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# Bureau of Justice Statistics Special Report

## 1989 Survey of Inmates of Local Jails

# Drunk Driving

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More than half the persons in local jails charged with the offense of driving while intoxicated with alcohol (DWI) in 1989 had prior sentences to incarceration for DWI offenses. About 1 in 6 persons jailed for DWI had served at least three prior sentences in jail or prison for drunk driving.

This report examines the characteristics of persons who were confined in local jails in 1989 and who had been charged with DWI. The findings were obtained from the 1989 Survey of Inmates of Local Jails, which gathered extensive data from interviews with a nationally representative sample of 5,675 inmates in 424 jails during the summer of 1989. The sample was drawn to represent an estimated 395,000 jail inmates in 3,312 local jails on June 30, 1989. The Bureau of the Census carried out the interviews for the Bureau of Justice Statistics.

This report also analyzes recent trends in arrests for driving under the influence of alcohol or other intoxicants (DUI). Data on arrests for DUI were drawn from Uniform Crime Reports provided by State and local police agencies to the Federal Bureau of Investigation (FBI).

Other major findings include the following:

- Between 1980 and 1989 the number of arrests nationwide for DUI increased nearly 22%, while the number of licensed drivers increased 14%.

Number of arrests for driving under the influence of intoxicants (DUI), 1980-89

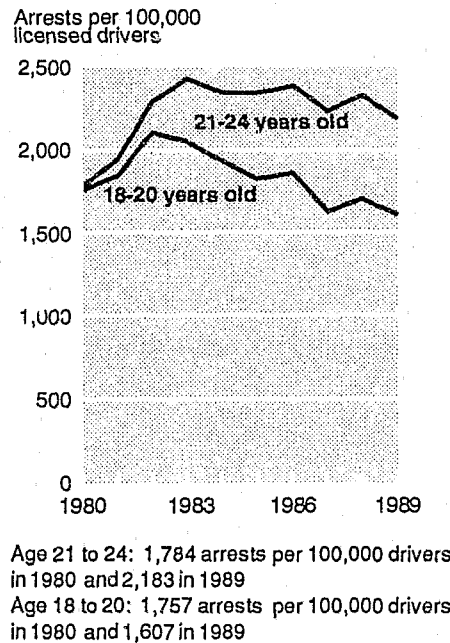


Figure 1

- Over the period from 1980 to 1989 the number of DUI arrests per 100,000 licensed drivers grew by nearly 7% from 982 per 100,000 drivers to 1,049.
- Since 1983 all States that permitted the sale or purchase of alcoholic beverages to persons under age 21 have phased in new laws raising the minimum age to 21. Per capita arrest rates for DUI for persons age 18 to 20 have decreased by 21% since then — more than twice the rate of the decrease among those age 21 to 24 (9.9%).

September 1992

In the 1989 Bureau of Justice Statistics survey of inmates in local jails, offenders charged with or convicted of driving while intoxicated were more than 1 in every 11 inmates. Among convicted inmates, 86% of those serving a sentence for DWI had been sentenced in the past. Almost a third of the DWI inmates had served 3 or more previous sentences in jail or prison.

Among all who are arrested for driving while impaired, persons in jail for DWI are more likely to be the serious offenders. During 1989 over 1.7 million drivers were arrested for driving under the influence. In discussing the population of DWI arrestees, this report examines the trends through the 1980's for arrest rates and changes in the age distribution of licensed drivers.

The first BJS Special Report on drunk driving, based on the 1983 survey, also presented the trends in rates, the effects of legislative changes before 1986, and the drinking patterns of inmates. That report had observed an early trend in the reduction of drunk driving arrests among persons under age 21 — a trend associated with initiatives like raising the legal age to buy alcoholic beverages. While the annual monetary costs to society from drunk driving remain in the billions, this report presents findings that suggest the positive effects of concerted legislative and law enforcement efforts.

Steven D. Dillingham, Ph.D., LL.M.  
Director

- On June 30, 1989, about 9% of all persons confined in local jails were charged with or convicted of DWI.

- In 1989, 96% of persons in jail for DWI were male; their median age was 32; and they reflected a racial distribution similar to the adult general population. At the time of their arrest, more than 70% were not living with a spouse and 78% were employed.

- Nearly 9 out of 10 jail inmates (86%) charged with or convicted of a DWI offense had a prior sentence to probation, jail, or prison for a DWI offense or other offense.

- Of convicted DWI offenders in local jails, 61% reported drinking only beer, about 2% only wine, 18% only liquor, and 20% had been drinking more than one type of beverage prior to their arrest.

- When the type and amount of beverages are converted into equivalent units of pure alcohol (ethanol), convicted DWI offenders who reported drinking more than one type of beverage consumed nearly three times the quantity of ethanol of those who drank only beer.

- Prior to their arrest for DWI, half of the convicted offenders in jails were estimated to have consumed at least 6 ounces of ethanol (about equal to the alcohol content of 12 bottles of beer) in about 5 hours. About 29% reported that they had consumed at least 11 ounces of ethanol (equivalent to about 22 beers) prior to their arrest.

- Those jail inmates convicted of DWI who consumed greater than average quantities of ethanol prior to arrest reported a greater frequency of usual drinking sessions, as reported by the inmates, and greater consumption of alcohol than other inmates.

- For DWI offenders sentenced to jail, the median term imposed was 6 months; those with 2 or more prior DWI sentences received sentences that were more than 1½ times as long as first-time DWI offenders.

- About 80% of all inmates in jail for DWI who admitted to being an alcoholic had previously been involved in an alcohol abuse treatment program.

## DUI and DWI defined

DUI is the general term for drivers who operate a motor vehicle after having consumed an intoxicant (such as drugs or alcohol); DWI, in this study, specifically refers to jail inmates who were charged with driving while intoxicated by alcohol (usually defined by State law as a specific concentration of alcohol in the blood).

## Legislative changes

As a result of changes in Federal highway legislation in 1983, States began to phase in new laws raising the minimum drinking age, as defined by the minimum age for which purchase of alcoholic beverages is legal. By 1989 all States had a minimum drinking age of 21. Approximately 18 States do not have a minimum age for consumption of alcohol, and 2 States do not have a minimum age for possession of alcohol.<sup>1</sup>

In addition, 29 States and the District of Columbia have adopted legislation that requires administratively imposed sanctions for all persons who, when asked, fail or refuse to take a test measuring the presence and concentration of alcohol.<sup>2</sup> Such statutes permit law enforcement officers to immediately confiscate the driver's license of persons arrested for DUI who fail or refuse to submit to alcohol testing.

