An Evaluation of

the Effectiveness of Sanctions for DWI

In Preventing Recidivism

in North Carolina

Final Report

for

the Governor's Highway Safety Program

AL-92-02-02

UNC/HSRC-92/9/5

Carol Lederhaus Popkin
J. Richard Stewart
Carol Martell
Johanna D. Birckmayer

Prepared by

The University of North Carolina Highway Safety Research Center
through the sponsorship of
The Governor's Highway Safety Program

September 30, 1992

This study was funded by the North Carolina Governor's Highway Safety Program as part of Project Number AL-92-02-02, entitled "DWI Adjudication." The authors wish to extend special thanks to the many people who devoted so much of their time in providing help and guidance. They include Ms. Dottie Ellis, John Armstrong, Charles Poole, and Roger Mitchell of the North Carolina Division of Motor Vehicles; Mr. Pete Martin of the Department of Human Resources Substance Abuse Services Section, DWI and Criminal Justice Branch; and Dr. James Drennan of the UNC Institute of Government.

We are especially grateful to Ms. Allyson Teem who was the contract manager for this project and provided valuable input when needed.

The opinions and findings contained in this report are solely those of the authors and are not necessarily those of the project sponsor.

An Evaluation of the Effectiveness
in North Carolina of Sanctions for DWI

Approximately 45,000 deaths and 5.5 million injuries each year are the result of motor vehicle crashes, making traffic crashes the leading cause of injury death in the United States (National Safety Council, 1991). The average age of victims is only 34. Crashes are the greatest single cause of death for every age group between five and 32 (National Safety Council, 1991). Because motor vehicle crash victims are disproportionately young, crash-related injuries are the third leading cause of lost years of life (National Safety Council, 1991).

Alcohol, a major contributing factor in motor vehicle crashes, is estimated to be involved in approximately 46 percent of all fatal traffic crashes and in 18 to 25 percent of all injury producing crashes (NHTSA, 1990). In 1990, more than 350,000 people were injured in alcohol-related (A/R) crashes, with more than 22,000 of those injuries being fatal (NCSA, 1991). Two of every five Americans can expect to be in an alcohol-related crash in their lifetime (National Safety Council, 1991). Economists estimate that the costs of such crashes to society exceed $21 billion, stemming from lost wages, reduced productivity, and medical and legal costs (NSA, 1990).

The staggering human and economic costs of alcohol-related motor vehicle crashes make alcohol-impaired driving a serious public health problem in North Carolina. In North Carolina in 1990, 91,404 DWI arrests were made statewide. That year, 13,263 alcohol-related crashes resulted in the deaths of 602 and injuries of 13,772 people.

Although the early part of the '80's witnessed a dramatic decrease in A/R driving behavior on our roadways, recent reports based on information from the Fatal Accident Reporting System (FARS) indicate that the proportion of drivers with BAC levels at or above .10 has remained at about 40 percent since 1987. Additional information from other states that regularly monitor DWI activity have indicated that an increasing proportion of those arrested for DWI and of those involved in A/R crashes are repeat DWI offenders (Simon, 1992; Fell, 1991). This is both good news and bad news. It is good because it means that many of our general deterrence programs have been effective

in preventing people from drinking and driving. It is bad because it means that in order to make further reductions in DWI-related activity more attention must be paid to preventing DWI recidivism.

In recognition of the great public health problem posed by drunken driving, North Carolina has made a great effort to address the problem. The Safe Roads Act of 1983 (SRA) was a comprehensive new law that focused on elimination of plea bargaining and of drinking/driving by young people. The SRA also sought to have a more equitable structure for the imposition of sanctions meted out in conjunction with a DWI. The reductions in alcohol-related and nighttime crashes indicate that North Carolina's Safe Roads Act of 1983 has had a general deterrent effect on DWI activity. However, the specific deterrent effect of the law has not been achieved, in that a significant proportion of those who actually are tried, found guilty and penalized are committing the offense again. Of the 65,714 people adjudicated for DWI in 1988, 32 percent (21,085) had one or more previous DWI convictions on their driving records and 31 percent of these (6,687) had two or more previous DWI convictions (Popkin and Martell, 1990).

The objective of this project was to evaluate many of the programs and countermeasures designed to prevent DWI recidivism and examine more closely some potential problems with the current law. Specifically, this evaluation focuses on many of the sanctions levied against those who are convicted of a DWI. It is one of the first studies to examine a variety of sanctions to determine which of them, alone, or in combination with others, is most effective in preventing further DWI recidivism. Finally, the project examines some of the specific programs employed by the State to deal with multiple DWI offenders and examines a growing problem in North Carolina of DWI cases pending on the DMV files. These evaluations are found in the four sections of this report. They include: 1) A description of DWI cases pending; 2) An examination of the effectiveness of traditional sanctions applied by the courts; 3) An examination of three programs employed by the DMV to prevent further recidivism; and 4) A description of the Department of Corrections Diversionary "In-Hospital Treatment Program" for those sent to prison for DWI.

A. DWI Arrestees Never Brought to Trial

One of the most effective deterrents to DWI recidivism applied to DWI arrestees may be their encounter with enforcement authorities, administrative license revocation and appearance in a court of law with attendant sanctions for those found guilty of the DWI offense. Unfortunately, many of those arrested in North Carolina are apparently not brought to trial. For this evaluation, we examined those people who were arrested in North Carolina during 1990 and tried as of September 1991. Table 1, which presents the adjudication of those arrested for DWI in North Carolina, shows that during 1990, there were 101,264 persons arrested for DWI in North Carolina. (Those 9,647 cases listed with a county code of zero were arrested out-of-state.) As of September 1991, 20 percent of those arrested had not been adjudicated. The table also presents the same information on a county by county basis.

Because the Division of Motor Vehicles Driver History files are dependent upon a court form indicating the disposition of a case in order to levy licensing sanctions, none of the traditional sanctions applied to those convicted of DWI are levied against this group of drivers.

Several hypotheses might explain why this large portion of cases is not brought to trial. First, a substantial number of these cases might have been dismissed by the magistrate because of no probable cause to arrest or low BAC levels. Because DMV is dependent upon the AOC 310 form to describe disposition of the cases, information so dismissed would not be available to DMV, and these would remain pending on the DMV driver history file. Similarly, many of those arrested may have been out-of-state drivers who may not have appeared for trial.

Methods

To examine the reason for the large number of pending cases, an examination of those persons arrested for DWI during 1990 was made using the N.C. Driver History file frozen as of September 1991. This meant that for each arrest there was a time period ranging from nine months to 21 months following the arrest in which the case might have

TABLE 1

1990 DWI ARRESTS BY COUNTY AND % TRIED AS OF SEPTEMBER 1991

	ARRESTED	TRIED			
		NO		YES	
	N	N	%	N	%
ALL	101264	20101	19.85	81163	80.15
COUNTY					
OTHER	9647	332	3.44	9315	96.56
ALAMANCE	1608	258	16.04	1350	83.96
ALEXANDER	292	69	23.63	223	76.37
ALLEGHANY	150	37	24.67	113	75.33
ANSON	280	35	12.50	245	87.50
ASHE	190	24	12.63	166	87.37
AVERY	167	26	15.57	141	84.43
BEAUFORT	647	40	6.18	607	93.82
BERTIE	264	47	17.80	217	82.20
BLADEN	555	65	11.71	490	88.29
BRUNSWICK	828	146	17.63	682	82.37
BUNCOMBE	2231	406	18.20	1825	81.80
BURKE	988	209	21.15	779	78.85
CABARRUS	2045	269	13.15	1776	86.85
CALDWELL	978	188	19.22	790	80.78
CAMDEN	138	13	9.42	125	90.58
CARTERET	965	182	18.86	783	81.14
CASWELL	308	56	18.18	252	81.82
CATAWBA	1933	430	22.25	1503	77.75
CHATHAM	458	69	15.07	389	84.93
CHEROKEE	213	38	17.84	175	82.16
CHOWAN	127	30	23.62	97	76.38

(CONTINUED)

1990 DWI ARRESTS BY COUNTY AND % TRIED AS OF SEPTEMBER 1991

	ARRESTED	TRIED			
		NO		YES	
	N	N	%	N	%
COUNTY					
CLAY	81	12	14.81	69	85.19
CLEVELAND	1164	185	15.89	979	84.11
COLUMBUS	886	136	15.35	750	84.65
CRAVEN	1417	380	26.82	1037	73.18
CUMBERLAND	4818	1375	28.54	3443	71.46
CURRITUCK	212	55	25.94	157	74.06
DARE	885	198	22.37	687	77.63
DAVIDSON	1455	276	18.97	1179	81.03
DAVIE	326	60	18.40	266	81.60
DUPLIN	790	117	14.81	673	85.19
DURHAM	2571	396	15.40	2175	84.60
EDGECOMBE	1096	472	43.07	624	56.93
FORSYTH	2880	800	27.78	2080	72.22
FRANKLIN	685	114	16.64	571	83.36
GASTON	2302	923	40.10	1379	59.90
GATES	126	19	15.08	107	84.92
GRAHAM	78	23	29.49	55	70.51
GRANVILLE	512	77	15.04	435	84.96
GREENE	214	48	22.43	166	77.57
GUILFORD	4701	1348	28.67	3353	71.33
HALIFAX	796	170	21.36	626	78.64
HARNETT	1545	289	18.71	1256	81.29
HAYWOOD	650	93	14.31	557	85.69

(CONTINUED)

1990 DWI ARRESTS BY COUNTY AND % TRIED AS OF SEPTEMBER 1991

	ARRESTED	TRIED			
		NO		YES	
	N	N	%	N	%
COUNTY					
HENDERSON	680	142	20.88	538	79.12
HERTFORD	492	65	13.21	427	86.79
HOKE	328	29	8.84	299	91.16
HYDE	89	9	10.11	80	89.89
IREDELL	1484	241	16.24	1243	83.76
JACKSON	280	57	20.36	223	79.64
JOHNSTON	1370	346	25.26	1024	74.74
JONES	44	7	15.91	37	84.09
LEE	693	127	18.33	566	81.67
LENOIR	1042	215	20.63	827	79.37
LINCOLN	515	96	18.64	419	81.36
MC DOWELL	185	23	12.43	162	87.57
MACON	223	52	23.32	171	76.68
MADISON	285	29	10.18	256	89.82
MARTIN	316	65	20.57	251	79.43
MECKLENBURG	3135	469	14.96	2666	85.04
MITCHELL	165	31	18.79	134	81.21
MONTGOMERY	463	121	26.13	342	73.87
MOORE	856	121	14.14	735	85.86
NASH	1296	411	31.71	885	68.29
NEW HANOVER	1740	303	17.41	1437	82.59
NORTHAMPTON	477	92	19.29	385	80.71
ONSLOW	1928	778	40.35	1150	59.65

(CONTINUED)

1990 DWI ARRESTS BY COUNTY AND % TRIED AS OF SEPTEMBER 1991

	ARRE-STED	TRIED			
		NO		YES	
	N	N	%	N	%
COUNTY					
ORANGE	701	142	20.26	559	79.74
PAMLICO	107	17	15.89	90	84.11
PASQUOTANK	390	65	16.67	325	83.33
PENDER	535	94	17.57	441	82.43
PERQUIMANS	150	63	42.00	87	58.00
PERSON	414	110	26.57	304	73.43
PITT	1717	239	13.92	1478	86.08
POLK	178	37	20.79	141	79.21
RANDOLPH	951	137	14.41	814	85.59
RICHMOND	830	118	14.22	712	85.78
ROBESON	1740	375	21.55	1365	78.45
ROCKINGHAM	1300	246	18.92	1054	81.08
ROWAN	1231	162	13.16	1069	86.84
RUTHERFORD	660	126	19.09	534	80.91
SAMPSON	688	132	19.19	556	80.81
SCOTLAND	495	56	11.31	439	88.69
STANLY	569	85	14.94	484	85.06
STOKES	499	124	24.85	375	75.15
SURRY	987	248	25.13	739	74.87
SWAIN	355	57	16.06	298	83.94
TRANSYLVANIA	129	28	21.71	101	78.29
TYRRELL	133	11	8.27	122	91.73
UNION	952	92	9.66	860	90.34

(CONTINUED)

1990 DWI ARRESTS BY COUNTY AND % TRIED AS OF SEPTEMBER 1991

	ARRE-STED	TRIED			
		NO		YES	
	N	N	%	N	%
COUNTY					
VANCE	1154	254	22.01	900	77.99
WAKE	6325	1672	26.43	4653	73.57
WARREN	322	86	26.71	236	73.29
WASHINGTON	175	24	13.71	151	86.29
WATAUGA	610	91	14.92	519	85.08
WAYNE	1367	245	17.92	1122	82.08
WILKES	762	109	14.30	653	85.70
WILSON	1068	422	39.51	646	60.49
YADKIN	358	48	13.41	310	86.59
YANCEY	124	22	17.74	102	82.26

been adjudicated--a period much longer than the usual three to four month period from trial to disposition.

In accordance with the law, it seemed that magistrates might dismiss cases if they believed that BAC levels were so low that guilty verdicts would not be found by the courts. In order to eliminate the possibility that a magistrate had dismissed the case because of a low BAC level, only those cases with BAC levels at or above the per se level of .10, or who had a refusal or a blood test were selected. We anticipated that this procedure would eliminate most of the pending cases.

Findings

Table 2 presents the court dispositions for those arrested for DWI during 1990 who had a BAC greater than or equal to .10 (North Carolina's per se level) or who refused the chemical test or who had a blood test administered. There were 70,405 of these more serious arrests during 1990. Of these, 20 percent (14,300) were not adjudicated.

To explore the possibility that these cases might have had BAC levels of approximately .10 and would have been dismissed by the magistrate because courts in their area only convicted at a .11 or above, we calculated the mean BAC level for those for whom a BAC was available. An examination was made of the differences in BAC levels between cases adjudicated and not adjudicated. Findings indicated that the mean BAC level for those adjudicated was .156 while the mean BAC level for those found not guilty was .127, and for those cases not adjudicated was .153.

Summary

These findings did not support our hypothesis that the large number of pending cases were due to a substantial pool of cases dismissed due to low BAC readings. Individual courts were contacted, but Clerks of Courts were unable to provide information about those cases pending.

