5	0.9
Marital Status:	%	%
Never Married	51.7	42.5
Married	25.9	29.2
Divorced / Separated	21.1	26.4
Widowed	1.3	1.9
Blood Alcohol Content at Time of Arrest:	%	%
.00 - .07	3.8	2.8
.08 -. 15	52.8	42.0
.16 - .23	25.5	28.1
.24 - .29	1.6	5.1
Refusal	16.3	22.0
Number of Prior DWI Convictions:	%	%
None	70.6	28.1
One	24.2	38.0
Two or More	5.2	33.9
Diagnosis at Time of Assessment:	%	%
Alcohol Abuse	84.9	26.9
Other Substance Abuse	1.9	1.2
Alcohol Dependence	7.8	68.3
Other Substance Dependence	0.6	2.4
Deferred / No Diagnosis	4.8	1.2
Multiple Diagnoses at Time of Assessment:	%	%
Yes	4.0	8.5
Number of Charges Associated with Initial DWI Arrest:	%	%
One	1.5	1.4
Two	36.2	34.3
Three or More	62.3	64.3

Table 1. (Continued)

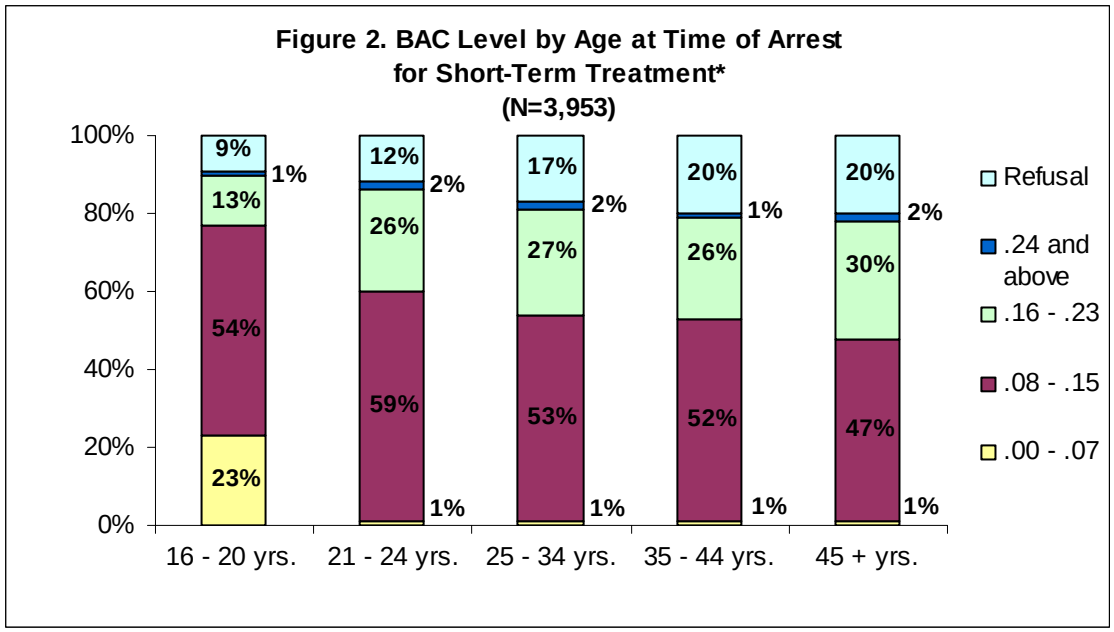
Profile of Individuals Completing Short-Term and Longer-Term Treatment	Short-Term	Longer-Term
DWI Recidivist Arrests:	%	%
1 Year Follow-up Period	4.5	4.9
2 Year Follow-up Period	9.5	9.2
3 Year Follow-up Period	13.4	12.0
DWI Recidivist Arrests Resulting in Conviction:	%	%
1 Year Follow-up Period	3.0	2.6
2 Year Follow-up Period	6.9	6.0
3 Year Follow-up Period	9.2	8.0
Months from Completion of Services to First DWI Recidivist Arrest (Mean):	9.1	8.3

