DOCUMENT RESUME

ED 448 379 CG 030 570

TITLE	Impaired Driving among Youth: Trends & Tools for Prevention. Technical Report.
INSTITUTION	Substance Abuse and Mental Health Services Administration (DHHS/PHS), Rockville, MD. Center for Substance Abuse Prevention.
REPORT NO	SMA-99-3364
PUB DATE	1999-00-00
NOTE	41p.
AVAILABLE FROM	National Clearinghouse for Alcohol and Drug Information, P.O. Box 2345, Rockville, MD 20847. Tel: 800-729-6686 (Toll Free); TDD: 800-487-4899 (Toll Free); Web site: http://www.health.org.
PUB TYPE	Numerical/Quantitative Data (110) -- Reports - Descriptive (141)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Adolescents; Alcohol Abuse; Alcohol Education; *Drinking; *Driving While Intoxicated; Laws; Prevention; State Legislation; *Young Adults

ABSTRACT

In 1996, after years of decline, alcohol-related crashes involving youth between 15 and 20 years old increased by nearly 5%. The estimated medical, monetary, and lost quality-of-life costs associated with injuries in crashes of young drivers are staggering. Policymakers are being called upon to address the problem of underage drinking and associated preventable problems, such as impaired driving and injuries. Strategies to prevent drinking and driving have proven to be effective. Substance abuse prevention professionals need to learn which strategies work and incorporate them into their ongoing efforts to prevent substance abuse problems. Brief overviews of some of these proven strategies are included and details are given on an extensive deterrence model. The report consists of four chapters. The first is an overview of the impaired driving problem with a focus on the young driver. Chapter 2 reviews minimum-age 21 alcohol purchase laws and discusses what states and communities do to ensure their enforcement. Chapter 3 discusses zero tolerance statutes, which require zero or low blood levels for young drivers. The last chapter concerns graduated licensing, a system that slowly eases young drivers into traffic flow. (Contains 16 figures, 9 tables, and 99 references.) (JDM)

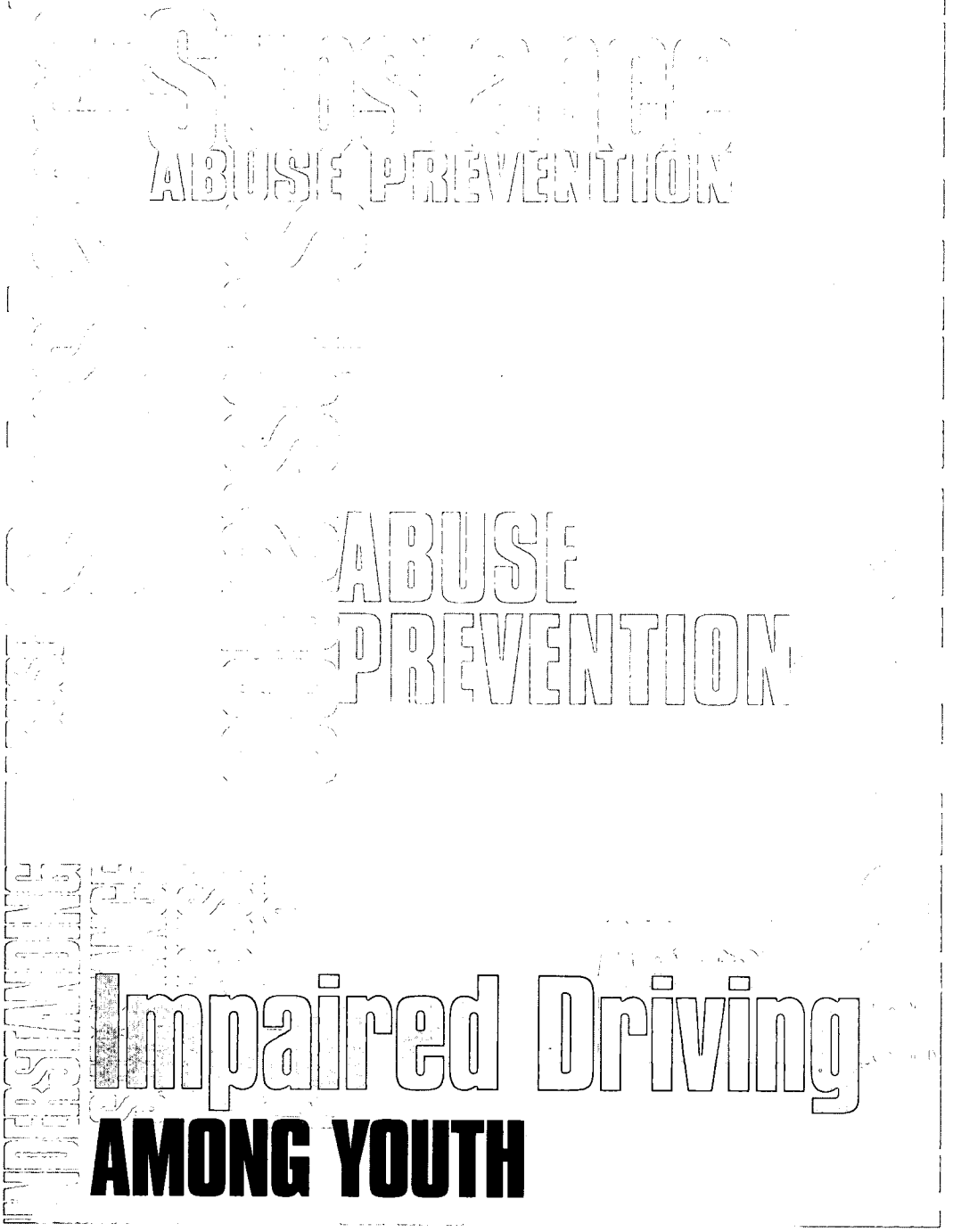
TECHNICAL REPOR

Impaired Driving AMONG YOUTH

Trends & Tools for Prevention

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
Center for Substance Abuse Prevention

TECHNICAL REPORT



Impaired Driving AMONG YOUTH

Trends & Tools for Prevention

Substance Abuse and Mental Health Services Administration
Center for Substance Abuse Prevention
Division of Knowledge Development and Evaluation

Acknowledgments

This publication was prepared for the Substance Abuse and Mental Health Services Administration's Center for Substance Abuse Prevention (SAMHSA/CSAP) by the Pacific Institute for Research and Evaluation in Rockville, Maryland. CSAP Project Officer Carol McHale provided guidance.

DHHS Publication No. (SMA)99-3364
Printed 1999

For single copies of this document, contact SAMHSA's National Clearinghouse for Alcohol and Drug Information (NCADI), P.O. Box 2345, Rockville, MD 20847-2345; 1-800-729-6686, 301-468-2600, or TDD 1-800-487-4889; or visit the Web site at www.health.org.

Foreword

The Center for Substance Abuse Prevention (CSAP), as part of the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services, is the Nation's lead agency for improving the quality and availability of substance abuse prevention services. In addition to the many programs sponsored by the agency, SAMHSA/CSAP serves as a facilitator of information dissemination, training, and technical assistance. In these capacities, SAMHSA/CSAP seeks to enhance the work of policymakers and practitioners in their substance abuse prevention efforts.

In 1996, after years of decline, alcohol-related crashes involving youth between 15 and 20 years old increased by nearly 5 percent. Clearly, despite the fact that it is illegal for youth under 21 to purchase alcohol, they still drink and they still die.

When young drivers combine alcohol and driving, they experience more trouble with less alcohol than older drivers. The problem is related to both their immaturity and their lack of driving experience. The estimated medical, monetary, and lost quality-of-life costs associated with injuries in crashes of young drivers are staggering. Policymakers are being called on to address the problem of underage drinking and associated preventable problems, such as impaired driving and injuries.

The good news is that strategies to prevent drinking and impaired driving have been shown to be effective. After reviewing the research on this topic, we realized that substance abuse prevention professionals should learn which strategies work and incorporate them into their ongoing efforts to prevent substance abuse problems in general. This document provides brief overviews of some of these proven strategies. Because many States already implement these strategies, the content of this report is rooted in both actual experience and research. Successes are often measured in lives saved.

This report consists of four chapters. The first is an overview of the impaired driving problem, with a focus on young drivers. The next chapter reviews minimum age alcohol purchase laws and discusses their effects and what States and communities can do to ensure their enforcement. A chapter on zero tolerance statutes, which require zero or low blood alcohol levels for young drivers, follows. The final chapter concerns graduated licensing, a system that helps ease young drivers into the traffic flow gradually.

In the coming years, SAMHSA and CSAP look forward to deepening our partnership with the States and jurisdictions as we continue to work toward becoming a Nation that protects its youth from the problems associated with alcohol.

Karol L. Kumpfer, Ph.D.
Director
Center for Substance Abuse Prevention
Substance Abuse and Mental Health Services Administration

Nelba R. Chavez, Ph.D.
Administrator
Substance Abuse and Mental Health Services Administration

Contents

List of Figures

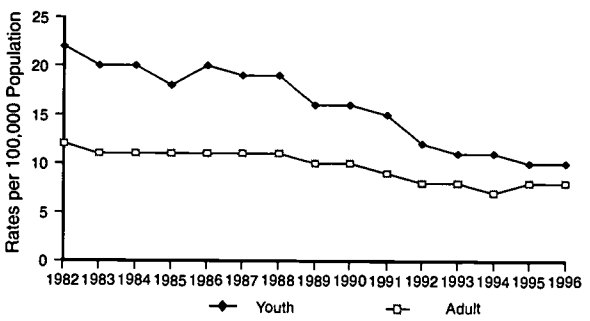
List of Tables

Impaired driving is a preventable social problem that costs Americans billions of dollars each year.* While the Nation has witnessed considerable reductions in impaired driving among all residents in recent years, almost 37 percent of youth traffic crash fatalities in the United States in 1996 were alcohol related. Drugs also play a small but important part in traffic crashes. Figure 1 shows the difference between youth and adults regarding alcohol-related fatality rates per 100,000.

Examining historical trends in impaired driving provides information about how the nature and extent of this problem have shifted over time. This report addresses the questions and summarizes the most effective strategies for preventing impaired driving by young people in the United States.

Figure 1.

Alcohol-Related Fatality Rates: Adult vs. Youth
Numbers Killed per 100,000 Population



Source: NHTSA, 1997c.

The personal and societal costs associated with impaired driving are staggering. The annual cost of alcohol-related crashes has been estimated at $148 billion. Though much less well studied, it is likely that driver impairment from drugs adds to these costs. The groups most affected are teenagers and young adults.

A variety of factors influence the rate of alcohol-related motor vehicle fatalities. These factors include geographic density, population demographics regarding age and sex, cultural differences, and law enforcement techniques. States with large populations of young drivers and lenient drinking and driving policies are likely to have higher rates of alcohol-related motor vehicle fatalities. In 1996, States with the highest percentages of youth traffic fatalities involving alcohol were Vermont (68 percent), North Dakota (62 percent), and Hawaii (52.5 percent). The lowest percentages were found in Utah (10.7 percent), Virginia (24.9 percent), and Georgia (25.2 percent). Males have more alcohol-related motor vehicle fatalities than females, but rates for females have been rising.

Drivers 15 to 20 years old have a higher rate of fatal alcohol-related motor vehicle crashes than older drivers. A recurring result in impaired driving research has been that young drivers more frequently crash at lower blood alcohol concentrations (BACs) than do older drivers, perhaps because of the former's inexperience with drinking, with driving, or both.

Drinking and driving by youth has been a major focus of preventionists for most of the past 15 years. In 1984, President Reagan signed legislation to withhold highway safety funds from States that did not set 21 as the minimum purchasing age for alcohol. By July 1988, all 50 States had conformed. A noticeable drop in youth alcohol-related fatalities occurred between 1988 and 1989. In 1988, 32.3 percent of drivers aged 16 to 20 who were involved in fatal crashes had BACs of more than 0.01 percent. In 1989, this figure dropped to 29.9 percent. By 1996, 21.5 percent of young drivers involved in fatal crashes had BACs greater than 0.01 percent. It is estimated that these laws have saved approximately 16,500 lives in alcohol-related traffic crashes since 1975. Many States also adopted low or zero tolerance laws that make it illegal for drivers under 21 to drive with any amount of alcohol in their system, and "use and lose" laws, which link drug and alcohol convictions, irrespective of motor vehicle involvement, to loss of the driver's license.

*Citations supporting the findings summarized here may be found in *Impaired Driving Among Youth: Trends and Tools for Prevention.*

Many strategies have been shown to prevent alcohol-related crashes among youth, including those designed as deterrence and those designed to affect alcohol consumption. Community organization and mobilization are often the mechanisms for implementing these strategies. This report describes three of these youth-oriented deterrence and alcohol policy strategies, summarized below.

Age 21 Laws Minimum age 21 alcohol purchase laws are now in place in all 50 States and the District of Columbia. The National Highway Traffic Safety Administration estimates that more than 16,500 traffic deaths have been averted since States started raising the minimum drinking age. The laws are not well enforced, however. A number of strategies have been developed to improve enforcement and decrease youth access to alcohol. These strategies include decoy or sting programs, responsible beverage service training, and the development of driver's licenses that are more difficult to alter or counterfeit.

Zero Tolerance Many States have enacted BAC limits of 0.02 percent or less for drivers under age 21. These limits reflect the facts that drinking is illegal for anyone under 21 and that young drivers are particularly vulnerable to impairment at low BACs. These laws have been found to reduce alcohol-related crashes in the affected age group by as much as 50 percent in some States and by between 17 and 22 percent consistently. The effectiveness of the laws increases when they are combined with a public awareness campaign.

Graduated Licensing Graduated licensing is a process by which learning drivers can be gradually granted driving privileges. When young people drink and drive, they experience far more trouble—with less alcohol—than older drivers. Reductions in traffic crashes, both alcohol related and not alcohol related, have been measured as a result of nighttime driving curfews, increased age of licensure, and graduated driving privileges (in which a variety of driving restrictions are gradually lifted as the driver gains experience and maturity). Such licensing systems have been found to be very effective in New Zealand and Australia and are supported by both parents and young people.

Impaired driving among youth is one negative consequence of the abuse of alcohol and drugs, but it can be prevented. Implementing the prevention strategies discussed in this report can help communities and States in their efforts to decrease the personal and societal costs of such behavior.

Preventing Impaired Driving Among Youth: What You Need To Know

The bad news is...

In 1996, the number of alcohol-related crashes involving youth between 15 and 20 years old increased by almost 5 percent compared with the previous year. More than 2,300 youth died in alcohol-related crashes in 1996.

The good news is...

There are many effective strategies that prevent impaired driving among youth.

Minimum Age 21 Laws
More than 16,500 traffic deaths have been avoided since States started raising the minimum legal drinking age.

Zero Tolerance Laws
These laws have reduced alcohol-related crashes involving youth by between 17 and 50 percent in some States.

Graduated Licensing
This system, which eases beginning drivers into the traffic environment, has led to reductions in both alcohol-related and non-alcohol-related crashes.

The bad news is...

Current minimum age 21 laws are not well enforced. Police officers have no standardized cues to aid in the detection of zero tolerance violators. Also, enforcing laws that involve juveniles is often more difficult and time consuming than enforcing laws for adults.

The good news is...

There are many effective programs to improve enforcement of minimum age drinking laws.

Combined with the belief that punishment will be swift and certain, these programs can deter sales outlets from selling to youth and youth from drinking. Many communities are implementing other strategies (e.g., undercover buying operations, responsible beverage service) with promising results.

Passive alcohol sensors, increased officer training, and community involvement also can make enforcement of underage drinking laws more effective.