TABLE 2

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
STATEWIDE	PENDING	14300	.	.	.	.	.	.	100	.153
	USDISTRICT	76	.	.	100	.157	.	.	.	.
	SUPERIOR	1701	0.6	.153	77.4	.153	22.0	.127	.	.
	DISTRICT	54275	1.7	.155	82.3	.156	16.0	.127	.	.
	OTHER	53	.	.	88.7	.182	11.3	.152	.	.
	ALL	70405	1.3	.155	65.5	.156	12.9	.127	20.3	.153
ALAMANCE	PENDING	181	.	.	.	.	.	.	100	.149
	SUPERIOR	31	.	.	87.1	.152	12.9	.207	.	.
	DISTRICT	1117	0.1	.148	96.2	.149	3.7	.145	.	.
	ALL	1329	0.1	.148	82.9	.149	3.4	.148	13.6	.149
ALEXANDER	PENDING	33	.	.	.	.	.	.	100	.151
	SUPERIOR	4	.	.	100	.120	.	.	.	.
	DISTRICT	169	.	.	88.2	.147	11.8	.136	.	.
	ALL	206	.	.	74.3	.146	9.7	.136	16.0	.151
ALLEGHANY	PENDING	26	.	.	.	.	.	.	100	.157
	USDISTRICT	1	.	.	100	.	.	.	.	.
	SUPERIOR	1	.	.	.	.	100	.137	.	.
	DISTRICT	87	1.1	.148	97.7	.167	1.1	.	.	.
	ALL	115	0.9	.148	74.8	.167	1.7	.137	22.6	.157
ANSON	PENDING	22	.	.	.	.	.	.	100	.153
	SUPERIOR	11	.	.	63.6	.137	36.4	.138	.	.
	DISTRICT	166	1.8	.148	79.5	.161	18.7	.136	.	.
	ALL	199	1.5	.148	69.8	.159	17.6	.136	11.1	.153
ASHE	PENDING	10	.	.	.	.	.	.	100	.138
	USDISTRICT	2	.	.	100	.148	.	.	.	.
	SUPERIOR	4	.	.	50.0	.129	50.0	.107	.	.
	DISTRICT	122	.	.	93.4	.154	6.6	.128	.	.
	ALL	138	.	.	85.5	.153	7.2	.123	7.2	.138

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
STATEWIDE	PENDING	14300	.	.	.	.	.	.	100	.153
	USDISTRICT	76	.	.	100	.157	.	.	.	.
	SUPERIOR	1701	0.6	.153	77.4	.153	22.0	.127	.	.
	DISTRICT	54275	1.7	.155	82.3	.156	16.0	.127	.	.
	OTHER	53	.	.	88.7	.182	11.3	.152	.	.
	ALL	70405	1.3	.155	65.5	.156	12.9	.127	20.3	.153
ALAMANCE	PENDING	181	.	.	.	.	.	.	100	.149
	SUPERIOR	31	.	.	87.1	.152	12.9	.207	.	.
	DISTRICT	1117	0.1	.148	96.2	.149	3.7	.145	.	.
	ALL	1329	0.1	.148	82.9	.149	3.4	.148	13.6	.149
ALEXANDER	PENDING	33	.	.	.	.	.	.	100	.151
	SUPERIOR	4	.	.	100	.120	.	.	.	.
	DISTRICT	169	.	.	88.2	.147	11.8	.136	.	.
	ALL	206	.	.	74.3	.146	9.7	.136	16.0	.151
ALLEGHANY	PENDING	26	.	.	.	.	.	.	100	.157
	USDISTRICT	1	.	.	100	.	.	.	.	.
	SUPERIOR	1	.	.	.	.	100	.137	.	.
	DISTRICT	87	1.1	.148	97.7	.167	1.1	.	.	.
	ALL	115	0.9	.148	74.8	.167	1.7	.137	22.6	.157
ANSON	PENDING	22	.	.	.	.	.	.	100	.153
	SUPERIOR	11	.	.	63.6	.137	36.4	.138	.	.
	DISTRICT	166	1.8	.148	79.5	.161	18.7	.136	.	.
	ALL	199	1.5	.148	69.8	.159	17.6	.136	11.1	.153
ASHE	PENDING	10	.	.	.	.	.	.	100	.138
	USDISTRICT	2	.	.	100	.148	.	.	.	.
	SUPERIOR	4	.	.	50.0	.129	50.0	.107	.	.
	DISTRICT	122	.	.	93.4	.154	6.6	.128	.	.
	ALL	138	.	.	85.5	.153	7.2	.123	7.2	.138

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
AVERY	PENDING	18	.	.	.	.	.	.	100	.170
	DISTRICT	84	6.0	.184	73.8	.159	20.2	.159	.	.
	ALL	102	4.9	.184	60.8	.159	16.7	.159	17.6	.170
BEAUFORT	PENDING	29	.	.	.	.	.	.	100	.152
	SUPERIOR	19	.	.	89.5	.131	10.5	.098	.	.
	DISTRICT	434	6.0	.146	79.7	.158	14.3	.117	.	.
	ALL	482	5.4	.146	75.3	.157	13.3	.116	6.0	.152
BERTIE	PENDING	29	.	.	.	.	.	.	100	.149
	SUPERIOR	1	.	.	100	.129	.	.	.	.
	DISTRICT	134	0.7	.188	85.8	.149	13.4	.147	.	.
	ALL	164	0.6	.188	70.7	.149	11.0	.147	17.7	.149
BLADEN	PENDING	45	.	.	.	.	.	.	100	.150
	SUPERIOR	11	.	.	90.9	.135	9.1	.	.	.
	DISTRICT	327	3.4	.154	86.9	.154	9.8	.124	.	.
	ALL	383	2.9	.154	76.8	.154	8.6	.124	11.7	.150
BRUNSWICK	PENDING	112	.	.	.	.	.	.	100	.156
	SUPERIOR	12	.	.	58.3	.128	41.7	.104	.	.
	DISTRICT	518	.	.	86.3	.155	13.7	.125	.	.
	ALL	642	.	.	70.7	.155	11.8	.124	17.4	.156
BUNCOMBE	PENDING	321	.	.	.	.	.	.	100	.158
	USDISTRICT	2	.	.	100	.180	.	.	.	.
	SUPERIOR	5	.	.	100	.172	.	.	.	.
	DISTRICT	1406	2.1	.146	93.0	.156	4.9	.143	.	.
	ALL	1734	1.7	.146	75.8	.156	4.0	.143	18.5	.158
BURKE	PENDING	173	.	.	.	.	.	.	100	.159
	SUPERIOR	41	.	.	75.6	.145	24.4	.134	.	.
	DISTRICT	566	0.5	.164	90.3	.156	9.2	.137	.	.
	ALL	780	0.4	.164	69.5	.155	7.9	.136	22.2	.159

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
CABARRUS	PENDING	193	.	.	.	.	.	.	100	.149
	SUPERIOR	36	.	.	97.2	.152	2.8	.098	.	.
	DISTRICT	1200	3.3	.152	88.3	.148	8.5	.131	.	.
	ALL	1429	2.7	.152	76.6	.149	7.2	.131	13.5	.149
CALDWELL	PENDING	145	.	.	.	.	.	.	100	.149
	USDISTRICT	1	.	.	100	.	.	.	.	.
	SUPERIOR	74	.	.	47.3	.149	52.7	.130	.	.
	DISTRICT	555	.	.	79.3	.150	20.7	.135	.	.
	ALL	775	.	.	61.4	.150	19.9	.133	18.7	.149
CAMDEN	PENDING	7	.	.	.	.	.	.	100	.142
	SUPERIOR	23	.	.	78.3	.145	21.7	.109	.	.
	DISTRICT	77	3.9	.161	83.1	.154	13.0	.115	.	.
	ALL	107	2.8	.161	76.6	.152	14.0	.113	6.5	.142
CARTERET	PENDING	140	.	.	.	.	.	.	100	.150
	SUPERIOR	11	.	.	90.9	.161	9.1	.	.	.
	DISTRICT	600	.	.	76.2	.161	23.8	.125	.	.
	ALL	751	.	.	62.2	.161	19.2	.125	18.6	.150
CASWELL	PENDING	46	.	.	.	.	.	.	100	.157
	SUPERIOR	13	.	.	100	.155	.	.	.	.
	DISTRICT	200	1.0	.250	92.0	.152	7.0	.172	.	.
	ALL	259	0.8	.250	76.1	.152	5.4	.172	17.8	.157
CATAWBA	PENDING	344	.	.	.	.	.	.	100	.158
	SUPERIOR	61	.	.	42.6	.138	57.4	.124	.	.
	DISTRICT	1171	.	.	77.8	.154	22.2	.126	.	.
	ALL	1576	.	.	59.5	.154	18.7	.126	21.8	.158
CHATHAM	PENDING	55	.	.	.	.	.	.	100	.147
	SUPERIOR	3	.	.	100	.	.	.	.	.
	DISTRICT	335	1.2	.155	91.0	.158	7.8	.143	.	.
	ALL	393	1.0	.155	78.4	.158	6.6	.143	14.0	.147

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
CHEROKEE	PENDING	32	.	.	.	.	.	.	100	.167
	SUPERIOR	4	.	.	50.0	.117	50.0	.	.	.
	DISTRICT	128	.	.	86.7	.149	13.3	.132	.	.
	ALL	164	.	.	68.9	.149	11.6	.132	19.5	.167
CHOWAN	PENDING	17	.	.	.	.	.	.	100	.141
	SUPERIOR	9	.	.	88.9	.163	11.1	.098	.	.
	DISTRICT	46	.	.	82.6	.159	17.4	.119	.	.
	ALL	72	.	.	63.9	.159	12.5	.115	23.6	.141
CLAY	PENDING	5	.	.	.	.	.	.	100	.134
	DISTRICT	51	.	.	94.1	.147	5.9	.119	.	.
	ALL	56	.	.	85.7	.147	5.4	.119	8.9	.134
CLEVELAND	PENDING	130	.	.	.	.	.	.	100	.164
	SUPERIOR	7	.	.	57.1	.188	42.9	.	.	.
	DISTRICT	775	1.4	.157	89.2	.157	9.4	.157	.	.
	ALL	912	1.2	.157	76.2	.157	8.3	.157	14.3	.164
COLUMBUS	PENDING	90	.	.	.	.	.	.	100	.150
	SUPERIOR	21	.	.	76.2	.148	23.8	.142	.	.
	DISTRICT	525	2.1	.145	79.0	.155	18.9	.113	.	.
	ALL	636	1.7	.145	67.8	.155	16.4	.114	14.2	.150
CRAVEN	PENDING	262	.	.	.	.	.	.	100	.142
	SUPERIOR	20	.	.	100	.163	.	.	.	.
	DISTRICT	805	0.6	.176	71.7	.157	27.7	.116	.	.
	ALL	1087	0.5	.176	54.9	.157	20.5	.116	24.1	.142
CUMBERLAND	PENDING	1036	.	.	.	.	.	.	100	.151
	USDISTRICT	54	.	.	100	.162	.	.	.	.
	SUPERIOR	23	4.3	.168	82.6	.143	13.0	.113	.	.
	DISTRICT	2298	2.3	.152	65.0	.159	32.7	.129	.	.
	ALL	3411	1.6	.152	45.9	.159	22.1	.129	30.4	.151

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

		ALL	DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
CURRITUCK	PENDING	45	.	.	.	.	.	.	100	.166
	SUPERIOR	17	.	.	76.5	.161	23.5	.108	.	.
	DISTRICT	99	.	.	88.9	.155	11.1	.112	.	.
	ALL	161	.	.	62.7	.156	9.3	.111	28.0	.166
DARE	PENDING	130	.	.	.	.	.	.	100	.147
	USDISTRICT	2	.	.	100	.139	.	.	.	.
	SUPERIOR	69	2.9	.152	56.5	.167	40.6	.128	.	.
	DISTRICT	490	4.7	.166	71.2	.163	24.1	.119	.	.
	ALL	691	3.6	.164	56.4	.164	21.1	.121	18.8	.147
DAVIDSON	PENDING	209	.	.	.	.	.	.	100	.155
	SUPERIOR	11	.	.	90.9	.142	9.1	.	.	.
	DISTRICT	982	1.4	.152	92.8	.150	5.8	.142	.	.
	ALL	1202	1.2	.152	76.6	.150	4.8	.142	17.4	.155
DAVIE	PENDING	44	.	.	.	.	.	.	100	.153
	SUPERIOR	4	.	.	75.0	.108	25.0	.	.	.
	DISTRICT	196	1.0	.098	93.4	.142	5.6	.130	.	.
	ALL	244	0.8	.098	76.2	.142	4.9	.130	18.0	.153
DUPLIN	PENDING	70	.	.	.	.	.	.	100	.153
	SUPERIOR	7	.	.	100	.143	.	.	.	.
	DISTRICT	464	7.8	.149	77.4	.156	14.9	.135	.	.
	ALL	541	6.7	.149	67.7	.156	12.8	.135	12.9	.153
DURHAM	PENDING	326	.	.	.	.	.	.	100	.161
	SUPERIOR	16	.	.	87.5	.148	12.5	.098	.	.
	DISTRICT	1782	0.1	.109	84.5	.161	15.4	.112	.	.
	ALL	2124	0.0	.109	71.6	.161	13.0	.112	15.3	.161
EDGECOMBE	PENDING	414	.	.	.	.	.	.	100	.160
	SUPERIOR	6	.	.	50.0	.219	50.0	.098	.	.
	DISTRICT	417	1.7	.140	71.0	.174	27.3	.130	.	.
	ALL	837	0.8	.140	35.7	.174	14.0	.130	49.5	.160

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
FORSYTH	PENDING	412	.	.	.	.	.	.	100	.158
	SUPERIOR	114	.	.	87.7	.163	12.3	.127	.	.
	DISTRICT	1801	1.6	.155	89.7	.156	8.7	.148	.	.
	ALL	2327	1.2	.155	73.7	.156	7.3	.147	17.7	.158
FRANKLIN	PENDING	98	.	.	.	.	.	.	100	.147
	SUPERIOR	33	.	.	75.8	.149	24.2	.109	.	.
	DISTRICT	427	0.7	.174	76.6	.155	22.7	.116	.	.
	ALL	558	0.5	.174	63.1	.154	18.8	.116	17.6	.147
GASTON	PENDING	506	.	.	.	.	.	.	100	.154
	SUPERIOR	20	.	.	70.0	.148	30.0	.130	.	.
	DISTRICT	1251	1.8	.142	72.5	.161	25.7	.125	.	.
	ALL	1777	1.2	.142	51.8	.160	18.5	.125	28.5	.154
GATES	PENDING	11	.	.	.	.	.	.	100	.183
	SUPERIOR	10	.	.	100	.157	.	.	.	.
	DISTRICT	66	1.5	.129	72.7	.153	25.8	.130	.	.
	ALL	87	1.1	.129	66.7	.154	19.5	.130	12.6	.183
GRAHAM	PENDING	15	.	.	.	.	.	.	100	.127
	SUPERIOR	1	.	.	.	.	100	.	.	.
	DISTRICT	39	.	.	89.7	.136	10.3	.098	.	.
	ALL	55	.	.	63.6	.136	9.1	.098	27.3	.127
GRANVILLE	PENDING	63	.	.	.	.	.	.	100	.162
	SUPERIOR	24	.	.	75.0	.164	25.0	.113	.	.
	DISTRICT	355	1.1	.133	79.4	.166	19.4	.132	.	.
	ALL	442	0.9	.133	67.9	.166	17.0	.130	14.3	.162
GREENE	PENDING	38	.	.	.	.	.	.	100	.154
	SUPERIOR	14	.	.	57.1	.161	42.9	.123	.	.
	DISTRICT	118	.	.	82.2	.165	17.8	.132	.	.
	ALL	170	.	.	61.8	.164	15.9	.130	22.4	.154