Substance Use: **Table 1** also lists the blood alcohol content (BAC) levels of individuals at the time of their arrest. A very small number of individuals in both treatment groups had a BAC level that was below the legal limit (.08), approximately four percent of short-term and three percent of longer-term. A sizeable percentage of individuals in both treatment services refused to take the breath test (16% of short-term and 22% of longer-term). Nationally, the breath test refusal rate is 22.4% according to the National Highway Traffic Safety Administration (NHTSA 2008). Over a quarter of the individuals completing short-term treatment (27%) had a BAC level that was twice the legal limit or greater while a third of individuals completing longer-term treatment (33%) had such.

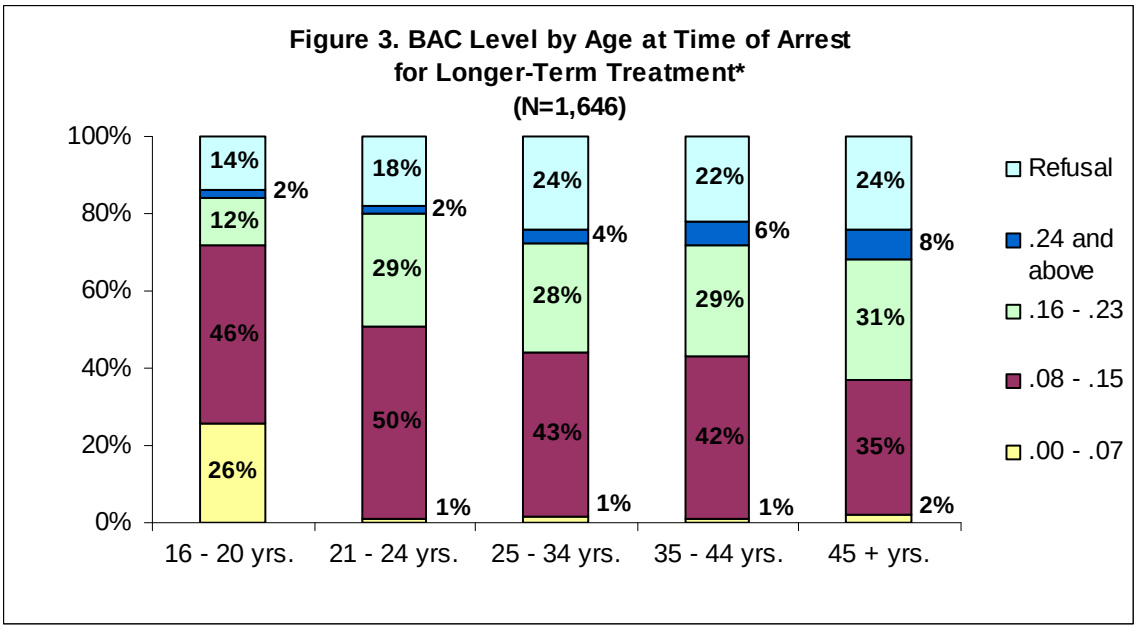


Individuals completing short-term treatment were more likely to be younger than those completing longer-term (mean age of 33 compared to 36, respectively). As seen in **Figure 1** on the previous page**,** almost one-third (32%) of individuals completing short-term treatment were under the age of 25 compared to 21% of longer-term.

When age is taken into consideration, the youngest individuals (16 to 20 years of age) were less likely than older persons to have a BAC level two or three times above the legal limit, regardless of treatment services (**Figures 2 and 3**). **Figure 2**, BAC Level by Age at Time of Arrest for Short-Term Treatment, is featured below and **Figure 3**, BAC Level by Age at Time of Arrest for Longer-Term Treatment, is located on the next page. For both treatment services, close to one-fourth of individuals under 21 years of age were more likely to have a BAC level under the legal limit compared to all the other age groups (which ranged from only one to two percent for all other age groups). **Figures 2 and 3** also show that younger individuals in both services were less likely than older ones to refuse the breath test.