The best news is...you and your community can implement the strategies described in this document and prevent impaired driving among youth!

Chapter 1
Trends in Impaired Driving

Impaired driving is a preventable social problem that costs Americans billions of dollars each year. In 1996, more than 21 percent of drivers between 15 and 20 years of age involved in fatal crashes had blood alcohol concentrations (BACs) between 0.01 and 0.10 (National Highway Traffic Safety Administration [NHTSA], 1998a). Examining trends in impaired driving provides answers to many questions concerning the nature and extent of this problem, such as who drives impaired and how impaired driving rates vary over time and by State. The following question-and-answer format presents the latest data in the field and summarizes the most effective strategies for preventing impaired driving by young people in the United States.

How is impaired driving defined?

Impaired driving is the joint occurrence of (1) driving a vehicle and (2) having a BAC of 0.01 or greater or being under the influence of some other psychoactive substance. NHTSA defines a fatal crash as "alcohol-related" if either a driver or a nonoccupant (e.g., pedestrian) has a BAC greater than or equal to 0.01 in a police-reported traffic crash. Those with a BAC of 0.10 or greater are considered "intoxicated" (NHTSA, 1997d). Separately, either driving or drinking may be socially acceptable and legal. However, combined they spell serious trouble. It is unlawful in all States for any person who is under the influence of any alcoholic beverage or any drug to drive a vehicle.

What is the magnitude of the problems caused by impaired driving?

The personal and societal costs associated with impaired driving are staggering. During 1996, alcohol-related motor vehicle crashes in the United States caused more than 17,000 deaths and more than 321,000 injuries (NHTSA, 1997d). In 1996, alcohol-related fatalities for youth ages 15 to 20 increased by nearly 5 percent (NHTSA, 1997c). More than 2,300 youth died in alcohol-related crashes (36.6 percent of their total traffic fatalities). Moreover, NHTSA (1997c) reported that high BACs (in excess of 0.10 percent) accounted for all of the increase in alcohol-related fatalities among youth in 1996. The annual cost of alcohol-related crashes has been estimated at $148 billion (Miller & Blincoe, 1994). Though studied much less, it is likely that driver impairment from drugs adds to these costs. The groups most affected are teenagers and young adults.

Does the area of the country make a difference?

Table 1 lists States' rates of alcohol-related traffic crash fatalities in 1996 per 10,000 population (including drivers and passengers) in descending order. Substantial regional differences in the incidence of alcohol-related motor vehicle fatalities can be seen in the table. The lowest rates are found in the northeastern States, such as New York (0.29 deaths per 10,000 population in 1996), Massachusetts (0.30 deaths), and Rhode Island (0.33 deaths). Rates three, four, and five times higher, respectively, are found in the South, Southwest, and Mountain States (but not Utah). In 1996, the States with the highest rates were New Mexico (1.41 deaths), Mississippi (1.24), Wyoming (1.20), and Alabama (1.14) (NHTSA, 1997a).

Table 2 lists States' total youth fatalities in traffic crashes (including drivers and passengers) for 1996 and the number and percentage of those that were alcohol related in descending order. Significant differences exist among States' percentages of alcohol-related crash fatalities among youth. The lowest percentages are in Utah (14.0 percent alcohol related), Virginia (24.8 percent), and Georgia (25.2 percent). States with the highest percentages of youth alcohol-related fatalities are Vermont (68.8 percent), North Dakota (64.3 percent), and Montana (55.2 percent). Overall, almost 37 percent of youth traffic crash fatalities in the United States in 1996 were alcohol related (NHTSA, 1998b).

Why are there such significant differences among States' rates?

A variety of factors interact to influence the rate of alcohol-related motor vehicle fatalities. These factors include population density, population composition (regarding age and sex), cultural differences, law enforcement techniques, and the like. States with large populations of young drivers and lenient drinking and driving policies are likely to have higher rates of alcohol-related motor vehicle fatalities. States that implement the effective strategies outlined later in this publication, such as increased enforcement of minimum purchase age laws, zero tolerance laws, and graduated licensing, are likely to see their death rates decline.

Table 1. Alcohol-Related Traffic Crash Deaths per 10,000 Population During 1996*

State	Rate	State	Rate
New Mexico	1.41	Alaska	0.68
Mississippi	1.24	Vermont	0.66
Wyoming	1.20	Delaware	0.66
Alabama	1.14	Washington	0.64
Nevada	1.09	Michigan	0.64
South Carolina	1.07	Colorado	0.64
Missouri	1.06	Wisconsin	0.62
Texas	1.04	Nebraska	0.59
Arizona	0.98	Indiana	0.57
South Dakota	0.96	Hawaii	0.56
Tennessee	0.94	Illinois	0.56
Louisiana	0.92	District of Columbia	0.55
Arkansas	0.85	Maine	0.51
Oklahoma	0.85	Virginia	0.51
Montana	0.84	California	0.50
Kansas	0.78	Pennsylvania	0.48
Georgia	0.77	Connecticut	0.47
Kentucky	0.76	Minnesota	0.47
Idaho	0.73	Ohio	0.41
West Virginia	0.72	Maryland	0.40
North Carolina	0.72	New Hampshire	0.40
Florida	0.70	Utah	0.38
North Dakota	0.70	New Jersey	0.35
Iowa	0.69	Rhode Island	0.33
Oregon	0.69	Massachusetts	0.30
		New York	0.29
All United States 0.65			

Source: NHTSA, 1997a.

*Including drivers and passengers.

Table 2. Alcohol-Related Traffic Crash Deaths During 1997—Ages 15 Through 20*

State	Total	Alcohol related	% Alcohol related
Vermont	16	11	68.8
North Dakota	14	9	64.3
Montana	29	16	55.2
Hawaii	26	14	53.8
New Mexico	86	45	52.3
Massachusetts	69	35	50.7
Washington	105	53	50.5
Connecticut	39	19	48.7
Arizona	122	58	47.5
Texas	600	283	47.2
Iowa	81	38	46.9
Nebraska	43	19	44.2
Missouri	196	86	43.9
New Hampshire	16	7	43.8
Oregon	90	39	43.3
Louisiana	119	51	42.9
Alaska	12	5	41.7
Minnesota	109	45	41.3
Wyoming	32	13	40.6
Dist. of Columbia	5	2	40.0
South Dakota	30	12	40.0
Alabama	170	67	39.4
Maine	33	13	39.4
Kansas	97	38	39.2
Michigan	250	95	38.0
South Carolina	146	55	37.8
Arkansas	106	40	37.7
Rhode Island	8	3	37.5
New Jersey	91	34	37.4
California	487	180	37.0
Nevada	38	14	36.8
Tennessee	202	74	36.6
Illinois	206	74	35.9
Mississippi	144	50	34.7
Maryland	79	27	34.2
West Virginia	61	20	32.8
Oklahoma	127	41	32.3
Pennsylvania	201	65	32.3
Wisconsin	121	39	32.2
Florida	297	94	31.7
Ohio	230	73	31.7
Delaware	16	5	31.3
New York	202	63	31.2
Colorado	94	26	27.7
Indiana	191	51	26.7
Kentucky	146	38	26.0
Idaho	54	14	25.9
North Carolina	220	57	25.9
Georgia	286	72	25.2
Virginia	133	33	24.8
Utah	57	8	14.0
Total	**6,332**	**2,323**	**36.6**

Source: NHTSA, 1998b.

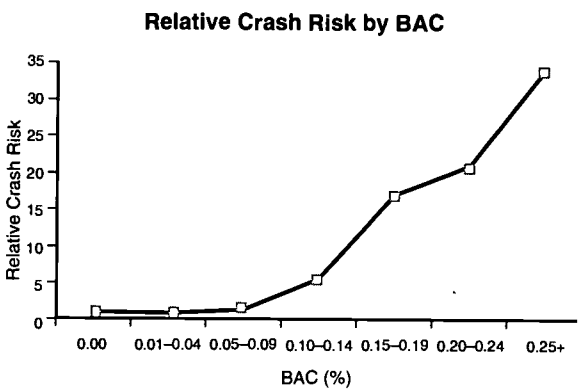
*Including drivers and passengers.

How do we know that driving under the influence of alcohol causes crashes?

The largest case-control study of drinking and driving ever conducted was completed in Grand Rapids, MI, during the early 1960's (see Hyman, 1968). The results for the 13,485 crash-involved and comparison drivers studied indicated that the risk of becoming involved in a crash increased after just a few drinks and increased exponentially with the number of drinks consumed.

The relative risk of becoming involved in a crash as a function of BAC, as studied in Grand Rapids, is shown in figure 2. The results indicate that crash risk increases gradually up to a BAC of about 0.10 percent (about four to five drinks in 1 to 2 hours for a 160-pound person). Then, crash risk increases exponentially with increasing amounts of alcohol. When compared with drivers who had not been drinking, drivers with BACs from 0.10 percent to 0.25 percent were 6 to 32 times more likely to become involved in a crash.

Figure 2.



Source: Hyman, 1968.

Are there any proven strategies for reducing impaired driving?

Yes. Research and evaluation efforts conducted in the late 1960's and 1970's suggested that crash reduction could be achieved by well-publicized, intensive law enforcement efforts. A prevention model emerged that suggested that reductions in alcohol-related crashes could be achieved by deterring potential offenders from drinking and driving. Such general deterrence involved creating a plausible risk of being apprehended, followed by the perception of certain and swift application of significant sanctions (Ross, 1982). In other words, the most effective approaches involved creating the perception among drivers that they would be well advised not to attempt driving after drinking (Nichols, 1987).

Have these strategies been implemented?

The 1980's can be characterized as a decade of implementation for this general deterrence model. States began to enact laws to mandate license suspension and eliminate or restrict plea bargaining.

Many States made it illegal per se to drive with a specified BAC, typically 0.10 percent. Formerly, in order to be charged with impaired driving, a person had to display obvious signs of intoxication, and the BAC was considered only a contributory factor. Another innovation was administrative license revocation (ALR), which allowed confiscation of the driver's license at the time of arrest rather than at some future court date. States also began to introduce new sanctions to broaden penalties and treatments. Some were responsive to victims' rights (e.g., restitution), some were alternatives or adjuncts to jail sentences (e.g., community service and house arrest), and others were attempts to deal specifically with repeated drinking and driving behavior (e.g., ignition interlocks, vehicle confiscation, or registration withdrawal).

The 1990's have seen even stronger legislation, more numerous sobriety checkpoints, and an increasing interest in drugs other than alcohol. Additional States passed ALR, and some States have lowered their per se alcohol limit to 0.08 percent BAC. A favorable Supreme Court ruling in 1990 and several positive evaluation studies (see, e.g., Voas, Rhodenizer, & Lynn, 1985; Wells, Preusser, & Williams, 1992) led to stronger support for sobriety checkpoints as a method of enforcing impaired-driving laws. Also, based on programs begun in Los Angeles during the 1980's, more than 4,000 police officers in 25 States were trained as drug recognition experts to provide them with the expertise to enforce impaired-driving laws in situations where the impairment was caused by drugs other than alcohol.

What special attention have underage drinking drivers received?

Drinking and driving by youth has been a major focus of preventionists for most of the past 15 years. In 1984, President Reagan signed legislation to withhold highway safety funds from States that did not set 21 as the minimum purchasing age for alcohol. By July 1988, all 50 States had set that minimum purchasing age. It is estimated that these laws have saved approximately 16,500 lives since 1975 (NHTSA, 1997d). Many States also adopted low or zero tolerance presumptive BAC limits for drivers under the age of 21 and "use and lose" laws, which link drug and alcohol convictions, irrespective of motor vehicle involvement, to loss of the driver's license (D. F. Preusser, Ulmer, & C. W. Preusser, 1992b).

Can convicted drinking drivers be successfully rehabilitated?

Impaired driving is often symptomatic of some degree of an underlying substance abuse problem. BACs of 0.20 percent at the time of arrest are not uncommon; BACs of 0.15 percent are typical (D. F. Preusser, Ulmer, & C.W. Preusser, 1992a). Persons who do not have alcohol problems rarely reach such levels. Therefore, alcohol or drug assessment, education, and treatment have traditionally been part of the sanctioning and relicensing process for convicted drinking drivers.

Evaluations of such treatment programs in terms of subsequent crashes and violations have been mixed. Results were negative when treatment was applied in lieu of traditional license withdrawal (Preusser, Ulmer, & Adams, 1976); they were positive when added to license withdrawal (DeYoung, 1995) and for drivers whose substance abuse problems were less severe (Wells-Parker, Bangert-Drowns, McMillen, & Williams, 1995). A meta-analysis of rehabilitative programs estimated that on average such programs decrease recidivism between 8 and 9 percent (Wells-Parker et al., 1995). More intensive treatment and monitoring programs, however, have shown more promise in reducing recidivism (Voas & Tippetts, 1990). Most States conduct some sort of rehabilitative program for convicted impaired drivers with a modest impact on recidivism.

Are crashes being prevented?

Yes. The numbers of vehicles, drivers, road miles, and miles driven have increased steadily throughout the 1980's and 1990's. Yet the numbers of alcohol-related fatalities, drinking drivers involved in fatal crashes, and drinking drivers randomly sampled in roadside surveys have declined.

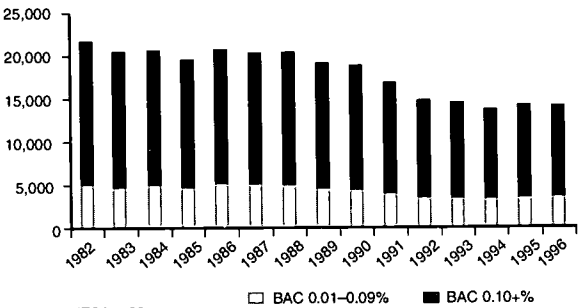
In 1983, there were 23,646 alcohol-related fatalities in motor vehicle crashes (or 55 percent of all motor vehicle fatalities during that year). In 1996, there were 17,126 alcohol-related fatalities in motor vehicle crashes (or 41 percent of all motor vehicle fatalities in that year). Thus, for the period 1982 through 1995, both the absolute number of alcohol-related fatalities and the percentage of alcohol-related fatalities among all motor vehicle fatalities declined (NHTSA, 1996c, 1997d).

A similar method of assessing the decline in fatal crashes is to examine the BACs of drivers involved in these crashes. In 1982, approximately 9 percent of all drivers involved in fatal crashes had BACs between 0.01 percent and 0.09 percent at the time of the crash,* and 30 percent had BACs of 0.10 percent or higher. By 1996, these percentages had declined to 6 percent and 19 percent, respectively (NHTSA, 1996c). Figure 3 shows the decline in alcohol-related fatal crashes for both BAC levels.

Data from national roadside surveys conducted in 1973, 1986, and 1996 corroborate the declines in the fatal crash rates (Insurance Institute for Highway Safety [IIHS], 1997a; Lund & Wolfe,

Figure 3.

Drivers in Alcohol-Related Fatal Crashes, by BAC, 1982 Through 1996



Source: NHTSA. 1997a.

*While BACs at this level are not illegal in most States, they do indicate that alcohol impairment may have been a factor in the crash.