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
GUILFORD	PENDING	874	.	.	.	.	.	.	100	.165
	SUPERIOR	8	.	.	75.0	.164	25.0	.129	.	.
	DISTRICT	2855	0.1	.188	86.4	.163	13.5	.135	.	.
	ALL	3737	0.1	.188	66.2	.163	10.4	.135	23.4	.165
HALIFAX	PENDING	99	.	.	.	.	.	.	100	.146
	SUPERIOR	1	.	.	100	.	.	.	.	.
	DISTRICT	434	3.5	.154	81.3	.152	15.2	.114	.	.
	ALL	534	2.8	.154	66.3	.152	12.4	.114	18.5	.146
HARNETT	PENDING	228	.	.	.	.	.	.	100	.142
	SUPERIOR	2	.	.	100	.209	.	.	.	.
	DISTRICT	918	4.1	.150	68.3	.157	27.6	.116	.	.
	ALL	1148	3.3	.150	54.8	.157	22.0	.116	19.9	.142
HAYWOOD	PENDING	66	.	.	.	.	.	.	100	.167
	SUPERIOR	34	.	.	88.2	.161	11.8	.165	.	.
	DISTRICT	404	2.7	.169	86.4	.162	10.9	.137	.	.
	ALL	504	2.2	.169	75.2	.162	9.5	.140	13.1	.167
HENDERSON	PENDING	114	.	.	.	.	.	.	100	.158
	SUPERIOR	11	.	.	90.9	.135	9.1	.227	.	.
	DISTRICT	412	1.5	.175	93.0	.156	5.6	.163	.	.
	ALL	537	1.1	.175	73.2	.155	4.5	.170	21.2	.158
HERTFORD	PENDING	47	.	.	.	.	.	.	100	.150
	SUPERIOR	14	.	.	92.9	.156	7.1	.	.	.
	DISTRICT	299	.	.	85.6	.159	14.4	.115	.	.
	ALL	360	.	.	74.7	.159	12.2	.115	13.1	.150
HOKE	PENDING	15	.	.	.	.	.	.	100	.139
	SUPERIOR	2	.	.	100	.	.	.	.	.
	DISTRICT	213	6.6	.158	80.3	.162	13.1	.129	.	.
	ALL	230	6.1	.158	75.2	.162	12.2	.129	6.5	.139

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
HYDE	PENDING	9	.	.	.	.	.	.	100	.120
	USDISTRICT	1	.	.	100	.117	.	.	.	.
	DISTRICT	36	.	.	83.3	.159	16.7	.123	.	.
	ALL	46	.	.	67.4	.157	13.0	.123	19.6	.120
IREDELL	PENDING	195	.	.	.	.	.	.	100	.158
	SUPERIOR	11	.	.	90.9	.151	9.1	.188	.	.
	DISTRICT	981	5.7	.161	90.3	.154	4.0	.148	.	.
	ALL	1187	4.7	.161	75.5	.154	3.4	.150	16.4	.158
JACKSON	PENDING	34	.	.	.	.	.	.	100	.145
	SUPERIOR	3	.	.	100	.248	.	.	.	.
	DISTRICT	166	.	.	83.7	.146	16.3	.129	.	.
	ALL	203	.	.	70.0	.148	13.3	.129	16.7	.145
JOHNSTON	PENDING	286	.	.	.	.	.	.	100	.149
	SUPERIOR	5	.	.	80.0	.181	20.0	.	.	.
	DISTRICT	796	6.7	.150	69.5	.157	23.9	.121	.	.
	ALL	1087	4.9	.150	51.2	.157	17.6	.121	26.3	.149
JONES	PENDING	6	.	.	.	.	.	.	100	.138
	SUPERIOR	1	.	.	100	.137	.	.	.	.
	DISTRICT	24	4.2	.156	75.0	.162	20.8	.109	.	.
	ALL	31	3.2	.156	61.3	.161	16.1	.109	19.4	.138
LEE	PENDING	107	.	.	.	.	.	.	100	.151
	SUPERIOR	5	.	.	100	.109	.	.	.	.
	DISTRICT	416	1.7	.145	77.9	.159	20.4	.116	.	.
	ALL	528	1.3	.145	62.3	.159	16.1	.116	20.3	.151
LENOIR	PENDING	165	.	.	.	.	.	.	100	.145
	SUPERIOR	28	.	.	53.6	.152	46.4	.134	.	.
	DISTRICT	617	0.2	.148	87.8	.154	12.0	.144	.	.
	ALL	810	0.1	.148	68.8	.154	10.7	.143	20.4	.145

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
LINCOLN	PENDING	62	.	.	.	.	.	.	100	.164
	SUPERIOR	8	.	.	100	.140	.	.	.	.
	DISTRICT	354	.	.	95.5	.149	4.5	.166	.	.
	ALL	424	.	.	81.6	.148	3.8	.166	14.6	.164
MC DOWELL	PENDING	18	.	.	.	.	.	.	100	.144
	SUPERIOR	1	.	.	100	.129	.	.	.	.
	DISTRICT	118	.	.	74.6	.153	25.4	.134	.	.
	ALL	137	.	.	65.0	.153	21.9	.134	13.1	.144
MACON	PENDING	38	.	.	.	.	.	.	100	.156
	USDISTRICT	1	.	.	100	.117	.	.	.	.
	SUPERIOR	1	.	.	.	.	100	.098	.	.
	DISTRICT	119	2.5	.191	85.7	.151	11.8	.109	.	.
	ALL	159	1.9	.191	64.8	.150	9.4	.107	23.9	.156
MADISON	PENDING	22	.	.	.	.	.	.	100	.155
	SUPERIOR	4	.	.	75.0	.129	25.0	.129	.	.
	DISTRICT	182	1.1	.227	86.3	.161	12.6	.110	.	.
	ALL	208	1.0	.227	76.9	.161	11.5	.111	10.6	.155
MARTIN	PENDING	44	.	.	.	.	.	.	100	.148
	SUPERIOR	6	.	.	100	.156	.	.	.	.
	DISTRICT	198	0.5	.180	93.9	.155	5.6	.159	.	.
	ALL	248	0.4	.180	77.4	.155	4.4	.159	17.7	.148
MECKLENBURG	PENDING	395	.	.	.	.	.	.	100	.157
	SUPERIOR	40	.	.	67.5	.155	32.5	.152	.	.
	DISTRICT	2019	0.1	.154	75.1	.161	24.8	.138	.	.
	ALL	2454	0.1	.154	62.9	.161	20.9	.139	16.1	.157
MITCHELL	PENDING	20	.	.	.	.	.	.	100	.159
	SUPERIOR	1	.	.	100	.117	.	.	.	.
	DISTRICT	92	.	.	76.1	.144	23.9	.134	.	.
	ALL	113	.	.	62.8	.143	19.5	.134	17.7	.159

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
MONTGOMERY	PENDING	80	.	.	.	.	.	.	100	.148
	SUPERIOR	16	.	.	81.3	.166	18.8	.168	.	.
	DISTRICT	231	.	.	90.0	.150	10.0	.133	.	.
	ALL	327	.	.	67.6	.151	8.0	.138	24.5	.148
MOORE	PENDING	87	.	.	.	.	.	.	100	.154
	SUPERIOR	21	.	.	66.7	.144	33.3	.115	.	.
	DISTRICT	547	0.2	.	76.1	.162	23.8	.125	.	.
	ALL	655	0.2	.	65.6	.162	20.9	.125	13.3	.154
NASH	PENDING	352	.	.	.	.	.	.	100	.153
	SUPERIOR	17	.	.	58.8	.137	41.2	.176	.	.
	DISTRICT	638	3.4	.143	63.6	.165	32.9	.129	.	.
	ALL	1007	2.2	.143	41.3	.165	21.5	.130	35.0	.153
NEW HANOVER	PENDING	220	.	.	.	.	.	.	100	.160
	SUPERIOR	8	.	.	87.5	.138	12.5	.	.	.
	DISTRICT	1162	0.4	.174	87.7	.164	11.9	.132	.	.
	ALL	1390	0.4	.174	73.8	.164	10.0	.132	15.8	.160
NORTHAMPTON	PENDING	56	.	.	.	.	.	.	100	.143
	SUPERIOR	6	.	.	66.7	.125	33.3	.	.	.
	DISTRICT	249	1.6	.172	82.7	.157	15.7	.134	.	.
	ALL	311	1.3	.172	67.5	.157	13.2	.134	18.0	.143
ONSLOW	PENDING	606	.	.	.	.	.	.	100	.142
	USDISTRICT	7	.	.	100	.155	.	.	.	.
	SUPERIOR	8	12.5	.098	50.0	.154	37.5	.104	.	.
	DISTRICT	884	3.5	.141	82.2	.142	14.3	.125	.	.
	ALL	1505	2.1	.139	49.0	.142	8.6	.124	40.3	.142
ORANGE	PENDING	87	.	.	.	.	.	.	100	.169
	SUPERIOR	7	.	.	57.1	.184	42.9	.104	.	.
	DISTRICT	437	1.6	.141	87.6	.154	10.8	.137	.	.
	ALL	531	1.3	.141	72.9	.154	9.4	.135	16.4	.169

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

		ALL	DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
PAMLICO	PENDING	13	.	.	.	.	.	.	100	.126
	SUPERIOR	2	.	.	100	.137	.	.	.	.
	DISTRICT	64	.	.	62.5	.151	37.5	.112	.	.
	ALL	79	.	.	53.2	.151	30.4	.112	16.5	.126
PASQUOTANK	PENDING	44	.	.	.	.	.	.	100	.146
	SUPERIOR	45	6.7	.172	68.9	.151	24.4	.111	.	.
	DISTRICT	194	2.1	.149	80.9	.144	17.0	.115	.	.
	ALL	283	2.5	.159	66.4	.145	15.5	.114	15.5	.146
PENDER	PENDING	66	.	.	.	.	.	.	100	.159
	SUPERIOR	8	.	.	75.0	.132	25.0	.137	.	.
	DISTRICT	293	1.0	.151	87.0	.152	11.9	.126	.	.
	ALL	367	0.8	.151	71.1	.152	10.1	.126	18.0	.159
PERQUIMANS	PENDING	32	.	.	.	.	.	.	100	.131
	SUPERIOR	11	.	.	90.9	.168	9.1	.098	.	.
	DISTRICT	51	.	.	92.2	.140	7.8	.098	.	.
	ALL	94	.	.	60.6	.145	5.3	.098	34.0	.131
PERSON	PENDING	85	.	.	.	.	.	.	100	.151
	SUPERIOR	4	.	.	75.0	.148	25.0	.188	.	.
	DISTRICT	248	.	.	86.3	.151	13.7	.125	.	.
	ALL	337	.	.	64.4	.151	10.4	.128	25.2	.151
PITT	PENDING	189	.	.	.	.	.	.	100	.162
	SUPERIOR	31	.	.	90.3	.175	9.7	.104	.	.
	DISTRICT	927	0.2	.113	81.3	.162	18.4	.120	.	.
	ALL	1147	0.2	.113	68.2	.162	15.2	.120	16.5	.162
POLK	PENDING	34	.	.	.	.	.	.	100	.171
	SUPERIOR	6	.	.	100	.139	.	.	.	.
	DISTRICT	104	1.9	.158	91.3	.155	6.7	.141	.	.
	ALL	144	1.4	.158	70.1	.154	4.9	.141	23.6	.171

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
RANDOLPH	PENDING	114	.	.	.	.	.	.	100	.155
	SUPERIOR	22	4.5	.	90.9	.157	4.5	.	.	.
	DISTRICT	574	1.7	.155	84.3	.149	13.9	.138	.	.
	ALL	710	1.5	.155	71.0	.149	11.4	.138	16.1	.155
RICHMOND	PENDING	94	.	.	.	.	.	.	100	.148
	SUPERIOR	19	.	.	36.8	.138	63.2	.125	.	.
	DISTRICT	536	.	.	73.5	.159	26.5	.120	.	.
	ALL	649	.	.	61.8	.158	23.7	.121	14.5	.148
ROBESON	PENDING	310	.	.	.	.	.	.	100	.160
	SUPERIOR	8	.	.	100	.191	.	.	.	.
	DISTRICT	1071	0.9	.158	91.1	.160	7.9	.130	.	.
	ALL	1389	0.7	.158	70.8	.161	6.1	.130	22.3	.160
ROCKINGHAM	PENDING	186	.	.	.	.	.	.	100	.154
	SUPERIOR	53	.	.	88.7	.166	11.3	.168	.	.
	DISTRICT	741	2.6	.148	91.4	.149	6.1	.143	.	.
	ALL	980	1.9	.148	73.9	.150	5.2	.144	19.0	.154
ROWAN	PENDING	132	.	.	.	.	.	.	100	.151
	SUPERIOR	15	.	.	100	.195	.	.	.	.
	DISTRICT	806	1.2	.180	89.5	.148	9.3	.143	.	.
	ALL	953	1.0	.180	77.2	.148	7.9	.143	13.9	.151
RUTHERFORD	PENDING	87	.	.	.	.	.	.	100	.156
	SUPERIOR	28	.	.	96.4	.166	3.6	.	.	.
	DISTRICT	378	.	.	93.7	.158	6.3	.152	.	.
	ALL	493	.	.	77.3	.158	5.1	.152	17.6	.156
SAMPSON	PENDING	87	.	.	.	.	.	.	100	.158
	SUPERIOR	5	.	.	80.0	.199	20.0	.	.	.
	DISTRICT	442	0.7	.128	86.7	.158	12.7	.115	.	.
	ALL	534	0.6	.128	72.5	.158	10.7	.115	16.3	.158

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
SCOTLAND	PENDING	31	.	.	.	.	.	.	100	.149
	SUPERIOR	3	.	.	66.7	.098	33.3	.109	.	.
	DISTRICT	344	2.3	.155	86.6	.163	11.0	.126	.	.
	ALL	378	2.1	.155	79.4	.163	10.3	.125	8.2	.149
STANLY	PENDING	45	.	.	.	.	.	.	100	.149
	SUPERIOR	7	.	.	100	.139	.	.	.	.
	DISTRICT	308	.	.	75.0	.153	25.0	.119	.	.
	ALL	360	.	.	66.1	.153	21.4	.119	12.5	.149
STOKES	PENDING	71	.	.	.	.	.	.	100	.150
	SUPERIOR	45	.	.	95.6	.156	4.4	.139	.	.
	DISTRICT	274	.	.	92.0	.156	8.0	.184	.	.
	ALL	390	.	.	75.6	.156	6.2	.176	18.2	.150
SURRY	PENDING	177	.	.	.	.	.	.	100	.152
	SUPERIOR	44	.	.	100	.144	.	.	.	.
	DISTRICT	522	1.9	.149	92.9	.155	5.2	.167	.	.
	ALL	743	1.3	.149	71.2	.154	3.6	.167	23.8	.152
SWAIN	PENDING	46	.	.	.	.	.	.	100	.142
	USDISTRICT	5	.	.	100	.118	.	.	.	.
	SUPERIOR	5	.	.	20.0	.098	80.0	.118	.	.
	DISTRICT	168	.	.	88.7	.145	11.3	.126	.	.
	OTHER	53	.	.	88.7	.182	11.3	.152	.	.
	ALL	277	.	.	72.9	.151	10.5	.131	16.6	.142
TRANSYLVANIA	PENDING	14	.	.	.	.	.	.	100	.138
	DISTRICT	65	.	.	93.8	.151	6.2	.148	.	.
	ALL	79	.	.	77.2	.151	5.1	.148	17.7	.138
TYRRELL	PENDING	8	.	.	.	.	.	.	100	.140
	SUPERIOR	7	.	.	85.7	.145	14.3	.098	.	.
	DISTRICT	69	1.4	.238	91.3	.141	7.2	.141	.	.
	ALL	84	1.2	.238	82.1	.142	7.1	.130	9.5	.140