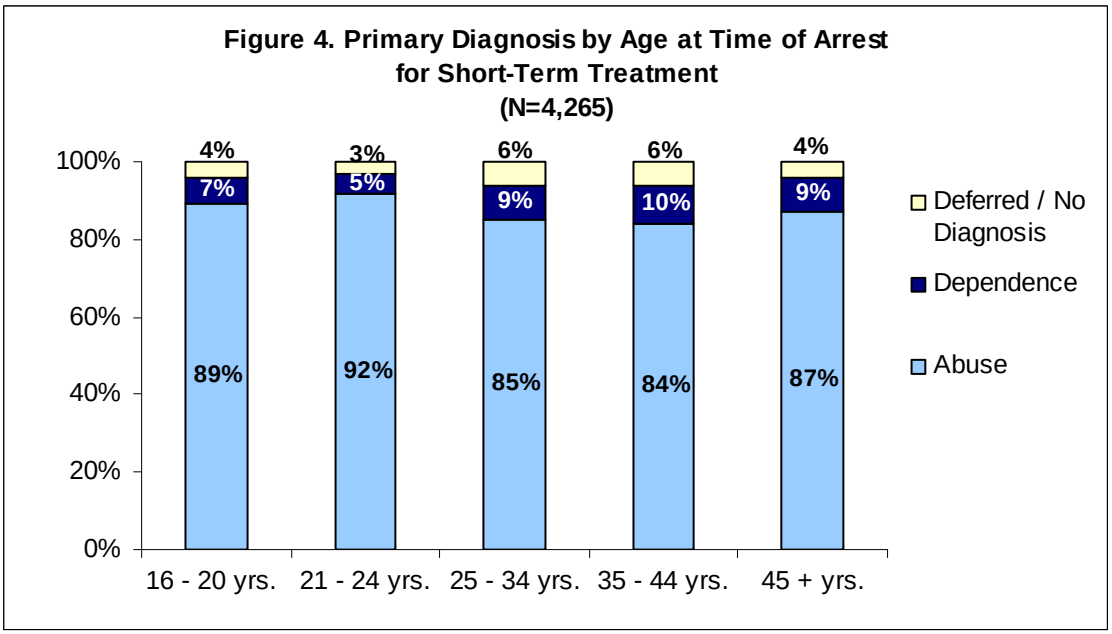
*NOTE: BAC level was unknown for 312 short-term cases. Of these, 3.2% had a re-arrest within 12 months and 4.8% had a re-arrest within 18 months.