Table 3. Percent of Drivers With High BACs, by Demographic Characteristics—1973, 1986, and 1996

		BAC ≥ 0.05			BAC ≥ 0.10		
		1973	1986	1996	1973	1986	1996
Age	15–20	10.9	4.6	2.8	4.1	2.7	0.3
	21–34	15.4	9.9	11.3	5.7	3.3	3.8
	35–44	15.9	9.4	6.9	5.8	4.7	3.7
	45 +	12.1	6.8	5.2	4.1	1.8	1.7
Sex	Male	14.7	9.9	8.7	5.5	3.9	3.5
	Female	8.8	3.9	5.8	3.0	1.3	1.5
Ethnicity	Hispanic	22.0	13.0	14.9	3.3	4.4	7.5
	White	13.3	7.4	7.1	5.1	2.7	2.3
	Black	16.5	13.5	9.4	6.0	5.9	3.6
ALL		13.7	8.4	7.7	5.1	3.2	2.8

Sources: IIHS, 1997a; Lund & Wolfe, 1991; NHTSA, 1997b; Wolfe, 1974.

1991; NHTSA, 1997b; Wolfe, 1974). Each of these surveys was conducted on weekend nights and involved voluntary breath tests of approximately 3,000 to 6,000 drivers sampled from around the country. As shown in table 3, approximately 5.1 percent of drivers sampled in 1973 had a BAC of 0.10 percent or higher. This figure dropped to 3.2 percent in 1986 and 2.8 percent in 1996. Steady declines were seen among all groups listed in table 3, except females, Hispanics, and adults aged 21–34. Research on female impaired drivers is fairly limited but suggests that females are drinking and driving more (Beirness, 1988). For example, analyses carried out by Popkin (1991) showed that when crash involvement for young females is examined, their alcohol-related deaths may actually be increasing. The increase seen among Hispanic drivers is of great concern in States with large Hispanic populations, and it warrants further attention. Table 3 also shows that declines were greatest among young drivers—possibly because of the minimum age 21 drinking laws promoted during the mid-1980's (see, e.g., DuMouchel, Williams, & Zador, 1987) and the more recent zero tolerance or low BAC laws for youth (see, e.g., Hingson, Heeren, & Winter, 1994).

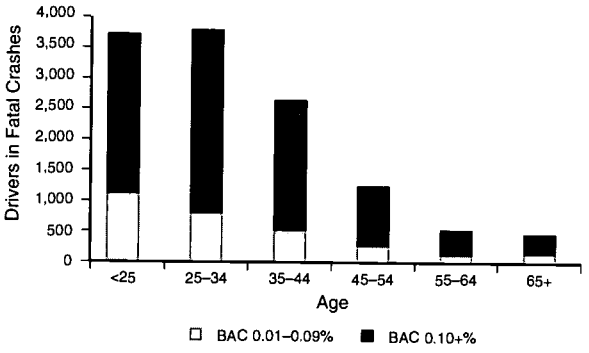
Who is still drinking and driving?

Despite progress, many people, especially males under age 25, continue to drink and drive. In 1996, 21 percent of all male drivers involved in fatal crashes had a BAC of 0.10 percent or greater, compared with only 11 percent of all female drivers involved in fatal crashes (NHTSA, 1997d).

As shown in figure 4 most drinking drivers of passenger vehicles (including light trucks and vans) who were involved in fatal crashes were 25 to 34, followed by drivers under the age of 25, followed by those ages 35 to 44 (NHTSA, 1997d). Overall, the median driver's age was 31. When looking only at drivers whose BAC was between 0.01 percent and 0.09 percent, the age group with the highest rate of impaired drivers was under 25 years. Figure 5 illustrates that young drivers (15 to 20 years old) have a higher rate of fatal alcohol-related motor vehicle crashes than older drivers (per 100,000 population). A recurring finding in impaired-driving research has been that young drivers more frequently crash at lower BACs than do older drivers, perhaps because of the former's inexperience with drinking, with driving, or both (see, e.g., Preusser et al., 1992b).

Figure 4.

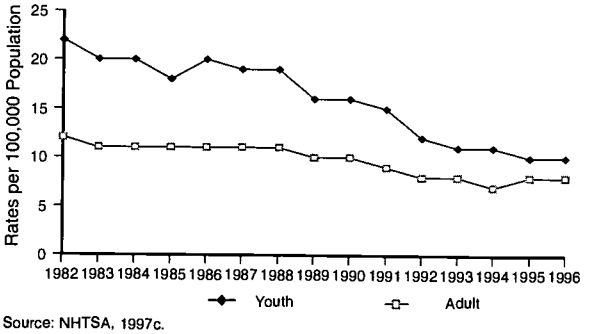
Drivers in Fatal Crashes, by Age and BAC, for 1996



Source: NHTSA, 1997a.

Figure 5.

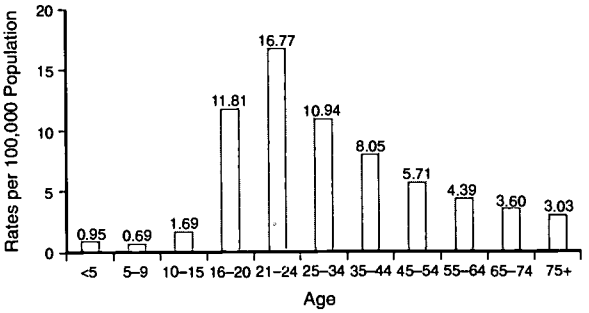
Alcohol-Related Fatality Rates: Adult vs. Youth
Numbers Killed per 100,000 Population



Source: NHTSA, 1997c.

Figure 6.

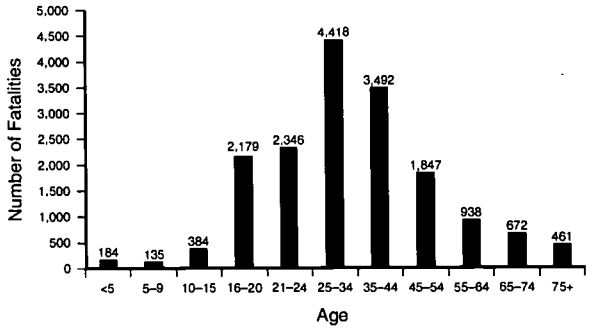
Fatality Rates of Alcohol-Related Crashes, by Age—1996



Sources: NHTSA, 1997a; U.S. Bureau of the Census, 1996.

Figure 7.

Fatalities in Alcohol-Related Crashes, by Age—1996



Sources: NHTSA, 1997a; U.S. Bureau of the Census, 1996.

Who is being killed in alcohol-related crashes?

In 1996, most of the 17,126 fatalities in alcohol-related crashes were drivers (10,135 or 60 percent), most of whom were between ages 16 and 44 (7,786 or 47 percent). The remainder were passengers (4,010 or 22 percent), pedestrians (2,599 or 15 percent), and others, including bicyclists (382 or 2 percent). Many of the passengers were children or teenagers (481 fatally injured passengers age 15 and younger, 789 between the ages of 16 and 20). The fatally injured pedestrians in alcohol-related crashes tended to be older (median age 39) than either the fatally injured drivers (median age 33) or the fatally injured passengers (median age 24) (NHTSA, 1997a).

As shown in figure 6, the rate of alcohol-related fatal crashes per 100,000 population was highest during 1996 for persons ages 21 to 24, followed closely by the age groups 16 to 20 and 25 to 34. Figure 7 illustrates the actual number of fatalities in alcohol-related motor vehicle crashes. As both figures show, while some children age 15 or younger and some persons age 65 or older die in these crashes, it is teenagers and young adults, followed by middle-aged adults, who suffer by far the greatest losses.

Do race and ethnicity make a difference?

Little is known about the race and ethnicity of fatally injured drivers and passengers in alcohol-related crashes. Ross, Howard, Ganikos, and Taylor (1991) conducted a literature search on ethnic/racial group involvement in impaired driving and found that African Americans and Hispanics are disproportionately more likely to be impaired drivers, but the relationship appeared to be reduced for ethnic/racial youth. The roadside survey data previously cited indicated that Hispanic drivers were more likely to have been drinking than Whites, Asians, or African Americans. Black adults ages 25 or older, Hispanic males, and Native Americans were more likely to have been drinking prior to their fatal crashes in which pedestrians were killed. Young Blacks, Hispanic females, and Asians were less likely to have been drinking (Leaf & Preusser, 1997).

When do alcohol-related crashes occur?

The month with the largest number of alcohol-related motor vehicle deaths during 1996 was August (9.7 percent of 17,126 deaths). June was second (9.3 percent), followed by September (9.0 percent), November (8.8 percent), and October (8.6 percent). December ranked seventh (8.3 percent). The months with the fewest deaths were January (6.8 percent) and February (6.8 percent) (NHTSA, 1997a).

Consistent with popular belief, most deaths that resulted from alcohol-related crashes occurred on a Saturday (24 percent), followed by Sunday (20 percent) and Friday (16 percent). The day with the fewest alcohol-related crash deaths was Tuesday (9 percent).

The results for time of day confirm that most alcohol-related deaths resulted from crashes at

night. The time of the crash for approximately two of every three alcohol-related deaths was between 8 p.m. and 5:59 a.m. (65 percent). Approximately 1 in 5 deaths occurred between 4 p.m. and 7:59 p.m. (20 percent), and approximately 1 in 10 occurred between 11 a.m. and 3:59 p.m. (9 percent) (NHTSA, 1997a).

Are drugs a problem?

No drug has been studied as extensively as alcohol has been studied with respect to motor vehicle crashes. Available evidence concerning drugs suggests that they have a small, yet measurable, association with impaired driving and the occurrence of impaired driving crashes.

Of 1,882 fatally injured drivers sampled in seven States during 1991 and 1992, postmortem blood samples showed alcohol in 51.5 percent of the drivers (Terhune et al., 1992). Of the 43 other drugs for which tests were conducted, the most prevalent were cannabis (6.7 percent), cocaine (5.3 percent), benzodiazepine tranquilizers (2.9 percent), and amphetamines (1.9 percent). Analysis of the circumstances surrounding each of these fatal crashes suggested that they were caused by impairment effects associated with alcohol (alone), alcohol-drug combinations, and drug-drug combinations. Statistically significant crash causation was not seen for drugs when used alone.

A study examined 10 police agencies in which officers were specifically trained to identify drivers impaired by drugs (Preusser et al., 1992a). Of 1,469 drivers arrested under suspicion of drug intoxication, 50 percent had BACs of 0.00, and 40 percent had BACs of less than 0.10 percent. Laboratory results indicated that 46.5 percent of these suspects tested positive for cannabis. Other drugs found were central nervous system (CNS) stimulants including cocaine (29.6 percent), CNS depressants (23.3 percent), narcotic analgesics (15.5 percent), phencyclidine, known as "PCP" (5.9 percent), inhalants (1.4 percent), and hallucinogens (0.8 percent). Between 1 and 4 percent of all persons arrested for impaired driving during this study were found to be under the influence of drugs. This finding is consistent with the conclusion that drugs are a small, yet measurable, part of the total impaired driving problem.

Type and amount of drug use varies for selected driver subgroups. For instance, Williams, Peat, Crouch, Wells, and Finkle (1985) found a high incidence of alcohol use, nonalcohol drug use, and multiple drug use among young, fatally injured male drivers in southern California. Lund, Preusser, and Williams (1988) found a relatively high incidence of stimulant types of drugs and a relatively low incidence of alcohol and depressant types of drugs among drivers of tractor-trailer trucks. Similar results for truck drivers were reported by the National Transportation Safety Board (1990). Researchers argued that stimulants were being used to combat fatigue, a common problem for these drivers, and that depressants were avoided.

What works to prevent impaired driving among youth?

Overall, impaired driving has declined nearly every year since 1982. The reasons for the decline likely have involved the interaction of several factors, including the general deterrents described above, changing social attitudes fostered by citizen pressure, and generally lower levels of alcohol consumption (Stewart & Voas, 1994). In 1996, however, alcohol-related fatalities for youth ages 15 to 20 increased by almost 5 percent. Much more progress needs to be made to prevent the more than 17,000 alcohol-related motor vehicle fatalities and 321,000 injuries that occur each year.

Many proven strategies can prevent these crashes or reduce their numbers, including those designed to enhance deterrence and those designed to affect alcohol consumption. Community organization and mobilization are often the mechanisms for implementing needed changes (see, e.g., Hingson et al., 1996). The chapters that follow describe three of the many youth-oriented deterrence and alcohol policy strategies that have been shown to be effective.

Age 21 Laws Minimum age 21 alcohol purchase laws are now in place in all 50 States and the District of Columbia. NHTSA (1997d) estimates that more than 16,500 traffic deaths have been averted since States started raising the minimum legal drinking age (NHTSA, 1997d). Current laws are not well enforced, however (Office of the Inspector

General, 1991; Wagenaar & Wolfson, 1994). A number of strategies have been developed to improve enforcement and decrease youth access to alcohol. See, for example, the Center for Substance Abuse Prevention's (CSAP's) Teen Drinking Prevention Program materials (CSAP, 1995).

Zero Tolerance Many States have enacted BAC limits of 0.02 percent or less for drivers under age 21. These limits reflect the facts that drinking is illegal for anyone under 21 and that young drivers are particularly vulnerable to impairment at low BACs. These laws have been found to reduce alcohol-related crashes in the affected age group by as much as 50 percent in some States (Blomberg, 1993) and by between 17 and 22 percent consistently (Hingson et al., 1994).

Graduated Licensing Graduated licensing is a process by which learning drivers can be gradually introduced to driving. Reductions in traffic crashes, both alcohol-related and non-alcohol-related, have been measured as a result of nighttime driving curfews, increased age of licensure, and graduated driving privileges in which a variety of driving restrictions are gradually lifted as the driver gains experience and maturity (Sweedler, 1990). Such licensing systems have been found to be very effective in New Zealand and Australia (National Transportation Safety Board, 1993).

Impaired driving among youth is one negative consequence of the abuse of alcohol and other drugs, but it can be prevented. Implementing the three strategies in the following chapters—and other effective prevention strategies—can help communities and States in their efforts to decrease the personal and societal costs of crashes caused by young impaired drivers.

Chapter 2

Minimum Age 21 Alcohol Purchase Laws: A Strategy for Preventing Impaired Driving Among Youth

Drinking alcohol is a particularly risky activity for young people, who lack experience and judgment. The risks of alcohol use by youth include traumatic injury, perpetrating or being the victim of crime or violence, and the possibility of developing chronic alcohol abuse. Minimum age 21 alcohol purchase laws are an important and effective countermeasure to address these problems. They have been particularly successful in reducing alcohol-related crashes among young drivers. NHTSA (1997d) estimates that these laws have reduced traffic fatalities involving 18- to 20-year-old drivers by 13 percent and have saved more than 16,500 lives since 1975. Why are these laws so important? How well have they worked? How can they be made more effective? This chapter addresses these and other questions.

How dangerous is youth drinking?

Levy, Miller, Stewart, and Spicer (1997) have estimated that in 1995, underage drinking led to crashes involving 1.1 million occupant and 585 nonoccupant injuries, and 1,400 occupant and 76 nonoccupant deaths. Approximately 11,322 nonfatal burns, 126 fatal burns, 1,420 near-drownings, and 208 drownings could be attributed to underage drinking. Regarding intentional injury, underage drinking was a factor in approximately 1,200 homicides, 100,000 rapes, 83,000 robberies, 639,000 assaults, and 60,000 cases of child abuse. The authors note that their estimates are conservative because of factors such as underreporting by physicians and exclusion of cases in which alcohol use by the victim may have contributed to the crime.

How dangerous is youth drinking and driving?

The results for 13,485 crash-involved and comparison drivers in Grand Rapids (Hyman, 1968) indicated that at BACs in the range of 0.01 to 0.04 percent (about one or two drinks for the average person), the risk to young drivers of crashing was 50 percent higher than if they had not been drinking. At alcohol concentrations in the range of 0.05 to 0.09 percent, still below the adult legal limit in most States, their crash risk was more than 150 percent higher. Older age groups did not show these sharp increases in crash risk after only one or two drinks. More recent studies have confirmed that young drivers have substantially increased crash risk with even low amounts of alcohol (e.g., Zador, 1991).