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
UNION	PENDING	77	.	.	.	.	.	.	100	.161
	SUPERIOR	34	.	.	52.9	.157	47.1	.131	.	.
	DISTRICT	677	3.2	.181	79.0	.161	17.7	.124	.	.
	ALL	788	2.8	.181	70.2	.161	17.3	.125	9.8	.161
VANCE	PENDING	178	.	.	.	.	.	.	100	.150
	SUPERIOR	48	.	.	68.8	.146	31.3	.114	.	.
	DISTRICT	611	1.6	.155	61.9	.159	36.5	.124	.	.
	ALL	837	1.2	.155	49.1	.157	28.4	.123	21.3	.150
WAKE	PENDING	1177	.	.	.	.	.	.	100	.147
	SUPERIOR	74	.	.	97.3	.143	2.7	.	.	.
	DISTRICT	3857	1.9	.161	81.2	.157	16.9	.117	.	.
	ALL	5108	1.4	.161	62.7	.156	12.8	.117	23.0	.147
WARREN	PENDING	66	.	.	.	.	.	.	100	.163
	SUPERIOR	11	.	.	45.5	.164	54.5	.110	.	.
	DISTRICT	175	0.6	.129	72.6	.159	26.9	.118	.	.
	ALL	252	0.4	.129	52.4	.159	21.0	.117	26.2	.163
WASHINGTON	PENDING	20	.	.	.	.	.	.	100	.176
	SUPERIOR	5	.	.	100	.141	.	.	.	.
	DISTRICT	101	1.0	.148	81.2	.157	17.8	.106	.	.
	ALL	126	0.8	.148	69.0	.157	14.3	.106	15.9	.176
WATAUGA	PENDING	62	.	.	.	.	.	.	100	.143
	SUPERIOR	17	.	.	88.2	.105	11.8	.098	.	.
	DISTRICT	386	2.8	.159	81.9	.150	15.3	.133	.	.
	ALL	465	2.4	.159	71.2	.148	13.1	.132	13.3	.143
WAYNE	PENDING	198	.	.	.	.	.	.	100	.151
	SUPERIOR	62	3.2	.137	71.0	.161	25.8	.128	.	.
	DISTRICT	831	8.3	.156	70.8	.162	20.9	.134	.	.
	ALL	1091	6.5	.156	57.9	.162	17.4	.134	18.1	.151

(CONTINUED)

COURT DISPOSITIONS BY COUNTY FOR 1990 DWI ARRESTS

ONLY CASES WITH BAC .10+, REFUSALS, OR BLOOD TEST

			DISPOSITION							
			OTHER		GUILTY		NOT GLT		PENDING	
		ALL N	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN	ROW %	BAC MEAN
WILKES	PENDING	69	.	.	.	.	.	.	100	.164
	SUPERIOR	11	.	.	90.9	.142	9.1	.	.	.
	DISTRICT	485	.	.	96.5	.150	3.5	.137	.	.
	ALL	565	.	.	84.6	.150	3.2	.137	12.2	.164
WILSON	PENDING	332	.	.	.	.	.	.	100	.159
	SUPERIOR	5	.	.	80.0	.207	20.0	.109	.	.
	DISTRICT	498	0.4	.123	72.7	.165	26.9	.132	.	.
	ALL	835	0.2	.123	43.8	.166	16.2	.132	39.8	.159
YADKIN	PENDING	28	.	.	.	.	.	.	100	.138
	SUPERIOR	5	.	.	80.0	.138	20.0	.238	.	.
	DISTRICT	223	4.0	.145	91.0	.151	4.9	.146	.	.
	ALL	256	3.5	.145	80.9	.151	4.7	.164	10.9	.138
YANCEY	PENDING	14	.	.	.	.	.	.	100	.154
	SUPERIOR	1	.	.	100	.168	.	.	.	.
	DISTRICT	68	1.5	.	77.9	.143	20.6	.117	.	.
	ALL	83	1.2	.	65.1	.143	16.9	.117	16.9	.154

B. Evaluation of the Effectiveness of DWI Sanctions in Preventing Recidivism

The goal of most DWI programs has been to prevent driving while impaired by alcohol or drugs. Deterrence theory is predicated on the belief that a behavior can be prevented by the threat of punishment. According to this theory, the effectiveness of the perceived threat depends on the perceived certainty, swiftness, and severity of the punishment. The effect of deterrence may be specific or general.

Specific deterrence seeks through punishments, education and treatment to influence the drinking driver who has already been apprehended to refrain from drinking and driving in the future. Research has shown that drivers fatally injured in alcohol-related (A/R) crashes are more likely to have a history of previous DWI convictions (Brewer, et al., 1991; Fell, 1991). Simon (1992) reports that recent studies of DWI recidivism conducted in Minnesota indicate that an increasing proportion of drivers arrested for DWI are recidivists. Furthermore, Minnesota has also experienced an increase in the percentage of drinking drivers involved in fatal accidents who have had one or more prior alcohol-related incidents on their driver history records. Given the growing proportion of previously convicted DWI offenders in the fatally injured driver population and the increasing proportion of recidivists among those arrested for DWI, increasing attention is being focused on specific deterrence.

Most sanctions/countermeasures have a dual deterrent function in that an effective specific deterrent may serve as a powerful general deterrent. For example, loss of a license may be a strong specific deterrent to those who have experienced this sanction, and at the same time it may be a powerful general deterrent to those who consider it a consequence of drinking, driving and getting caught.

Numerous evaluations have been made of the impact of various sanctions (Voas, 1986; Nichols and Ross, 1989). However, it has been challenging to determine the deterrent value of individual sanctions because they are frequently implemented as part of a comprehensive set of countermeasures such that their individual contribution is difficult, if not impossible, to assess. Moreover, many evaluations have been handicapped by a lack of agreement on appropriate criteria for measuring effectiveness.

Evaluation of sanctions has further been complicated by the uniqueness of the settings in which they have been employed. The philosophy of the citizens of a state or jurisdiction shapes its public policy/law making. This means that the entire milieu in which sanctions and countermeasures are evaluated may differ not only state by state but also county by county and court by court. The variations are numerous, and interpretations of the success of a particular program as well as its transferability to other jurisdictions must be carefully considered. Researchers must endeavor to untangle the complexities of laws, enforcement practices, impositions of sanctions, etc. before they suggest that a particular sanction has had a deterrent effect.

This study seeks to evaluate the specific deterrence effectiveness of a set of sanctions applied to DWI offenders in North Carolina in order to identify which appeared to be most effective -- either in combination with other sanctions or alone -- in preventing subsequent DWI arrests. It does not consider the possible effectiveness of any remediation the offender may have received.

Background

The Safe Roads Act of 1983 made sweeping changes in the handling of DWI cases. It was intended to deter persons from driving while impaired by imposing more certain and uniformly severe sanctions on those arrested for and convicted of DWI. A major change resulting from the SRA was the division of the adjudication of each case into two discrete parts --determination of guilt or innocence and sentencing. Under the new sentencing structure, a series of aggravating and mitigating factors are weighed based upon a set of guidelines; at that time, the seriousness of the offense (level of offense) is determined and appropriate sanctions levied. Guidelines determine the range of sanctions to be applied at each level.

Methods

Data used in this study were obtained from the North Carolina Division of Motor Vehicle (DMV) Driver History File. This file contains confidential records referred to as RATERS (Rehabilitation, Alcohol Test, Evaluation, and Retrieval System) and contains

sanctioning information on every Driving While Impaired (DWI) arrest or, prior to the passage of the Safe Roads Act, for every Driving Under the Influence (DUI). This information is retained on the individual's file indefinitely -- regardless of case outcome. Furthermore, this file was established primarily as a tool to assist licensing authorities and the courts. It only serves in a secondary capacity as a means of evaluating sanctions.

The following analyses were directed toward identifying possible relationships between the sanctions imposed by the courts on drivers convicted of DWI and drivers' likelihood of recidivism over the three-year period following the conviction. Data for these analyses were extracted from the North Carolina driver history file for drivers convicted of DWI in 1987. Most of the analyses were based on recidivism (i.e., one or more subsequent DWI arrests) within the following three-year period, though some analyses also considered the first one-year period.

The sanctions considered were as follows:

Fine (no fine, active fine);
Jail (active jail, suspended jail);
Jail days (0,1,...);
Community service (yes, no);
Order by judge not to operate a motor vehicle (Not op or no not op, i.e., not told by the judge not to operate a motor vehicle);
Limited driving privilege (yes, no).

Since the level of offense dictates the range of sanctions, to some extent, most of the analyses were carried out within fixed level of offense. Licensure Sanctions imposed by DMV are not considered. Most people with a level 1 to 3 have a permanent or four year revocation.

Table 3 shows the distribution of 43,740 convicted drivers cross-classified by level of offense and 17 combinations of the above listed sanctions. The table also shows average number of jail days for those (sanction) groups receiving active jail sentences, and overall three-year recidivism rates for each group. Thus, it will be noted that those in our sanction combination group 2 who had no fines, had a mean number of 20 jail day, were assigned to community service, were told by the judge not to operate a motor vehicle and who received no limited driving privilege had a DWI recidivism rate of 29.7

Table 3. Combinations of sanctions for N C drivers convicted of DWI in 1987 by level of offense

Combination of Sanctions	Level of Offense							
Frequency Row Pct Col Pct	1	2	3	4	5	Total	Average # of Jail days	3 Year DWI Recidivism Rate
No Fine Active Jail Term No Community Service 1 Judge says No Veh. Oper. No Limited Privilege	1380 55.85 26.90	654 26.47 7.70	144 5.83 3.50	97 3.93 1.64	196 7.93 0.98	2471 5.65	242.2	28.4
No Fine Active Jail Term 2 Community Service Judge says No Veh. Oper. No Limited Privilege	11 10.89 0.21	32 31.68 0.38	9 8.91 0.22	9 8.91 0.15	40 39.60 0.20	101 0.23	20.1	29.7
No Fine 3 Suspended Jail Senc. Community Service Judge says No Veh. Oper. No Limited Privilege	0 0.00 0.00	0 0.00 0.00	18 18.00 0.44	18 18.00 0.30	64 64.00 0.32	100 0.23	--	18
No Fine 4 Suspended Jail Senc. Community Service Judge says No Veh. Oper. Limited Privilege	0 0.00 0.00	0 0.00 0.00	27 11.84 0.66	35 15.35 0.59	166 72.81 0.83	228 0.52	--	23.7
Fine 5 Active Jail Term No community service Judge says No Veh. Oper. No limited Privilege	2781 29.07 54.21	5817 60.80 68.52	280 2.93 6.80	231 2.41 3.90	459 4.80 2.29	9568 21.87	17.5	21.7
Fine 6 Active Jail Term No Community Service Judge says No Veh. Oper. Limited Privilege	6 0.69 0.12	20 2.30 0.24	81 9.33 1.97	131 15.09 2.21	630 72.58 3.14	868 1.98	4.4	26.0
Fine 7 Active Jail Term No Community Service Not Operate No Limited Privilege	389 28.54 7.58	737 54.07 8.68	50 3.67 1.21	38 2.79 0.64	149 10.93 0.74	1363 3.12	17.5	21.2
Fine 8 Active Jail Term Community Service Judge says No Veh. Oper. No Limited Privilege	416 24.05 8.11	848 49.02 9.99	94 5.43 2.28	84 4.86 1.42	288 16.65 1.43	1730 3.96	22.4	23.9
Fine 9 Active Jail Term Community Service Judge says No Veh. Oper. Limited Privilege	4 0.58 0.08	5 0.72 0.06	57 8.23 1.38	100 14.43 1.69	527 76.05 2.62	693 1.58	25.5	20.1

Combination of Sanctions	Level of Offense							
Frequency Row Pct Col Pct	1	2	3	4	5	Total	Average # of Jail days	3 Year DWI Recidivism Rate
10 Fine Active Jail Term Community Service Not Operate No Limited Privilege	17 13.39 0.33	80 62.99 0.94	13 10.24 0.32	5 3.94 0.08	12 9.45 0.06	127 0.29	20.4	18.9
11 Fine Suspended Jail Term No Community Service Judge says No Veh. Oper. No Limited Privilege	93 7.39 1.81	225 17.89 2.65	148 11.76 3.59	240 19.08 4.05	552 43.88 2.75	1258 2.88	--	15.7
12 Fine Suspended Jail Term No Community Service Judge says No Veh. Oper. Limited Privilege	0 0.00 0.00	1 0.25 0.01	34 8.44 0.83	68 16.87 1.15	300 74.44 1.49	403 0.92	--	25.6
13 Fine Suspended Jail Term No Community Service Not Operate No Limited Privilege	17 0.66 0.33	29 1.13 0.34	374 14.59 9.08	595 23.21 10.05	1548 60.40 7.71	2563 5.86	--	13.3
14 Fine Suspended Jail Term No Community Service Not Operate Limited Privilege	0 0.00 0.00	0 0.00 0.00	36 8.82 0.87	58 14.22 0.98	314 76.96 1.56	408 0.93	--	19.9
15 Fine Suspended Jail Term Community Service Judge says No. Veh. Oper. No Limited Privilege	12 0.15 0.23	29 0.36 0.34	1469 18.46 35.67	1880 23.63 31.75	4566 57.39 22.74	7956 18.19	--	24.4
16 Fine Suspended Jail Term Community Service Judge says No. Veh. Oper. Limited Privilege	4 0.03 0.08	10 0.08 0.12	1103 8.30 26.78	2178 16.38 36.78	9998 75.21 49.79	13293 30.39	--	23.0
17 Fine Suspended Jail Term Community Service Judge says No. Veh. Oper. No Limited Privilege	0 0.00 0.00	2 0.33 0.02	181 29.67 4.40	154 25.25 2.60	273 44.75 1.36	610 1.39	--	21.0
Total	5130 11.73	8489 19.41	4118 9.41	5921 13.54	20082 45.91	43740 100.00		

Frequency Missing = 400

within a three year period. About 40% of these offenders fell into level of offense category 5. On the other hand, combined sanction group 1 which also had a high recidivism rate, 28.4, had most of its cases drawn from level of offense category 1. This group also served an average of 242 jail days. Thus it may be seen that this group experienced a very high recidivism rate given that most of its members were incarcerated for almost an entire year and thus had reduced driving exposure.

Other factors often found to be associated with differing recidivism rates are age, sex, race, BAC at arrest, and prior driving record. Since level of offense is in part a function of prior record and BAC, the major part of the following analyses consists of examining recidivism rates within fixed levels of offense as functions of age, race, sex, and the various sanctions. Table 4 gives the frequency distributions of age, race, and sex by level of offense. The four age categories shown were selected on the basis that overall recidivism rates tended to be relatively constant within the categories, but varied monotonically across categories.

To investigate relationships between the sanctions, demographic variables and DWI recidivism, a series of logistic regression models were fit to the recidivism rates within each level of offense. More specifically, these models were of the form:

$$\log \frac{r_\alpha}{1-r_\alpha} = \beta 0 + \beta 1 \, X1\alpha + \ldots + \beta K X K\alpha \quad ,$$

where r_α is the probability of recidivism for the ath subject and the independent variables $X_{1\alpha}, X_{2\alpha}, \ldots, X_{K\alpha}$ represent the demographic factors and types of sanctions imposed for the ath individual. The model parameters were estimated by maximum likelihood methods using SAS PROC LOGISTIC. Table 5 shows results of main effects models fit to the data within each of the five levels of offense. The tabulated values are the estimated model coefficients and their standard errors.