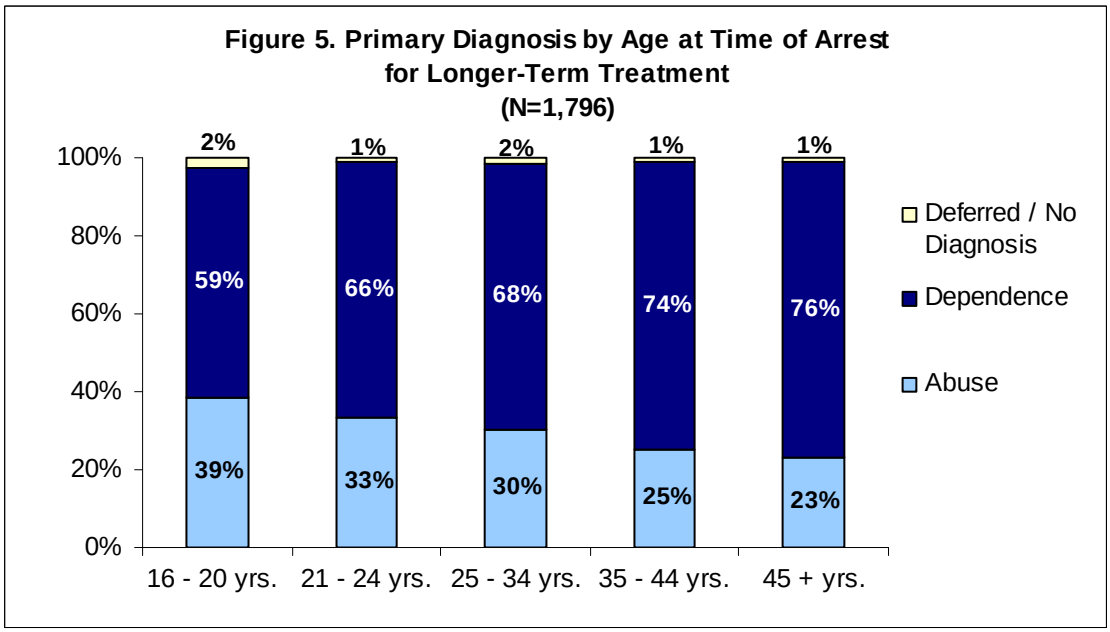


*NOTE: BAC level was unknown for 150 longer-term cases. Of these, 2.7% had a re-arrest within 12 months and 4.0% had a re-arrest within 18 months.

The two treatment groups were very different in terms of substance use diagnoses. The large majority of individuals completing short-term treatment (85%) had a diagnosis of alcohol abuse and over two-thirds of those completing longer-term (68%) had an alcohol dependence diagnosis. This is a result of administrative rules guiding the appropriate placement of individuals into either short-term or longer-term based on their diagnosis as described earlier. As shown in the profile of individuals in **Table 1,** close to nine percent of longer-term cases had more than one diagnosis, which is more than double that of short-term (4%).

When looking at the diagnosis by age group, there were no stark differences among the age groups for short-term treatment (**Figure 4)**. However, when looking at the longer-term completions, it was evident that there were differences in diagnosis based on age **(Figure 5**). **Figures 4 and 5** are located on the next page. Even though dependence was the most common diagnosis for all of the longer-term completions, the older individuals were much more likely to be dependent than younger individuals. For example, three-fourths (76%) of longer-term completions 45 years of age and older were dependent compared to only 59% of the 16 to 20 year olds. Thirty-nine percent of longer-term completions between the ages of 16 to 20 had an abuse diagnosis compared to only 23% of those 45 years of age and older.





Prior DWI History: As shown in the profile of short-term and longer-term treatment completions **(Table 1**), the treatment groups differed greatly in terms of their prior DWI history. While the large majority (71%) of short-term treatment completions did not have a prior DWI conviction at the time of their current arrest, 72% of longer-term treatment completions had at least one prior DWI conviction. Over a third of longer-term cases (34%) had two or more prior DWI convictions compared to only five percent of short-term cases. When only looking at those with a prior DWI conviction, the average for individuals completing short-term was 1.2 convictions and the average for longer-term was 1.8 convictions.

DWI Recidivism: As part of the outcomes evaluation, each individual in the two treatment groups was followed for a period of three years to determine whether the individual had a recidivist DWI arrest. The fixed follow-up period for each individual was calculated from the date treatment (short-term or longer-term) was completed. Recidivist arrests were captured at the one, two, and three year periods as shown in the profile of short-term and longer-term treatment completions in **Table 1**.

In the three year follow-up period, both treatment groups had very low re-arrest rates overall and there was no significant difference in rates between the two groups. Approximately five percent of both groups were rearrested for a DWI offense within one year. The two year re-arrest rate almost doubled for both groups and within three years the re-arrest rate reached 13% and 12% for short-term and longer-term completions, respectively.

For the short-term treatment group, age of the individual at the time of the initial arrest was significantly related to a DWI re-arrest (**Table 2**). Younger individuals were more likely than older ones to be rearrested for a DWI offense regardless of treatment services, although this was not significant for the longer-term treatment group. For short-term services, individuals under the age of 21 were noticeably different in their one, two and three year re-arrest rates from the other age groups, having a much greater likelihood of a DWI re-arrest.