Have minimum drinking age laws contributed to a reduction in underage drinking?

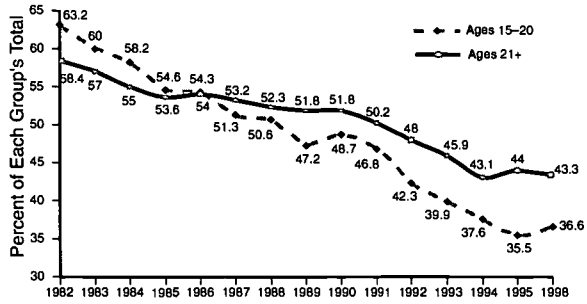
Historically, there has been a trend toward lower alcohol use, particularly among high school students. This trend apparently began in the 1980's as States were passing minimum age 21 purchase laws. Monthly use of alcohol among high school seniors declined from 72 percent in 1980 to 51 percent in 1993. Drinking five or more drinks in a row on at least one occasion during the past 2 weeks (binge drinking) declined from 41 percent in 1983 to 28 percent in 1993. However, there are signs that this trend may have ended. Recent surveys have shown that the rate of alcohol consumption has been flat during the past few years. Reported binge drinking by seniors had actually increased to 30 percent in 1996 (Johnston, O'Malley, & Bachman, 1996).

Has there been a reduction in alcohol-related traffic crashes?

Historically, the trend in motor vehicle fatalities for persons 21 or older was similar to the trend for those under 21. This trend is illustrated in figure 8 for the period between 1982 and 1996. After 1988, the year in which the last State passed the minimum age 21 purchase regulations, both groups' trendlines continued to decline; however, the fatality rate for those ages 15 to 20 declined faster than the rate for older drivers, representing a significant minimum age effect. In 1982, 63.2 percent of all motor vehicle fatalities among persons ages 15 to 20 were alcohol related. By 1988, that figure had dropped to 50.6 percent. By 1996, the figure stood at 36.6 percent (NHTSA, 1997c).

Figure 8.

Youth vs. Adult Motor Vehicle Fatalities: Alcohol-Related Percent of Each Total

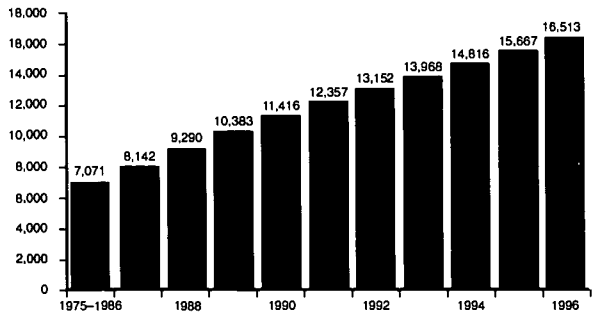


Source: NHTSA, 1997c.

Further, as shown in figure 9, it is estimated that minimum age 21 purchase laws saved more than 16,500 lives from 1975 through 1996 (NHTSA, 1997d).

Figure 9.

Cumulative Estimated Number of Lives Saved by Minimum Drinking Age Laws, 1975–1996



Source: NHTSA, 1997d.

Can underage persons still purchase alcohol?

The direct purchase of alcohol by underage persons from licensed retailers is still possible despite nationwide minimum age 21 alcohol purchase laws. In one study, 19- and 20-year-olds bought beer in 97 of 100 purchase attempts at randomly selected retail outlets in Washington, DC; in 82 of 102 outlets in Westchester, NY; and in 44 of 100 outlets in Albany and Schenectady, NY (Preusser & Williams, 1994). For each of these attempts, the underage purchasers did not have false identification (ID) and were instructed to answer truthfully any questions concerning their age.

How else do young people obtain alcohol?

Direct purchase is not the only, or even the primary, way in which young persons obtain alcohol. In a recent survey conducted in Minnesota and Wisconsin, the most common source of alcohol "on the last drinking occasion for current [underage] drinkers" was people over 21 (e.g., friends). Alcohol was also obtained from home. Direct purchase from a commercial outlet was reported as the source of alcohol on the last drinking occasion by only 3 percent of 9th graders, 9 percent of 12th graders, and 14 percent of 18- to 20-year-olds (Wagenaar et al., 1996).

Table 4 shows the results from a survey of high school and college students in southeastern New York and eastern Pennsylvania (Preusser, Ferguson, Williams, & Farmer, 1997). The survey asked whether the respondent ever drank, obtained alcohol from friends, attempted a direct purchase, or used false ID. The results indicate that by age 16, 59 percent of high school students surveyed had obtained alcohol from a friend under the age of 21. Also by age 16, 28 percent of high school students had attempted to purchase alcohol at some retail outlet. By age 18, more than half had obtained alcohol from a friend over the age of 21. This figure increased to 83 percent for 20-year-old college students. The results of this study demonstrate the need for more awareness and enforcement of the minimum age 21 alcohol purchase laws.

How serious a problem is drinking by college students?

Drinking by college students, on or off campus, is a problem in and of itself. In their national survey of students from 140 4-year colleges in the United States, Wechsler, Davenport, Dowdall, Moeykens, and Castillo (1994) found that almost half the students surveyed were binge drinkers and that almost half of them had experienced five or more different alcohol-related problems (e.g., engaged in unplanned sex, damaged property, argued with friends). Furthermore, 62 percent of male frequent binge drinkers (those who binged three or more times in a 2-week period) (n = 1,630) and 49 percent of female frequent binge drinkers (n = 1,684) reported driving after drinking alcohol.

Table 4. Percent of New York and Pennsylvania High School and College Respondents (N = 4,390)

	High School Age			College Age		
	16	17	18	18	19	20
Ever Drink Alcohol—Yes	72	81	85	87	92	90
Drink 2+ times/month	29	33	54	54	59	61
Ever Obtain Alcohol From: Parent—Yes	18	19	19	24	27	30
Friend over 21—Yes	41	49	63	66	76	83
Friend under 21—Yes	59	64	55	69	68	62
Ever Try To Buy at: Bar/Nightclub—Yes	16	27	33	47	59	68
Restaurant—Yes	10	18	19	32	39	56
Liquor Store—Yes	12	15	27	29	34	45
Beer Distributor—Yes	14	21	30	27	35	41
Grocery/Convenience—Yes	17	23	29	28	31	38
Number of Above—1+	28	39	49	57	68	77
Ever Use False ID—Yes	16	22	34	38	53	55

Source: Preusser et al., 1997.

The study also examined "secondary binge effects"—the percentage of nonbingeing students who experienced problems because of other students' drinking. The schools were grouped by the level of reported binge drinking, and students could pick from the following eight possible problems:

- been insulted or humiliated;
- had a serious argument or quarrel;
- been pushed, hit, or assaulted;
- had property damaged;
- had to take care of intoxicated student;
- had studying interrupted;
- experienced unwanted sexual advance; and
- been victim of sexual assault or date rape.

In schools with high bingeing levels, 87 percent of nonbingeing students reported experiencing at least one of the eight possible problems. The results of this nationally representative study illustrate that alcohol is still available on college campuses. Furthermore, it shows the abuse of alcohol has negative effects on drinking college students and on nondrinking students as well.

Why and when did States adopt the minimum age 21 purchase laws?

Twenty-nine States lowered their minimum alcohol purchase age from 21 to 18, 19, or 20 during the early 1970's—the same period during which minimum age limits for activities such as voting were also being lowered (Toomey, Rosenfeld, & Wagenaar, 1996). The result was a substantial increase in alcohol-related crashes involving young persons (Williams, Rich, Zador, & Robertson, 1975). After researchers documented these increases and brought them to the attention of activists and policymakers, States began to return to an age 21 purchasing requirement in the late 1970's and early 1980's, with a subsequent decrease in alcohol-related crashes (DuMouchel et al., 1987). By 1984, 23 States had a minimum age 21 purchasing law, and Federal legislation was passed that would have withheld highway funds from the remaining 27 States (IIHS, 1984). As of July 1988, it was illegal in all 50 States and the District of Columbia to sell alcohol to anyone under the age of 21. As shown in table 5, this legislative history means that some States have had minimum age 21 drinking laws for several generations of teens, while some have had these laws only for the present generation (NHTSA, 1996a).

What do these laws actually cover?

The minimum age 21 purchase laws were reviewed soon after the last State, Wyoming, implemented its minimum age legislation in 1988 (Office of the Inspector General, 1991). This review indicated that all 50 States and the District of Columbia had made it illegal to sell alcohol to those under age 21. The key word is "sell." Sale of alcohol by those under 21 to older persons, or possession, consumption, and even the purchase of alcohol by those under 21, are not necessarily illegal under these laws.

Some of these laws have been strengthened since the Inspector General's 1991 review. Figure 10 illustrates that many exceptions and exemptions remain and may contribute to the large number of youth who still obtain alcohol. For example, by employing minors as clerks, establishments may actually facilitate minors' alcohol purchases. In a survey conducted by the Office of the Inspector

General (1991), 3.5 million junior high and high school students reportedly purchased alcohol from stores with young clerks, and almost 3 million students reported that they knew the clerk from whom they made the purchase. Of the 36 States in which possession was legal at the time of the review, some or all of the following circumstances applied: the alcohol is for a parent, guardian, and/or spouse; possession occurs in private settings; alcohol is to be used for medicinal purposes; alcohol is to be used for religious purposes; and alcohol is legal for the minor to possess, but not consume.

Table 5. Year in Which Minimum Age 21 Law Took Effect

State	Year	State	Year
Alabama	1985	Montana	1987
Alaska	1984	Nebraska	1985
Arizona	1985	Nevada	1935
Arkansas	1935	New Hampshire	1985
California	1933	New Jersey	1983
Colorado	1987	New Mexico	1934
Connecticut	1985	New York	1985
Delaware	1984	North Carolina	1986
District of Columbia	1986	North Dakota	1936
Florida	1985	Ohio	1987
Georgia	1986	Oklahoma	1985
Hawaii	1986	Oregon	1933
Idaho	1987	Pennsylvania	1935
Illinois	1980	Rhode Island	1984
Indiana	1934	South Carolina	1986
Iowa	1986	South Dakota	1988
Kansas	1985	Tennessee	1984
Kentucky	1938	Texas	1986
Louisiana	1987	Utah	1935
Maine	1985	Vermont	1986
Maryland	1982	Virginia	1985
Massachusetts	1985	Washington	1934
Michigan	1978	West Virginia	1986
Minnesota	1986	Wisconsin	1986
Mississippi	1986	Wyoming	1988
Missouri	1945		

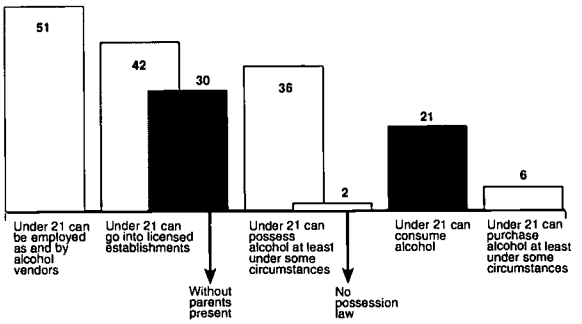
Source: NHTSA, 1996a.

What are the penalties?

The penalties for violating these laws vary at least as much as the laws themselves. For selling to underage persons, establishment owners can receive civil or criminal penalties ranging from a warning to fines of $10,000 and up to 5 years in jail and revocation of the vendor's license to sell

Figure 10.

Minumum Age 21 Laws, by Number of States



Sources: Hatos, 1997; Office of the Inspector General, 1991.

alcohol. People who knowingly provide alcohol to those under 21 (e.g., servers, party hosts) can be found liable under States' dram shop laws and subject to various penalties. This liability is civil and applies to both commercial servers and social hosts for injuries or damages involving their intoxicated and/or underage drinking patrons or guests (Holder, 1993). In other words, the server who knowingly sold alcohol to an underage or visibly intoxicated person could be charged if that person were involved in a crash or perpetrated another criminal offense. For the underage person who buys, possesses, or consumes alcohol, penalties can range from nothing, because the purchase was legal under State law, to a fine of $5,000, 1 year in jail, and loss of the driver's license (Office of the Inspector General, 1991).

What is "use and lose"?

One penalty that may be especially meaningful and threatening to young people is the loss of their driver's license. Laws that allow for the suspension of the driver's license following a conviction for any alcohol or drug violation are often referred to as "use-and-lose" laws. In most cases, the alcohol or drug violation need not be associated with driving or riding in a car. The violation could be alcohol or drug consumption, possession, or attempt to purchase with or without the use of false ID. The license suspension could be for a certain period of time or until some specified age is reached. Persons who are not yet licensed could have their licensure delayed. By the end of 1993, 39 States had adopted use-and-lose legislation (S. Hatos, personal communication, December 8, 1993).

One of the problems with use-and-lose laws has been the inconsistent imposition of the license withdrawal penalty (Preusser et al., 1992b). Parents have expressed concern as to how their children's nondriving alcohol violation will affect their automobile insurance premiums. Judges are often reluctant to impose a driving sanction for a nondriving violation. Nevertheless, active enforcement of the underage drinking laws followed by consistent use-and-lose license withdrawal for those convicted has been shown to reduce alcohol-related crashes among young drivers (Preusser et al., 1992b).

How effective is enforcement of minimum age laws?

There are many examples of effective programs to enforce minimum age drinking laws. However, it appears that, nationally, these laws are not vigorously enforced. Using national crime statistics and population data, it was estimated that "only two of every one thousand occasions of youth drinking result in an arrest, and only five of every one hundred thousand youth drinking occasions result in an Alcohol Beverage Control action against an alcohol outlet" (Wagenaar & Wolfson, 1994).

Research suggests that for laws to be effective, people must believe that they have some chance of being caught and that their punishment will be swift and severe. Only 38 percent of the 256 alcohol merchants surveyed thought it likely that they would be cited for selling alcohol to a minor (Wolfson et al., 1996). Furthermore, enforcement agencies often do not cite or arrest illegal providers because (1) community members appear to accept underage drinking; (2) the community does not encourage increased enforcement of the law; and (3) the community lacks the resources to enforce the law effectively (Toomey et al., 1996).

How can enforcement be made more effective?

Undercover buying operations or "stings" can be an effective way of enforcing minimum age purchase laws (Preusser, Williams, & Weinstein, 1994). An underage person—often a police explorer, auxiliary, or cadet—working under the direct supervision of a sworn officer, enters a retail establishment and attempts to purchase alcohol. The purchase attempt is made without using false ID and with truthful answers to any and all questions concerning age. Enforcement actions ranging from a warning to loss of liquor license are taken against those who complete the sale.

The Michigan State Police conducted a decoy or sting program known as "Michigan SAVE." At the start of the program, approximately 75 percent of licensed establishments sold to the decoy. By the end of the program, that figure dropped to 20 percent (Michigan State Police, 1989). The Denver Police Department conducted a series of sting operations at randomly selected outlets for packaged beer. During the initial or baseline period, underage police cadets were able to purchase beer 59 percent of the time. The purchase rates for successive waves of enforcement were 32 percent and 26 percent (Preusser et al., 1994).