The results of Table 5 form a fairly consistent pattern. Race is a significant factor for levels 4 and 5 and then becomes nonsignificant for the higher levels of offense 1 to 3.

Table 4. Distributions of age, sex, race by level of offense.

Level	Race	Sex	Age				
			16-20	21-30	31-40	41+	All
1	W	F	5	97	65	35	202
		M	103	1506	929	643	3181
	NW	F	.	14	18	15	47
		M	17	574	635	432	1658
	All		125	2191	1647	1125	5088
2	W	F	16	249	174	107	546
		M	180	2457	1371	1099	5107
	NW	F	1	36	45	35	117
		M	16	895	967	774	2652
	All		213	3637	2557	2015	8422
3	W	F	15	96	41	36	188
		M	234	869	568	481	2152
	NW	F	2	46	43	25	116
		M	62	569	556	402	1589
	All		313	1580	1208	944	4045
4	W	F	42	212	111	81	446
		M	449	1350	764	661	3224
	NW	F	4	61	65	28	158
		M	96	766	606	434	1902
	All		591	2389	1546	1204	5730
5	W	F	273	1128	611	432	2444
		M	1885	5344	2594	2219	12042
	NW	F	16	226	225	113	580
		M	307	1922	1246	1012	4487
	All		2481	8620	4676	3776	19553

Table 5. Logistic models for recidivism within 3 years by level of conviction.

Variable	Level				
	5	4	3	2	1
Race (W,NW)	.21** (.04)	.15* (.07)	.07 (.07)	.07 (.06)	-.04 (.07)
Sex (F,M)	.55** (.06)	.41** (.11)	.41** (.15)	.56** (.11)	.46** (.16)
Age (increasing)	-.21** (.02)	-.17** (.03)	-.24** (.04)	-.24** (.03)	-.13** (.04)
Fine (N,Y)	.08 (.11)	-.03 (.19)	.12 (.17)	-.08 (.09)	-.31** (.07)
Jail (Y,N)	-.09 (.06)	-.22√ (.12)	.06 (.12)	.10 (.14)	.17 (.18)
Com S (N,Y)	.18** (.06)	.33** (.11)	.20√ (.11)	.05 (.08)	-.05 (.11)
Not Op (N,Y)	-.29** (.08)	-.33** (.13)	-.25* (.12)	-.12 (.09)	-.14 (.12)
Lim P (N,Y)	.12** (.04)	.09 (.07)	.29** (.08)	.35 (.33)	-.65 (.64)
N (Total Revidivism Rate (%)	19,533 (21.0)	5,730 (23.3)	4,045 (27.6)	8,422 (22.2)	5,088 (28.3)

√ .05 < p < .10
* .01 < p < .05
** p < .01

The estimated effect shows non-whites to have higher recidivism rates than whites for levels four and five. Sex and age are always significant, with males having higher recidivism rates than females, and recidivism rates decreasing monotonically with increasing age category. The sanction of being prohibited by the judge from operating a motor vehicle was statistically significant in the models for levels 3, 4, and 5, as was the community service variable. Lower recidivism rates were associated with the sanction of being directed by the judge not to operate a motor vehicle; higher recidivism rates were associated with the community service sanction. The variable indicating that the subject was granted a limited driving privilege was significant in the models for levels 3 and 5 where it was associated with higher recidivism rates. The variables indicating an active fine was significant only in the model for level 1 where it was associated with lower recidivism rates. Finally, active jail was only marginally significant in the model for level 4 and was associated with higher recidivism rates.

To further examine the above relationships, refined models were developed for each level of offense through a process of removing nonsignificant variables and/or adding certain first order interaction terms to the model. Models using the variable jail days rather than the jail variable, which simply indicated an active jail sentence, were also considered. Only interaction terms representing combinations of sanctions were included in the models since primary interest was focused on such combinations, as opposed to interactions involving demographic variables. Only three such interaction terms were found to be statistically significant in the models presented in Table 6. These were labeled C*L, C*J, and $F^{*}J^{+}$, which represent interactions between community service and limited privilege and jail, and between fine and jail days, respectively.

It is of interest to examine the interpretation of the model results of Table 6. The effects due to the demographic variables are generally quite similar to those of Table 3-5. The model for level 5 shows estimated recidivism rates to be higher for drivers having community service than for those who do not, and higher for those with a limited privilege than those without a limited privilege. Thus, reaffirming the value of licensing as a deterrent. The interaction term, however, is negative and of essentially the same magnitude as the limited privilege effect. Thus, drivers who have both community

Table 6. Refined 3-year recidivism models by level of offense.

Variable	Level				
	5	4	3	2	1
Race	.20** (.04)	.12√ (.07)	--	--	--
Sex	.56** (.06)	.40** (.11)	.42** (.15)	.57** (.11)	.44** (.16)
Age	-.21** (.02)	-.17** (.03)	-.23** (.04)	-.23** (.03)	-.13** (.04)
Fine	--	--	--	--	-.29** (.11)
Jail†	--	.80** (.14)	--	--	-.0009† (.0007)
Comm S	.47** (.08)	.76** (.10)	.29** (.10)	--	--
Not Op	-.21** (.08)	--	-.24* (.11)	--	--
Lim P	.67** (.09)	--	.68** (.19)	--	--
C*L	-.66** (.10)	--	-.47* (.20)	--	--
C*J	--	1.11** (.23)	--	--	--
F*J†	--	--	--	--	.001* (.0005)

†This symbol in association with the jail sanction indicates that jail days was the variable used rather than the variable indicating an active jail sentence.

√ .05 < p < .10

* .01 < p < .05

** p < .01

service and limited privilege have essentially the same recidivism rates as those who have only community service; in other words, the effects are not additive. The interpretation of the level 3 model is essentially the same.

In the model for level 4, both an active jail sentence and community service are associated with higher recidivism rates as indicated by the positive parameter estimates for these variables in Table 6. The negative interaction term, however, negates most of the effects of both. That is, the net effect of having both active jail and community service is jail + community service + interaction = .80 + .76 - 1.11 = .45.

Neither interaction terms nor, any sanction variables were statistically significant in the recidivism model for level 2. In the level 1 model, the variable indicating an active fine and jail days (through its interaction with the fine variable) were statistically significant. Lower recidivism rates were associated with an active fine and with increasing jail days. The interaction term, however, negates the jail days effect for those having both the active fine and positive jail days. It should be noted that among level 1 convictees, those with no active fine generally tend to have long active jail sentences.

In addition to fitting recidivism models within levels of offense, a series of models were also fit within levels of a variable reflecting prior driving record and BAC level at time of arrest. This variable is labelled PCOND and is defined as shown in Table 7. Table 8 gives results in a similar format to Table 5 of main effects logistic models for DWI recidivism within three years fit to data within each level of PCOND. These results seem to be very consistent with those of Table 5.

A sequence of logistic models were also fit to data on recidivism within the first year following conviction, again within levels of offense. Computational difficulties were encountered with the estimation of a main effects model for the level 1 data. Results for models at levels 2 to 5 are presented in Table 9. Generally, fewer factors are statistically significant, but again, the same basic pattern of effects can be seen in these results as in Tables 3, 4, and 6.

Discussion

The sanctions that are placed upon a person convicted of DWI are, to a large extent, tailor-made to fit the situation. Thus, the DWI convictee thought, *a priori*, to have an

Table 7. Prior condition variable (PCOND) as defined in terms of prior alcohol arrests and convictions and BAC status at current arrest.

PCOND	Prior Arrests	Prior Convictions	BAC
1	0	0	<.12
2	0	0	blood test or .12-.15
3	0	0	.16-.18
4	0	0	>.18 or refused
5	1 or more	0	<.12
6	1 or more	0	.12-.15 or blood test
7	1 or more	0	.16-.18
8	1 or more	0	<.18 or refused
9	1+	1-3	<.12
10	1+	1-3	.12-.15 or blood test
11	1+	1-3	.16-.18
12	1+	1-3	>.18 or refused
13	1+	4	all
14	1+	>4	all

Table 8. Logistic models for recividism within 3 years by prior conditions (PCOND).

Variable	PCOND						
	1	2	3	4	5	6	7
Race	.25* (.11)	.23** (07)	.30** (.09)	.20** (.07)	-.04 (.25)	.14 (.16)	.31 (.21)
Sex	.92** (.19)	.67** (.11)	.54** (.12)	.32** (.09)	.68 (.56)	.44√ (.25)	.46 (.32)
Age	-.26** (.06)	-.35** (.04)	-.21** (.04)	-.27** (.04)	-.15 (.13)	-.14√ (.08)	-.33** (.11)
Fine	-.25 (.26)	.02 (.20)	.10 (.24)	.14 (.18)	.12 (.61)	.18 (.45)	-1.16** (.40)
Jail	-.11 (.19)	-.21√ (.11)	-.27√ (.14)	.10 (.11)	.10 (.32)	-.11 (.22)	.25 (.29)
Com S.	.50** (.19)	.23* (.12)	-57** (.15)	.22* (.11)	-.31 (.32)	.09 (.23)	.35 (.30)
Not. OP.	-.43√ (.23)	-.29* (.15)	.03 (.18)	-.25* (.12)	-.59 (.43)	-.42 (.31)	.41 (.33)
Lin. P	.06 (.10)	.05 (.07)	.07 (.09)	.20** (.07)	.13 (.22)	.26√ (.14)	.02 (.19)
N (Total) Recidivism Rate	2893 (19.3)	6539 (19.0)	3958 (21.6)	5899 (22.4)	526 (26.1)	1122 (32.1)	632 (33.4)

√ .05 < p < .10
* .01 < p < .05
** p < .01

Table 8. Logistic models for recividism within 3 years by prior conditions (PCOND) (Con't).

Variable	PCOND						
	8	9	10	11	12	13	14
Race	.32* (.16)	.16 (.17)	.11 (.10)	.06 (.11)	.00 (.06)	-.10 (.15)	-.13 (.14)
Sex	.33 (23)	.00 (.33)	.51* (.22)	.45* (.22)	.51** (.13)	-.24 (.52)	.01 (.58)
Age	-.42** (.09)	-.27** (.09)	-.29** (.05)	-.27** (.06)	-.30** (.04)	-.48** (.11)	-.38** (.10)
Fine	-.16 (.36)	-.03 (.25)	-.24√ (.14)	-.23 (.17)	-.20* (.09)	.07 (.18)	-.23 (.14)
Jail	.12 (.23)	.08 (.25)	.10 (.15)	.17 (.16)	.10 (.09)	.47√ (.25)	.12 (.24)
Com S.	-.01 (.23)	-.08 (.21)	-.07 (.13)	.02 (.14)	.06 (.08)	-.07 (.23)	-.05 (.22)
Not. OP.	-.24 (.26)	-.51√ (.29)	-.14 (.15)	.06 (.17)	-.02 (.10)	-.51 (.33)	-.09 (.25)
Lin. P	.14 (.16)	.28 (.27)	.24 (.16)	.48** (.16)	.25* (.11)	.05 (.29)	-.05 (.37)
N (Total) Recidivism Rate	1007 (29.1)	1052 (23.0)	3013 (23.4)	2413 (24.5)	6640 (25.6)	982 (27.5)	1063 (36.1)

√ .05 < p < .10
* .01 < p < .05
** p < .01

Table 9. Logistic models for recidivism in 1st year, by level of conviction.

	Level			
Variables	5	4	3	2
Race	.22** (.06)	.13 (.09)	.01 (.10)	.15√ (.09)
Sex	.48** (.08)	.17 (.15)	.46* (.22)	.48* (.19)
Age	-.15** (.03)	-.09√ (.05)	.14* (.06)	-.26** (.05)
Fine	-.07 (.15)	.08 (.27)	.14 (.25)	.09 (.18)
Jaildays	-.006** (.002)	-.001 (.002)	-.001 (.002)	.001√ (.0007)
Com S.	.11 (.08)	-.02 (.13)	.33* (.14)	.14 (.12)
Not. Op.	-.41** (.12)	-.29√ (.17)	-.06 (.17)	.15 (.14)
Lim. P.	.10√ (.06)	.21* (.09)	.21√ (.11)	.83* (.42)

√ .05 < p < .10
* .01 < p < .05
** p < .01

elevated risk of recidivism, may have subsequent DWI activity in spite of receiving relatively stiff sanctions rather than because of these sanctions. Other sanctions, such as active fine, are applied almost universally. This situation makes it very difficult to draw inferences from examining data on sanctions and subsequent recidivism.

Nonetheless, the consistency of the associations of higher recidivism rates with community service and limited privilege, and lower recidivism rates with the "no operation of a motor vehicle" sanction, especially for lower levels of offense (levels 3 through 5), may be suggestive of some true relationships that should be further investigated and may be further validation of the value derived from licensing sanctions.

C. Special DMV Programs Targeting DWI Recidivists

The 1983 Safe Roads Act made sweeping changes in the handling of Driving While Impaired (DWI) cases in North Carolina. However, while the 1980's witnessed a general reduction in alcohol-related and nighttime crashes in North Carolina, a significant proportion of those convicted of DWI continue to be repeat offenders. Of the 65,714 people adjudicated for DWI in 1988, 32 percent had one or more previous DWI's on their driving records; and 31 percent of these had two or more previous DWI convictions (Popkin and Martell, 1990).

In an effort to reduce this high recidivism rate, the North Carolina Division of Motor Vehicles (DMV) has instituted several programs that target those drivers who have been convicted of more than one DWI. A driver convicted of a second DWI offense loses his/her driving privilege for a period of four years if the offenses occurred within a three year period. Those who have had more than two convictions receive a permanent revocation after committing two offenses within a five year period and a third within ten years.

For purposes of this report a second time offender is one who had another DWI offense within three years of his first offense. Second-time offenders who have had their licenses suspended for a four-year period may appeal for a conditional driver's license at the end of two years of a hard license revocation. The appeal process is complicated and involves the offender's providing documentation that he/she is no longer having a drinking problem. Upon successful completion of the application process, the offender must appear before a hearing officer with at least three character witnesses who will testify as to his/her reform. These witnesses must not have a current DMV revocation for any alcohol-related offense. The second-time offender makes his/her appeal before a single hearing officer.

Offenders with permanent revocations present the greatest driving risk. After three years of a hard license suspension, these offenders may petition for a conditional restoration. At this hearing, the applicant must make his/her petition before a panel of three hearing officers who question the individual and witnesses and then vote

independent of one another regarding the suitability of the petitioner to be granted a conditional license. Majority vote rules. He must also provide a recent substance abuse evaluation.

In January of 1990, the North Carolina DMV provided the option to participate in a pilot ignition interlock program to a select group of second-time DWI offenders who were petitioning for a conditional license restoration.

The following evaluation is divided into two sections -- one focusing on procedures for handling second-time offenders and the second focusing on those with a permanent revocation.

C.1. An Evaluation of Specific DMV Programs Targeting Second-Time DWI Offenders

A recent advancement in the field of drunken driving countermeasures is the use of the ignition interlock, a device that prevents a car from starting if the driver is intoxicated. Unique among countermeasures, ignition interlocks target the agent in the public health framework -- the car -- as the point of intervention.