## Trends in DUI arrests

Between 1980 and 1989, the number of arrests for DUI increased 21.7%, compared to an increase of 13.9% in the number of licensed drivers (table 1). Overall, the number of DUI arrests per 100,000 licensed drivers increased 6.8% over the period, from 982 to 1,049.

The difference between the arrest rates for those age 18 to 20 and 21 to 24 steadily increased between 1980 and 1989 (figure 1). In 1980, arrest rates were 1,757 and 1,784, respectively, for drivers age 18 to 20 and 21 to 24 — a difference of 27 per 100,000 drivers. After 1980, the arrest rate of 18-to-20-year-olds decreased while the rate for 21-to-24-year-olds increased. In 1989, the rates per 100,000 drivers were 1,607 and 2,183, respectively — a difference of 576 per 100,000 drivers.

<sup>1</sup>See *A Digest of State Alcohol-Highway Safety Related Legislation* (Washington: National Highway Traffic Safety Administration, 1991).

<sup>2</sup>Data were obtained from a survey of the States conducted by the Nebraska State Senate Transportation Committee for yearend 1990.

**Table 1. Number of licensed drivers, number of arrests for DUI, and rate of arrest for DUI, 1980-89**

Year	Number of licensed drivers*	Number of arrests for DUI	Rate of arrest for DUI per 100,000 drivers
1980	145,295	1,426,700	982
1981	147,075	1,531,400	1,041
1982	150,234	1,778,400	1,184
1983	154,389	1,921,100	1,244
1984	155,424	1,779,400	1,145
1985	156,868	1,788,400	1,140
1986	159,487	1,793,300	1,124
1987	161,818	1,727,200	1,067
1988	162,853	1,792,500	1,101
1989	165,555	1,736,200	1,049
Percent change, 1980-89	13.9%	21.7%	6.8%

\*Estimated in thousands.

Sources: FBI *Crime in the United States, 1980-89*; *Fatal Accident Reporting System 1989, A Decade of Progress*, National Highway Traffic Safety Administration, 1990.

Arrest rates for those age 18 to 20 peaked in 1982; for 21-to-24-year-olds, the rates peaked a year later.

The number of DUI arrests of those age 18 to 20 decreased by 33% between 1983 and 1989 (from 216,255 to 144,800). The number of licensed drivers in this age group declined by 15% (from 10.6 million to 9.0 million). More than half of the decline in the number of arrests between 1983 and 1989 among drivers age 18 to 20 (and as much as 22% of the decline in arrests for all ages between 1983 and 1990) could possibly be linked to changes in the drinking age laws.<sup>3</sup>

Between 1983 and 1989, arrest rates for age groups 21 or older declined at a slower pace than those for drivers age 18 to 20. Arrest rates among licensed drivers age 18 to 20 declined more than twice as fast as arrest rates for those age 21 to 24 between 1983 and 1989 (21% versus 10%).

## DUI arrests in 1989

In 1989 more than 165 million persons held a driver's license in the United States —

<sup>3</sup>This estimate was calculated by applying the 1983 arrest rate for those age 18 to 20 (2,043 per 100,000 drivers) to the number of drivers in this age group in 1989 (9,009,821), producing an estimate of 184,074 arrests in 1989. Actual arrests in 1989 were 144,800 or 39,274 fewer than expected. The overall decline in the number of arrests between 1983 to 1989 was 71,455 (216,255 - 144,800); the percentage of the decline not due to a change in the number of drivers of these ages would be more than half (39,274/71,455). The total decline in the number of arrests for persons of all ages between 1983 and 1989 was 180,947. Thus, as much as 22% of the drop (39,274/180,947) would be attributable to changes in the prevalence of arrests of 18-to-20-year-olds.

nearly 86% of the population age 16 or over. The FBI estimated that during the same year more than 1.7 million DUI arrests were made by State and local police agencies. In addition 45,555 motor vehicle fatalities occurred; about 49% were probably alcohol-related, according to the National Highway Traffic Safety Administration.<sup>4</sup>

The prevalence of DUI arrests can be viewed in the context of the amount of alcoholic beverages consumed in the United States. The per capita consumption of alcoholic beverages reflected little change from 1980 to 1989, from 28.3 gallons per person to 27.2 gallons. In 1989, the per capita consumption of alcoholic beverages was greater than the per capita consumption of coffee (26.9 gallons per U.S. resident) and milk (26.0 gallons) and was exceeded only by the consumption of soft drinks (41.8 gallons).<sup>5</sup>

The annual consumption of alcoholic beverages based only upon the adult population age 21 or older (all States now impose this age restriction) would equal about 33.7 gallons of beer, 3.0 gallons of wine, and 2.1 gallons of liquor per person. However, individual patterns of consumption vary. It has been estimated that 33% of the adult population accounts for 95% of the alcohol consumed, and 5% of the adult population accounts for 50% of the consumption.<sup>6</sup>

#### DUI arrests and age

Since 1980 arrest rates for DUI have not increased consistently across all age groups. In 1980 those between age 18 and 39 were overrepresented among arrestees, compared to their share of licensed drivers (table 2). Persons age 18 to 20 accounted for 7.2% of drivers but 12.9% of those arrested, about 1 arrest for every 57 drivers. Drivers age 65 or older, by contrast, accounted for 10.7% of drivers but less than 2% of those arrested, about 1 arrest for 714 drivers in this age group.

Compared to 1980, data for 1989 reflected declines in arrest rates for drivers under

<sup>4</sup>See *Fatal Accident Reporting System, 1989: A Decade of Progress*, National Highway Traffic Safety Administration, 1990, p. 1.

<sup>5</sup>*Food Consumption, Prices, and Expenditures, 1970-90*, Department of Agriculture, Economic Research Service, 1992, p. 63.

<sup>6</sup>Steve Olson and Dean R. Gerstein, *Alcohol in America: Taking Action to Prevent Abuse* (Washington: National Academy Press, 1985, p. 13).