Both the Michigan and Denver programs involved establishments selected from among all licensed vendors in the respective jurisdictions. Some smaller communities have been able to target every outlet within their jurisdiction on multiple occasions. In Keene, NH, the police conducted a series of sweeps of all 25 local food stores that sold beer and wine. Their "planted" underage female college student purchased alcohol 23, 15, 10, 0, and 0 times on the five sweeps, respectively. Similarly, a series of four sweeps of the 42 retail outlets in Bolingbrook, IL, resulted in a total of 60 violations during the first three sweeps, as compared with zero violations on the fourth sweep (Preusser et al., 1994).

Other strategies have been shown to improve the effectiveness of the laws. A study of more than 400 outlets found that alcohol establishments could (1) require that all servers receive responsible beverage service training on how to detect false IDs and refuse sales to minors, (2) establish systems to monitor servers to prevent illegal sales to minors, and (3) post warning signs to reduce their rate of sales to minors (Wolfson et al., 1996).

How can proof-of-age identifications be safeguarded?

Table 4 reported that, overall, 36 percent of high school and college students indicated that they had

used false identification of some kind at some time for the purchase of alcohol. The most common type of false ID was a driver's license that was borrowed (14 percent), altered (9 percent), or counterfeit (12 percent), or a "real" license obtained fraudulently from an official source (10 percent). (The total exceeds 36 percent because some persons had several licenses.) States are working to provide greater safeguards against obtaining IDs from official sources through fraudulent means. For example, photographs of licensed individuals may be digitized and stored on computer for verification in the event that a person tries to obtain another license under the same name. Also, States are continuing to develop and distribute driver's licenses that are more difficult to alter or counterfeit (Preusser et al., 1997).

What else affects alcohol availability to minors?

Overall alcohol availability and consumption can be affected by responsible beverage service policies, controls on the number and location of outlets, and taxes. These approaches affect underage drinkers, too. Server training programs have been developed to reduce sales to underage persons, help servers recognize false ID by underage persons, and reduce sales to intoxicated patrons. Such programs have been shown to be effective (Holder & Wagenaar, 1994; McKnight, 1990). Alcohol consumption has also been related to the number of alcohol outlets in the community: the more outlets per population, the more consumption. Similarly, increased consumption can be traced to the privatization of alcohol sales from a relatively few State-operated stores to more general availability through privately owned retail outlets (Wagenaar & Holder, 1995).

One extremely effective way of reducing consumption, particularly among young people, is increasing the alcohol excise tax, thus increasing the product's price (Holder, 1993). For example, Grossman, Coate, and Arluck (1987, cited in Holder, 1993) found that a 10-cent increase in the price of beer would result in a 14.8-percent decrease in the number of young heavy beer drinkers (i.e., three to five beers per day). The authors also found that a 30-cent increase in the price of distilled spirits would result in a 27.3-percent decline in the number of underage heavy liquor drinkers (i.e., three to five drinks of liquor per day).

How do broadly based community programs help?

Some communities are trying to implement a full range of prevention programs, as opposed to relying on one or two strategies. The Community Trials Program implemented in California and in South Carolina (Holder et al., 1997) is one such effort. Typical activities include training alcohol beverage servers, training retail clerks to ask for and recognize proper age identification, enforcing minimum purchase age laws, establishing sobriety checkpoints with extensive coverage by local media, and reducing the number of alcohol outlets in the community. Alcohol sales to minors have been reduced by approximately 50 percent in these communities (Grube, 1997). Also reduced are single-vehicle nighttime crashes, a type of crash that is often alcohol related (Holder et al., 1997). The Saving Lives Program implemented in six Massachusetts communities was similarly effective in reducing alcohol-related crashes among youth (Hingson et al., 1996).

What are the States doing to improve enforcement of minimum purchase age laws?

A recent survey of States indicated that most were actively conducting youth alcohol prevention programs (NHTSA, 1995). Seven categories of State programs were listed:

(1) Public information and education (e.g., public service announcements) (42 States)
(2) Leadership training conferences and task forces (36 States)
(3) Specialized prevention programs at schools or colleges or in the workplace (33 States)
(4) Underage drinking law enforcement, court, server, and/or assessment programs (e.g., developing innovative enforcement strategies, improving the prosecution and adjudication process, training servers, conducting assessment studies) (27 States)
(5) Minigrants for community initiatives (8 States)
(6) Family educational programs (6 States)
(7) Driver licensing or BAC legislative efforts (4 States)

Summary

Minimum purchase age laws have been successful in reducing alcohol use and related problems among our country's youth. They have prevented thousands of alcohol-related traffic deaths. Still, underage drinking has not been eliminated, and many existing State laws are not comprehensive. While these laws may cover the sale of alcohol, they do not always encompass key aspects of underage purchase, possession, and consumption. Nationally, overall enforcement remains low despite some high-profile, effective efforts. Also, other sources of alcohol, in particular "friends"—over or under age 21—who provide alcohol should be targeted for prevention activities. Continued efforts are also needed to achieve better safeguards against fraudulent and counterfeit ID. Alcohol policies affecting price and availability in general can also reduce underage drinking. Effective community programs that combine enforcement with education, prevention, server and clerk training, and other measures are showing good results and should be replicated across the country.

Chapter 3

Zero Tolerance: A Strategy for Preventing Impaired Driving Among Youth

Drinking alcohol before driving is extremely risky behavior especially for young people who lack experience and judgment. More than 33 percent of all deaths of 15- to 20-year-olds result from motor vehicle crashes, and in 1996, the alcohol-involvement rate for young drivers was approximately double the rate for the over-21 licensed driver population (NHTSA, 1997c). This phenomenon may be due to the fact that young drivers have less experience both with drinking and with driving. They also may lack the fundamental skills needed to assess realistically the hazards posed by various driving situations.

Almost all States (plus the District of Columbia) have enacted a law to prohibit underage drivers from operating a motor vehicle after drinking. The details of the laws, such as the precise permissible BAC, vary from State to State. Zero tolerance laws, when properly implemented and enforced, can be effective in sending a no-use message to young people and preventing alcohol-related crashes among young drivers. This chapter presents a brief overview of the strategy and reasons for the nearly nationwide spread of zero tolerance laws. It explains the importance of publicity and enforcement of such laws and discusses challenges that can accompany their enforcement.

What is zero tolerance?

Zero tolerance laws prohibit young persons from driving a vehicle while they have a BAC greater than 0.00 percent, 0.01 percent, or 0.02 percent (depending on the State). The BAC depends on a person's body weight, the number of drinks consumed, and the length of time over which the drinks were consumed. If a police officer has probable cause to believe that a driver has been drinking, the officer administers a breath test. In most States with zero tolerance laws, any amount of alcohol in the body of a driver under 21 is an offense for which the driver's license may be suspended (NHTSA, 1996d). Because of the high value young drivers place on their licenses, the threat of revocation has proven to be an especially effective sanction—for both its punitive and its deterrent effect—for this age group (NHTSA, 1996d).

The most commonly specified BAC for drivers under 21 is 0.02 percent, which is approximately equal to one drink for the average person (34 States). Ten States and the District of Columbia have adopted the 0.00-percent level, and two States, 0.01 percent. States that set levels lower than the adult level, yet higher than 0.02 percent, are not considered to have zero tolerance for alcohol.

Are zero tolerance laws effective in reducing traffic crashes involving youth who have been drinking?

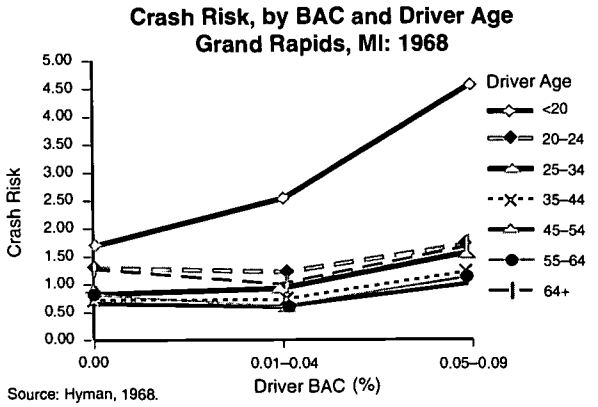
The first four States to reduce the legal BAC limit for young drivers were Maine (July 1983), North Carolina (September 1983), Wisconsin (July 1984), and New Mexico (July 1984). These States experienced a 34-percent decline in nighttime fatal crashes among adolescents targeted by the lower BAC levels. This decline was approximately one-third greater than a similar decline observed in four nearby states selected for comparison (Hingson, Heeren, & Winter, 1991).

By the end of 1990, 12 States had lowered BAC levels for youth. These states experienced a 16-percent overall decline in nighttime single-vehicle fatal crashes among young drivers targeted by the new laws, compared with a 1-percent rise among drivers of the same age in selected comparison States. Of the 12 States, 4 had adopted a BAC level of 0.00 percent, 4 had a level of 0.02 percent, and 4 had levels ranging from 0.04 percent to 0.06 percent. Measured crash reductions were statistically significant for the 0.00-percent States (22-percent reduction) and the 0.02-percent States (17 percent) but not for the 0.04-percent to 0.06-percent States (7 percent). It was estimated that if all States adopted a 0.00-percent or 0.02-percent level for drivers ages 15 to 20, at least 375 nighttime single-vehicle fatal crashes would be prevented each year (Hingson et al., 1994).

Is there a scientific basis for setting a low BAC level for young drivers?

The results for the 13,485 crash-involved and comparison drivers studied in Grand Rapids are shown in figure 11 in terms of crash risk by driver age for BACs of 0.00 percent, 0.01 percent to 0.04 percent, and 0.05 percent to 0.09 percent.

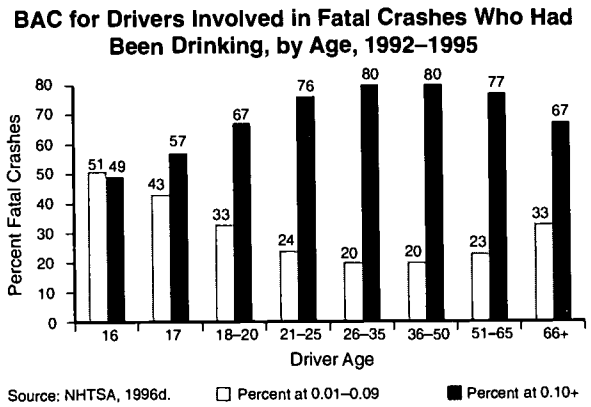
Figure 11.



Source: Hyman, 1968.

At 0.00-percent BAC, drivers under age 20 had a crash risk 1.68 times greater than that of adult drivers. At BACs in the range of 0.01 percent to 0.04 percent (about one or two drinks in 1 hour for the average person), the young driver's crash risk was more than two and one-half times as great as for drivers in general; and at BACs in the range of 0.05 percent to 0.09 percent, risk was more than four and one-half times greater. None of the other age groups shown in figure 11 experienced such substantial increases in crash risk for BAC levels below 0.10 percent, the typical adult legal limit. Greater crash risk for young drivers at low BAC levels has also been found in other studies (e.g., Zador, 1991).

Figure 12.



Source: NHTSA, 1996d.

Figure 12 shows the BAC by driver age for all drivers involved in fatal crashes who had been drinking, from 1992 to 1995. These are national estimates from the Fatal Accident Reporting System (FARS) (called the "Fatality Analysis Reporting System" after January 1996) of NHTSA. During this period, NHTSA estimated that there were more than 7,000 drivers between the ages of 16 and 20 who had been drinking and involved in fatal crashes. Of these drivers, more than half of the 16-year-olds and more than a third of 17- to 20-year-olds had BACs of less than 0.10 percent (NHTSA, 1996d).

Figure 12 illustrates that when young drivers consume even a small amount of alcohol, their crash risk is elevated (Preusser et al., 1992b). It is likely that young drivers involved in fatal crashes are inexperienced both with drinking and with driving and may also lack judgmental skills needed to deal with certain driving situations.

What penalties are appropriate for zero tolerance violations?

All States have laws against driving while intoxicated (DWI) or operating a motor vehicle while under the influence of alcohol. These laws carry severe penalties, including a possible jail sentence, loss of license, and a substantial fine. A second or third impaired-driving arrest can lead to a felony conviction. Under zero tolerance laws, however, lesser charges are typically brought against young drivers; the strategy is not intended to send young persons to jail or to produce a criminal record.

The penalties for a zero tolerance violation vary widely among the States, but they nearly always involve the suspension or revocation of the driver's license. In some States, the term of the license suspension can be equal to or greater than the term of suspension for a DWI conviction. Penalties may also involve alcohol or drug assessment, some form of alcohol or drug education or treatment, and a fine. High fines, jail, house arrest, the creation of a felony conviction record, and vehicle impoundment—all possible consequences of a DWI conviction—are not part of sanctioning for zero tolerance.

Why 0.02 percent rather than zero?

States adopting 0.02 percent as the zero tolerance threshold have argued that alcohol levels between 0.00 percent and 0.01 percent can occur from the use of over-the-counter medications and some food preparations and thus would not necessarily constitute underage drinking. Also, the 0.02-percent level allows for some variability in measurement. Nevertheless, the clear intent of these laws, regardless of BAC, is to prohibit drinking among drivers under 21.

Why can't the minimum age 21 alcohol purchase laws do the job?

Minimum purchase age laws have been shown to reduce alcohol-related crashes (see, e.g., DuMouchel et al., 1987; Wagenaar, 1993). However, young drivers can still obtain alcohol from friends and can still purchase alcohol at commercial outlets (Preusser et al., 1997). A national survey conducted during 1995 indicated that 51 percent of high school seniors had consumed alcohol within the past month, and 74 percent had consumed alcohol within the past year (Johnston et al., 1996). Clearly, while the minimum age purchase laws have been effective, they have not solved the problem.

How important is publicity about the law?

A public awareness campaign can dramatically increase the effectiveness of the law. Maryland experienced an 11-percent statewide reduction in the number of drivers under age 21 who had been drinking and crashed after it implemented its 0.02-percent zero tolerance law. However, in six counties where a special public education campaign was implemented, alcohol-related crashes among young drivers were reduced by 50 percent (Blomberg, 1993). The campaign included television and radio commercials that featured local police officials as spokespersons. A pamphlet and matching poster with the theme, "You don't have to be drunk to lose your license in Maryland" were distributed to support the broadcast campaign. As with most other types of traffic enforcement, effects are greatest when the law and efforts to enforce it are well publicized.

How can low BAC laws affect enforcement?

Zero tolerance laws can increase the willingness of police officers to stop and check young drivers if they suspect the driver has been drinking. Table 6 shows statewide results from chemical tests for driver BAC from Maine. During 1981 and 1982 combined—the last 2 full years prior to the Maine zero tolerance law—alcohol tests were requested from only 297 drivers who were under 20 years old and whose actual test results were under 0.10 percent BAC (James Montel, Maine Bureau of Highway Safety, personal communication, 1991).

In July 1983, Maine became the first State to implement a 0.02-percent BAC limit for drivers under age 21. During 1984 and 1985 combined, alcohol tests were requested from proportionately more drivers under age 20. Clearly, in the 2 years after the law took effect, tests were requested from many more drivers—particularly those who were very young. As also shown in table 6, after the Maine law was implemented, tests were requested from almost four times the number of drivers under age 20 whose actual tested BAC was less than 0.10 percent than in the years preceding the law. These results are an example of zero tolerance laws being enforced.

When considering enforcement issues, however, it is essential to keep in mind that detecting, apprehending, and punishing violators is not as

Table 6. Maine Chemical Test Data (Pre- vs. Post-0.02 Percent Law)

Pre- (1981–1982)			
Age	**<0.10 percent**	**0.10 percent+**	**Total**
<17	13	36	**55**
17	52	142	**205**
18	105	381	**520**
19	127	751	**976**
20+	1,385	14,241	**18,860**
ALL	**1,682**	**15,551**	**20,616**
Post- (1984–1985)			
Age	**<0.10 percent**	**0.10 percent+**	**Total**
<17	105	78	**184**
17	202	206	**411**
18	363	432	**801**
19	425	684	**1,111**
20+	1,458	12,342	**16,560**
ALL	**2,553**	**13,742**	**19,067**

Note: Totals include test refusals.