The notion of a "car that drunks can't drive" has been under consideration by the federal government since the late '60s. In 1970, Robert Voas wrote: "A car that could sense the capability of its driver and refuse to operate if the driver was not capable of safe performance, provides the most parsimonious approach to the problem of the impaired operator." Since then, two primary methods to identify a drinking driver have been considered -- performance tests and chemical tests. The former requires the driver to pass some type of dexterity test in order to start the car, and the latter requires the driver to pass an alcohol breath test to start the car. Difficulties with the development of dependable tests have delayed the use of both methods. However, recent improvements in the technology of electronic breath test devices have led to the development of breath test ignition interlock systems (Compton, 1988).

The popular device in current use is a breath test device attached to a car ignition system. Before starting the car, the driver is required to blow into a hand-held alcohol sensing device that determines the blood alcohol content (BAC) of a driver's deep-lung air sample and compares the driver's results with a pre-set limit. A BAC lower than the limit allows the driver to start the vehicle. If the driver tests above the allowable limit, the devices will 'lock out' the ignition system and the driver will be unable to start the car (Compton, 1988).

Potential Benefits of the Interlock

Developing a car which "drunks can't drive" has intuitive appeal, given the difficulties with educating or coercing drinking drivers to change their behavior or changing our social or physical environment. As the countermeasure targets the car, the

interlock is attractive for a variety of reasons. It bypasses any decision-making requirement on the part of the driver; the driver is prevented from driving regardless of any personality or situational factors that might influence that decision. The ability of the interlock to bypass the individual's decision-making ability may be especially relevant for the population of repeat offenders. While estimates vary on the extent of alcohol problems among offenders, most studies show that the majority of those convicted have driving problems (Fell, 1990; Arstein-Kerslake & Peck, 1985). Drivers who are alcohol-dependent may be unable to control their drinking and consequently, may have great difficulty controlling their drinking and driving.

Ignition interlocks give immediate feedback on a driver's intoxication level and provide a driver with a reminder not to drink and drive each time he/she enters the car. Some evidence suggests that people are not accurate judges of their own levels of intoxication (Russ & Geller, 1985) and consequently may drive under the mistaken assumption that they are not intoxicated. By providing immediate feedback when a driver attempts to start the car, interlock may help a person more accurately judge his/her intoxication level. Over time, interlock may serve to teach drivers to separate their drinking and driving. In one study, 90 percent of interlock users self-reported that interlock has been successful in helping them learn to separate their drinking and driving (Morse & Elliott, 1991).

Interlock specifically prohibits driving while impaired. As described earlier, other interventions attempt to address the drunk driving problem by targeting either drinking behavior or driving behavior. Studies have failed to show that alcohol treatment or educational programs alone, which target drinking behavior, have much effect on highway safety (NHTSA, 1988; Fell, 1990). While researchers have found license sanctions, which target driving behavior, to be an effective measure in reducing recidivism rates, more recent studies have found that the combination of license sanctions and rehabilitation is more effective than either alone (Fell, 1990). Although interlock is neither a license sanction nor a treatment program, it addresses drinking and driving as one behavior rather than targeting either drinking behavior or driving behavior exclusively.

In addition, the interlock provides a mechanism to keep a driver under the surveillance of the licensing system and at the same time, ensures that the driver is not driving while impaired while using the vehicle with an interlock. While license sanctions are effective in reducing recidivism, and are easily imposed, they are often difficult to enforce. Various studies report that 75 percent to 90 percent of those with suspended or revoked license continue to drive (Fell, 1990). An interlock allows a driver to operate a vehicle legally while ensuring he/she cannot drive drunk while in the vehicle with an interlock.

Limitations of Interlocks

In the public health framework, interlock directly targets the car, bypassing to some extent host and environmental factors which influence the practice of drunk driving. The device is, however, by no means foolproof in the real world. In laboratory testing of the devices available in 1988, NHTSA found a motivated individual could tamper with the system and bypass the device (NHTSA, 1988). Additional problems associated with the use of the device include: the risk that a person other than the designated interlock user will start the car; the possibility that the offender will use another car; and the danger that a person will drink after having started the car.

Devices currently available require a driver to provide a breath code to activate the device in order to make it more difficult for people other than the targeted offender, to start the car (Compton, 1988). In addition, many states have per se laws, making it illegal for another person to start a car for an interlock user or for an interlock user to solicit aid. To ensure that once the driver has started the car, he/she continues to drive sober, devices can be set to require retesting after a certain period of time (after 45 minutes in North Carolina).

Prior Evaluations of the Interlock

The development of reliable interlocks is relatively new. Hence, research to determine their effectiveness is sparse. Furthermore, two methodological limitations of existing studies raise questions concerning the reliability and validity of their findings.

The primary objective of interlock programs is to reduce recidivism rates. However, the only measure of recidivism available to researchers is a repeat DWI offense in DMV driver files or involvement in an A/R crash. Given the low detection rates for drunk driving and estimates that the average amount of time between offenses ranges from one to two years (Fell, 1990), studies must either follow large numbers of people or cover long periods of time. Secondly, researchers have had to study interlock programs as implemented by agencies in the field. The studies, to date, all lack random assignment; and consequently, it is difficult to isolate the effects of interlock from other intervening influences.

Two studies have provided preliminary results regarding the effectiveness of the interlock as a countermeasure, using repeat DWI offenses as their primary outcome measure. Both have been underway for a few years, and consequently their conclusions are limited by the relatively short period of follow-up. A study conducted in Ohio (Morse and Elliot, 1990) matched convicted DWI drivers assigned to interlock with a license suspension group. Assignment to interlock was non-random with participation dependent on both judicial and self selection. However, the researchers noted the bias to be in the direction of higher risk for the interlock group. After 30 months, the recidivism rate for the interlock group was 3.4 percent as compared to 9.8 percent for the control license suspension group, a 65 percent reduction in rates.

In a California study (EMT, 1990), offenders assigned to interlock were matched with offenders from other counties where interlock was not available. After 30 months, 9.2 percent of the interlock participants were reconvicted for DWI as compared to 12 percent for the controls. Unfortunately, problems with the study implementation made it difficult to interpret this difference. The probationers were under little supervision and violations were numerous; many assigned to interlock did not have the device installed or failed to report for monitoring.

Both studies are ongoing and will provide further information regarding the effectiveness of interlock over time. Additional studies have been initiated or planned in Oregon, Maryland and Minnesota (Linnell and Mook, 1991).

Current findings do not enable us to identify the types of convicted drunk drivers for whom interlock would be most effective. With time, it may be possible to pool the results of programs targeting different groups of offenders in order to determine if there are particular types of offenders for whom interlocks are most effective. To date, the Ohio interlock program targets offenders with one of the following characteristics: a blood alcohol content (BAC) of greater than or equal to 0.20; a prior DWI conviction within the past 10 years; or those who refused the BAC test (Morris & Elliott, 1990). In California, although a diverse group of offenders was eligible for an interlock, reductions in recidivism rates were greatest among offenders with one or more prior convictions for DWI. In a Maryland study (1988), Baker concluded that multiple offenders may be the best target group based on the results of self-assessments of the usefulness of the interlock device by both first-time and multiple offenders. She found, compared to multiple offenders, first-time offenders were more hostile toward the device and their assessment of the device's usefulness was lower. Somewhat contradictory results were reported by a program implemented in Pennsylvania which targets first-time offenders. That program reported very low rates of recidivism among the first-time offenders on interlock (Linnel & Mook, 1991).

In summary, based on the studies conducted to date, interlock appears to be a potentially useful countermeasure to address the problem of drunk driving. In a recent "Report to Congress", Compton (1988) concluded that because "there was not enough evidence that the devices are effective, it is not appropriate for the devices to be used in lieu of other sanctions that have evidence of beneficial effects (e.g., suspension); however, use of this technology as an additional condition of probation or for reinstatement of a restricted driving privilege does appear appropriate." The report advocates additional research to determine the effectiveness of the devices.

North Carolina's Interlock Program

The North Carolina Interlock Pilot Program began in North Carolina in January 1990. Its primary goals are to:

1. Provide a more verifiable restoration program;
2. Reduce DWI recidivism;
3. Reduce DWLR offenses;
4. Introduce an additional tool of deterrence by separating the intoxicated driver from his or her vehicle;
5. Introduce a known behavioral modification tool in changing the driving habits of the DWI offender;
6. Introduce an additional punitive element as part of the highway safety "sanctioning package": and
7. Provide a deterrent action for the entire driving population through their desire to avoid forced interlock use.

The interlock program in North Carolina is administratively managed by the Division of Motor Vehicles under the statutory authority of DMV's commissioner. The DMV contracts with a private company, Monitech, to install its Guardian interlock devices and monitor the program. Consequently, the DMV is responsible for assigning offenders to the program, and Monitech has the responsibility of monitoring the offenders once offenders enter the program.

Sanctioning Process. In North Carolina, the DMV suspends the license of all persons convicted of a second DWI offense for a period of four years. After serving two years, all second time offenders are eligible to petition for a conditional license valid for the remainder of their suspension period. Conditional licenses granted to DWI offenders generally restrict the driver to daylight-only driving and prohibit the consumption of any alcohol while driving. If the driver violates any terms of the conditional license, the conditional license is revoked for the balance of the four year revocation; and the four years of his/her license suspension period begins again. Approximately one half of the offenders eligible to petition actually begin the application process.

Conditional License Application Procedure. The conditional license application process is lengthy, taking an average of three to five months. The procedure requires the petitioner to submit documentation that he/she has incurred no additional criminal or

vehicular records and is not currently abusing alcohol or drugs. Once this documentation is submitted to the DMV, the file is turned over to one of 20 DMV hearing officers responsible for making decisions on license restoration. On the basis of this documentation, the hearing officer either makes a determination that there is a disqualifying conviction and disqualifies the petitioner or grants the petitioner a hearing.

Hearings. At the hearing, the petitioner is required to testify regarding his/her alcohol use. Three witnesses, who know the petitioner well enough to attest to his/her character, are asked to confirm whether the petitioner is or is not currently drinking. Three outcomes of the hearing are possible. The hearing officer can: (1) deny the petitioner's application; (2) grant the petitioner a conditional license and require participation in the Interlock program or; (3) grant the petitioner a conditional license.

Criteria for Issuance of a Conditional License. Assignment of petitioners to the Interlock program is not random, but rather is made upon the completion of the petition and the decision of the hearing officer. Each officer is required during the hearing to complete a form indicating that the offender has been assigned to interlock, given a conditional license without interlock, or denied a license.

No set policy guides the hearing officers' decisions during a hearing. However, preliminary discussions with several hearing officers suggest that the officers use the interlock as an extra control measure if they are reasonably certain the person is not drinking, but believe the person needs some additional support and that highway safety needs some additional assurance. Thus, it can be hypothesized that the interlock group is more at risk for a repeat DWI than the conditional license group, but less at risk than the group denied a conditional license.

Self Selection. Once a hearing officer offers either a conditional license with or without interlock to a petitioner, the petitioner may choose to accept or reject the offer. This decision may be affected by several factors: the high cost of insurance for DWI offenders; the cost of interlock itself; objections of other family members; and the ownership of a car. Offenders who reject the offer of interlock are consequently unlicensed for the remainder of their four-year suspension period, but may reapply for another hearing after one year.

Implementation by Monitech: the Interlock Service Company. The DMV contracted with a private company, Monitech, to supply, install, and monitor the Interlock devices and their use. Currently, Monitech has one installation center located in the middle of the state and two additional service centers regionally located in the eastern and western parts of the state. The company is required by the state to provide service to interlock users throughout the state within 24 hours.

Program Monitoring. Petitioners who agree to participate in the Interlock program do not receive their conditional license until they provide the DMV with installation papers from Monitech. This assures the DMV that a petitioner has, in fact, had an interlock installed. Once the device is installed, the participant must return to the service center every 60 days for a monitoring check. The device itself will warn the user that a check is needed by emitting regular beeping noises. If the user misses a monitor check, the device will lock-out the ignition system, and the user will be unable to start the car. Interlock users are in close contact with Monitech personnel, returning to the service center every 60 days and calling if they have problems with their device. The company must submit compliance reports to the DMV for all installations, monitoring checks and device removals.

Program Costs. All program costs are the responsibility of the offender. Costs include an installation fee of $70 and a fee charged at each monitoring check. Monitech is required by the DMV to provide assistance to offenders who qualify for food stamps. Thus, the program costs are born by the individual offenders and Monitech rather than the State.

Methods

An ideal experimental design for the evaluation of the program would call for persons convicted of a second DWI offense to be randomly assigned to (1) receive a license without interlock, (2) receive a license with interlock, or (3) not receive a license; and then monitor and compare the recidivism rates of these groups over time. However, random assignment is not possible in North Carolina as licensing decisions are made at the discretion of DMV hearing officers and in some instances, by judicial discretion. Thus, it is likely that differences existed among the second-time offender groups at the

onset of the study period; and consequently, it is likely that group recidivism rates reflect, in addition to treatment effects, driver characteristics prior to assignment. For this reason, the present study describes how these groups differed at the time of arrest for second time DWI and then compares their recidivism rates.

This study examines North Carolina DMV's current programs for handling second-time DWI offenders.

Study Population and Group Assignment: All DWI offenders convicted of their second offense between January 1, 1986, and November 3, 1989, were identified using the Division of Motor Vehicle's driver history files. The offenders were categorized by group using information from the driver history files and a list of interlock participants provided by the DMV. The four groups were defined as follows:

1. Non-Applier Group (Non-Appl.) consists of those who never applied or who began the application process but did not complete the documents necessary to be considered for a hearing and consequently have no license.

2. Denied License Group (Denied) are those who completed their application documents, but were denied a conditional license by the hearing officer. The hearing officer may have rejected their request based solely on a review of their documents or on the basis of further information obtained during a hearing. Also included in this group are those who were offered a conditional license with mandatory participation in the interlock program but declined.

3. Interlock Group (Interlock) includes those who obtained a conditional license and had an interlock installed on their vehicles; and

4. Conditional License Group (Cond. Lic.) are those who obtained a conditional license and were not required to participate in the interlock program. This group was believed by the hearing officers to present the lowest highway safety risk.

The survival of each of these groups of drivers was followed during the four-year period of suspension and for the period of time after which they had gained full licensure (and had the interlock removed).

Measure of Recidivism. Because of the short length of follow-up, DWI recidivism was measured by a subsequent arrest or reconviction for DWI recorded in the DMV files.

Time at Risk. Recidivism was examined retrospectively for three time periods:

TIME 1: To examine how the four groups differed before becoming eligible for a hearing, recidivism data were collected during the pre-hearing time period for each of the four groups. The number of DWI events was determined for Non-Appl. and Denied Groups for the first 730 days of their license suspension period. The number of DWI events was determined for the Interlock and Cond. Lic. Groups for the period of time before they received their conditional license.

TIME 2: Data for Time 2 were collected for the second period of the four-year suspension . For offenders in the Interlock and Cond. Lic. Groups, this time period began when they received their conditional license. For offenders in the Non-Appl. and Denied Groups, this time period began on day 731 of their license suspension. Each offender was followed until either he/she received a full license at the end of his/her suspension period or March 1992.

TIME 3: A final examination was made of recidivism rates of those second-time offenders in each group who completed their four-year suspension period and received a full license. (Because the pilot Interlock program only began in January 1990, the post-licensing interlock group is relatively small.)