**Table 2. Percentage distributions of licensed drivers and arrests for driving under the influence (DUI), by age, 1980 and 1989**

Age	1980			1989			Percent change in rate, 1980-89
	Percent of Drivers	Arrests	Arrests per 100,000 drivers	Percent of Drivers	Arrests	Arrests per 100,000 drivers	
Total	100%	100%	981	100%	100%	1,048	6.8%
16-17	3.2%	2.2%	668	2.3%	1.1%	503	-24.7%
18-20	7.2	12.9	1,757	5.4	8.3	1,607	-8.5
21-24	10.6	19.3	1,784	8.3	17.3	2,183	22.4
25-29	13.0	17.9	1,347	12.4	22.2	1,869	38.8
30-34	12.0	13.1	1,076	12.4	17.6	1,486	38.1
35-39	9.4	8.6	996	11.2	12.0	1,123	12.8
40-44	7.7	7.4	944	9.7	8.1	872	-7.6
45-49	6.9	5.9	837	7.6	5.3	725	-13.4
50-54	6.9	4.9	686	6.2	3.3	558	-18.7
55-59	6.7	3.5	509	5.7	2.2	400	-21.4
60-64	5.7	1.9	335	5.6	1.4	262	-21.8
65 or older	10.7	1.5	140	13.0	1.2	100	-28.6

Note: Percents may not add to 100% because of rounding. Table excludes licensed drivers and arrests for those less than 16 years old. For those 16 or older, there were 145,207,000 licensed drivers in 1980 and 165,517,596 in 1989; there were 1,424,736 DUI arrests in 1980 and 1,734,909 in 1989. The number of arrests for each age group was obtained by applying the age distribution of known arrests for DUI to the total number of estimated DUI arrests. Sources: *Selected Highway Statistics and Charts, 1989*, Federal Highway Administration; *FBI Crime in the United States, 1980 and 1989*.

age 21 and over the age of 40. Arrest rates for those age 18 to 20 decreased by approximately 9%, and among drivers age 16 and 17, arrest rates dropped nearly 25% over the period. Drivers between 21 and 39 years old had higher rates of arrest for DUI in 1989 than in 1980. For example, drivers between the ages of 25 and 34 during 1989 experienced rates of arrest about 40% higher than drivers of similar age groups in 1980. For those age 40 to 44, arrest rates were down about 8% from 1980 and each succeeding age group showed a larger percentage decline.

Several possible reasons may account for why arrest rates increased in each age group between 21 and 39 and decreased among all other age groups. Although increased enforcement of drinking and driving laws would be expected to affect all age groups to some degree, more stringent enforcement efforts may have been selectively applied to younger age groups. Drinking or driving behavior may also have changed according to different age groups.

Arrest rates for new groups of drivers who turned age 18, 19, and 20, and who are fully covered by the new laws, decreased 8.5% from 1980 to 1989. Lower arrest rates may be a reflection of changing drinking behavior in this group as a result of raising the minimum drinking age to 21.

National surveys of high school seniors in 1989 indicated less prevalent daily drinking and drinking in the month preceding the survey than did seniors in 1985 and in 1980 (before drinking ages were raised). In addition, a smaller percentage of seniors in 1989, compared to those in 1980, reported engaging in binge drinking (5 or more drinks in a row at least once in the 2 weeks prior to the interview).<sup>7</sup>

Overall, the surveys of high school seniors document a decline from 1980 to 1989 in the percentage of high school seniors who drank daily or who had drunk in the last 30 days.

	Senior class		
	1980	1985	1989
Percent who had drunk in last 30 days	72.0%	65.0%	60.0%
Percent who drank daily	6.0	5.0	4.2
Percent with binge drinking	41.2	34.7	33.0

<sup>7</sup>See "Drug use among American high school seniors, college students and young adults, 1975-1990," *Volume 1: High School Seniors* (Rockville, Maryland: National Institute on Drug Abuse, 1991).

## DUI offenders in jail

On June 30, 1989, an estimated 395,000 adults were confined in the Nation's 3,312 local jails. An estimated 30,147 (13.8%) were serving sentences after conviction for driving while intoxicated by alcohol or drugs; in 1983, an estimated 10% of the jail population nationwide had been convicted of DUI. Persons held in local jails who were unconvicted but charged with DUI accounted for approximately 2% of the inmate population in both 1983 and 1989.

## Profile of DWI offenders in jail

Among convicted and unconvicted persons in jail for DWI, males predominated, and the racial distribution was more similar to the adult general population than was the case for those jailed for offenses other than DWI (table 3). Inmates charged with DWI were more likely to classify themselves as white and non-Hispanic (68%) than were those jailed for other offenses (36%). Persons jailed for other offenses were more likely to classify themselves as black and non-Hispanic (45%), compared to those charged with DWI (8%).

The average age of those jailed for DWI was higher than that of those jailed for other offenses. The median age of the DWI jail inmates was 32, about 5 years older than the median age of those in jail for other crimes. Of those jailed for DWI, about 47% had completed high school and about 20% had completed 8 years or less of education. Compared to 82% of jail inmates charged with offenses other than DWI, about 70% of persons charged with DWI reported that they were not living with a spouse at the time of their arrest: An estimated 35% had never been married, 35% were divorced or separated, and about 2% were widowed.

At the time of the arrest, 78% of those charged with DWI were employed, compared to 63% of inmates charged with other offenses. The median annual income of those who had been free for at least 1 year prior to the DWI arrest was \$11,000. The median annual income for those inmates charged with other offenses was \$6,750.

## Prior sentences and criminal histories

About 86% of persons jailed for DWI had prior convictions for crimes, including DWI, and had been sentenced to probation, jail, or prison (table 4). This percentage was lower among those in jail for crimes other than DWI (76%).

**Table 3. Characteristics of jail inmates, by type of offense, 1989**

Characteristic	Percent of inmates charged with:	
	DWI	Other offenses
<b>Sex</b>		
Male	96.3%	90.1%
Female	3.7	9.9
<b>Race</b>		
White non-Hispanic	67.7%	36.0%
Black non-Hispanic	8.2	45.0
Hispanic	19.5	16.9
Other <sup>a</sup>	4.6	2.1
<b>Age</b>		
17-20 years old	.9%	15.4%
21-24	9.7	20.7
25-29	23.6	23.6
30-34	26.5	18.6
35-39	11.6	11.5
40-44	9.4	5.0
45-49	9.2	2.7
50 or older	9.0	2.4
Median age	32 yrs.	27 yrs.
<b>Education</b>		
8th grade or less	19.9%	15.2%
Some high school	33.2	38.9
High school graduate	32.4	33.2
Some college or more	14.5	12.7
Median education	12 yrs.	12 yrs.
<b>Marital status</b>		
Married	28.5%	18.0%
Widowed	1.8	.9
Divorced/separated	34.8	22.3
Never married	34.9	58.8
<b>Employment status at arrest</b>		
Employed	78.1%	63.1%
Full-time	69.2	51.5
Part-time	8.9	11.6
Unemployed	21.9%	36.9%
Looking	11.0	22.5
Not looking	10.9	14.4
<b>Median annual income<sup>b</sup></b>	\$11,000	\$6,750
Number of jail inmates	32,310	348,927

Note: Excludes an estimated 320 inmates for unknown race and Hispanic origin and an additional 1,056 inmates for missing data on age. Data were missing for 2,309 inmates on education, 1,890 inmates on marital status, and 1,911 inmates on employment status.