Table 2. Re-Arrest for Subsequent DWI by Age at Time of Arrest

Age at Time of Arrest	N	Short-Term			N	Longer-Term		
		1 Year	2 Year	3 Year		1 Year	2 Year	3 Year
16-20	560	9.5%	16.8%	21.6%	122	6.6%	15.6%	17.2%
21-24	799	4.6%	10.6%	15.1%	249	7.6%	12.9%	15.3%
25-34	1,312	4.0%	8.8%	12.7%	499	3.6%	7.2%	10.2%
35-44	890	3.2%	6.5%	10.5%	535	4.5%	8.0%	11.6%
45+	704	2.7%	7.4%	9.8%	391	3.8%	9.0%	11.5%
TOTAL	4,265	4.5%	9.5%	13.4%	1,796	4.7%	9.2%	12.0%

The following **Table 3** shows the recidivist arrest rate for short-term and longer term treatment groups by the blood alcohol content level of the individual at the time of arrest. Although not significant, it is true that for both treatment groups, those with a BAC level under the legal limit of 0.08 had a higher likelihood of a DWI recidivist arrest than those with higher BAC levels at every point in time for the three-year follow-up period.

In further exploration of the short-term and longer-term completions with a BAC level under the legal limit, it is interesting to note that such individuals were more likely than those in the higher BAC level categories to have multiple substance-related diagnoses and more likely to have a primary diagnosis with abuse or dependence of a substance

other than alcohol.[1] So, while the likelihood of increased recidivism for individuals with a low BAC level (or a BAC level of .00) is not what one might expect, it is likely a reflection of other drug impairment.

Table 3. Re-Arrest for Subsequent DWI by Blood Alcohol Content Level*

Blood Alcohol Content Level	N	Short-Term			N	Longer-Term		
		1 Year	2 Year	3 Year		1 Year	2 Year	3 Year
.00-.07	151	8.0%	12.6%	15.9%	46	8.7%	10.9%	15.2%
.08-.15	2,086	5.3%	10.5%	14.5%	692	3.8%	8.8%	11.6%
.16-.23	1,009	3.2%	8.5%	11.8%	462	5.6%	9.5%	13.0%
.24 and above	707	3.2%	7.9%	12.7%	446	4.8%	8.3%	13.1%
Refusal	644	3.7%	8.9%	13.2%	362	5.5%	11.3%	13.8%
TOTAL	3,953	4.6%	9.8%	13.6%	1,646	4.9%	9.5%	12.6%

*NOTE: BAC level was unknown for 312 short-term cases. Of these, 10.0% had a re-arrest within three years. BAC level was unknown for 150 longer-term cases. Of these, 6.0% had a re-arrest within three years.

Table 4 on the next page, shows the relationship between the primary diagnosis of the individual and recidivism rates over the three follow-up periods. While the differences between those with an abuse versus dependence diagnosis for short-term completions were insignificant, the differences were somewhat more pronounced for the longer-term completions.

Looking more closely at the longer-term completions, the relationship between diagnosis and recidivism is likely a function of age. Those with an abuse diagnosis were more likely to have a DWI re-arrest compared to those with a dependence diagnosis and, as referenced in **Figure 5** on page 10, younger individuals in the longer-term treatment services were more likely to have a primary diagnosis of abuse than older individuals. Therefore, this could be having an impact on the re-arrest rates for individuals with an abuse diagnosis in long-term treatment.

Another interesting finding relates to individuals whose primary diagnosis was deferred or nonexistent. Recidivism rates were higher for this particular group if the individual completed a short-term treatment program but rates were much lower if the individual completed a longer-term treatment program.

[1] For short-term treatment with a BAC level under the legal limit, 8% of individuals had multiple substance-related diagnoses compared to 3% of all others. In addition, approximately 9% of these short-term completions had a primary diagnosis of abuse or dependence of a substance other than alcohol compared to 2% of all other short-term clients. For longer-term completions with a BAC level under the legal limit, 26% had multiple substance-related diagnoses compared to only 7% of all other longer-term completions. Over 17% of these longer-term completions had a primary diagnosis of abuse or dependence of a substance other than alcohol compared to roughly 3% of all other longer-term cases.