Analysis. The percentage of offenders in each group arrested and/or reconvicted for DWI was calculated for the three time periods. Additionally, failure rates per 100,000 exposure days were calculated for the four groups during the three separate time periods by dividing the total number of arrests and/or convictions for each group by the total days of exposure for each group. The failure rates for the Cond. Lic. and the Interlock groups during their conditional license period (TIME 2) were compared and the significance of the difference calculated.

Limitations of the study. The study design was quasi-experimental, which affected the assignment of individuals into groups. Thus, it is likely that differences existed among the second-time offender groups at the onset of the study period, and consequently likely

that group recidivism rates reflect, in addition to treatment effects, driver characteristics prior to assignment.

The study findings should be interpreted with caution. The following research limitations should be considered when interpreting the results: 1) Lack of random assignment: 2) Small numbers of Interlock participants; and 3) Short time at risk.

FINDINGS

A total of 22,418 offenders convicted of a second-time DWI offense between January 1, 1986, and November 3, 1989, were identified: 19,206 Non-Appliers (Non-Appl.); 1,889 in Denied Conditional License Group (Denied); 407 in the Interlock Group (Interlock); and 916 in the Conditional License Group (Cond. Lic.). Table 10 presents the average age, race, and sex and BAC level at the time of arrest for each group. The majority of the second-time DWI offenders were white males with an average age of 31.5 and an average BAC at arrest of 16.5. Non-Appliers were more likely to be male and non-white than the three groups whose members completed the license application process. There are few differences among the three groups that applied for a conditional license, although the Denied Group's members were slightly more likely to be non-white males, and the Cond. Lic. Group was more likely to be female. It is interesting to note that the Interlock group had the highest mean BAC level at the time of arrest.

TABLE 10

Characteristics of second-time offenders by group.

	Non-Appl N=19,206	Denied N=1,889	Interlock N=407	Cond.Lic. N=916	Total N=22,418
Age	31.4	31.3	31.5	33.0	31.5
% White	66.4	76.1	83.0	84.0	68.0
% Male	90.9	88.5	84.8	82.9	90.0
Average BAC	16.5	16.1	16.7	16.3	16.5

Table 11 presents the failure rates during TIME 1. A substantial difference exists between Non-Appl. Group and the groups who applied for conditional licenses. Eighteen percent of the Non-Appl. Group were rearrested or reconvicted during TIME 1 as compared to only one percent of the other groups. Their failure rate was 24.4, compared with failure rates ranging between 1 and 1.7 for the other groups applying for a conditional license.

TABLE 11

Recidivism rates of second-time offenders by group during TIME 1				
	Non-Appl	Denied	Interlock	Cond. Lic.
# Rearrested	34.0	23.0	5.0	9.0
% Rearrested	18.0	1.2	1.0	1.0
Failure Rate Per 10^5 Exposure Days	24.4	1.7	1.2	1.0

TABLE 12

Recidivism rates by group during TIME 2				
	Non-Appl	Denied	Interlock	Cond. Lic.
# Rearrested	1,891	106	11	65
% Rearrested	9.8	5.6	2.7	7.1
Failure Rate Per 10^5 Exposure Days	12.4	7.7	7.8	13.5

TIME 2. Table 12 presents the failure rates for offenders during TIME 2 (the second half of the license suspension period). The Non-Appl. and Denied Groups have no license, while the Interlock and Cond. Lic. Groups both possess conditional licenses. For the Non-Appl. Group, the percentage of offenders who recidivate, was considerably lower during TIME 2 as compared to TIME 1. The Non-Appl. Group failure rate per 10^5 for this period was 12.4.

The groups that applied for conditional licenses experienced increases in their failure rates between TIME 1 and TIME 2. The Denied Group's failure rate increased from 1.7 in the first two years of its license suspension period to 7.7 during the second two years. The Interlock Group shows a similar increase from 1.2 to 7.8. The Cond. Lic. Group increased from 1.0 to 13.5. Of special interest to the study is the difference in the failure rates of the three groups applying for a conditional license. The failure rates of the Denied Group and the Interlock Group are the same even though the Denied Group is unlicensed and should have no driving exposure. For those licensed groups, Interlock and Cond. Lic, the difference in failure rates is statistically significant ($p < .05$).

Table 13 presents data on the failure rates for the four groups during the entire four-year license-suspension period. During this time, the Non-Appl. Group experienced a failure rate of 18.2. Among the groups that apply for a conditional license, the Interlock Group had the lowest failure rate (2.9), followed by the Denied Group (4.7) and the Cond. Lic. Group (5.2).

A considerable difference in the exposure times between groups was found. The average exposure days per offender in each group are: 793.4 days for Group 1; 726.4 for Group 2; 346.2 for Group 3; and 527.3 for Group 4.

TABLE 13

Recidivism rates by group during license suspension period				
	Non-Appl N=19,206	Denied N=1,889	Interlock N=407	Cond. Lic. N-916
# Rearrested	5,311	129	16	74
% Rearrested	27.7	6.8	3.9	8.1
Failure Rate Per 10^5 Exposure Day	18.2	4.7	2.9	5.2

TIME 3. The failure rates of those study participants completing their license suspension period and receiving a full license are presented in Table 14. During the study period, 2,621 members of the Non-Appl. Group completed their four-year license suspension period and received their full license, whereas 1,048 members of the Denied Group, 160 members of the Interlock Group, and 428 members of the Cond. Lic. Group received a full license. The percentage of those offenders arrested or reconvicted after receiving their full license is similar for the Non. Appl. and Denied Groups -- 13 percent and 14 percent respectively -- and the Interlock and Cond. Lic. Groups at 6.3 percent and 5.8 percent. However, when the failure rate for the four groups is determined, the Interlock Group had a rate (35.7) comparable to the Non-Appl. (37.4) and Denied (33.0) Groups, while the Cond. Lic. Group maintained a much lower rate, 14.4.

TABLE 14

Recidivism rates by group after full-license restoration				
	Non-Appl N=2,621	Denied N=1,048	Interlock N=160	Cond. Lic. N=428
# Rearrested	341	147	10	25
% Rearrested	13.0	14.0	6.3	5.8
Failure Rate Per 10^5 Exposure Days	37.4	33.0	35.7	14.4

Discussion

The primary purpose of this study is to determine the effectiveness of the Interlock program, as implemented in North Carolina, in reducing recidivism among second-time DWI offenders. Because the results of this study are preliminary, conclusions must be interpreted with caution given the research limitations mentioned earlier.

North Carolina's DMV is trying innovative approaches to deal with its large number of DWI recidivists. The licensing sanctions are quite stringent for recidivists. DMV has implemented a rigorous application process for any offenders seeking a conditional license. The number of forms and extent of information the applicant must complete undoubtedly discourages the less determined from applying. Many others disqualify themselves from eligibility by committing the offense again before they are eligible to apply for a hearing. Those second time DWI offenders who completed the application process for a conditional driver's license were less likely to have been arrested for another DWI during the two-year hard license revocation period and maintained a lower failure rate for DWI during the entire revocation period.

The study results can be generalized only to a relatively small low-risk group of second-time DWI offenders, given that the majority of offenders, by not completing the application process for a conditional license, select out of the Interlock program. These offenders appear to be a higher-risk group than those who apply. Additionally, the fact that only a small percentage of offenders complete the application process may indicate that these offenders are different in some way than those who did not complete the application, perhaps more motivated to drive or more capable of safe driving.

The primary comparison groups examined to test the effectiveness of Interlock consisted of those offenders who applied for a conditional license. Hearing officers determine the composition of the three primary groups under study. While the study included no mechanism to assess risk among the offenders assigned to the three study groups, as previously described, informal interviews with several hearing officers suggest that officers consider interlock participants to rank between the denied group and the

conditional license group in risk. If this assignment process is followed, the study provides a conservative estimate of the effects of interlock as compared to either license denial or the conditional license.

The failure rates found after offenders received their full licenses indicate that while the Interlock program reduces recidivism during the period of program participation, the suppression effect may not continue once the devices are removed and participants leave the program. Through interviews and questionnaires, Interlock users in several studies have stated that Interlock has served to reduce their drinking or helped them drink more responsibly (Linnell & Mook, 1991) suggesting that interlock may function to change drinking/ driving behavior. The findings in this study suggest that any behavior change effects of interlock are dependent on participation in the program and may not continue after the device is removed. The findings suggest that Interlock programs may control a driver's behavior while under the program auspices but may not serve to change drinking/driving behavior over time.

In summary, those second-time DWI offenders in North Carolina receiving the interlock at the end of two years of a hard license revocation fared better during the final two years than those who had a four-year hard license revocation. In addition, the interlock group's recidivism rate was significantly better than that of the conditional licensees during the period of time that the interlock was installed on the car. Unfortunately, recidivism levels for the Interlock group returned to higher levels after full licensing privileges were returned, and interlocks were removed. The low failure rate at full licensure of the Cond. Lic. Group supports the hypothesis that the hearing officers are successfully identifying the lowest risk group to receive a conditional license. Once all sanctions have been removed, this group performs the most successfully.

Several areas for research are suggested by the study findings:

1. The North Carolina study should be continued for an additional period of follow-up after the Interlock device is removed in order to provide stronger evidence on the long-term effectiveness of the Interlock.

2. The data available should be analyzed to determine the amount of time Interlock was installed. A comparison of installation time between those who failed after the device was removed and those who did not would

permit exploration of the possibility that the long-term effects of Interlock are time-dependent. Future studies should examine the effects of variable installation time on both the short (during program participation) and long-term (after removal) effects of Interlock installations.

3. To understand the dynamics of program effectiveness, information should be collected from Interlock participants about their attitudes, opinions and feelings regarding the Interlock program. Of particular interest are their perceptions of the effects of interlock installations, both short and long term, on drinking/ driving behavior and their perception of the role of the service provider in assisting an offender to change his/her drinking driving behavior.

4. The large number of offenders who do not complete the application process and their high rate of recidivism during the four-year license suspension period indicates a need to examine more closely who does and who does not apply for a conditional license and how these differences may affect the effectiveness of Interlock.

Recommendations

It was difficult to estimate any long term behavior benefits of the Interlock program because the study was limited by the both the number of cases and amount of follow-up time at full-licensure. From research conducted to date, it is not known how Interlock might function to break the drinking/driving cycle. If Interlock operates primarily as a control mechanism and produces no change in long-term drinking/driving behavior, as the preliminary results of this study suggest, the devices may need to be installed on offenders' cars either permanently or for a longer period of time. If long-term behavior change is desired, the Interlock program may need to be coupled with remediation or other supervisory programs targeting drinking behavior. The results of this study are preliminary and do not provide conclusive evidence to support either direction at this time.

Although random assignment may not be possible within the North Carolina sanctioning system for second-time offenders, consistent data collection on offender characteristics ultimately would provide more information on the type of offender who would benefit most from the use of Interlock. The information would allow the DMV to

further develop sanctioning of drunk driving and to use the Interlock program for offenders most likely to benefit.

The North Carolina program is still relatively small, serving approximately 700 second and third-time offenders. Until now, the program owner and staff have kept in close contact with program participants. It is possible that the effects of the Interlock program found in this study reflect some aspect of the close contact with the service personnel rather than an effect of the Interlock device itself. As the program grows, it will be essential to monitor the failure rate of Interlock participants in order to determine the maximum number of participants the program can serve effectively.

Monitech, the North Carolina Interlock service provider, is currently computerizing its system to monitor program participants. Several states are in the process of developing Interlock programs. The information that Monitech has the potential to provide regarding both the service time spent monitoring the program (i.e., responding to service problems, scheduled monitoring checks, etc.) and the types of service problems experienced will be invaluable in the development of model programs.

The finding that a majority of offenders do not complete the application process for a conditional license and that these offenders experience a high failure rate throughout the four-year license suspension period indicates an area of concern for the North Carolina sanctioning program for second-time offenders.

CONCLUSIONS

The study supports the conclusion that the North Carolina Interlock program serves to reduce recidivism while the device is installed on the car. It suggests, however that Interlock does not serve to change the long- term behavior patterns of drinking drivers which reemerge once participants have left the program. The study conclusions must be interpreted with caution given the research limitations described earlier.

The positive results of the study are sufficient to recommend the continued experimental use of ignition interlocks as a sanction for second- time offenders in North Carolina. The limitations in the study design and expected future growth in the Interlock

program in North Carolina indicate the need to continue to measure the effects of the program over time.

C.2. Analysis of Driver Records for Those with Permanent Revocations for DWI

The data file used for these analyses consisted of the driver history records for drivers receiving a permanent revocation following a conviction for DWI, in the time interval running from January 1984 through March 15, 1992. Each study record contained the driver's race, sex, and birthdate, counts of prior convictions for DWI, driving with no license, moving violations, and accidents. Counts of each of these items over the study period following the permanent revocation were also included as were the dates when as many as (the first) three of each of these events occurred. The records contained the starting date and ending date for each subject, and the point in time when the subject was granted a conditional license; and if this license was revoked, when these events occurred.

The data file contained a total of 36,739 records. Approximately 10 percent (3694), were given conditional licenses at some point during the study period. Sex and race distributions of the group getting a conditional license and the no license group are shown in Table 15 below. The average age of subjects in the two groups, as of 1992, was 40.0 for the no license group and 42.7 for the conditional license group. Females were more likely to be granted a conditional drivers license as were whites.

TABLE 15

Sex and race distributions					
	Females	Males	Whites	Non-Whites	Total
No License	1587 (4.8%)	31173 (95.2%)	21872 (66.8%)	10888 (33.2%)	32760
Conditional License	224 (6.1%)	3470 (93.9%)	2922 (79.1%)	772 (20.9%)	3694
Total	1811	34643	24794	11660	36454

Since our records start at the time of the DWI conviction leading to the permanent revocation, the record of a driver who is eventually granted a conditional license usually contains a fairly long time interval prior to his getting the conditional license (4.1 years on average). The average length of record following the conditional license is 2.6 years. By contrast, the average record length of those who did not get a conditional license within our study period was 4.5 years. Thus, these differing observational intervals need to be taken into account, either formally or informally in the comparisons that follow.

Table 16 presents the driving performance of the group of drivers with a permanent revocation who were not licensed (N=33,045). Of this group, 10,582 (32%) had 17,415 DWI's within the study period. Their failure rate per 100,000 exposure days was 32. The average time to failure was 734 days.

Table 16

Performance of no license group N=33,045

	No of Events	Events/100,000 Days
DWI	17,415	32.0
Accidents	3,876	7.1
No D.L.	17,689	32.5
Moving Violations	3,585	6.6

Total exposure 54,358,364 days

Table 17 presents the performance of that group of drivers with a conditional license (N=3694). Information is presented for the period before licensure as well as for the period after conditional licensure. The fact that performance in the before period is good is not surprising because the panel of DMV hearing officers judged them to present so low a risk that they received a conditional license.

Table 17

Performance of conditional license group N=3694

	No of Events	Events/100,000 Days
Before Licensure		
DWI	311	5.6
Accidents	137	2.5
No D.L.	423	7.7
Moving Violations	87	1.6

Total exposure 5,516,915 days

	No of Events	Events/100,000 Days
After Licensure		
DWI	1167	33.9
Accident	725	21.1
No D.L.	348	10.1
Moving Violations	801	23.3

Total exposure 3,439,022 days

The performance of this group after they obtain licensure declines. Of the 3,694 members of this group, 816 (22.1%) had 1167 subsequent DWI's within the study period for a failure rate of 33.9 per 100,000 days of exposure. The average time from granting the conditional license to first DWI was 504 days.