<sup>a</sup> Includes Asians, Pacific Islanders, American Indians, Alaska Natives, and other racial groups.

<sup>b</sup> Includes only those inmates who had been free at least 1 full year prior to arrest.

An estimated 71% of those in jail for DWI had prior sentences to incarceration; among those in jail for crimes other than DWI, 56% had previously been confined. Compared to those in jail for other crimes, jailed persons charged with DWI were more likely to have been incarcerated three or more times. Convicted DWI offenders in jail were nearly twice as likely to have two or more prior DWI convictions as those unconvicted persons in jail for DWI (table 5).

**Table 4. Prior sentences to probation or incarceration, for jail inmates, 1989**

Prior sentence	Percent of inmates charged with:	
	DWI	Other offenses
<b>Probation</b>		
None	28.3%	37.4%
Juvenile only	3.2	11.8
Adult only	55.6	35.4
Both	12.9	15.3
<b>Number of times</b>		
0	28.3%	37.5%
1	32.9	34.2
2	14.7	15.2
3 or more	24.1	13.3
<b>Incarceration</b>		
None	29.1%	44.4%
Juvenile only	1.1	3.8
Adult only	62.4	40.7
Both	7.4	11.1
<b>Number of times</b>		
0	29.1%	44.4%
1	24.1	21.7
2	16.7	11.2
3 or more	30.2	22.8
<b>Probation or incarceration</b>		
None	13.9%	24.1%
Juvenile only	1.3	8.1
Adult only	66.2	44.5
Both	18.6	23.4
<b>Number of times</b>		
0	13.9%	24.1%
1	16.2	20.9
2	16.8	16.5
3 or more	53.1	38.6
<b>Number of jail inmates</b>	30,717	332,726

Note: Excludes inmates for whom data on prior sentences to probation or incarceration were unknown.

About 52% of persons jailed for DWI had a previous DWI conviction (table 5). These convicted DWI offenders were more likely than other inmates to have been previously convicted of the same crime (table 6).

Among those in jail charged with robbery, 22% had a prior robbery conviction with a jail or prison sentence; among those jailed for assault, 17% had a previous assault conviction; among those charged with drug trafficking, 14%; among those charged with burglary, 28%; and among those charged with larceny, 30% had a prior larceny conviction with a jail or prison sentence.

Nearly half (45%) of those in jail for DWI had a criminal justice status at the time of their arrest:

Total	100%
No criminal justice status	55%
Criminal justice status	45%
Probation	33
Parole	5
Bail/pretrial release	5
Other release	3

#### Alcohol consumption

Convicted offenders were asked detailed questions about their consumption of alcoholic beverages prior to their arrest for DWI. Each offender who reported drinking prior to arrest provided the types and amount of beverages consumed and the

period spent drinking. Based on these responses, it was possible to convert the amount and type of beverage consumed to a pure alcohol equivalent (ethanol) to estimate total intake. (See *Methodology* for conversions.)

Half of the convicted DWI offenders had consumed at least 6 ounces of ethanol (equivalent to the alcohol content of about 12 beers) prior to arrest (table 7). About 7% of the convicted offenders had consumed less than 2 ounces of ethanol; 34% had consumed between 2 and 5 ounces; 30% between 5 and 11 ounces; and 29% reported consuming the equivalent of 11 or more ounces of ethanol. To consume 11 ounces of ethanol would require drinking the equivalent of about 22 beers.

The median length of the drinking session prior to the arrest was 5 hours (table 8). Given the median consumption of 6 ounces of alcohol, this amount of time would imply a rate of consumption equivalent to about 2.4 beers per hour. The average, or mean, ethanol consumption was 8.1 ounces, and the average amount consumed escalated with the number of hours spent drinking. Those who were drinking for 1 hour or less had an average ethanol consumption of 2.2 ounces, compared to those who were drinking for

12 hours or more and consuming 16.4 ounces.

Most convicted DWI offenders reported drinking only beer prior to arrest:

#### Percent of DWI offenders drinking

Beer only	61%
Wine only	2
Liquor only	18
More than one type	20

Amounts consumed prior to arrest varied with the type of beverage. The median ethanol consumption for beer drinkers was

**Table 7. Alcohol consumption prior to arrest of jail inmates convicted of DWI, 1989**

Ounces of ethanol consumed	Percent of jail inmates convicted of DWI
Total	100%
Less than 1 ounce	.9%
1-1.9	6.0
2-2.9	13.9
3-3.9	10.4
4-4.9	9.2
5-5.9	3.3
6-6.9	16.5
7-10.9	10.6
11-14.9	15.1
15 or more	14.2
Median ounces of ethanol	6.0 ozs.
Number of jail inmates	26,488

Note: Percents may not add to 100% because of rounding. Excludes an estimated 2,735 inmates with unknown data on drinking at the time of the offense, drinking during the previous year, or the amount of alcoholic beverages consumed.

**Table 5. Number of prior DWI sentences to jail or prison among jail inmates charged with DWI, 1989**

Number of prior DWI sentences to jail/prison	Percent of inmates charged with DWI		
	All	Unconvicted	Convicted
Total	100%	100%	100%
None	47.6%	56.0%	46.7%
1	23.7	28.0	23.3
2	12.7	8.0	13.2
3 or more	15.9	8.0	16.8
Number of jail inmates	32,310	3,087	29,223

Note: Percents may not add to 100% because of rounding.

**Table 6. Number of prior sentences to jail or prison for the same offense as the current charge, jail inmates, 1989**

Prior sentences for same as current charge	Percent of inmates currently charged with:					
	Robbery	Assault	Burglary	Larceny	Drug trafficking	Drug possession
Total	100%	100%	100%	100%	100%	100%
None	78.3%	82.7%	72.1%	70.5%	86.3%	79.4%
1	15.7	13.4	17.0	15.4	11.6	12.1
2	4.1	3.6	6.3	6.6	.8	5.0
3 or more	2.0	.3	4.6	7.5	1.2	3.6
Number of jail inmates	25,650	27,315	40,752	30,033	45,660	37,037

Note: Percents may not add to 100% because of rounding.