Source: James Montel, Maine Bureau of Highway Safety, personal communication, 1991.

important as deterring young people from drinking and driving in the first place. Deterrence is strongest when people believe that punishment will be swift and severe. Therefore, well-publicized enforcement campaigns in which the apprehended offenders receive penalties are extremely important—even if many offenders are not caught.

Do any practical problems result from low BAC laws?

Zero tolerance laws require somewhat different enforcement strategies from those used for traditional impaired driving patrols. Police officers are often reluctant to stop young people, especially if there is a good chance they might be drinking—but at a level below the adult limit. Officers need to be trained to take enforcement action when identifying low levels of alcohol in young drivers. Such training might include knowledge of the statute, application of implied consent under the statute, and procedures for handling juveniles. In general, officers identify these violations only after the vehicle has been stopped for some other reason, such as speeding or suspected DWI over the 0.10-percent or 0.08-percent adult legal limit. Unlike for DWI, there are currently no standardized, documented cues to aid officers in the detection of zero tolerance violators within a moving traffic stream.

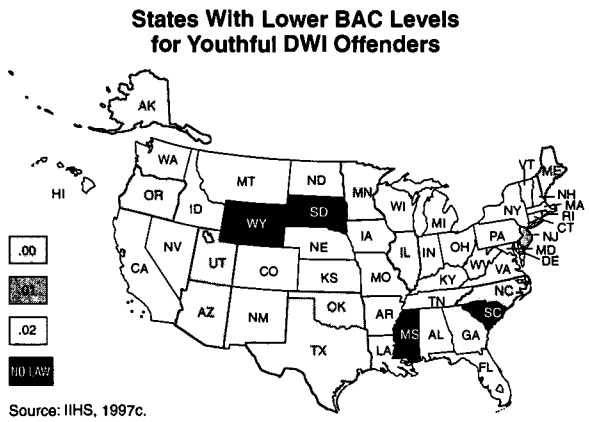
One tool that may eventually prove helpful in zero tolerance enforcement is the passive alcohol sensor. Such devices test the air around a driver for traces of alcohol from exhaled breath. They do not require the driver's active cooperation. Such devices have proven to be quite effective at sobriety checkpoints in identifying drivers at or near the legal limit (see Ferguson, Wells, & Lund, 1995). However, the currently available passive devices were designed for enforcing the adult drinking-driver statutes, and hence, higher legal adult alcohol limits. While they may prove useful for enforcing zero tolerance at checkpoints, these sensors appear to be less well suited for the enforcement of very low levels of alcohol during regular patrols (Leaf & Preusser, 1996).

It should also be noted that enforcement of any laws that involve juveniles can be difficult. In most States, juvenile offenders may not be incarcerated with adults and, once arrested, may not be released except to a parent, guardian, officer of the court, or special juvenile facility. This situation may keep an officer off patrol for a long period while the arrest is processed and the parents are located. Communities that want their police to conduct this type of enforcement need to provide support personnel and facilities to handle the identified juvenile violators, typically those under the age of 18.

Where do we stand now?

Figure 13 shows the status of zero tolerance laws as reported by NHTSA and the IIHS (1997c). At present, 45 States and the District of Columbia have a BAC limit of 0.02 percent or less for all drivers under age 21 (Wisconsin's law applies to drivers under age 19). As of November 1997, only four States did not have some form of lower BAC limit for young drivers (IIHS, 1997c).

Figure 13.



Source: IIHS, 1997c.

Summary

Teenage drivers increase their risk of crashes after only one or two drinks. The goal of zero tolerance is to eliminate driving by young persons who have consumed any alcohol. Beginning with Maine in 1983, most States have now adopted zero tolerance laws. Substantial crash reductions have been documented, particularly in places where the law has been well publicized. Further, zero tolerance laws provide consistent no-use messages to young people. Challenges that remain include securing passage of this legislation in the few remaining States that do not have it and finding more effective strategies for zero tolerance enforcement and related publicity.

Chapter 4

Graduated Licensing: A Strategy for Preventing Impaired Driving Among Youth

Youth between the ages of 15 and 20 are more likely to die in traffic crashes than from any other cause (NHTSA, 1996c). On a per-mile-driven basis, the risk of a crash is four to eight times higher for teenage drivers than for older drivers. When alcohol or drugs are added to the mix, the combination is often deadly. Driver licensing systems have been developed that can protect young people as they gain maturity and experience behind the wheel. These systems—usually referred to as graduated licensing—are especially valuable in improving traffic safety. They are also an important strategy to prevent substance abuse.

What is graduated licensing?

Graduated licensing is "a system designed to ease beginning drivers into the traffic environment under controlled exposure to progressively more difficult driving experiences" (NHTSA, 1996b, p. 3). A licensing system is considered to be graduated if it contains at least three distinct steps or stages:

Learning The young person is required to undergo a period of practice driving under the supervision of an experienced licensed driver.

Restricted The young person can engage in unsupervised driving subject to certain restrictions. A key restriction is a prohibition against driving after drinking any alcohol. Restrictions on night driving may also reduce the probability that the young driver will drive after using harmful psychoactive substances. Other possible restrictions include added requirements for seatbelt use, limitations on passengers, and limitations on the types of vehicles that can be driven. During the restricted stage, license actions and suspensions are often rendered for fewer and less serious traffic violations. Often there are very serious penalties for driving under the influence of any amount of alcohol.

Full The young person is issued a full-privilege (drive anywhere at any time) license.

To enter the learning stage in a typical graduated licensing system, the young person needs to have attained the minimum age (typically 15 or 16) and pass vision and rules-of-the-road tests. Entry into the restricted stage requires completing a minimum period of violation-free driving as a learner and passing a road test. Full licensure requires reaching some minimum age, typically 17 or 18, and completing the restricted stage with few or no violations or at-fault crashes. The required learning period and the required restricted period distinguish graduated licensing systems from traditional systems, in which the young person need only attain a certain age and pass rules, vision, and road tests before receiving a full-privilege license (see Hedlund & Miller, 1996). Many States are considering graduated licensing as a means to reduce the high crash rates and costs associated with teen drivers.

What are teen driver crash rates and costs?

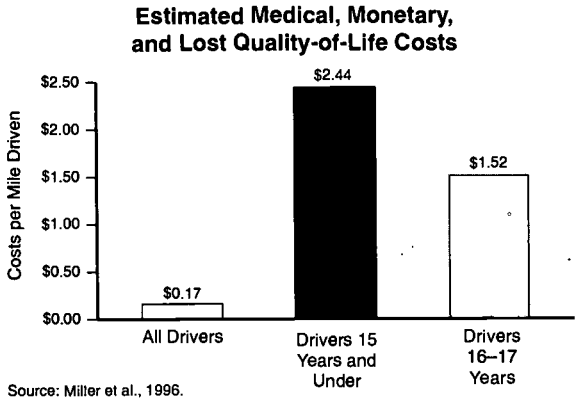
The costs of teen driver crashes are immense (see table 7 and figure 14). Sixteen-year-old drivers have very high crash rates in proportion to the number of miles they drive. In 1990, the last year the Nationwide Transportation Survey was conducted (Research Triangle Institute, 1991), 16-year-olds had 43 crashes per million miles driven, compared with 30, 15, 10, and 5 for ages 17, 18 to 19, 20 to 24, and 25 or older, respectively. The 1990 rate of fatal crashes was 17 per 100 million miles driven by 16-year-olds, compared with 13, 7, 5, and 3, respectively, for older drivers. The estimated medical, monetary, and lost quality-of-life costs associated with injury in crashes of drivers ages 17 or younger during 1993 were $44 billion (Miller, Lestina, & Spicer, 1996). This amount represents a cost of $2.44 per mile driven for drivers

Table 7. Teen Driver Crash Rates, 1990

Age	Crash Rate (per million miles)	Fatality Rate (per 100 million miles)
16	43	17
17	30	13
18–19	15	7
20–24	10	5
25+	5	3

Source: Research Triangle Institute, 1991.

Figure 14.



Source: Miller et al., 1996.

ages 15 or younger and $1.52 per mile driven for 16- and 17-year-olds, compared with costs ranging from $0.09 to $0.14 per mile driven for drivers in age groups from 25 to 64 (Miller et al., 1996).

Why are crash rates so high?

As mentioned above, research has indicated that high rates of teen driver crashes are the result of both driver immaturity and lack of driving experience. That is, young drivers have a disproportionate number of crashes both because they lack full judgmental and decisionmaking skills of older people and because they lack driving experience. A recent European literature review concluded that experience and age-related factors are extremely important; experience is more important than age (especially at age 17 and older); American studies, which often include drivers of younger ages, are more likely to show that age is more important (Gregersen & Bjurulf, 1996). Most European countries do not license drivers until they are 18; some license at 17; and only one, Estonia, licenses 16-year-olds (Twisk, 1995). This is in sharp contrast to the United States, where most States license at age 16 and some license at age 15.

Why are these crash costs so high?

Costs are high both because of the high crash rate and because teen driver crashes tend to be severe events, often involving several teen passengers. Even if the driver survives, one or more of the passengers may die or be seriously injured (Williams & Wells, 1995). Any loss of life or permanent disability for a teen driver or teen passenger creates cost factors affecting all the years of an entire adult lifetime.

Are there any driving situations where teen crash rates are low?

Yes. While the overall crash rate for teens is very high, some driving situations appear to be less dangerous. It is this gradation from relatively safe to very dangerous that forms the basis for graduated licensing systems.

The relatively safe situation occurs when a teen with a valid learner's permit is accompanied by an adult (Williams, Preusser, Ferguson, & Ulmer, 1997). Therefore, graduated licensing systems typically both require and encourage extended learning periods during which the teen driver gains driving experience while accompanied by an older, experienced licensed driver.

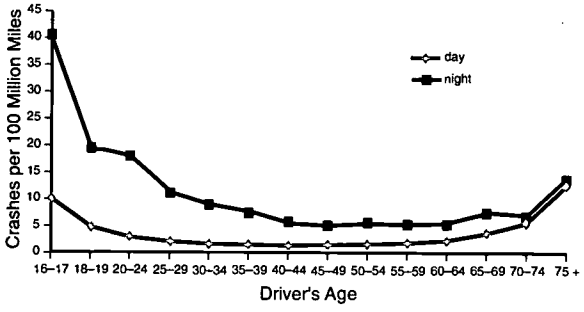
When problems do occur with an adult present in the vehicle, however, they are often on an interstate highway or other high-speed road where there is little time to react and little opportunity for the adult to intervene (Williams et al., 1997). Some jurisdictions in Australia restrict learner's permit holders to a maximum speed of 80 km/hr (50 mph). The United Kingdom and the Province of Ontario, Canada, do not allow beginning learners to drive on expressways. No similar restrictions are known to exist in the United States.

Does night driving increase the risk of crashes?

Yes. Figure 15 shows the fatal crash involvement rate by driver age for day versus night (9 p.m. to 6 a.m.) driving as calculated from the 1990 Nationwide Personal Transportation Survey (Research Triangle Institute, 1991) and the 1990 FARS (NHTSA, 1991). As shown in the figure, young drivers have much higher crash rates during the night than during the day. In fact, while drivers ages 16 to 17 accumulate only 14 percent of their miles driven between the hours of 9 p.m. and 6 a.m., they experience 39 percent of their fatal crashes during that time period. It is highly likely that some of the increased risk at night is due to the consumption of alcohol or drugs.

Figure 15.

Fatal Crash Involvement per 100 Million Miles, Day vs. Night, by Driver's Age, 1990



Sources: NHTSA, 1991; Research Triangle Institute, 1991.

An integral element in any graduated licensing system is a restriction on night driving—other than for work or school or when accompanied by a parent or guardian—during the intermediate or restricted phase of the system. This night driving restriction may be in place for some period of time (e.g., the first year of driving in Maryland), until reaching some specified age (typically 17 or 18), or until the young person has reached some specified age and has completed a driver education course (e.g., in New York and Pennsylvania).

Night driving restrictions have been shown to be highly effective in reducing teen driver crashes. Reductions in fatal crashes have been demonstrated nationally by comparing States with and without such restrictions (Levy, 1988) and studying selected cities (Preusser, Zador, & Williams, 1993). Reductions in nonfatal injury crashes have been found for selected States (LA, MD, NY, and PA) (Preusser, Williams, Zador, & Blomberg, 1984) and cities (Detroit, Cleveland, and Columbus) (Preusser, Williams, Lund, & Zador, 1990). Reductions in night crashes associated with night driving restrictions can be dramatic—as much as 69 percent—despite the fact that night driving with a parent or guardian, or to or from work or school, is typically allowed.

Is alcohol a problem for teen drivers?

The minimum age 21 drinking laws have greatly reduced the number of alcohol-related crashes among young people. Still, some young people continue to drink and drive. When they do, they experience far more trouble—with less alcohol—than older drivers (Preusser et al., 1992b). Therefore, most States currently have zero tolerance laws. Such laws have been shown to reduce crashes substantially (Hingson et al., 1994) and are regarded as an important component of a graduated licensing system.

Are teen passengers a problem for teen drivers?

Several studies have shown that teen drivers are more likely to crash when carrying only teen passengers than when traveling alone or with other passenger combinations (Drummond & Triggs, 1991; Foldvary & Lane, 1969; Preusser, Ferguson, & Williams, 1998). New Zealand's graduated licensing system and the system recently adopted in Georgia restrict unsupervised teen drivers from transporting teen passengers. Evaluation of the New Zealand law has shown a reduction in the number of teenagers injured as passengers in cars driven by teens (Langley, Wagenaar, & Begg, 1996).

Does gender make a difference?

Licensing data indicate that males and females become licensed at approximately the same rate once they turn 16. Recent data have indicated, however, that proportionately more females among 16-year-old drivers are involved in crashes than male teenagers and older drivers (Ulmer, Williams, & Preusser, 1997; Williams, Preusser, Ulmer, & Weinstein, 1995). There is some indication that females enter the licensing process with somewhat less learning-driving experience than males (Ferguson, Leaf, Preusser, & Williams, 1994). This fact may account for the somewhat higher crash rate of 16-year-old females, which dissipates by age 17 or 18. Accumulating driving experience under supervised and controlled situations prior to full-privilege licensure would seem to be important for both males and females.

At what age should teens begin learning to drive?

Most States that recently changed their licensing laws to resemble graduated licensing more closely have left unchanged the age at which learning

driving can begin. They have extended their required learning period and often added an intermediate or restricted-driving period before full-privilege licensure. The effect of these changes has been to delay the time when a young person can obtain a license to drive anywhere at any time.

Two States, Michigan and Virginia, recently lowered the age at which learning driving may begin. On the one hand, lowering the learning age should allow for the accumulation of more supervised driving experience prior to full-privilege licensure. On the other hand, if people enter the licensing process at an earlier age, they may qualify for a license when they are younger. More practice is consistent with the goals of graduated licensing; younger licensing is not. Allowing younger people to learn to drive may give them access to vehicles and driving knowledge at an even younger age, thereby contributing to more unlicensed and unsupervised operation of motor vehicles.