Data on number of accidents, charges of driving while license suspended or revoked are presented for each group. Associated failure rates are also presented. The no licensed group, perhaps because of reduced exposure, experienced lower failure rates in all categories except no valid driver's license. It is logical to assume that those with a conditional license would be much less likely to be charged with No Driver's License.

The poorer performance of the conditional license group with regard to accident involvement and moving violations is reason for concern. These drivers should only be driving during the day and should have consumed no alcohol before driving.

Summary and Recommendations

The poor driving histories of these groups of drivers indicate that they are poor driving risks. Even those drivers who provided, extensive documentation that they had 'changed' their drinking driving behavior and who were granted a conditional license restoration had an unacceptably high rate of DWI recidivism. Of most serious concern is the high accident involvement of this group. These findings suggest that these drivers require supervision and monitoring. A reasonable plan would be to have these drivers attend a special driver improvement course. In addition, these offenders could be required to have permanent interlock installed on all the vehicles they drive. If they drive a "non-interlock" equipped vehicle or bypass the interlock and are found driving while impaired, their tags and or cars be confiscated. All permanently revoked drivers could be required to have a large reflectorized decal placed on the side of their vehicle to alert enforcement officers that a high risk driver may be present. In addition, this group of drivers could be on supervised probation, and courts should require providing interlock data on a regular basis to probation officers. This information will assure better

compliance and enable earlier intervention and tag confiscation of those who are unable or unwilling to comply. It also reminds the individual that he is under surveillance.

D. An Evaluation of the N.C. Department of Correction's DWI Parole Treatment Facility

An additional program for dealing with multiple DWI offenders is operated by the North Carolina Department of Corrections (DOC). Approximately 700 to 800 of the 19900 inmates in state prisons are there as the result of a DWI misdemeanor or other DWI related offense. Most offenders sentenced to terms of less than 6 months to serve their time in county jails, while those with sentences of six or more months of confinement are typically sent to N.C. prisons. There are some exceptions to this with women in some counties without adequate facilities more often being sent to state prison.

Many of these inmates have multiple DWI offenses on their driving records and may be regarded as one of the most difficult groups to deter. Many of them return to the prison system soon after they are released. In response to the large number of inmates in North Carolina Prisons for DWI misdemeanors or other DWI related offenses, the Department of Corrections established a DWI Parole Treatment Facility at Cherry Hospital in Goldsboro.

The program which began operation in July 1989 identifies DWI misdemeanant offenders upon their admission to the state prison system. Participation in the program is offered to inmates and upon successful application, offenders are paroled to the facility by the North Carolina Parole Commission for 28 days of intensive substance abuse counseling. As many as 96 offenders may participate in the program at one time. Those who successfully complete the program are returned to their home communities under parole supervision. Those who fail to complete the program are returned to prison.

The goals of this program are to prevent further DWI recidivism on the part of participants. While most of these offenders have permanent revocations on their driving records and are not yet eligible to receive a license restoration, this group represents the most dangerous of the hard core drinking drivers because many of this group drive regardless of their licensing status.

Although a sufficient amount of time has not elapsed to enable an in depth evaluation of the impact of this sanction on offenders. HSRC is currently examining the driving performance of those released to their respective communities. Due to problems in

obtaining the necessary information on participants, this aspect of the project will be submitted to GHSP as a separate report by HSRC.

E. SUMMARY

Numerous evaluations have been made of the impact of various sanctions (Voas 1986; Nichols and Ross 1989) on general DWI deterrence as measured by A/R crashes, single vehicle nighttime crashes and DWI arrests. However, it has been challenging to determine the deterrent value of individual sanctions because they are frequently implemented as part of a comprehensive set of countermeasures so that their individual contribution is difficult, if not impossible, to assess. Moreover, many evaluations have been handicapped by a lack of agreement on appropriate criteria for measuring effectiveness.

Evaluation of sanctions has further been complicated by the uniqueness of the settings in which they have been employed. The philosophy of the citizens of a state or jurisdiction shapes its public policy/law making. This means that the entire milieu in which sanctions and countermeasures are evaluated may differ from state to state. The variations are numerous, and interpretations of the successfulness of a particular program as well as its transferability to other jurisdictions must be carefully considered. Thus, sanctions found effective in one area of the country may have limited effectiveness in North Carolina.

As elsewhere, North Carolina has a set of problem drinkers who drive while impaired. This set of evaluations sought to identify the sanctions or combinations of sanctions as well as specific programs designed to restrict those convicted of DWI so that they might be less likely to have a subsequent DWI arrest or A/R crash. This set of evaluations focuses on the specific deterrent effectiveness of sanctions in terms of subsequent DWI arrests. It did not focus on the general deterrence effectiveness of such sanctions in terms of impacting on the general driving population. DWI arrests were used as the outcome measure because several of the programs studied have small numbers and crashes are infrequent events even among this population of high risk drivers.

Determining the specific deterrent effectiveness of the variety of sanctions applied to DWI offenders is an arduous task because little information is available to enable one to

differentiate the characteristics of the offender and his drinking and drinking driving history which might enable us to identify a group of high risk drivers who should never be relicensed or a group who present no risk to the general driving public or themselves. Furthermore, a set of mitigating and aggravating factors is weighed in North Carolina to determine the level or severity of the offense committed and the appropriate sanctions to be applied. Our evaluation of the sanctions described in Section B describes the complexity of factors to be considered in evaluating sanctions.

Probably the most important findings of that study for North Carolina are that the offenders who have reduced licensing sanctions, as manifest in the granting of a limited driving privilege by the courts and the attendant increased driving exposure, are more likely to have a subsequent DWI. Furthermore, the fact that direction by the judge not to operate a motor vehicle may further indicate the strength of the sentencing process and the judgement. In other words, perhaps people understand best that they are not to drive and the gravity of their deeds if the judge tells them at the time of sentencing that they are not to drive a vehicle. The sanctions of jail and community service apparently do little to prevent recidivism. A brief discussion on these individual sanctions follows.

Jail as a Sanction

The past decade has witnessed a substantial increase in legislation mandating incarceration for those convicted of DWI. Twenty-five states now proscribe mandatory jail terms for drunken driving, with first offenders typically ordered to serve 24 to 48 hours and repeat offenders to serve 10 days to two weeks. While the imposition of jail as a sanction has great appeal to those advocating the punitive aspects of sanctions, incarceration is costly. In some jurisdictions resources are not available for handling DWI offenders, particularly women. Popkin et al. (1985) found numerous complaints of jail crowding on weekends due to DWI offenders serving their jail time in a manner that would not affect their employment. Furthermore, because of over-crowding, many of those sentenced fail to serve their time or are released within a few hours. Situations such as these serve to erode perceived risk of jail as a sanction.

The effectiveness of jail as a sanction is much less evident than that of license suspension. Several reviews of the research literature have been conducted and have

shown little deterrent benefit for jail (Ross and Voas 1989; Nichols and Ross 1989; Salzberg and Paulsrude 1984; Ross et al. 1990; and Jones and Lacey 1991, Popkin and Wells-Parker, 1992). However, a few studies have reported beneficial effects. Falkowski (1984) and Cleary and Rodgers (1986) examined the effect of Minneapolis, Minnesota's judicial policy to sentence all first time DWI offenders to 48 hours in jail and found a 20 percent reduction in nighttime fatal crashes after the policy had been in place for two months. Jones et al. (1987) evaluated a mandatory 2 day jail sentence in Tennessee and concluded that the legislation might have produced up to a 15 percent reduction in A/R crashes. However, as in Minneapolis, there was a time lag before the effect was observed.

The public is increasingly demanding imposition of longer jail or prison sentences for multiple DWI offenders, in spite of the fact that long-term incapacitation appears to have very limited effectiveness in terms of the number of lives saved (Simon, 1992). Furthermore, the annual cost of incarceration is estimated to be $17,000 TO $30,000 a year/per person. These factors make incapacitation alternatives seem highly appealing. Programs such as the Anoka County, Minnesota Repeat Offender Program provide a high degree of supervision, loss of freedom and treatment and education at a lower cost. In addition these programs require the offender to pay part of the cost of the program. We recommend that North Carolina consider implementing such a program and evaluating its cost benefit.

Community service. Community service is a widely applied sanction which directs the offender to pay restitution to the community by providing general service through activities such as picking up litter on public roadways. Some community service programs attempt to tailor the particular skills of the offender to meet the needs of the community, thus optimizing their potential benefit. Some frequently mentioned impediments to community service programs are difficulties finding jobs, liability risk, the cost of supervision, and failure to provide service. Stenzel et al. (1985) failed to find any significant effects of a well-publicized community service program on self-reports of drinking and driving and crashes in Baton Rouge, La. Although Zador (1988) found that states with laws providing for mandatory jail or community service in

lieu of jail had lower A/ R crash rates, there is little evidence that use of community service alone when applied to a large number of offenders has a deterrent impact. This is the first study to examine the specific deterrent effectiveness of this sanction. Although this sanction apparently has little value in terms of reducing future DWI recidivism, it is a program that when well orchestrated can pay back the community for the DWI offense and very often the community is the only victim of the offender.

Fines. In the United States, the value of fines as a specific or general deterrent has received little study. While in some jurisdictions fines provide a means of maintaining DWI countermeasure and treatment programs, in most they are only a modest portion of the cost of a DWI conviction. Because fines have not been indexed to the rate of inflation, they have declined in terms of financial impact, and have certainly declined relative to the overall costs of insurance and legal fees. In addition, collection mechanisms have been extremely inadequate.

Imposition of fines has been evaluated in Europe and Australia. In Sweden, the offender's fine is linked to his annual income and with the severity of the offense. Votey and Shapiro (1983, 1985) found that the fines imposed in Scandinavian countries were associated with reductions in fatal crashes. In Australia, Homel (1989) found that increased fines were associated with decreases in DWI recidivism for those who were also charged with driving while disqualified, but not for other groups.

While this was not an in depth study of the value of fines, it does appear that they have some beneficial effect on those who are the most serious offenders.

Effectiveness of Special DMV Programs

Our evaluations of programs employed by the Division of Motor Vehicles was very useful. All of these programs are designed to prevent A/R crashes by restricting the exposure of high risk drivers. Clearly, the North Carolina Division of Motor Vehicles has done a good job in identifying the lowest risk group of second time DWI offenders to grant a conditional license. It has gone one step further, in terms of trying provide the most mobility to this high risk group by imposing the requisite licensing sanctions and then providing the individual applying for a conditional license with an opportunity to drive if they participate in the interlock program. While not without problems, this

appears to be a useful tool for restricting the driving of high risk drivers in that it targets their vehicle as the point of intervention. It permits these offenders to drive, something vital to everyday existence in North Carolina, while at the same time protecting the public. If this program proves to be effective in preventing more serious offenders from drinking and driving it will be a most valuable tool.

In May of 1992 the pilot interlock program was made available to those offenders with a permanent revocation. This is a group of drivers that is more overtly unwilling or unable to control their drinking. These drivers often are adept at circumventing the system, for example, several drivers with permanent revocations have three or more licenses - all of which have permanent revocations. It is extremely important that a sound policy be implemented for monitoring these drivers.

Finally, of gravest concern to highway safety in North Carolina are the large numbers of drinking drivers who leave the licensing system completely and continue to drive often drunk. The development of countermeasures to separate these people from their vehicles is desperately needed.

References

Arstein-Kerslake G, Peck R. (1985). *Typology Analysis of California DUI Offenders and DUI Recidivism Correlates.* California State Department of Motor Vehicles, Sacramento, CA.

Baker EA (1989). *The Calvert County Study, A Program Evaluation; Doctoral Dissertation.* University of Maryland, College Park, MD.

Compton RP (1988). *Potential for Application of Ignition Interlock Devices to Prohibit Operation of Motor Vehicles by Intoxicated Individuals.* National Highway Traffic Safety Administration, Washington, DC.

EMT Group (1990). *Evaluation of the California Ignition Interlock Pilot Program for DUI Offenders-Final Report.* EMT Group, Inc., Sacramento, CA.

Fell JC (1990). "Drinking and Driving in America: Disturbing Facts; Encouraging Reductions," *Alcohol Health & Research World* 14(1): 18.

Fell, JC (1991). Repeat DWI Offenders: Their Involvement in Fatal Crashes. Paper presented at a Wisconsin Statewide Conference entitled" Intoxicated Drivers: Multiple and Problem Offenders. Sept. 1991, Stevens Point, WI.

Graham, JD (1988). *Preventing Automobile Injury: New Findings.* Auburn House Pub Co., Dover, MA.

Jacobs, JB (1989). *Drunk Driving.* University of Chicago Press, Chicago.

Jones, B, Wood, N (1989). *Traffic Safety Impact of the 1988 Ignition Interlock Pilot Program.* Oregon Motor Vehicles Division, Oregon.

Linnell RH, Mook SJ (1991). *Ignition Interlock Devices: An Assessment of Their Application to Reduce DUI.* Harmony Institute, Washington, DC.

Morse, BJ, Elliott DS (1990). *Hamilton County Drinking and Driving Study: 30 Month Report.* University of Colorado, Boulder CO. Jacobs, JB (1989). *Drunk Driving.* University of Chicago Press, Chicago.

National Highway Traffic Safety Administration (1989). *Alcohol and Highway Safety 1989: A Review of the State of Knowledge.* U.S. Dept. of Transportation, Washington DC.

National Center for Statistics and Analysis (1991). *Drunk Driving Facts.* National Highway Traffic Safety Administration, Washington DC.

National Safety Council (1991). *Accident Facts.* NSA, Chicago, IL.

Nichols JL, Ross HL (1990). "The Effectiveness of Legal Sanctions in Dealing with Drinking Drivers," *Alcohol, Drugs and Driving* 6(2): 33-55.

Popkin CL, Lacey JH. (1985). "System and Deterrence Effects of a Major Change in DWI Legislation in North Carolina." In 29th *Proceedings of the Am. Association for Automotive Medicine*: 23-38.

Popkin CL, Martell C. (1990). *The Factors Influencing DWI in North Carolina.* HSRC Publication. UNC Highway Safety Research Center, Chapel Hill, NC.

Popkin CL, Stewart JR, and Lacey JH. 1983. The Driving Performance of Medically Evaluated Drivers in the 27th *Proceedings of the American Association for Automotive Medicine:* 263-274.

Russ NW & Geller ES (1985). "Changing the Behavior of the Drunk Driver: Current Status and Future Directions," *Psych Docs*:

Simon, Steve. (1992) Incapacitation alternatives for repeat DWI offenders. *Alcohol, Drugs and Driving* 8(1):51-60.

Stoke CB, Wilson CB (1990). *Motor Vehicle Ignition Interlocks.* Virginia Department of Transportation, Charlottesville, VA.

Snyder MB (1984). *The Drunk Driving Warning System-Status Review.* National Highway Traffic Safety Administration, Washington DC.

U.S. Dept. of Health and Human Services (1988). *Surgeon General's Workshop on Drunk Driving.* Washington DC.

U.S. Dept. of Justice (1990). *Uniform Crime Report.* Washington DC.

Voas RB (1970). *Cars that Drunks Can't Drive.* National Highway Safety Bureau, Washington DC.