**Table 8. Number of hours spent drinking and amount of ethanol consumed prior to arrest for DWI, for convicted jail inmates, 1989**

Hours spent drinking	Percent of jail inmates convicted of DWI	Average ethanol consumption prior to arrest
Total	100%	8.1 ozs.
1 hour or less	8.2%	2.2
2-3	28.5	4.8
4-5	20.2	6.5
6-7	17.1	8.6
8-9	9.8	13.1
10-11	2.8	10.9
12 hours or more	13.3	16.4
Median	5 hrs.	6.0 ozs.
Number of jail inmates	26,508	

Note: Percents may not add to 100% because of rounding. Excludes an estimated 2,715 inmates with unknown data on drinking at the time of the offense, drinking during the previous year, or the amount of alcoholic beverages consumed.

5.0 ounces or the equivalent of about 10 beers (table 9). Those drinking only liquor prior to arrest consumed a median quantity of ethanol of 8 ounces — approximately equal to 10 to 11 drinks — or nearly 60% more ethanol than those who drank only beer. Those who combined different beverages were estimated to have had an intake of ethanol nearly two and a half times that of those who consumed beer only.

Those jail inmates convicted of DWI who consumed greater quantities of ethanol prior to arrest reported a greater frequency of typical drinking sessions and more alcohol consumed during those sessions (table 10). Some evidence indicates that as the amount of ethanol consumed prior to arrest increased, the percentage of those who described themselves as usually drinking daily also increased. Among those offenders reporting consumption of 2 ounces or less of ethanol prior to arrest, 18% described themselves as daily drinkers. By contrast, among those who had consumed at least 10 ounces of ethanol prior to arrest, 45% reported daily drinking.

**Table 9. Type of alcoholic beverage and amount of ethanol consumed prior to arrest of jail inmates convicted of DWI, 1989**

Ounces of ethanol consumed	Percent of inmates convicted of DWI who drank:		
	Beer only	Liquor only	More than one type
Total	100 %	100 %	100 %
Less than 1 oz.	1.0%	1.8%	0
1 - 1.9	6.7	8.2	1.7
2 - 2.9	16.4	12.2	3.2
3 - 3.9	15.2	6.4	0
4 - 4.9	9.7	11.4	6.6
5 - 5.9	3.1	1.8	5.6
6 - 6.9	25.2	1.8	3.5
7 - 10.9	7.0	17.4	13.9
11 - 14.9	12.5	9.6	29.7
15 or more	3.2	29.5	35.8
Median ounces of ethanol consumed	5.0 ozs.	8.0 ozs.	13.5 ozs.
Number of jail inmates	16,322	4,489	5,100

Note: Percents may not add to 100% because of rounding. Excludes an estimated 576 inmates serving time in jail who reported only drinking wine. Also excluded are an estimated 2,736 inmates for whom information on drinking was not reported.

## Sentencing and DWI

Convicted offenders sentenced to jail are not representative of all persons who drive drunk or of those sentenced for DWI. Many first-time offenders may have driven drunk previously but managed to avoid arrest or conviction. Also, a number of DWI offenders are under probation supervision in the community or have received other sanctions.<sup>8</sup> The most

<sup>8</sup>On December 31, 1989, 37 States reported that 22.6% of the 1,831,432 adult offenders on probation had been convicted of DWI. If applied to the entire probation population of the 50 States and the District of Columbia (2,461,333 probationers), the estimated number of DWI offenders on probation would be more than 556,000 — an estimate that is perhaps 17 times the number of DWI offenders in local jails in 1989. See *Correctional Populations in the United States, 1989*, BJS Report, NCJ-130445, 1991, table 3.10.

chronic DWI offenders may have been sentenced to State prisons rather than local jails.

Examination of the length of the jail sentence imposed for DWI may be useful since the inmates are more likely to be the chronic and serious offenders for whom the effect of a prior record can be gauged.

Of those with two or more prior sentences to jail or prison for DWI, 3 out of every 4 people received a sentence of 4 months or more. The median jail sentence for first-time DWI offenders was 115 days. For those with two or more prior sentences to jail or prison for DWI, the median jail sentence was 181 days.

**Table 10. Usual drinking behavior of jail inmates convicted of DWI, by amount of ethanol consumed prior to arrest, 1989**

Frequency of usual drinking	All convicted inmates	Percent of convicted jail inmates, by amount of ethanol consumed prior to arrest			
		Less than 2 ounces	2 - 4.9 ounces	5 - 9.9 ounces	10 or more ounces
Total	100 %	100 %	100 %	100 %	100 %
Daily	35.5%	18.2%	26.7%	40.4%	44.5%
Once a week	36.1	36.8	40.1	35.0	32.8
Less than once a week	6.6	14.6	4.6	5.3	8.3
Once a month	9.7	21.1	10.6	9.7	6.2
Less than once per month	11.9	9.4	17.9	9.6	8.2
Median ounces of ethanol consumed prior to arrest	6.0 ozs.	1.5 ozs.	3.0 ozs.	6.0 ozs.	14.0 ozs.
Number of jail inmates	26,021	1,807	8,687	7,610	7,916

Note: Percents may not add to 100% because of rounding. Excludes an estimated 3,202 inmates with unknown data on drinking at the time of the offense, drinking during the previous year, the frequency of their usual drinking sessions, or the amount of alcoholic beverages consumed.

**Table 11. Length of sentence imposed on convicted DWI offenders, by number of prior DWI sentences to jail or prison, 1989**

Sentence length	All	Percent of convicted DWI offenders		
		Prior DWI sentences to jail or prison		
		None	One	Two or more
Total	100 %	100 %	100 %	100 %
30 days or less	13.6%	16.3%	20.4%	4.8%
31 - 90	23.1	31.7	20.4	12.6
91 - 120	6.6	6.5	6.4	6.9
121 - 240	27.8	20.1	28.3	38.5
241 - 365	17.3	12.6	17.6	23.7
More than 1 year	11.6	12.7	7.0	13.4
Mean number of days	258 days	228 days	194 days	346 days
Median number of days	180	115	134	181
Number of jail inmates	23,061	10,549	5,212	7,299

Note: Percents may not add to 100% because of rounding.