Table 4. Re-Arrest for Subsequent DWI by Primary Diagnosis								
Diagnosis	N	Short-Term			N	Longer-Term		
		1 Year	2 Year	3 Year		1 Year	2 Year	3 Year
Abuse	3,701	4.5%	9.5%	13.4%	505	6.7%	10.7%	14.3%
Dependence	361	3.3%	8.9%	12.7%	1,270	3.9%	8.7%	11.3%
Deferred / No Diagnosis	203	5.4%	9.9%	14.8%	21	0.0%	4.8%	9.5%
TOTAL	4,265	4.5%	9.5%	13.4%	1,796	4.7%	9.2%	12.0%

It might be expected that individuals with a prior DWI conviction would be more likely to have a subsequent arrest for a DWI but this was not the case. As shown in **Table 5** below, there was very little difference in re-arrest rates across the two treatment groups and follow-up periods regardless of a prior DWI history.

Table 5. Re-Arrest for Subsequent DWI by Prior DWI Conviction								
Prior DWI Conviction	N	Short-Term			N	Longer-Term		
		1 Year	2 Year	3 Year		1 Year	2 Year	3 Year
No	3,012	4.5%	9.3%	13.0%	505	5.3%	9.5%	12.9%
Yes	1,253	4.5%	9.9%	14.2%	1,291	4.5%	9.1%	11.8%
TOTAL	4,265	4.5%	9.5%	13.4%	1,796	4.7%	9.2%	12.0%

Implications

This report is the third biennial report to the Legislature on outcomes focused on individuals who complete substance abuse services in order to restore a drivers' license after DWI conviction (s). This report follows the 2009 study cohort on individuals completing short-term or longer-term outpatient treatment to see if the recidivism rates increase or remain low over time.

This report found that a re-arrest for a subsequent DWI was highly unlikely for individuals in both treatment groups. The overall recidivism rates for both treatment groups were remarkably similar between the two groups for all three follow-up periods. Within one year of completing the treatment services, only 4.5% of short-term completions and 4.7% of longer-term completions were rearrested for a DWI. When the follow-up period was extended to three years, the re-arrest rate increased to 13.4% for short-term completions and 12.0% for longer-term completions.

Of particular interest in this report are three noteworthy findings pertaining particularly to the short-term treatment group:

1) An individuals' age at time of initial DWI arrest appears to be related to DWI recidivism. Younger individuals had a greater likelihood of being rearrested for a subsequent DWI than older individuals. Twenty-two percent of short-term completions under the age of 21 were rearrested within three years, which is significantly higher than the three year recidivism rate for those over the age of 21. For longer-term completions, the differences were not significant although higher rates existed for the youngest age group. Seventeen percent of those under 21 were rearrested within three years which was slightly higher than the 15% of those between the ages of 21 and 24 with a DWI re-arrest and approximately six percentage points higher than the rate for those 25 years of age and older.

2) In addition to age, short-term completions with a BAC level under the legal limit of .08 were more likely to be rearrested than those with a high BAC level; however, this finding was only significant for the one year follow-up period. For the two and three year follow-up periods, the same pattern exists but differences in recidivism rates were not significant across the various BAC levels. Impairment from other drugs may be contributing factor to the increase in recidivism for individuals with a low BAC level based on the data showing a higher incidence of multiple substance-related diagnoses in this group.

3) Another interesting finding relates to individuals whose primary diagnosis was deferred or nonexistent. These cases would include individuals who had a BAC .15 or more, had a prior conviction or refused the breathalyzer but the assessment did not identify a substance use disorder. The law requires that if any of these factors exist they must complete at least short term treatment. Recidivism rates were higher for this particular group if the individual completed a short-term treatment program but rates were much lower if the individual completed a longer-term treatment program.

References

Borkenstein, R. F. (1975) Problems of enforcement, adjudication and sanctioning. In: Israelstam, S., and Lambert, S., eds. *Alcohol, Drugs and Traffic Safety*. Toronto, Ontario: Addiction Research Foundation of Ontario. 655-662.