Table 8 summarizes State variations in minimum learning and licensing ages and associated rates of fatal crashes involving teen drivers per 100,000 population (Williams, Weinberg, Fields, & Ferguson, 1996). For the years 1989 to 1993, States that allowed earlier learning had higher rates of fatal crashes for drivers ages 15 or younger and drivers age 16. States that allow early learning and licensing also tend to have somewhat higher crash rates for 17-year-olds. As a group, these States tend to be more rural and thus to have higher overall fatal crash rates for drivers of all ages. Also, they are less likely to have night driving restrictions for 17-year-olds, such as those found in New York and Pennsylvania, which do not allow learning until age 16.

Table 8. State Licensing Laws and Driver Fatal Crash Involvements, 1989–1993

State Group	Learn Age	License Age	No. of States	Crash Rates/100k Population Driver's Age ≤15	16	17
1	16	16–17	9	0.24	1.38	2.18
2	15.2–15.8	16	12	0.59	2.36	3.03
3	15	16	17	0.67	2.82	3.12
4	14	16	5	1.14	3.13	3.32
5	14–15	14–15	8	2.33	2.59	3.66

Note: License law information is from Williams et al., 1996; total involvements data are from FARS (NHTSA, 1991).

Does driver education help?

Historically, young people have used driver education as a way to learn how to drive, pass the required written and road tests, and get a license. Young people who have access to driver education have been more likely to become licensed and drive at a younger age than those who have not had access to such courses. The result has been that those young people who live in communities that provide driver education, for example in their high schools, have more crashes than those who do not live in such communities (Robertson, 1980).

There may be no easy solution to this dilemma. On the one hand, when young people do learn to drive, it would seem prudent to provide them with the best teachers and course materials. On the other hand, driver education will have negative effects if it enables younger people to drive or lifts driving restrictions sooner than would otherwise be the case (see, e.g., Mayhew & Simpson, 1996).

A solution will likely require some form of multistage delivery of driver education leading to full licensing. Appropriate education may be used as a supplement as the young person moves from stage to stage. It is also likely that future driver education will focus far more on the importance of avoiding alcohol and other drug use rather than simply teaching vehicle handling or rules of the road. Such multistage, risk-reduction driver education programs are under development (NHTSA, 1996b).

Who is covered by graduated licensing provisions?

Countries, Provinces, and States with graduated licensing have taken various approaches as to who is and who is not included in the system. In New Zealand, graduated licensing applies to 15- to 24-year-olds. In Nova Scotia and Ontario, it applies to beginning drivers of all ages. In the United States, the two States with licensing provisions that most closely approximate graduated licensing are Florida and North Carolina. In both States, graduated licensing provisions are generally limited to people under age 18, with the zero tolerance alcohol provision limited to those under age 21. Similar age limitations can be found in Maryland, Michigan, New York, and Pennsylvania.

Who supports graduated licensing?

Parents. In 1996, Connecticut and Florida passed legislation requiring learner's permits prior to licensure and holding the permit for a specified period of time. More than 90 percent of parents of 15-year-olds surveyed in each State soon after its laws were passed supported the required minimum learning periods. Also in 1996, Florida adopted a night driving restriction for 16- and 17-year-olds. The night driving restriction was supported by 90 percent of the Florida parents surveyed. In Connecticut, 82 percent of the parents surveyed supported a night driving restriction that was not enacted (Williams, Ferguson, Leaf, & Preusser, 1996).

What do teens think?

Young people support graduated licensing, too. In New Zealand, teenagers were first interviewed at age 15 (when graduated licensing was first introduced and before they were licensed) and again at age 18 to determine their attitudes toward the new system. At both ages, more than 70 percent of those questioned agreed with the driving restrictions imposed by the new system; and at age 18, significantly more of them reported that they had been more affected by the new system than they had expected to be at age 15 (Begg, Langley, Reeder, & Chalmers, 1995).

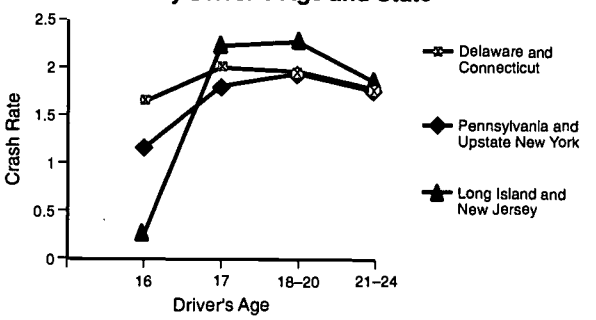
Does graduated licensing reduce crashes?

Yes. Maryland implemented a graduated—then called provisional—licensing system with a night driving restriction in 1979. A 5-percent reduction in the number of teen drivers involved in crashes and a 10-percent reduction in traffic law violations and convictions were found for 16- and 17-year-old drivers (McKnight, Hyle, & Albricht, 1983). New Zealand implemented a graduated licensing system, including a night driving restriction, in 1987. An 8-percent reduction in crashes was found for drivers ages 15 to 19 (Langley et al., 1996).

Upstate New York and Pennsylvania have had a key component of graduated licensing—a night driving restriction for 16-year-olds and some 17-year-olds—for several years. These two States were compared with Connecticut and Delaware, which licensed 16-year-olds at the time of the study but did not have graduated systems, and with New Jersey and Long Island, which did not license until age 17 (Ferguson, Leaf, Williams, & Preusser, 1996). Figure 16 compares teen injury and fatal crash rates associated with these three different approaches to licensing. The results indicated that New Jersey and Long Island, with no licensing until age 17, had a huge advantage over Delaware and Connecticut for 16-year-olds. However, crash rates were higher in New Jersey and on Long Island for the remaining

Figure 16.

Injury and Fatal Crash Rates by Driver's Age and State



Source: Ferguson et al., 1996.

teen years. New York and Pennsylvania, with the night-driving restriction, had rates lower than Delaware and Connecticut for 16-year-olds and somewhat lower rates for 17-year-olds, followed by rates comparable to Connecticut and Delaware for the remaining teen years. Researchers argued that New York and Pennsylvania were better able to ease young drivers into the traffic stream by allowing them to accumulate driving experience during the less hazardous daylight hours.

Where do we stand now?

Table 9 shows the key graduated licensing provisions for the 50 States and the District of Columbia (IIHS, 1997b). Until recently, State licensing laws were static. The basic provisions concerning when young people could begin learning to drive, how long they needed to stay in learner status, when they could become licensed, and what restrictions were on the license had remained relatively constant for more than a generation.

Table 9. State Licensing Laws (as of July 1998)

State	Minimum Age Learner's Permit	Minimum Age License	Minimum Permit Period	Special (Lower) BAC	Nighttime Driving Prohibited?
Alabama	15	16	—	.02	—
Alaska	14	16	—	.00	—
Arizona	15 yrs., 6 mos.	16	—	.00	—
Arkansas	14	16	30 days	.02	—
California	15	16	6 months	.01	Midnight – 5 a.m. until age 17
Colorado	15 yrs., 3 mos.	16	90 days	.02	—
Connecticut	16	16 yrs., 6 mos.	180 days	.02	—
Delaware[1]	15 yrs., 10 mos.	16 yrs., 4 mos.	6 months	.02	9 p.m. – 6 a.m.
District of Columbia	16	16	—	.00	—
Florida	15	16	180 days	.02	16 yrs.: 11 p.m. – 6 a.m.; 17 yrs.: 1 – 5 a.m. until age 18
Georgia	15	16	12 months	.02	1 – 5 a.m. until age 18
Hawaii	15	15	90 days	.02	—
Idaho	15	15	—	.02	—
Illinois	15	16	3 months	.00	11 p.m. – 6 a.m. Sun–Thr Midnight – 6 a.m. F & Sat until age 17
Indiana	15	15 yrs., 2 mos.	60 days	.02	1 a.m. – 5 a.m. Sat & Sun After 11 p.m. Sun–Thr until age 18
Iowa[2]	14	16	6 months	.02	12:30 – 5 a.m.
Kansas	14	16	—	.02	—
Kentucky	16	16 yrs., 6 mos.	180 days	.02	—
Louisiana	15	16	3 months	.02	11 p.m. – 5 a.m. until age 17
Maine	15	16	90 days	.00	—
Maryland	15 yrs., 9 mos.	16 yrs., 1 mo.	4 mos.	.02	Midnight – 5 a.m. until age 18
Massachusetts	16	16 yrs., 6 mos.	—	.02	1 – 4 a.m. until age 18
Michigan	14 yrs., 9 mos.	16	180 days	.02	Midnight – 5 a.m. for 1 yr or until age 18
Minnesota[2]	15	16	180 days	.00	—
Mississippi	15	16	30 days	.08	—
Missouri	15 yrs., 6 mos.	16	—	.02	—
Montana	14 yrs., 6 mos.	15	—	.02	—
Nebraska[2]	15	16	—	.02	Midnight – 6 a.m.
Nevada	15 yrs., 6 mos.	16	—	.02	—
New Hampshire	16	16 yrs., 3 mos.	3 months	.02	1 – 5 a.m. until age 18
New Jersey	16	17	—	.01	—
New Mexico	15	15	—	.02	—
New York	16	16	—	.02	9 p.m. – 5 a.m. until age 18
North Carolina	15	16	365 days	.00	9 p.m. – 5 a.m. for 6 mos. or until age 18
North Dakota	14	16	90 days	.02	—

Table 9. State Licensing Laws (as of July 1998) (cont'd.)

State	Minimum Age Learner's Permit	Minimum Age License	Minimum Permit Period	Special (Lower) BAC	Nighttime Driving Prohibited?
Ohio[2]	15 yrs., 6 mos.	16	6 months	.02	1 a.m. – 5 a.m. until age 17
Oklahoma	15 yrs., 6 mos.	16	—	.00	—
Oregon	15	16	—	.00	—
Pennsylvania	16	16	—	.02	Midnight – 5 a.m. until age 18
Rhode Island	16	16	—	.02	—
South Carolina	15	15 yrs., 3 mos.	90 days	—	6 p.m. – 6 a.m. EST 8 p.m. – 6 a.m. EDT until age 16
South Dakota	14	16	—	—	—
Tennessee	15	16	90 days	.02	—
Texas	15	16	—	.00	—
Utah	16	16	—	.00	—
Vermont	15	16	—	.02	—
Virginia	15	16	180 days	.02	—
Washington	15	16	—	.02	—
West Virginia	15	16	—	.02	—
Wisconsin	15 yrs., 6 mos.	16	—	.00	—
Wyoming	15	16	10 days	—	—

Source: IIHS, 1997b, 1998.

[1] Delaware licensing law not in effect until 7/1/99.
[2] Iowa, Minnesota, Nebraska, Ohio licensing laws not in effect until 1/1/99.

An extremely important recent trend has been low BAC limits for young drivers. In 1996, Congress passed a law requiring all States to pass a zero tolerance law or lose a portion of their highway funding. This was a crucial step in preserving the safety of young people. It also sent a strong prevention message about alcohol.

In 1993, States began to raise their minimum age of licensure. Louisiana made it somewhat more difficult for 15-year-olds to become licensed, though it is still one of seven States that license 15-year-olds. Mississippi raised its minimum licensing age from 15 to 16. Connecticut raised its minimum age from 16 to 16 and 6 months (4 months with driver education), and Kentucky went from 16 years and 1 month to 16 years and 6 months.

Also, several States have recently required minimum periods during which a young driver must hold a learner's permit prior to licensure. As of July 1998, 25 States required minimum periods ranging from 10 days (Wyoming) to 365 days (North Carolina).

Most recently, more States have adopted night driving restrictions for newly licensed 16- and 17-year-olds. At the beginning of 1996, only six States had a night restriction that applied to 16-year-olds (Illinois, Louisiana, Maryland, Massachusetts, New York, and Pennsylvania; the South Carolina restriction is for 15-year-olds only). As of 1998, 18 States had adopted night driving restrictions. The licensing laws in five of these States (Delaware, Iowa, Minnesota, Nebraska, and Ohio) will become effective in 1999.

Conclusion

The goal of graduated licensing is to phase in exposure to increasingly complex driving tasks and environments as young people mature and develop their driving skills. During this process, alcohol is subject to a zero tolerance restriction. Unsupervised night driving is also restricted. Both these restrictions should limit the extent to which alcohol and other drugs contribute to the crash injury and fatality of young drivers. They also help to establish clear legal and normative limits on substance use. By establishing a graduated licensing system and combining it with a zero tolerance restriction, States will be able to reduce their rate of motor vehicle crashes and violations involving youth.

References

Begg, D. J., Langley, J. D., Reeder, A. I., & Chalmers, D. J. (1995). The New Zealand Graduated Driver Licensing System: Teenagers' attitudes towards and experiences with this car driver licensing system. *Injury Prevention,* 1, 177–181.

Beirness, D. J. (1988). Female drivers in Canada: Trends in accident involvement. In M. R. Valerius (Ed.), *Women, alcohol, drugs, and traffic: Proceedings of the international conference* (pp. 23–31). Stockholm, Sweden: Dalctraf.

Blomberg, R. D. (1993). Lower BAC limits for youth: Evaluation of the Maryland .02 law. In *Alcohol and other drugs: Their role in transportation* (Transportation Research Circular No. 413, pp. 25–27). Washington, DC: National Research Council, Transportation Research Board.

Center for Substance Abuse Prevention. (1995). *Teen drinking prevention program* (DHHS Publication No. SMA 95-3023). Rockville, MD: Author.

DeYoung, D. J. (1995). *An evaluation of the effectiveness of California drinking driver programs* (Report Number CAL-DMV-RSS-95-146). Sacramento, CA: California Department of Motor Vehicles.

Drummond, A. E., & Triggs, T. J. (1991). *Driving as skilled performance: A perspective for improving young driver safety.* Melbourne, Australia: Monash University, Accident Research Center.

DuMouchel, W., Williams, A. F., & Zador, P. L. (1987). Raising the alcohol purchase age: Its effects on fatal motor vehicle crashes in 26 states. *Journal of Legal Studies,* 16, 249–266.

Ferguson, S. A., Leaf, W. A., Preusser, D. F., & Williams, A. F. (1994). *Teenage driving practices and licensing regulations: Differences in four states.* Arlington, VA: Insurance Institute for Highway Safety.

Ferguson, S. A., Leaf, W. A., Williams, A. F., & Preusser, D. F. (1996). Differences in young driver crash involvement in states with varying licensure practices. *Accident Analysis and Prevention,* 28, 171–80.

Ferguson, S. A., Wells, J. K., & Lund, A. K. (1995). The role of passive alcohol sensors in detecting alcohol-impaired drivers at sobriety checkpoints. *Alcohol, Drugs & Driving,* 11, 23–30.

Foldvary, L. A., & Lane, J. C. (1969). Car crash injuries by seating position and miles traveled. In *Proceedings of the 13th annual conference of the American Association for Automotive Medicine* (pp. 17–72). Minneapolis, MN.

Gregersen, N. P., & Bjurulf, P. (1996). Young novice drivers: Towards a model of their accident involvement. *Accident Analysis and Prevention,* 28, 229–241.

Grube, J. (1997). Preventing sales of alcohol to minors: Results from a community trial. *Addiction,* 92(Suppl. 2), S251–S260.

Hatos, S. (1997). *Sanctions against minors who violate various provisions of the States' Alcohol Beverage Control laws.* Manuscript in preparation for National Highway Traffic Safety Administration.

Hedlund, J., & Miller, L. (1996). Graduated driver licensing for young novice drivers: United States experience. In *Graduated licensing: Past experiences and future status* (Transportation Research Circular No. 458, pp. 27–30). Washington, DC: National Research Council, Transportation Research Board.

Hingson, R., Heeren, T., & Winter, M. (1991). Reduced BAC limits for young people (impact of night fatal crashes). *Alcohol Drugs and Driving,* 7, 117–127.