**Characteristics of jail inmates charged with or convicted of DWI, by whether they reported being alcoholic, 1989**

	Self-reported prior alcoholism:	
	Yes	No
<b>Age</b>	100 %	100 %
17-20 years	.5	1.5
21-24	5.2	14.6
25-29	24.3	22.8
30-34	29.3	24.2
35-39	12.9	10.7
40-44	10.7	7.5
45-49	8.0	9.6
50 or older	9.1	9.3
<b>Number of prior DWI sentences to jail or prison</b>	100 %	100 %
None	40.6	55.4
1	26.7	21.1
2	13.1	11.9
3 or more	19.7	11.6
<b>Frequency of usual drinking</b>	100 %	100 %
Daily	44.3	25.8
Once a week	26.3	42.9
Less than once a week	7.4	5.0
Once a month	11.3	9.2
Less than once per month	10.6	17.1
<b>Ounces of ethanol consumed prior to arrest*</b>	100 %	100 %
Less than 2 ounces	6.6	7.6
2-4.9	23.0	45.4
5-9.9	28.6	30.5
10 or more	41.7	16.4
<b>Median ounces of ethanol</b>	7.5 oz.	4.5 oz.
<b>Number of jail inmates</b>	16,332	14,552

Note: Excludes inmates whose alcoholic status or frequency of their usual drinking behavior was unknown.  
 \*Includes only inmates convicted of DWI: 13,989 who reported having been an alcoholic and 11,744 who reported never having been an alcoholic.

**Profile of jail inmates who reported being an alcoholic**

Compared to inmates charged with or convicted of DWI who reported never having been an alcoholic, those who reported being an alcoholic had a more extensive history of prior sentences to jail or prison for DWI (59% of alcoholics had prior sentences versus 44%) and a higher percentage with daily drinking (44% versus 26%). Convicted DWI offenders who reported being an alcoholic had consumed a median of 7.5 ounces of ethanol prior to arrest, compared to 4.5 ounces consumed by those who had never been alcoholics.

**Alcohol treatment, by number of prior sentences to jail or prison among jail inmates charged with DWI, 1989**

	Number of jail inmates	Percent of jail inmates charged with DWI who:	
		Ever received treatment	Never received treatment
All jail inmates	16,173	80.2%	19.8%
<b>Number of prior DWI sentences</b>			
None	6,626	76.8%	23.2%
1	4,365	86.7	13.3
2	2,132	84.3	15.7
3 or more	3,050	75.6	24.4

Note: Includes only those persons who admitted to being an alcoholic.

Over half (53%) of inmates charged with or convicted of DWI categorized themselves as having been alcoholics. Among those who classified themselves as having been an alcoholic, about 80% reported prior participation in an alcohol treatment program.

Of those jail inmates convicted and sentenced for DWI, 42% (11,901) were given as part of their sentence a special condition or restriction other than jail time, prison, parole, or probation. Half of these 11,901 jail inmates were required to attend an alcohol treatment program.

**Location of drinking**

About 4 out of 5 offenders convicted of DWI and serving time in jail reported that they had been drinking with others prior to their arrest.

<b>Alone</b>	17.2%
Athome	5.8
In a vehicle	5.3
Other place	6.1
<b>With others</b>	82.8%
Athome	7.8
At a friend's house	24.9
In a vehicle	9.2
In a bar/tavern/inn	32.3
Other place	8.7

Those who drank with others were more likely to have been drinking in a bar/tavern/inn or a friend's house.

**Appendix: Estimating blood alcohol concentration (BAC)**

Blood alcohol concentration (BAC) refers to the number of grams of pure alcohol present in 100 milliliters of blood. The BAC of an individual may be established by a variety of testing procedures including chemical breath analysis, saliva testing, blood testing, urinalysis, or chemical analysis of tissue samples.

Calculating the BAC levels of convicted DWI offenders in jail is useful for two reasons. First, estimating blood alcohol concentration serves as a validity check of the self-reported amounts consumed prior to arrest: whether such amounts seem reasonable or even physiologically possible. Second, BAC provides a measure of intoxication that can be compared to other groups of drivers for whom BAC is known — such as drinking drivers involved in fatal accidents.

Blood alcohol concentrations may be affected by numerous factors, including physiological differences, food consumption, the amount of ethanol ingested, and the time elapsed between drinking and testing. Several assumptions underlie the estimates of blood alcohol concentration presented here:

1. An average rate of metabolism was assumed for the jail inmates equivalent to the general population, though such rates are known to vary because of differences in physiology and alcohol tolerance.
2. The self-reported body weight used in the calculations was assumed to be the correct weight for each inmate.
3. The rate of alcohol consumption was assumed to be stable over the drinking session prior to arrest. For example, if 6 ounces of ethanol were consumed during a 5-hour drinking session, the formula



assumes that 1.2 ounces of ethanol were consumed per hour.

State statutes often define two types of minimum BAC that constitute evidence of intoxication — "illegal per se" and "presumptive" levels. Presumptive levels of intoxication are generally lower than illegal per se levels and require a different burden of proof to convict an individual of drunk driving. Across the States, illegal per se blood alcohol levels cluster around 0.10, but several States define it as low as 0.08 and others as high as 0.15. Presumptive levels for DWI or DUI may range from 0.05 and up but also cluster at the 0.10 level.

The President's Commission on Drunk Driving has recommended that a presumptive BAC of 0.08 be enacted by State legislatures (November 1983). A

**Appendix table 1. Estimated mean blood alcohol concentration (BAC) at arrest of jail inmates convicted of DWI, 1989**

	Estimated BAC
<b>Age</b>	
17-24 years	0.20
25-29	0.21
30-34	0.20
35-39	0.25
40-44	0.21
45-49	0.16
50 or more	0.24
<b>Number of prior DWI sentences to jail or prison</b>	
None	0.21
1	0.23
2	0.18
3 or more	0.21
<b>Number of hours spent drinking before arrest</b>	
1 hour or less	0.11
2	0.16
3	0.20
4	0.23
5	0.20
6	0.23
7	0.27
8	0.32
<b>Beverage consumed prior to arrest</b>	
Beer	0.18
Wine	0.17
Liquor	0.25
More than one type	0.32
Number of jail inmates	29,223

Note: Excludes an estimated 8,062 jail inmates who were drinking at the time of the offense but did not report one or more of the following: amount of ethanol consumed, the number of hours spent drinking prior to the arrest, or their weight. BAC is estimated for those who reported drinking for up to 8 hours before their arrest. Because of too few cases, reliable estimates could not be obtained for those who reported drinking for more than 8 hours.

BAC level above 0.05 is described as "driving while impaired" by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) Clearinghouse on Alcohol Information.