Chang, I., Gregory, C. & S. C. Lapham. (2002). Review of Screening Instruments and Procedures for Evaluating DWI [Driving While Intoxicated/Impaired]Offenders. Prepared for AAA Foundation for Traffic Safety, Washington, DC 20005 retrieved 1/20/04 from http://www.aaafoundation.org/pdf/DWIScreeningReport.pdf

Iffland, R. and Grassnack, F. (1995) Epidemiologische untersuchung zum CDT und andere indikatoren für alcoholprobleme in blut alcoholauffalliger Deutsche PKW fahrer. *Blutalcohol* **32**, 27–41.

Lapham, S.C., Skipper, B.J., Hunt, W.C. and Chang, I. (2000) Do risk factors for rearrest differ for female and male drunk-driving offenders? *Alcoholism: Clinical and Experimental Research*. 24 (11) 1647-1655.

Miller, B. A., Whitney, R. and Washousky, R. (1986) Alcoholism diagnoses for convicted drinking drivers referred for alcoholism evaluation. *Alcoholism: Clinical and Experimental Research* **10**, 651–656.

Nalty, Dennis, Ph.D., (2003) South Carolina Recidivism Data: Fiscal Year 1998; Management Information and Research, South Carolina Department of Alcohol and Other Drug Abuse Services (DAODAS).

National Highway Traffic Safety Administration (NHTSA) (2007) Traffic Safety Facts: Research Note, Breath Test Results, DOT HS 810 871, November 2007.

National Highway Traffic Safety Administration (NHTSA) (2008) Traffic Safety Facts 2008 Data, Alcohol-Impaired Driving DOT HS 811-155.

Popkin, C. L., Kannenberg, C. H., Lacey, J. H. & P. F. Waller. (1988) *Assessment of Classification Instruments Designed to Detect Alcohol Abuse.* Final Report No. DOT HS 807475. Chapel Hill, NC: UNC Highway Safety Research Center.

Scoles, E. A., Fine, E. W. and Steer, R. A. (1986) DUI offenders presenting with positive blood alcohol levels at pre-sentencing evaluation. *Journal of Studies on Alcohol* **47**, 500–502.

Voas, R. B. & D. A. Fisher. (2001). Court Procedures for Handling Intoxicated Drivers. *Alcohol Health and Research World*. January 1, 32-42.

Voas R.B., AND Hause, J.M. (1987). Deterring the drinking driver: The Stockton experience. *Accident Analysis and Prevention* 19(2):81-90.

Wells-Parker, E., Bangert-Drowns, R., McMillan, R., Williams, M. (1995). Final Results from a meta-analysis of remedial interventions with drink/drive offenders. *Addiction* 90, 907-926.

Appendix 1

List of Related DWI Offense Codes and Offenses Used in Recidivism Analysis

Offense Code	Offense
4175	Drink beer/wine while driving
5403	DUI-DRUGS
5404	DUI-Alcoholic beverage
5405	Driving while impaired
5406	Felony death by vehicle
5413	Reckless driving aft alcohol
5423	DUI-driving instructor
5431	Drive w/.1 or more bl alc
5453	Allow intox person driver
5459	DWI 2nd offense
5471	Aid and abet impaired driving
5472	DUI-2nd offense
5473	DUI- 3rd offense
5511	DWI-Level 1
5512	DWI-Level 2
5513	DWI-Level 3
5514	DWI-Level 4
5515	DWI-Level 5
5516	DWI-Level 5- Aid/Abet
5517	DWI (.10)- Level 1
5518	DWI (.10)- Level 2
5519	DWI (.10)- Level 3
5520	DWI (.10)- Level 4
5521	DWI (.10)- Level 5
5522	DWI (.10)- Level 5- Aid/Abet
5526	DWI-Provisional license
5527	Habitual impaired driving
5570	Drive after drinking provisional license
5594	Open cont after cons alc 1st
5595	Open cont after cons alc subofn
5610	DWI commercial vehicle
5615	Commercial DWI under influence
5620	Commercial DWI >=.04
5622	Consume alcohol commercial vehicle
5624	Consume alcohol school bus/child vehicle
6230	DWI motor boat/vessel
9956	Drive after drink-prov license
9958	Aid and abet DWI