Hingson, R., Heeren, T., & Winter, M. (1994). Lower legal blood alcohol limits for young drivers. *Public Health Reports,* 109, 738–744.

Hingson, R., McGovern, T., Howland, J., Heeren, T., Winter, M., & Zackocs, R. (1996). Reducing alcohol-impaired driving in Massachusetts: The Saving Lives program. *American Journal of Public Health,* 86, 791–797.

Holder, H. D. (1993). Prevention of alcohol-involved traffic crashes. In *Alcohol and other drugs in transportation: Research needs for the next decade* (Transportation Research Circular 408, pp. 85–105). Washington, DC: National Research Council, Transportation Research Board.

Holder, H. D., Saltz, R. F., Grube, J. W., Voas, R. B., Gruenewald, P. J., & Treno, A. J. (1997). A community prevention trial to reduce alcohol-involved accidental injury and death: Overview. *Addiction,* 92(Suppl. 2), S155–S171.

Holder, H. D., & Wagenaar, A. C. (1994). Mandated server training and reduced alcohol-involved traffic crashes: A time series analysis of the Oregon experience. *Accident Analysis and Prevention,* 26(1), 89–97.

Hyman, M. M. (1968). Accident vulnerability and blood alcohol concentrations of drivers by demographic characteristics. *Quarterly Journal of Studies on Alcohol* (Suppl. 4), 34–57.

Insurance Institute for Highway Safety. (1984). Federal law links states' funds to 21 purchase age. *Status Report,* 19(12), 1–2.

Insurance Institute for Highway Safety. (1997a). Alcohol impaired driving still a big problem. *Status Report,* 32(3), 1–2.

Insurance Institute for Highway Safety. (1997b). *Facts: State laws 1997: Young driver laws 1997.* Arlington, VA: Author.

Insurance Institute for Highway Safety. (1997c). *State law facts 1997: DUI/DWI laws.* Arlington, VA: Author.

Insurance Institute for Highway Safety. (1998). *Characteristics of selected licensing laws.* Arlington, VA: Author.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (1996). *National survey results on drug use from the Monitoring the Future Study, 1975–1995. Volume 1: Secondary school students* (NIH Publication No. 96-4139). Washington, DC: U.S. Government Printing Office.

Langley, J. D., Wagenaar, A. C., & Begg, D. J. (1996). An evaluation of the New Zealand graduated driver licensing system. *Accident Analysis and Prevention,* 28, 139–146.

Leaf, W. A., & Preusser, D. F. (1996). *Effectiveness of passive alcohol sensors* (DOT HS 808 381). Washington, DC: National Highway Traffic Safety Administration.

Leaf, W. A., & Preusser, D. F. (1997). *Identification of alcohol-pedestrian crash problems among selected racial/ethnic groups.* Washington, DC: National Highway Traffic Safety Administration. (NTIS No. PB 98-110 653INZ)

Levy, D. T. (1988). The effects of driving age, driver education, and curfew laws on traffic fatalities of 15–17 year olds. *Risk Analysis,* 8, 565–570.

Levy, D., Miller, T., Stewart, K., & Spicer, R. (1997). *The immediate consequences of underage drinking and their costs.* Manuscript in preparation for Center for Substance Abuse Prevention.

Lund, A. K., Preusser, D. F., & Williams, A. F. (1988). Drug use by tractor trailer drivers. *Journal of Forensic Sciences*, 33, 648–661.

Lund, A. K., & Wolfe, A. C. (1991). Changes in the incidence of alcohol-impaired driving in the United States, 1973–1986. *Journal of Studies on Alcohol*, 52, 293–301.

Mayhew, D. R., & Simpson, H. M. (1996). *Effectiveness and role of driver education and training in a graduated licensing system*. Ottawa, Canada: The Traffic Injury Research Foundation of Canada.

McKnight, A. J. (1990). Intervention with alcohol-impaired drivers by peers, parents and purveyors of alcohol. *Health Education Research*, 5(2), 225–236.

McKnight, A. J., Hyle, P., & Albricht, L. (1983, December). *Youth License Control Demonstration Project* (Report No. DOT HS 806 616). Washington, DC: National Highway Traffic Safety Administration.

Michigan State Police. (1989). *Surveillance of alcohol vending establishments: Michigan SAVE program*. Lansing, MI: Author.

Miller, T. R., & Blincoe, L. J. (1994). Incidence and cost of alcohol-involved crashes in the United States. *Accident Analysis and Prevention*, 26, 583–591.

Miller, T. R., Lestina, D. C., & Spicer, R. S. (1996). Highway crash costs in the United States by driver age, blood alcohol level, victim age, and restraint use. In *40th annual proceedings of the Association for the Advancement of Automotive Medicine* (pp. 495–517). Des Plaines, IL: Association for the Advancement of Automotive Medicine.

National Highway Traffic Safety Administration. (1991). *The Fatal Accident Reporting System (FARS)*. Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1995). *Report to Congress: Youth alcohol traffic safety* (prepared in response to House of Representative report 103-543 and Senate report 103-310 accompanying the Department of Transportation and related agencies appropriations bill for 1995). Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1996a). *Digest of state alcohol-highway safety related legislation* (fourteenth edition) (DOT HS 808 333). Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1996b). *Graduated driver licensing system for young novice drivers* (DOT HS 808 331). Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1996c). *Traffic safety facts 1995*. Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1996d). *Zero tolerance laws to reduce alcohol-impaired driving by youth: State legislative fact sheet*. Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1997a). *Fatality Analysis Reporting System, 1996*. Washington, DC: U.S. Department of Transportation. [Public Use Data]

National Highway Traffic Safety Administration. (1997b). *The 1996 National Roadside Survey finds fewer drinking drivers on American roadways but no change in drivers above 0.05 BAC* (Traffic Tech No. 152), L. Cosgrove (Ed.). Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1997c). *1996 Youth fatal crash and alcohol facts* (DOT HS 808 678). Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1997d). *Traffic safety facts, 1996—alcohol*. Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1997e). *Traffic safety facts 1996: State alcohol estimates*. Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1998a). *Alcohol involvement in fatal crashes—1996*. Washington, DC: U.S. Department of Transportation.

National Highway Traffic Safety Administration. (1998b). *1997 Youth fatal crash and alcohol facts* (DOT HS 808 837). Washington, DC: U.S. Department of Transportation.

National Transportation Safety Board. (1990). *Safety study: Fatigue, alcohol, other drugs, and medical factors in fatal-to-the-driver heavy truck crashes* (Vol. 1). Washington, DC: Author. (NTIS No. PB 90-917 002)

National Transportation Safety Board. (1993). *Safety recommendation: Youth accident experience*. Washington, DC: Author.

Nichols, J. (1987). The alcohol crash problem. In J. Nichols, A. Russell, J. Onder, B. Brown, R. Ross, & F. Garrison (Eds.), *Impaired driving issues compendium: A grassroots call to action* (pp. 3.1–3.4). Irving, TX: Mothers Against Drunk Driving.

Office of the Inspector General. (1991). *Youth and alcohol: Laws and enforcement. Is the 21-year-old drinking age a myth?* (HHS Report No. OEI-09-91-00650). Washington, DC: U.S. Department of Health and Human Services.

Popkin, C. L. (1991). Drinking and driving by young females. *Accident Analysis and Prevention*, 23, 37–44.

Preusser, D. F., Ferguson, S. A., & Williams, A. F. (1998). The effect of teenage passengers on the fatal crash risk of teenage drivers. *Accident Analysis and Prevention*.

Preusser, D. F., Ferguson, S. A., Williams, A. F., & Farmer, C. M. (1997). Underage access to alcohol: Sources of alcohol and use of false identification. In C. Mercier-Guyon (Ed.), *Proceedings of the 14th International Conference on Alcohol, Drugs and Traffic Safety* (pp. 1017–1025). Annecy, France: Centre d'Etudes et de Recherches en Medecine du Trafic.

Preusser, D. F., Ulmer, R. G., & Adams, J. R. (1976). Driver record evaluation of a drinking driver rehabilitation program. *Journal of Safety Research*, 8, 98–105.

Preusser, D. F., Ulmer, R. G., & Preusser, C. W. (1992a). *Evaluation of the impact of the drug evaluation and classification program on enforcement and adjudication*. Washington, DC: National Highway Traffic Safety Administration. (NTIS No. PB 94-143 302-WTS)

Preusser, D. F., Ulmer, R. G., & Preusser, C. W. (1992b). *Obstacles to enforcement of youthful (under 21) impaired driving*. Washington, DC: National Highway Traffic Safety Administration. (NTIS No. PB 93-185 544)

Preusser, D. F., & Williams, A. F. (1994). Sales of alcohol to underage purchasers in three New York counties and Washington, DC. *Journal of Public Health Policy*, 13, 306–317.

Preusser, D. F., Williams, A. F., Lund, A. K., & Zador, P. L. (1990). City curfew ordinances and motor vehicle injury. *Accident Analysis and Prevention*, 22, 391–397.

Preusser, D. F., Williams, A. F., & Weinstein, H. B. (1994). Policing underage alcohol sales. *Journal of Safety Research,* 25, 127–133.

Preusser, D. F., Williams, A. F., Zador, P. L., & Blomberg, R. D. (1984). The effect of curfew laws on motor vehicle crashes. *Law and Policy,* 6, 115–128.

Preusser, D. F., Zador, P. L., & Williams, A. F. (1993). City curfew ordinances and teenage motor vehicle fatalities. *Accident Analysis and Prevention,* 25, 641–645.

Research Triangle Institute. (1991). *1990 Nationwide Personal Transportation Survey: User's guide for the public use tapes.* Washington, DC: U.S. Government Printing Office.

Robertson, L. S. (1980). Crash involvement of teenaged drivers when driver education is eliminated from high school. *American Journal of Public Health,* 70, 599–603.

Ross, H. L. (1982). *Deterring the drinking driver: Legal policy and social control.* Lexington, MA: Lexington Books.

Ross, H. L., Howard, J. M., Ganikos, M. L., & Taylor, E. D. (1991). Drunk driving among American Blacks and Hispanics. *Accident Analysis and Prevention,* 23, 1–11.

Stewart, K., & Voas, R. B. (1994). Decline in drinking and driving crashes, fatalities and injuries in the United States. In *The nature of and the reasons for the worldwide decline in drinking and driving* (Transportation Research Circular No. 422, pp. 50–59). Washington, DC: National Research Council, Transportation Research Board.

Sweedler, B. (1990). Strategies to reduce youth drinking and driving. *Alcohol, Health & Research World,* 14, 76–80.

Terhune, K. W., Ippolito, C. A., Hendricks, D. L., Michalovic, J. G., Bogema, S. C., Santinga, P., Blomberg, R., & Preusser, D. F. (1992). *The incidence and role of drugs in fatally injured drivers: Final report.* Washington, DC: National Highway Traffic Safety Administration. (NTIS No. PB 94-151768)

Toomey, T., Rosenfeld, C., & Wagenaar, A. (1996). The minimum legal drinking age: History, effectiveness, and ongoing debate. *Alcohol Health and Research World,* 20(4), 213–218.

Twisk, D. (1995). Young driver accidents in Europe, magnitude and nature. In H. Simpson (Ed.), *New to the road: Reducing the risks for young motorists* (Proceedings of the First Annual International Symposium of the Youth Enhancement Service, June 8–11, 1995, pp. 27–33). Los Angeles, CA: UCLA Brain Information Service.

U.S. Bureau of the Census. (1996). *Statistical abstract of the United States: 1996* (116th ed.). Washington, DC: Author.

Ulmer, R. G., Williams, A. F., & Preusser, D. F. (1997). Crash involvements of 16-year-old drivers. *Journal of Safety Research, 28,* 97–103.

Voas, R. B., Rhodenizer, E., & Lynn, C. (1985). *Evaluation of the Charlottesville Checkpoint Operations: Final report December 30, 1983 to December 30, 1984.* Charlottesville, VA: City of Charlottesville Police Department. (NTIS No. PB 86-247 152/WTS)

Voas, R. B., & Tippetts, A. S. (1990). Evaluation of treatment and monitoring programs for drunken drivers. *Journal of Traffic Medicine,* 18, 15–26.

Wagenaar, A. C. (1993). Minimum drinking age and alcohol availability to youth: Issues and research needs. In *Economics and the prevention of alcohol-related problems* (NIAAA Monograph 25, NIH Publication No. 93-3513, pp. 175–200). Washington, DC: U.S. Government Printing Office.

Wagenaar, A. C., & Holder, H. D. (1995). Changes in alcohol consumption resulting from the elimination of retail wine monopolies: Results from five U.S. States. *Journal of Studies on Alcohol,* 56, 566–572.

Wagenaar, A. C., Toomey, T. L., Murray, D. M., Short, B. J., Wolfson, M., & Jones-Webb, R. (1996). Sources of alcohol for underage drinkers. *Journal of Studies on Alcohol,* 57, 325–333.

Wagenaar, A. C., & Wolfson, M. (1994). Enforcement of the legal minimum drinking age in the United States. *Journal of Public Health Policy, 15,* 37–53.

Wechsler, H., Davenport, A., Dowdall, G., Moeykens, B., & Castillo, S. (1994). Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *Journal of the American Medical Association,* 272(21), 1672–1677.

Wells, J. K., Preusser, D. F., & Williams, A. F. (1992). Enforcing alcohol-impaired driving and seat belt use laws, Binghamton, NY. *Journal of Safety Research,* 23, 63–71.

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

Williams, A. F., Ferguson, S. A., Leaf, W. A., & Preusser, D. F. (1996). *Views of parents of teenagers about graduated licensing systems.* Arlington, VA: Insurance Institute for Highway Safety.

Williams, A. F., Peat, M. A., Crouch, D. J., Wells, J. K., & Finkle, B. S. (1985). Drugs in fatally injured young male drivers. *Public Health Reports,* 100, 19–25.

Williams, A. F., Preusser, D. F., Ferguson, S. A., & Ulmer, R. G. (1997). Analysis of the fatal crash involvements of 15-year-old drivers. *Journal of Safety Research,* 28, 49–54.

Williams, A. F., Preusser, D. F., Ulmer, R. G., & Weinstein, H. (1995). *Characteristics of fatal crashes of 16 year-old drivers.* Arlington, VA: Insurance Institute for Highway Safety.

Williams, A. F., Rich, R. F., Zador, P. L., & Robertson, L. S. (1975). The legal minimum drinking age and fatal motor vehicle crashes. *Journal of Legal Studies,* 4, 219–239.

Williams, A. F., Weinberg, K., Fields, M., & Ferguson S. A. (1996). Current requirements for getting a driver's license in the United States. *Journal of Safety Research,* 27, 93–101.

Williams, A. F., & Wells, J. K. (1995). Deaths of teenagers as motor-vehicle passengers. *Journal of Safety Research,* 26, 161–167.

Wolfe, A. C. (1974). *1973 U.S. National Roadside Breathtesting Survey: Procedures and results.* Ann Arbor, MI: University of Michigan Highway Safety Research Institute.

Wolfson, M., Toomey, T., Murray, D., Forster, J., Short, B., & Wagenaar, A. (1996). Alcohol outlet policies and practices concerning sales to underage people. *Addiction,* 91(4), 589–602.

Zador, P. (1991). Alcohol related relative risk of fatal driver injuries in relation to driver age and sex. *Journal of Studies on Alcohol,* 52, 302–310.

DHHS Publication No. (SMA)99-3364
Printed 1999

CSAP Center for Substance Abuse Prevention
Substance Abuse and Mental Health Services Administration

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").