The estimated BAC was highest among inmates age 35 to 39 and those age 50 to 64 (appendix table 1). BAC's did not vary greatly based on the number of prior DWI convictions. As with ethanol consumption, BAC's escalated with the number of hours spent drinking. The BAC increased from 0.11 for those who drank 1 hour or less to 0.32 for those who drank for 8 hours. The BAC varied by the type of beverage consumed, although the highest BAC levels were found among those who drank combinations of beverages (0.32).

Jail inmates were estimated to have had a median BAC at the time of the DWI arrest of 0.19 and an average (mean) BAC of 0.21 (appendix table 2). The distribution of BAC levels for DWI jail inmates was similar to the BAC levels of drinking drivers involved in fatal accidents in 1989, suggesting that the average degree of intoxication of both groups was similar.

**Appendix table 2. Comparison of estimated blood alcohol concentration for fatal accident drivers in 1989 and convicted DWI offenders in local jails, 1989**

	Estimated BAC, 1989	
	Drinking drivers involved in fatal accidents*	Jail inmates
Mean	0.16	0.21
75th percentile	0.22	0.34
50th percentile (median)	0.16	0.19
25th percentile	0.11	0.09

\*Data were provided by Dr. Terry S. Zobeck of the Alcohol Epidemiologic Data System of the National Institute on Alcoholism and Alcohol Abuse. BAC test results were available for approximately 46% of 27,803 drivers involved in fatal accidents in 1989. Testing methods included blood, breath, urine, saliva, and other types of analyses that varied from case to case. Note that these data cover drivers involved in fatal accidents with measurable amounts of alcohol in their blood, regardless of whether the drinking driver caused the accident or intoxication contributed to the accident.

**Formula for calculating BAC after multiple hours of drinking (Widmark Formula)**

The National Highway Traffic Safety Administration (NHTSA) has provided a formula for use in this study that permits an estimate of BAC to be made based upon the self-reported drinking behavior before arrest of the jail inmates. The methodology for estimating BAC was supplied by Dr. Alfred J. Farina, research psychologist, Research Division, NHTSA.

$$BAC(h) = [(A/(r \times p))/10] - (h \times k)$$

BAC(h) = Blood alcohol concentration at time h

A = grams of ethanol consumed which is equal to:  
 $[(\text{liquid ounces ethanol}) \times (.82)]/.035$

r = reduced body mass (.68 for males and .55 for females)

p = weight in kilograms which is equal to:  
 $\text{weight in pounds}/2.2046$

h = hours drinking

k = estimated rate at which the body metabolizes ethanol  
 (.015 ounces per hour)

Based on this formula, a male DWI offender who weighs 173 pounds (78.47 kilograms) and who consumes 12 beers or about 6 ounces of ethanol (140.57 grams by weight) in 5 hours would have an estimated BAC of 0.19 when he finished drinking:

$$\begin{aligned}
 BAC(h) &= [(140.57/((.68 \times 78.47))/10] - (5 \times .015) \\
 &= (2.634/10) - (.075) \\
 &= .263 - .075 \\
 &= .188
 \end{aligned}$$

Appendix table 3. Estimating the effect of age on DUI arrests, 1980 and 1989

	A	B	C	D	E	F
	Number of arrests, 1980	Arrest rate, 1980 <sup>a</sup>	Number of licensed drivers, 1989 <sup>b</sup>	Expected number of arrests, 1989 <sup>c</sup>	Actual number of arrests, 1989	Difference between actual and expected number of arrests, 1989 <sup>d</sup>
Total	1,424,735	981	165,518	1,549,430	1,734,909	185,479
Age						
16-17	30,813	668	3,756	25,090	18,899	(6,191)
18-20	183,201	1,757	9,010	158,306	144,800	(13,506)
21-24	274,706	1,784	13,775	245,746	300,717	54,971
25-29	255,034	1,347	20,569	277,064	384,402	107,338
30-34	186,907	1,076	20,514	220,731	304,748	84,017
35-39	136,456	996	18,560	18,560	208,378	23,520
40-44	105,133	944	16,120	152,173	140,629	(11,544)
45-49	84,356	837	12,584	105,328	91,189	(14,139)
50-54	69,216	686	10,259	70,377	57,215	(13,162)
55-59	49,732	509	9,506	48,386	38,031	(10,355)
60-64	27,559	335	9,313	31,199	24,389	(6,810)
65 and older	21,622	140	21,553	30,174	21,512	(8,662)

<sup>a</sup>Number of arrests per 100,000 licensed drivers in each age group.  
<sup>b</sup>Estimated in thousands.  
<sup>c</sup>The expected number of arrests was calculated as

follows:  $(B/100) \times C = D$ .  
<sup>d</sup>The difference between actual and expected arrests was calculated as follows:  $E - D = F$ .

The effects of the changing age distribution of licensed drivers on the expected number of DUI arrests can be estimated. Had the rate of DUI arrests remained the same for each age group in 1989 compared to 1980, more than 1.5 million arrests in 1989 (column D) would have been expected, about 200,000 more than

occurred in 1980. However, during 1989, law enforcement agencies reported more than 1.7 million DUI arrests (column E). The number of arrests in 1989 among those age 25 to 34 was higher than expected, while arrests for those younger than 21 and 40 or older were lower than expected (column F).

Appendix table 4. Number of arrests for DUI per 100,000 licensed drivers, by age and year of birth

Year of birth	Number of arrests per 100,000 licensed drivers of these ages						
	18	19	20	21	22	23	24
1958	1,068	2,521	4,072	5,850	7,689	9,581	11,707
1959	1,288	2,766	4,545	6,492	8,461	10,653	12,918
1960	1,344	2,967	4,832	6,958	9,310	11,710	13,920
1961	1,486	3,288	5,319	7,822	10,327	12,627	14,912
1962	1,586	3,455	5,789	8,325	10,708	13,004	15,298
1963	1,596	3,737	6,096	8,575	10,933	13,284	15,479
1964	<b>1,787</b>	<b>3,873</b>	6,082	8,490	10,910	13,112	15,367
1965	1,623	3,596	5,713	8,197	10,453	12,750	14,896
1966	1,526	3,374	5,494	7,760	10,107	12,222	
1967	1,428	3,314	5,195	7,606	9,803		
1968	1,532	3,157	5,083	7,369			
1969	1,340	3,064	4,880				
1970	1,435	3,067					
1971	1,347						

**Bold face** and underline denote the birth cohort with the highest rate for the specified age.

DUI arrest rates for specific ages can be compared across different years of birth. Persons born in 1958 who became 24 years old in 1982 would have accumulated an estimated 11,707 arrests per 100,000 licensed drivers between the ages of 18 and 24 — about 1 arrest for every 8.5 drivers. By comparison, those born 5 years later who became 24 in 1987, accumulated 32% more arrests —

15,479 arrests per 100,000 licensed drivers, or 1 arrest for every 6.5 drivers. Those born in 1963 accumulated more arrests by age 24 than either their predecessors or those born later. Persons born in 1963 became 21 years old at about the same time that States began phasing in new, higher minimum-age laws for the purchase of alcoholic beverages.

Note: See note, table 2.

## Methodology

A jail is defined as a confinement facility administered by a local government agency that holds persons detained pending adjudication and persons committed after adjudication, usually for sentences of a year or less. Convicted jail inmates are either awaiting sentencing, serving sentences to jail confinement, awaiting transfer to a prison or serving a prison sentence in jail by arrangement with prison authorities. Unconvicted inmates are those who have been unable to obtain pretrial release, those detained pending trial, those on trial at the time the survey was being conducted, and those held for other governmental entities.

The 1989 Survey of Inmates in Local Jails was conducted for the Bureau of Justice Statistics by the U.S. Bureau of the Census. Through personal interviews during July, August, and September 1989, data were collected on individual characteristics of jail inmates, current offenses and sentences, criminal histories, and prior alcohol use and treatment. Similar surveys of jail inmates were conducted in 1972, 1978, and 1983.

### Conversion formulas for ethanol

The formulas used for calculating ounces of ethanol and blood alcohol concentration are described on page 8. In cases where extreme outliers or impossible responses were found, data were treated as missing.

For the purposes of this report the following conversions were used:

- 1 ounce of ethanol is equal to —
- 24 ounces of beer (4% alcohol content);
- 7 ounces of wine (14% alcohol content);
- 2 ounces of liquor (100 proof or 50% alcohol content).

Mixed drinks were assumed to contain 1.5 ounces of liquor. However, these conversions are approximations since some beer, wine, or liquor may have a different alcoholic content.

### Sample design

The sample for the 1989 survey was selected from a universe of 3,312 jails enumerated in the 1988 National Jail Census. The sample design was a stratified two-stage selection. In the first

stage six separate strata were formed based on the size of the male and female populations. In two strata all jails were selected; in the remaining four strata, a systematic sample of jails was selected proportional to the size of each jail. Overall, a total of 424 local jails were selected. In the second stage, interviewers visited each sampled facility and systematically selected a sample of male and female inmates using predetermined procedures. As a result, approximately 1 of every 70 men were selected, and depending on the stratum, 1 of every 14, 15, or 70 women were selected. A total of 5,675 interviews were completed, yielding an overall response rate of 92.3%.

Based on the completed interviews, estimates for the entire population were developed using weighting factors derived from the original probability of selection in the sample. These factors were adjusted for variable rates of nonresponse across strata and inmate characteristics. Further adjustments were made to control the survey estimates to counts of jail inmates obtained from the 1988 National Jail Census and the 1989 Sample Survey of Jails.

#### Accuracy of the estimates

The accuracy of the estimates presented in this report depends on two types of errors: sampling and nonsampling. Sampling error is variation that may occur by chance because a sample rather than a complete

enumeration of the population was conducted. Nonsampling error can be attributed to many sources, such as non-response, differences in the interpretation of questions among inmates, recall difficulties, and processing errors. In any survey the full extent of the nonsampling error is never known.

The sampling error, as measured by an estimated standard error, varies by the size of the estimate and the size of the base population. Estimates of the standard errors have been calculated for the 1989 survey of jail inmates, (see appendix table 5). These standard errors may be used to construct confidence intervals around percentages in this report. For example, the 95-percent confidence interval around the percentage of convicted jail inmates in 1989 who had 2 or more prior DWI sentences to jail or prison is 30.0 plus or minus 1.96 times 2.9 (or 24.3% to 35.7%).

These standard errors may also be used to test the statistical significance of the difference between two sample statistics by pooling the standard error of the two sample estimates. For example, the standard error of the difference in the percentage of convicted jail inmates in 1989 who reported they had 2 or more prior sentences to jail or prison compared to those unconvicted jail inmates who reported they had 2 or more prior sentences to jail or prison would be 6.4 (or the square root of

the sum of the squared standard errors in each category). The 95-percent confidence interval around the difference would be 1.96 times 6.4% (or 12.5%). Since the observed difference of 14.0% (30.0% minus 16.0%) is greater than 12.5%, the difference would be considered significant.

Comparisons discussed in this report were determined to be statistically significant at the 95 percent confidence level. Statements of comparison qualified by language such as "some evidence" or "slightly" indicate statistical significance at the 90% level (1.6 standard errors). Because of the sample design, State, local, or other sub-national estimates cannot be made.

Bureau of Justice Statistics Special Reports are written primarily by BJS staff. This Special Report was written by Robyn L. Cohen, under supervision of Allen J. Beck. Tracy L. Snell and Darrell K. Gillard reviewed the statistics, and Rhonda Keith produced the graph. Tom Hester edited the report, and Betty Sherman and Jayne Pugh produced the report. Corrections statistics are prepared under the general direction of Lawrence A. Greenfeld.

NCJ-134728 September 1992

The Bureau of Justice Statistics is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime.

Data used in this report are available from the National Archive of Criminal Justice Data at the University of Michigan, 1-800-999-0960. The dataset is archived as the Survey of Inmates of Local Jails (ICPSR 9419).

Appendix table 5. Standard errors of the estimated percentages, all jail inmates, 1989

Base of the estimate and year	Estimated percentages					
	98 or 2	95 or 5	90 or 10	80 or 20	70 or 30	50
1,000	4.4	6.9	9.5	12.7	14.6	15.9
5,000	2.0	3.1	4.3	5.7	6.5	7.1
10,000	1.4	2.2	3.0	4.0	4.6	5.0
25,000	0.9	1.4	1.9	2.5	2.9	3.2
50,000	0.6	1.0	1.3	1.8	2.1	2.2
100,000	0.4	0.7	1.0	1.3	1.5	1.6
200,000	0.3	0.5	0.7	0.9	1.0	1.1
395,553*	0.2	0.3	0.5	0.6	0.7	0.8

Note: The reliability of an estimated percentage depends on the size of the percentage and its base. Each standard error when multiplied by 1.96 provides a 95-percent confidence interval around an estimated percentage. To calculate the standard error of the difference between two estimated percentages, take the square root of the sum of each squared standard error for the percentages being compared.

\*The total number of jail inmates in 1989.



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